Universidade de Trás-os-Montes e Alto Douro



ECTS > European Credit Transfer System
2005>06

Vila Real, **Portugal**

University

of Trás-os-Montes

and Alto Douro

European Credit Transfer
System 2005>06

ECTS > Information Package

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INTRODUCTION

Welcome to UTAD, University of Trás-os-Montes and Alto Douro, and to The city of Vila Real.

What is ECTS?

The European Community promotes interuniversity cooperation as a means of improving the quality of education for the benefit of students and higher education institutions, and student mobility is a predominant element of that interuniversity cooperation. The Erasmus programme clearly demonstrates that studying abroad can be a particularly valuable experience as it is not only the best way to learn about other countries, ideas, languages and cultures; increasingly it is also an important element in academic and professional career development.

The recognition of studies and diplomas is a prerequisite for the creation of an Open European area of education and training where students and teachers can move without obstacles. That is why the European Credit Transfer System (ECTS) was developed in a pilot scheme established within the Erasmus programme as a means of improving academic recognition for study abroad. The external evaluation of ECTS has demonstrated the potential of the system and the European Commission has decided to include ECTS in its proposal for the Socrates programme, in particular in Chapter 1 on higher education (Erasmus). The ECTS system is now moving from its restricted pilot stage towards a much wider use as an element of the European dimension in higher education.

ECTS provides an instrument to create transparency, to build bridges between institutions and to widen the choices available to students. The system makes it easier for institutions to recognise the learning achievements of students through the use of commonly understood measurements - credits and grades - and it also provides a means to interpret national systems of higher education. The ECTS system is based on three core elements: information (on study programmes and student achievement), mutual agreement (between the partner institutions and the student) and the use of ECTS credits (to indicate student workload).

MAIN CHARACTERISTICS OF ECTS

As stated in the introduction, the ECTS system is based on three core elements: information (on study programmes and student achievement), mutual agreement (between the partner institutions and the student) and the use of ECTS credits (to indicate student workload). These three core elements are made operational through the use of three key documents: the information package, the application form/learning agreement and the transcript of records. Most of all, ECTS is made operational by students, teachers and institutions who want to make study abroad an integral part of the educational experience. In itself, ECTS in no way regulates the content, structure or equivalence of study programmes. These are issues of quality which have to be determined by the higher education institutions themselves when establishing a satisfactory basis for cooperation agreements, bilaterally or multilaterally. The code of good practice called ECTS provides those actors with tools to create transparency and to facilitate academic recognition.

Full academic recognition is a condition sine qua non for student mobility in the framework of the Erasmus and Socrates programmes. Full academic recognition means that the study period abroad (including examinations or other forms of assessment) replaces a comparable period of study at the home university (including examinations or other forms of assessment), though the content of the agreed study programme may differ.

The use of ECTS is voluntary and is based on mutual trust and confidence in the academic performance of partner institutions. Each institution selects its own partners.

TRANSPARENCY

ECTS provides transparency through the following means:

ECTS credits, which are numerical values allocated to course units to describe the student workload required to complete them. They reflect the quantity of work each course unit requires in relation to the total quantity of work necessary to complete a full year of academic study at the institution, that is, lectures, practical work, seminars, tutorials, fieldwork, private study - in the library or at home - and examinations or other assessment activities. ECTS is thus based on a full student workload and not limited to contact hours only. In ECTS, 60 credits represent the workload of an academic year of study and normally 30 credits for a semester and 20 credits for a term.

The ECTS information package which supplies written information to students and staff on institutions, departments/faculties, the organisation and structure of studies and course units.

The ECTS learning agreement covering the programme of study to be taken and the ECTS credits to be awarded for their satisfactory completion, committing the student to undertaking study abroad as an integral part of his or her higher education, the home institution to guaranteeing full academic recognition of the credits gained abroad and the host institution to providing the agreed course units, subject to timetabling.

The ECTS transcript of records which shows students' learning achievements in a way which is comprehensive, commonly understood and easily transferable from one institution to another.

Good communication and flexibility are also needed to facilitate the academic recognition of studies completed or taken abroad.
ECTS credits ensure that the programme will be reasonable in terms of workload for the period of study abroad, for example, a student whose choice of course units totals 120 ECTS credits for an academic year would have to work twice as much as an average local student at the receiving institution, and a student whose programme totals 30 ECTS credits for a whole academic year would be undertaking much less work than the average local student and would in effect be studying part-time.

ECTS also enables further studies abroad. With ECTS, a student will not necessarily go back to the home institution after the study period abroad; he/she may prefer to stay at the host institution - possibly to gain a degree - or even move to a third institution. The institutions themselves decide whether or not this is acceptable and what conditions the student must fulfil to obtain a diploma or transfer registration. The transcript of records is particularly useful in this context as it provides a history of the students' academic achievements, which will help institutions to make these decisions.

I - THE INSTITUTION

A. Name and Address

University of Trás-os-Montes and Alto Douro (UTAD)
Universidade de Trás-os-Montes e Alto Douro (UTAD)
Quinta de Prados
Apartado 1013
5000-911 Vila Real - Portugal
Tel: +351 259 350000
Fax: +351 259 350480
Internet: http://www.utad.pt

Rectory
Quinta dos Prados
Apartado 1013
5000-911 Vila Real – Portugal
Tel: +351 259 350170 or 259350167/350168
Fax: +351 259 325058
internet http://www.utad.pt
E-mail: reitoria@utad.pt

Academic Authorities

Rector

Professor Armando Mascarenhas Ferreira

Vice-Rectores

Professor Bulas Cruz – Innovation and Technology

Professor Carlos Sequeira – Planning and Infrastructures

Professor Eduardo Rosa – Research and Co-operation

Professor Vilela de Matos – Extension and Documentation

Professor Isolina Poeta – Teaching Quality Assessment

Pro-Rectores

Professor Fontaínhas Fernandes – Teaching Quality Assessment

Professor Pedro Melo – Public Relations

Professor Torres de Castro – Landscape and Environment

B. Academic Calendar

The academic calendar is drawn up every year in July. Here is the calendar for the academic year 2005/2006

School year
1st semester: 5th September to 21st December
2nd semester: 14th February to 9th June

Examinations periods
1st semester: 6th to 28th January
2nd semester: 17th June to 7th July

The academic calendar is different for the courses degre of Veterinary Medicine and Enology

School year (Veterinary Medicine)
1st semester: 12th September to 21st December
2nd semester: 30th January to 20th May

Examinations
1st semester: 6th to 21st January
2nd semester: 5th June to 15th July

School year (Enology)
1st semester: 3rd October to 21st January
2nd semester: 15th February to 9th June

Examinations
1st semester: 23rd January to 11th February
2nd semester: 17th June to 7th July

Vacations
Christmas: 22nd to 31st December
Carnival: 28th February
Easter: 10th April to 18th April

Holidays
5th October
1st November
1st December
8th December
1st January
27th February
28th February
25th April
14th March
22th March
1st May
10th June
13th June

It is important to highlight that the academic calendar might slightly vary depending on the Degree Course. Please contact the Vice-Rectory for Research and Co-operation for further information.

C. The ECTS Institutional Coordinator

Doutor Eduardo Augusto dos Santos Rosa
Vice-Rector for Research and Co-operation
Universidade de Trás-os-Montes e Alto Douro
Quinta de Prados
Vice-Reitoria para a Investigação e Cooperação
Socrates/Erasmus Programmes
Apartado 1013
5000-911 Vila Real – Portugal

Telephone +351 259 350407
Fax: +351 259 350629
E-mail: erosa@utad.pt, or vric@tad.pt and vricc@utad.pt

D. General Description of the Institution

The Universidade de Trás-os-Montes e Alto Douro is a public university with finacial and administrative autonomy.

Fig .1 The University Campus

The Vila Real Polytechnic Institute, founded in 1973, was transformed in 1979 into the Trás-os-Montes and Alto Douro University Institute and, in 1986 became a fully-fledged university. Despite its relatively short history, the University of Trás-os-Montes and Alto Douro (UTAD) has already developed considerable national and international prestige. With more than 7000 students, 500 teaching staff and 523 technical and administration staff.

Today, after over 15 years of commitment to high quality teaching, research and community extension, UTAD has earned its rightful place among the new generation of Portuguese universities, and is striving to make its name at both national and international levels as a centre of academic excellence and innovation.
One of the University's key challenges in the coming years will be to adapt its current portfolio of undergraduate and postgraduate courses to the Bologna Declaration proposals and to the rapidly changing requirements of the labour market, to the shifts in economic and social priorities at national and EU levels, and the teaching and research opportunities provided by new technologies.
The campus built on the site of a number of adjacent former farm estates, or quintas, is 10 minutes walk from the centre of the city. There are also two academic units closer to the centre - the ex-DRM building, which houses the Department of Economy and Sociology, and a complex containing CIFOP (the Education Department), the Department of Arts and Crafts and the Department of Physical Education and Sports. Finally, UTAD also has installations in Chaves and Miranda do Douro The addresses and telephone numbers of the various quintas of the main campus and their respective departments and services are outlined below:
The Quinta de Prados (Apt. 1013, 5000-911 Vila Real, Portugal, telephone + 351 259 350000, fax + 351 259 350480) contains the Rectory, the Geo-Sciences building, the Teaching (Pedagogical) Complex, the Engineering building, the Veterinary Laboratories, the Agricultural Sciences building (where you will also find the Vice-Rectory for Research and Cooperation - Erasmus Office), the Engineering building, the Plant Protection and Food Industries Blocks (Pavilhão 1 and Pavilhão 2), the Genetics and Biotechnology building, the Central Library, the offices of the University's Technical Services and Publications Department, the Student's Association Bookstore, the University Chapel, tennis courts, as well as the Student's Welfare Services canteen and various cafeterias.
The Quinta de Nossa Senhora de Lurdes (Apt. 1013, 5000-911 Vila Real, telephone +351 259 350000, fax +351 259 350502) houses the Enology building, and the offices of the Technical Services.
The Teaching (Pedagogical) Complex and the Sports Hall are to be found at the Quinta de Gramaxos.
The Quinta Nova is the site of the university's football and rugby fields, as well as its athletics track.

In the city, you will also find
The CIFOP building (on Rua Dr. Manuel Cardona, Apt. 200; 5000-558 Vila Real, telephone (+351 259 330100/330167, fax +351 259 330167/169/169, E-mails: desporto@utad.pt for Physical Education and Sports, artes@utad.pt for Arts and Crafts and ciedu@utad.pt for Educational Sciences) is used for the degree courses of Nursery School Teaching and Primary School Teachers, as well as some of the classes for the degree course in Physical Education and Sports.

The ex-DRM or former Destacamento Regional Militar, (Avenida Almeida Lucena, 5000-660 Vila Real, telephone +351 259 302200, fax +351 259 302249, E-mail: eco@utad.pt) is the home of the Department of Economy and Sociology, where two degree courses - in Economics and in Management - are taught.

Other UTAD campus (Chaves and Miranda do Douro)
In recent years, the scale of UTAD's activities has not only expanded at the main University campus in Vila Real, but also through the establishment of two subsidiary campuses (or poles) - one in Chaves, to the north of Vila Real, near the border with Spain's province of Galícia, the other in Miranda do Douro, on the Eastern border with Spain's province of Castille and Leon.

In Chaves
This pole of UTAD was created in 1987, and was located in the former premises of the School of Elementary Education. In 1998/99 UTAD was able to extend this pole, thanks to a protocol signed with Chaves City Council, where 3 courses are taught: full degree courses in Nursery School Teaching, Primary School Teaching, and a degree in Recreation, Leisure and Tourism. The Campus extension in Chaves is located at Avenida Nuno Álvares, Edifício do Imperador Flavius, Apt. 61, 5400-342 Chaves, telephone +351 276 309300, fax +351 276 309309 E-mail: pchaves@chaves.utad.pt).

In Miranda do Douro
This pole of UTAD was created in October 1998, to reafirm the University's willingness and active commitment to the development of the extreme Northeast of the region. Based on the accumulated experience of the other two University campuses (in Vila Real and Chaves), it was possible to ensure the active participation and collaboration of the local population and local government representatives, as well as from neighbouring regions in Spain. This pole of the University currently offers two first degree courses: in Social Work, and in Anthropology Applied to Development.
Campus extension in the town of Miranda do Douro - Rua D. Dinis 5210-217 Miranda do Douro, telephone +351 273 438140, fax +351 273 438159, E-mail: sec@miranda.utad.pt).

D. 1 Governing Institutions

The University's governance is assured by the Rector, Senate and University Assembly, the latter responsible for the election of the Rector and members of Senate. The Rector has the main responsibility for the strategic direction and overall administration of UTAD together with the Senate and assisted by the Administrative Council.
There is also The Scientific Council (whose membership consists of all UTAD staff of doctoral status) and The Pedagogical Council (consisting of representatives of teaching staff and students)
The Rector is assessed by 5 Vice-Rectors in the areas of Research and Co-operation, Teaching Quality Assessment, Extension and Documentation, Planning and Infrastructures, Inovation and Tecnology and 3 Pro-Rectors in the areas of Public Relations, Landscape and Environment and Teaching Quality Assessment and Accreditation.
The University interacts with the region through two dedicated interface organisations:
The D. Dinis Foundation is the organisation through which the University channels its efforts in the scientific, technological, cultural, social and economic development and promotion.
The Centre for Regional Development Studies (CEDR) is the organisation through which the University channels its extension efforts, linking the campus to the community.

D.2 Departmental Structure and Scientific Centres

UTAD's academic activities operate on the basis of departments which provide teaching and undertake research in the disciplinary areas for which they have responsibility. The university's departments are grouped in three broad disciplinary areas:

Agrarian Sciences, which includes the Departments of

Animal Sciences
Crop Science & Rural Engineering
Food Industries & Technology
Forestry
Plant Protection
Animal Health & Hygiene
Veterinary Sciences

Exact, Natural & Technological Sciences

Biological & Environmental Engineering
Chemistry
Engineering
Genetics & Biotechnology
Geology
Mathematics
Physics
Soil Science

Humanities & Social Sciences

Arts & Crafts
Educational Sciences
Physical Education & Sports
Economics & Sociology
Languages & Literature

Scientific Centres

Due to the growth of the University and the resulting further diversification of the scientific interests involved, the research structure at UTAD was revised in 2001-2002, resulting in 9 distinct research centres, some of them from outside the scope of the original ICETA (Institute for Agrarian and Agri-Food Sciences and Technologies):

The Centre for Agronomic Sciences and Engineering
The Centre for Animal and Veterinary Sciences
The Centre for Chemistry
The Centre for Development Transdisciplinary Studies
The Centre for Ecosystems Management Studies
The Centre for Educational Studies
The Centre for Genetics and Biotechnology
The Centre for Literature Studies
The Centre for Technological, Environmental and Life Studies

D.3 Available Courses

The tendency is to align the University's courses with the proposals contained in the Bologna Declaration, currently, undergraduate (first degree) courses offered are of either four or five-years duration. UTAD also provides a number of specialised courses and programmes at postgraduate Diploma, Masters and Doctoral levels

Undergraduate Courses

Most of the Courses are developed in 5 years although some other are currently developing to 4 years, meting the Bologna agreement.

In the agrarian sciences:

Agronomy, Animal Science, Landscape Architecture, Forestry, Enology (4 years), Veterinary Medicine and Food Science and Health.

In the exact, natural and technological sciences:

Applied Ecology, Biological & Environmental Engineering, Biology, Chemistry, Civil Engineering, Electrical Engineering, Informatics, Financial Mathematics, Mechanical Engineering, Teaching of Physics and Chemistry, Teaching of Biology and Geology, Teaching of Mathematics and Communications and Multimedia, Biochemistry Degree, Energy Engineering Degree, Genetic and Biotechnology Degree, Information and Communication Technologies Degree.

In the humanities and social sciences:

Applied Foreign Languages, Development Anthropology, Economics, Management, Nursery School Teaching, Physical Education & Sports, Primary School Teaching, Recreation, Leisure and Tourism, Social Work, Teaching of English & German, Teaching of Portuguese & French, and Teaching of Portuguese & English, Psychology Degree, Social Cultural Entertainment Degree, Sciences of Communication Degree e Theatre and Arts Performances Degree.

Postgraduate Diplomas and Masters Degrees

(1 year and 2 years, respectively)
Agrarian Sciences (specialisation in Animal Production)
Agriculture, Environment and Markets
Biology and Geology in Teaching
Crop Science (specialisation in viticulture and horticulture/fruit-crops)

Education - Portuguese Educational History and Current Problems
Education - Teaching Organisation and Evaluation
Engineering Technologies
Environmental Technology
Forestry Production
Forestry Resources Engineering
Genetic Resources and the Improvement of Agricultural and Forest Species
Health Promotion and Education
Management
Mathematics and Natural Sciences
Physical Education and Sports (specialisation in observation and motion analysis)
Physics and Chemistry in Teaching
Portuguese Culture
Rural Development Management (in collaboration with the University of Santiago de Compostela, Spain)
Rural Development Policy and Practice
Sports and Exercise Psychology
Teaching of Mathematics
Teaching of Portuguese Language & Literature
Vine, Wine and Terroir Management
Translation

Since some of the courses are not available every year, please contact the Pedagogical Services for further information.

E. Registration Procedures

Before you arrive at UTAD
Before leaving to Portugal, visitors intending to study at UTAD as part of the Socrates/Erasmus programme should contact the UTAD Socrates Coordinator through the Vice–Rectory for Research and Co-operation (telephone +351 259 3500407; fax: +351 259 350629). They should provide basic personal details, indicating the courses they intend to study and/or the nature of the fieldwork project (estágio) they plan to undertake, their proposed date of arrival and the duration of their stay, and whether they wish to be considered for accommodation in one of the university Halls of Residence. Students wishing to a short study at the Universidade de Trás-os-Montes e Alto Douro (UTAD) should fill in the Exchange Student Application Form and send it to the International Office of their home institution which is responsible for forwarding it to the Vice-Rectory for Research and Co-operation of UTAD.

Required Documentation
Erasmus Letter
Learning Agreement
ID Card/Passport
Form E-111/E-128
3 Photographs

F. Portuguese Language Course

Fig. 2 Languages laboratory

The Classes are taught in portuguese. Language classes can be arranged for those wishing to develop or improve their basic understanding of the Portuguese language, as long as a minimum of 8 foreign students register. The Department of Letters and Languages provides this tuition at the following times:

- Summer Courses
- Pre-First Semester Courses (September/October)
- Pre-Second Semester Courses (February)

Those interested in registering for these courses should express their interest to the Socrates Coordinator in their own institution before leaving to Portugal.
For further information please contact theVice–Rectory for Research and Co-operation.

II - General Practical Information

A. Host Country Formalities

Foreign students who does not belong to EU must obtain a entry visa before departure from their home country. Upon arrival to Portugal, foreign students, except EU countries students, need to contact the "Serviço de Estrangeiros e Fronteiras" (Rua Alexandre Herculano, Telf. +351 259 324829), to inform this services about their staying at UTAD. They can require the passport, the E-111/128 (guarantee of heath assistance) and a proof of Erasmus status issued by their home institution.

B. Getting There

On their arrival in Vila Real, Socrates students should report in person to the Vice–Rectory for Research and Co-operation (Vice-Reitoria para a Investigação e Cooperação) of University of Trás-os-Montes and Alto Douro, Room 1.71, ground floor, Agrarian Sciences building, situated in the Quinta dos Prados, where they will be provided both with general information about their stay in Vila Real, and more particularly, how to register at UTAD.
No later than 15 days before returning to their country of origin, visiting Socrates students should again contact the Vice–Rectory for Research and Co-operation in order to receive UTAD's official Certificate of Studies Completed, and the corresponding results/marks, which may then be used in their home university to seek course equivalence.

Contacts:
Telephone +351 259 350407
Fax: +351 259 350629
E-mail: erosa@utad.pt, vric@tad.pt and vricc@utad.pt

Students Affairs Office/ Socrates/Erasmus Programmes and other International Programmes(Tempus, Leonardo, Alfa, etc).
Vice-Rectory Research and Co-operation
Quinta de Prados,
Agricultural Sciences building,
Ground floor (left),
Room 1.72.
Tel.: +351 259 350407
Fax: +351 259 350629
E-mail: vric@tad.pt - Socrates/Erasmus programmes
and vricc@utad.pt - Research and Co-operation

C. Cost of Living

Here are the prices of a selection of items for a nine month study period at UTAD:

Accommodation	93,68€ x 9 = 843.12 €
Bus ticket Vila Real/Porto	6.20 €
Bus ticket Vila Real/Lisboa	15 €
Coffee	0,50 €
Copies and books	250 €
Newspaper	0,65 €
Milk (1 litre)	0,60 €
Other cost (approximate examples):	
Bread (one bread)	0,12€
Average restaurant meal	8 €
Meals (Canteen and bar)	1.85 € x 2(meals per day) x 30 x 9 months = 999€.

D. Accommodation

Students who wish to reserve accommodation at University Residence hall must state it in the application form. Students should confirm the reservation with Vice-Rectory for Research and Co-operation of UTAD (Socrates/Erasmus Office) before departure so that they can go directly to the hall of residence upon arrival (students must show an identity card or passport).
Since there are a limited number of rooms available for exchanges students at our Residences it is advisable that students send their form back to our Erasmus Office full filled as soon as possible.
The room allocation criteria are based on:
1. Students from East European countries
2. Students who will stay for short periods (3 or 6 months)
3. Students who can prove that they and their families have limited economic income.
4. Arrival order
All residences have bedclothes and self-service laundry, kitchen and social rooms.
At the Além Rio Residence (usually for foreign students) is also available a health centre and an informatic centre.

Address and Telephone of the halls of residence:
Residence Além Rio of Nervir
Nervir, 5000 Vila Real
Telf. +351 259 309925

Student Residence of Codessais (Students Welfare Services)
Quinta de Codessais
Apartado 154
5001-910 Vila Real
For further information students are invited to contact the Welfare Services Telf. +351 259 309920/259309925/Fax: +351 259 309939, E-mail:sasutad@utad.pt)

Should students prefer to rent a private room or apartment can contact the Academic Student Association. They have a list of contacts with same apartments and rooms to rent. The Vice-Rectory for Research and Cooperation of UTAD can provide some assistance once they are at UTAD. Upon arrival, foreign students should contact the Vice-Rectory for Research and Co-operation of UTAD in order to obtain the list of contacts of private accommodation. Therefore, they are strongly advised to arrive at least one week prior to the beginning of their study period.

E. Health and Insurence

E.1 Medical facilities at UTAD

There is a Student Health Service, free of charge located in the UTAD residence hall Além Rio (Bloco B) with medical and nursing personal.

Medical facilities at VILA REAL - Hospital and Health Centres
The São Pedro Hospital (telephone +351 259 300500) is in Lordelo, a suburb close to the city centre, located on the other side of the IP4 (see Fig. 3). In addition, there are two health centres (Centros de Saúde) - one in Avenida Dr. Manuel Cardona (telephone +351 259 324095), between the Department of Economics and Sociology and the campsite, and in Mateus – Quinta da Redonda on the outskirts of the city (telephone +351 259 302090).

Youth Advice Centre
Qualified volunteers provide free medical and psychological counselling every weekday afternoon at the Centro de Atendimento de Jovens, on Rua Gonçalo Cristóvão R/C. Tel.: +351 259 302088/322678

Pharmacies
Check in the newspaper for which pharmacies stay open late.

Almeida	Avenida Carvalho Araújo	+351 259 375184
Baptista	Rua Dr. Roque da Silveira, nº 20/22	+351 259 325990
Barreira	Rua Dr. Roque da Silveira, nº 141/143	+351 259 348735
Chaves Ferreira	Rua da Santa Iria , nº 7	+351 259 338180
Galeno	Avenida 1° de Maio, nº7	+351 259 374801
Lordelo	Urbanização São Lourenço, lote 16	+351 259 341433
Mateus	Bairro do Marrão	+351 259 338710
Mesquita	Rua D. Margarida Chaves, nº 77	+351 259 323125
Seixas	Avenida Aureliano Barrigas, nº 33/35	+351 259 324167

E.2 Special Needs Students

Almost all buildings are prepared for student with handicap.

E.3 Insurance requirements

Students from the EU countries are covered by form E-111/E-128 or similar, they can benefit from the National Social Security System. Others Students must be provided with an insure before they leave their own country.

F. Study facilities at the host institution

Fig. 3 Computer Room

F.1 Computing Facilities - The Universidade de Trás-os-Montes e Alto Douro enjoys plentiful computing facilities and software on three campus. All students have free access to the Internet and electronic mail.
If students wish to open an e-mail account the Technician in the computer Room (Engineering building) will tell you what to do.
Can be contacted from 10.00 to 13.00 h and 14.00 to 17.00 h Monday to Friday

Fig. 4 Central library

F.2 Libraries - The university's libraries are administered by the Documentation and Extension Service. In addition to the main library, UTAD has of a number of small departmental libraries whose books, journals and documents may be consulted and/or borrowed with the permission of either the librarian in charge, or the head of department. Some of these libraries also have reading-room and literature research facilities.
Socrates Students are entitled to use libraries of the University.

A student card must be shown for access. The University offers a total of 112093 books. Most of the books can be borrowed.

Below, is given a list of the University Libraries:

Library:	**Opening times:**
Central Library, Quinta de Prados.	Monday to Friday: 9.00 - 23.00 Saturdays: 9.00 - 13.00. Vacations: 9.00 - 12.30 and 14.00 - 17.30
CIFOP Library, CIFOP, Rua Dr.Manuel Cardona.	Monday to Friday: 9.00 - 20.00 Vacations: 9.00 - 12.00 and 14.00 - 17.30
Children's Library, CIFOP building, Rua Dr. Manuel Cardona.	Monday to Friday: 9.00 - 20.00 Vacations: 9.00 - 12.30 and 14.00 - 17.30
Languages Library, Pedagogical Complex, Quinta de Gramaxos.	Monday to Friday: 9.00 - 20.00 Vacations: 9.00 - 12.30 and 14.00 - 17.30
Economics & Sociology Library, Ex-DRM, Avenida Almeida Lucena.	Monday to Friday: 9.00 - 23.00 Vacations: 9.00 - 12.30 and 14.00 - 17.30
Chaves Campus Library Av. Nuno Álvares, Edifico Imperador, Apt. 61 Chaves	Monday to Friday (during semester only) 9.00 - 12.30 and 14.00 - 17.30

In order to use the library services, and to borrow books for home study, students have to register as library users. This is done by filling in the appropriate form, with a photograph attached, in return for which you will receive your library card. When you borrow a book, library will fill in a loan form in triplicate. Students may borrow up to three books at a time for a maximum period of five working days, and are responsible for returning the book in the condition in which it was borrowed. Certain materials (such as encyclopaedias, atlases and maps, dictionaries, periodicals, CD-ROMs, other reference books, special publications and any other article designated with a red stamp, can only be consulted in the library. The Libraries provide the following services: supervised consultation of books, periodicals, etc; loan of library materials for home study; inter-library loans; accessing bibliographical data (including periodicals) on manual and computerised catalogues; local data base and CD-ROM searches. For further information, ask the library staff.

F.3 Student's Welfare Services

In addition, the University has a financial and administrative. independent Student Welfare Service (SASUTAD) that provides financial assistance, scholarships, as well as part-time paid employment in various sections of the University's administrative services. SASUTAD also manages a series of key services through which students enjoy better overall study conditions, thereby ensuring higher rates of academic success. It co-ordinates on- and off-campus catering facilities (4 canteens with a total of 1100 places, plus numerous cafeterias and snack bars) and in its new student clinic provides healthcare and personal counselling services (by special arrangement with the Regional Health Authority). It runs one mixed and two men-only Halls of Residence with a total of 422 places.

Student Welfare Services
Apartado 154
5001-910 Vila Real Codex
(Quinta de Codessais)
Tel.: +351 259 309920
Fax: +351 259 309930
E-mail:sasutad@utad.pt

F.4 Academic Administration

Registration for the courses/modules selected by Erasmus/Socrates students;
Emission of certificates for subsequent recognition at home university.

Academic Administration
Quinta de Prados
Rectory,1st Floor.
Tel.: +351 259 350128/350129/350000
Fax: +351 259 350480
E-mail: sa@utad.pt

Monday	14.15 - 16.00
Tuesday	11.00 - 12.00/14.15 - 16.00
Wednesday	11.00 - 12.00/14.15 - 16.00
Thursday	11.00 - 12.00/14.15 - 16.00
Friday	11.00 - 12.00

F.5 Student's Canteen

UTAD's Social Services operates two student canteens, one in the Quinta de Prados, the other at Codessais, close to CIFOP. Both are open Monday to Friday for lunch from 12.00 noon to 13.30 and from 19.00 to 20.30 h. At weekends, one refectory is open alternately to serve meals. Student prices (subject to minor variations) are as follows: a full meal including the dish of the day (prato do dia) costs 1,85 euros. Details of a week menu are announced in advance. Student's intending to use the canteen must be in possession of a student card.

F.6 Coffee shops

In addition to the numerous bars and cafes in the city, Social Services also operate cafe-bars in all buildings on the university campus, where snacks and refreshments can be purchased.

F.7 The UTAD Academic Association

Student Academic Association
Apartado 174
Avenida 1° de Maio, 174, 1° Direito.
5001-910 Vila Real
Tel.: +351 259 330740
Fax: +351 259 330741
E-mail: aautad@utad.pt

The Academic Association represents the students of the UTAD. It is organized on the following sections providing the following services:

Sports Section: athletics, canoeing, tennis, water polo, handball, table tennis, football (both outdoor and indoor), swimming, volleyball, basketball, rugby, orienteering, gymnastics, paintball, chess, karate and a wide range of other leisure activities.
The external relations section, which runs the unit for career prospects, a service that exists to improve graduates' access to job opportunities; and
The cultural section, which provides the framework for numerous musical, dramatic and cultural activities, such as choirs specialising in classical, traditional and other types of vocal music, a theatre group, a cinema club, and NEPA - the Nature Protection & Study Group. It also produces the student newspaper "O Informativo".
The Student Association's Cine Club shows two films a week at the Portuguese Youth Institute (IPJ) on Avenida Dr. Manuel Cardona.

Various cultural and recreational events, and other forms of entertainment are organised throughout the academic year, including the Freshmen's Week (Semana de Caloiro) and the Academic Sports Week, both held in November, the Week of Culture (January), Inter-University Traditional Games (April) and the Academic Week (May).

On the university campus, the Academic Association operates a photocopying centre, a bookshop, a cafe-bar, an Information Technology Unit and an Advice and Welfare Centre. There is also a student bar - the Melão - situated in the Pioledo building, in the city centre.

F.8 The IAAS (International Association of Agricultural Students) and the IEEE student Branch

The IAAS was founded in Tunisia in 1957 by eight countries and is currently the world's largest student organisation in the agricultural field. The Association, which is independent, non-profit-making and politically unaligned, has a membership consisting of students in agriculture, plant and animal sciences, agricultural economics, rural engineering, plant protection, horticulture, agro-industrial engineering, and landscape architecture, among other disciplinary fields.
The IAAS has two main aims, namely to encourage the exchange of ideas in all areas of agricultural endeavour, and to promote cooperation between agricultural students throughout the world. Today, the Association has members and local committees as well as promoting initiatives in 400 universities, in 45 countries in all continents except Oceania. In Portugal, the IAAS has its headquarters at the Instituto Superior de Agronomia in Lisbon, with local committees active at the University of Trás-os-Montes e Alto Douro, Lisbon, the Azores, Évora and the Algarve, and at the Coimbra, Santarém and Beja Agricultural Colleges.

IAAS
Apartado 27
5001 Vila Real Codex
Telephone +351-259 350626
Fax: +351-259 350626
E-mail: iaas@utad.pt

UTAD's IEEE Student Branch

The IEEE student branches are intended to provide a focus for IEEE activities on campus, with due regard for local interests and needs, and to encourage interest in the profession, particularly in electrical engineering, computer engineering and computer sciences. In addition, the IEEE student branches are also intended to provide opportunities for students to network with practicing electrical and computer engineers and scientists.
Contact:
UTAD - Prof. Manuel Cabral Reis
Ed. Engenharias II, E 0.03
Tel: +351-259 3502367
E-mail: mcabral@utad.pt

F.9 Transport to and from the University Campus

There is a regular bus service linking the several campus. Buses leave the centre of Vila Real from the Civil Governor's Office, (Largo do Conde de Amarante) off Avenida Carvalho Araújo at 07.30, 08.30 and 09.30, at 12.15, 13.30 and 14.15, and at 17.15. Once they arrive at the university campus, the buses immediately initiate the return journey to the city centre. The last bus back to the city from the campus is at 20.05. Soon, a more frequent bus service will be provided. The Company Corgobus has regular trips from the city centre to the University and vice-versa.

Line 1 – Red (Monday to Friday)

Lordelo	Hospital	Mercado	Mateus	Escolas	UTAD	Escolas	Mateus	Mercado	Hospital
7:30	7:40	7:45	8:00	8:05	8:15	8:20	8:30	8:40	8:50
8:00	8:10	8:15	8:30	8:35	8:45	8:50	9:00	9:10	9:20
8:30	8:40	8:45	9:00	9:05	9:15	9:20	9:30	9:40	9:40
9:00	9:10	9:15	9:20	9:30	9:40	9:50	9:50	10:00	10:10
9:30	9:40	9:45	9:50	10:00	10:15	10:20	10:20	10:30	10:40
9:50	10:00	10:15	10:20	10:20	10:30	10:40	10:40	11:00	11:00
10:20	10:30	10:30	10:40	10:50	11:00	11:30	11:10	11:20	11:30
10:50	11:00	11:00	11:10	11:20	11:30	11:40	11:40	11:50	12:00
11:10	11:20	11:30	11:40	11:40	12:00	12:00	12:10	12:20	12:30
11:40	11:50	12:00	12:10	12:10	12:30	12:40	12:40	13:00	13:00
12:10	12:20	12:20	12:30	12:40	13:00	13:00	13:10	13:20	13:30
12:40	12:50	12:50	13:10	13:10	13:30	13:30	13:40	13:50	14:00
13:10	13:20	13:30	13:40	13:50	14:00	14:00	14:10	14:20	14:30
13:40	13:50	13:50	14:10	14:10	14:20	14:30	14:30	14:40	14:50
14:10	14:20	14:20	14:30	14:40	14:50	15:00	15:00	15:10	15:20
14:40	14:50	14:50	15:00	15:10	15:20	15:30	15:30	15:40	15:50
15:00	15:10	15:20	15:30	15:30	15:40	15:50	15:50	16:10	16:10
15:30	15:40	15:40	15:50	16:00	16:10	16:20	16:20	16:30	16:40
16:00	16:10	16:10	16:20	16:30	16:40	16:50	16:50	17:00	17:10
16:20	16:30	16:40	16:50	16:50	17:00	17:10	17:20	17:30	17:40
16:50	17:00	17:10	17:20	17:30	17:40	17:40	17:50	18:00	18:10
17:20	17:30	17:30	17:50	17:50	18:00	18:10	18:20	18:30	18:40
17:50	18:00	18:00	18:20	18:20	18:30	18:40	18:40	19:00	19:00
18:20	18:30	18:30	18:40	18:50	19:00	19:10	19:10	19:20	19:30
18:50	19:00	19:00	19:10	19:20	19:30	19:30	19:40	19:50	20:00
19:10	19:20	19:30	19:40	19:40	19:50	20:00	20:00	20:10	20:20
19:40	19:50	19:50	20:00	20:10	,,,	,,,	,,,	,,,	,,,
20:00	20:10	20:20	20:30	20:30	,,,	,,,	,,,	,,,	,,,

Line 4 – Blue (Monday to Friday)

U.Montezelos	Mercado	Av. A. Barrigas	CC Dolce Vita	UTAD	Escolas	CC Dolce Vita	Av. A. Barrigas	Mercado
,,,	,,,	,,,	,,,	7:25	7:35	7:40	7:40	7:52
7:30	7:35	7:45	7:52	8:00	8:10	8:15	8:20	8:27
8:05	8:14	8:20	8:27	8:35	8:45	8:50	8:50	9:02
8:40	8:45	8:55	9:02	9:10	9:15	9:25	9:25	9:34
9:15	9:25	9:27	9:35	9:40	9:45	9:55	9:55	10:04
9:45	9:55	9:57	10:02	10:10	10:15	10:25	10:25	10:34
10:15	10:25	10:27	10:35	10:40	10:45	10:55	10:55	11:04
10:45	10:55	10:57	11:02	11:10	11:15	11:25	11:25	11:34
11:15	11:25	11:27	11:35	11:40	11:45	11:55	11:55	12:04
11:45	11:55	11:57	12:02	12:10	12:20	12:25	12:35	12:37
12:15	12:24	12:30	12:37	12:45	12:55	13:00	13:00	13:12
12:50	12:55	13:05	13:12	13:20	13:30	13:35	13:40	13:47
13:25	13:34	13:40	13:47	13:55	14:05	14:10	14:10	14:27
14:00	14:05	14:14	14:20	14:25	14:35	14:35	14:44	14:49
14:30	14:37	14:42	14:49	14:55	15:05	15:05	15:14	15:19
15:00	15:07	15:12	15:19	15:25	15:35	15:35	15:44	15:49
15:30	15:37	15:42	15:49	15:55	16:05	16:05	16:14	16:19
16:00	16:07	16:12	16:19	16:25	16:35	16:35	16:44	16:49
16:30	16:37	16:42	16:49	16:55	17:05	17:05	17:14	17:20
17:00	17:07	17:13	17:20	17:35	17:45	17:50	17:50	18:02
17:35	17:44	17:50	17:57	18:05	18:15	18:20	18:20	18:32
18:12	18:22	18:27	18:34	18:40	18:48	18:53	18:55	19:04
18:45	18:52	18:57	19:03	19:10	19:18	19:23	19:25	19:34
19:15	19:22	19:27	19:33	19:40	19:48	19:53	19:55	20:04
19:45	19:52	19:57	20:03	20:10	20:18	20:23	20:25	20:34
20:15	20:22	20:27	20:33	,,,	,,,	,,,	,,,	,,,

Students can apply for a discount when buying a ten trips card.
For further information dial nº 259 336 806.

G. Other Practical Information

G.1 How to get to us

You can reach (or leave) Vila Real by car, bus or train:

	from LISBON	from PORTO
BY CAR	Lisbon-Porto via the A1 motor-way, then the IP 4 highway to Vila Real	Porto/Amarante A4, Amarante/Vila Real IP4 highway
BY BUS	With Rodonorte departing from the Campo Grande bus-station (Nº 30 B, Lisbon, Telf. +351 21 7967443 Auto-Viação do Tâmega departing from the Campo Pequeno bus-station, Lisbon (Telf. +351 21 7976366)	With Rodonorte departing from Travessa Passos Manuel, Porto (Telf. +351 22 2005637) Auto-Viação do Tâmega departing from Rua Alexandre Herculano, Porto (Telf. +351 22 2083019
BY TRAIN	Lisbon-Porto on the "Linha do Norte" departing from the Santa Apolónia station (Telf. +351 21 808208208 and 21 8816242 Lisbon) then Porto/Régua on the "Linha Douro" departing from Porto's Campanhã station (Telf. +351 22 808208208 and + 351 22 5191387) and Régua-Vila Real on the "Linha do Corgo" departing from Régua station.	Porto-Régua on the "Linha do Douro" departing from Porto's Campanhã station, then Régua-Vila Real on the "Linha do Corgo" departing from Régua station. Train station at Vila Real – Telf. +351 259 322193

(for costs see part B. cost of living)

G.2 Postal Services

The central Post Office is located at the top of Avenida Carvalho Araújo and is open from 8.30 to 18.00 h. You can also telephone from there or from the several public phone-boxes in the city. Some take coins and others take phone cards (available in the post office and newsagents). To call another country, you dial 00, followed by the country code, followed by the city or regional code. There is another Post Office named Poste Office of Araucária, at Rua of University (near the University).

G.3 Banks

Currency in Portugal is the euro. The main banks operating in Vila Real are:

Banco Bilbao Vizcaya Argentaria – Avª 1º de Maio	259 302040
Banco BPI (Corgo) –Av. 1º de Maio Torre C, nº 60	808 200510
Millennium BCP – Rua Manuel Bessa Monteiro nº 6	259 308020
Millennium BCP – Largo do Pioledo, Avª. D. Diniz	259 309030
Millennium BCP – Largo S. Pedro, 1/9	259 308050
Banco Espírito Santo (Corgo)– Avª. 1º de Maio, Torre B	259 309770
(with a branch at Rectory building)	259 338405
Banco Espírito Santo –Rua Dr. Augusto, estação nº 25	259 340270
Banco Internacional de Crédito - Rua D. Pedro Menezes	259 309110
BANIF.- Rua S. Sofia r/c nº 25	259 340410
Banco de Portugal- Largo Visconde Almeida Garrett, nº1	259 340360
Caixa Geral de Depósitos – Avª. Carvalho Araújo, nº124	259 320799
Caixa Geral de Depósitos – Alves Rossadas nº 25	259 321940
Caixa Geral de Depósitos – Edifício Encosta do Rio, Loja 13	259 330030
Banco Totta & Açores – Rua António Azevedo nº48	259 309 150

G.4 Public Libraries

In addition to the University's libraries, details of which are provided below, there is a Municipal Library, the Calouste Gulbenkian Foundation Library, both located in the City Hall (Council Chambers) at Avenida Carvalho Araújo, and the District Archive on Avenida Almeida Lucena, close to the ex-DRM building UTAD's Department of Economics and Sociology.

G.5 Tourist Office

There is a tourist office in the city centre, on Avenida Carvalho Araújo, where a range of useful information can be obtained.

G.6 Youth Portuguese Centre

Youth Institute (IPJ) on Avenida Dr. Manuel Cardona is a Centre which offers special support to young people.

G7. Camping

The Camping is located at Avenida Dr. Manuel Cardona and user's of the camping have access to the recreation and leisure complex of Codessais with a riverside lido, swimming pool, radical park, etc.

H. Extra-campus and leisure activities

H.1 Cinemas and Music Centres

There is a very good offer in cinemas. Recently a new shooping centre has open, named Douro Centre, near NERVIR with ten minutes walking distance from the University, with seven cinemas. In this area is also located the new Theatre of Vila Real, and there is a "Café Concerto" with live music from Monday to Thursday. Also, at the Theatre, there are regular exhibitions, plays, and music concerts. Students have a discount on the price tickets..
Regular concerts of both classical and popular music are also held at the University's main auditorium - the Aula Magna.

H.2 Local Newspapers

There are some local newspapers (weekly papers) like "Notícias de Vila Real" and "Voz de Trás-os-Montes" "Semanário Transmontano-VR" at Vila Real. At Chaves there are available the "Voz de Chaves" "Semanário Transmontano-Chaves" and "Notícias de Chaves" local newspapers and at Miranda do Douro the "Voz de Nordeste".

H.3 Bars and Dancing

There is plenty of night life in Vila Real, provided by bars and discothèques in and around the city centre.

Fig. 5 Municipal swimming pool

H.4 Sport Centres and Swimming Pools - There is a municipal open-air swimming pool, as well as an indoor pool (Clube Desportivo de Vila Real) below the Health Centre on Rua Dr. Manuel Cardona, near UTAD's CIFOP (Education) building.
The Vila Real Gymnasium Club provides facilities for a number of indoor sports - swimming, gymnastics, trampolining, weight-lifting, aerobics and karate, among others.
Near UTAD has been built a new Athletic field, where students can practice jogging, play football or play other outdoor sports.
Each sport has its own weekly timetable (afternoons and evenings).

Fig. 6 São Pedro's fair

H.5 Handicrafts and Traditional Holidays, Fairs and Festivals - Distinctive kiln-blackened pottery is produced in the village of Bisalhães close to Vila Real, and beautiful linen items are still hand-woven to traditional patterns in the highland community of Agarez.

The city's traditional festas are on June 13th (the municipal fair of Santo António) and June 29th (São Pedro's fair).

H.6 Local Cuisine and Restaurants

The city and region has a rich and varied local cuisine, including such dishes as oven-roast kid (cabrito no forno), small pies made of beef or chicken (covilhetes), rolled tripe (tripas aos molhos), wonderful smoked ham (presunto), bola de carne, a savoury loaf filled with various types of meat, and a host of different sausages such as salpicão (made of pickled pork), alheiras (made with bread and chicken), mouras (a type of blood sausage); there are numerous sweets and pastries, such as Pitos de Santa Luzia, consisting of pumpkin wrapped in pastry, so-called heaven's bacon (toucinho do ceu) made of almonds, pastéis de Santa Clara (custard tarts) and cavacórios (a special cake for Lent). The wines of the region are excellent, ranging from the fortified wines such as Port and Favaios, produced from grapes grown on the shale terraces of the valley of the Douro river and its tributaries, the established table wines fromVila Real, Murça, Mesão Frio and Santa Marta de Penaguião, the emerging areas of Valpaços, Chaves and Macedo de Cavalheiros, and the sparkling wines of Tarouca from the Raposeira and Murganheira vineyards near Lamego.
There are restaurants of all types throughout the city centre and the suburbs, some of which have special menus and prices for students. Not far from Vila Real are the Casa de Campeã (off the IP4 driving towards Porto), and the Pousada de São Gonçalvo (also off the IP4 in the Marão mountains) where the food is excellent and the atmosphere convivial.
Around Vila Real there are some typical houses "Turismo Rural" like Casa das Cardosas, Casa Agrícola da Levada, Casa da Timpeira and casa da Quinta de S. Martinho.

Fig. 7 Mateus Palace

H.7 Cultural Patrimony - The most important buildings are the gothic Cathedral (also known as Saint Domingos), built in the 15th century; the barroque Capela Nova (New Chapel) designed by Nicolau Nasoni; Saint Peter's church (Igreja de S.Pedro); and the Mateus Palace - immortalised on the label of the famous rosé wine). Other noteworthy monuments include the Casa de Arco and the house of Diogo Cão (the first European to reach Angola), the Misericórdia church, the pillory and the oldest building in

Vila Real, the 14th century Chapel of Saint Brás close to the old cemetery.
Just a few kilometres outside Vila Real visitors can find Panoias, a pre-Christian shrine dedicated to Serapis and other pagan gods, with its curiously sculpted rocks.

H.8 Numismatic Museum

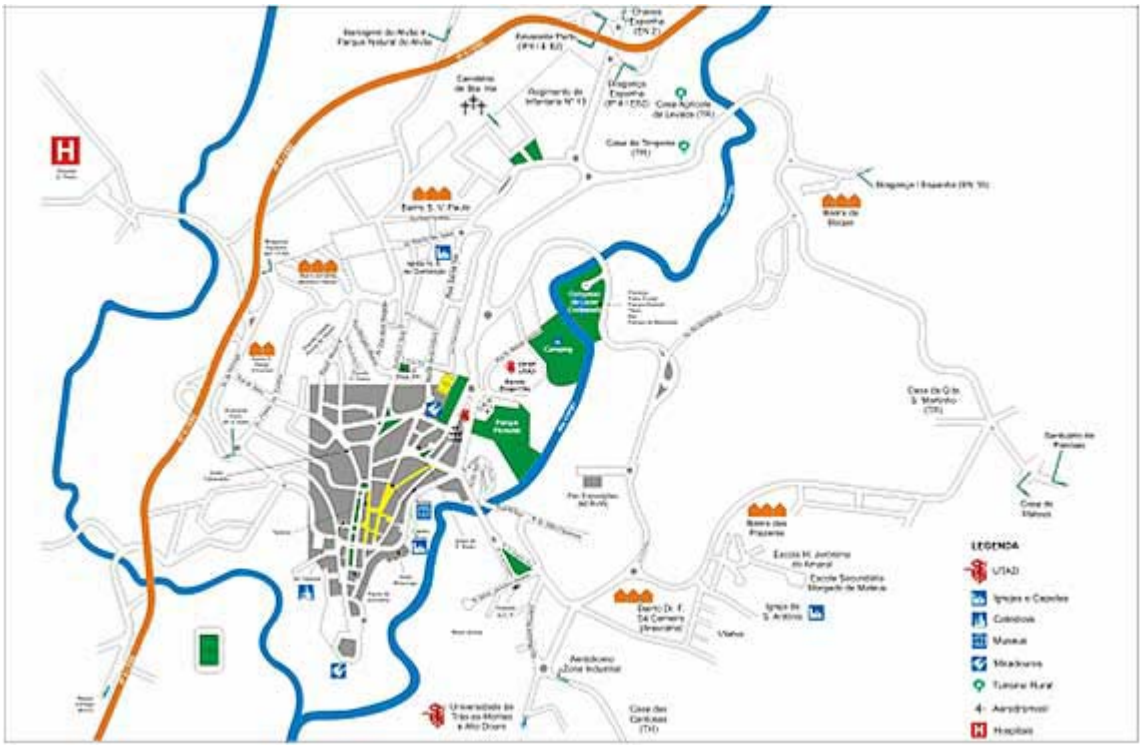
The city's new numismatic museum is situated on the Rua do Rossio (tel. +351-259 325730) and is open to the public each afternoon from Tuesday to Sunday inclusive, from 10 to 18 o'clock. The museum boasts a fine and valuable collection of notes and coins, and organises public meetings each fortnight on a wide variety of cultural, literary and other themes.

H.9 Other Suggestions in the surroundings

Starting either from Porto or from Régua, there is a breathtaking train journey along the banks of the River Douro as far as Barca de Alva. Alternatively, you may choose to take an unforgettable trip by boat along the same stretch of river. Indeed, some of the most spectacular scenery in Portugal, with extensive vineyards and impressive country houses (quintas), can be found in the valleys of the Douro and its tributaries - which together constitute the Port Wine Demarcated Region world heritage 2001.
For those who prefer more natural landscapes, the conservation area of the Alvão Nature Park, some 12 kilometres from Vila Real, provides an ideal location. There you can visit the typical villages of Lamas de Olo, with its traditional rural architecture and rich highland pastures where the local breed of cattle (the maronês) graze. In Ermelo, the houses are built with slate from the nearby hills. Nearby, at Ermelo, the magnificent waterfalls are the centre-piece of mountain scenery of rare beauty.
To the north, within 60 kilometres of Vila Real, there are the spa towns of Vidago and Chaves: the former has a hotel in the belle époque style, swimming pools and tennis courts. In addition to its natural springs, developed by the Romans, a fine archaeological museum and one of UTAD's campus extensions, Chaves has a bustling commercial life typical of frontier towns. This region of the Alto Tâmega is known by the water systems, not only the spas, but the entire hydrographic network, are a rich source of heritage in this region. The extraordinary polygon formed by the spas of Caldas Santas de Carvalhelhos in the municipality of Boticas, and Termas de Chaves, Vidago and Pedras Salgadas and their natural parks, are important for the several hydrological treatments. Some of them with beneficial effects.
To the south, but much closer, lies Régua, on the Douro river, surrounded by the terraced vineyards where the grapes for port wine are grown and Lamego, with its historic monuments, museum and hill-top shrine. Going eastwards on the IP4 highway, you can visit Mirandela and finally arrive at Bragança - some 120 kilometres from Vila Real, with its imposing castle, fine historic buildings and renowned cuisine.

Fig. 8 Map of Europe and northen region of Portugal with the 3 UTAD Campus (Vila Real, Chaves and Miranda do Douro)

Fig. 9 Map of Vila Real



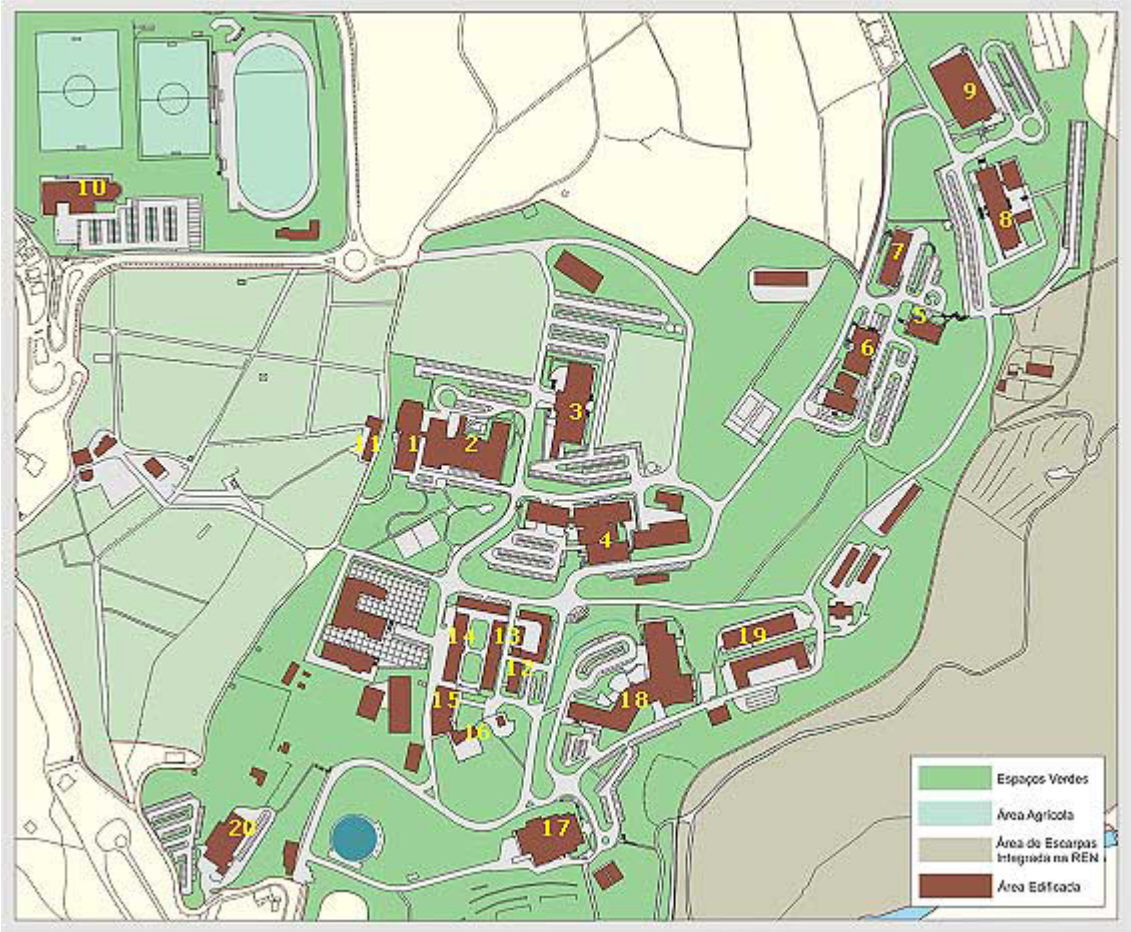


Fig. 10 Quinta de Prados Campus

Legend: Department Buildings and UTAD Services
1- Rectory and Administration; 2- Biology and Environmental Engineering, Chemistry. Geology, Soil Sciences; 3- Central Library; 4- Mathematics, Physics, Informatics, Civil and Mechanical Engineering; 5- Electronic Engineering; 6- Forestry; 7- Rural Engineering; 8- Languages and Literature; 9- Sports Centre I; 10- Sports Centre II; 11- Oenology; 12- Genetics; 13- Genetics; 14- Plant Protection (1st floor), Photocopy Centre and Reprography (Ground floor); 15- Bar (1st floor); Students Association (Ground floor); 16- Bookstore; 17- Veterinary Medicine; 18- Crop Science; Animal Science Animal Health; Erasmus Office (Room 1.71); 19- Cow-shed; 20- Canteen.

INFORMATION ON THE DEPARTMENTS OF UTAD

Agrarian Sciences, which includes the Departments of
Animal Sciences
Crop Science & Rural Engineering
Food Industries & Technology
Forestry
Plant Protection
Animal Health & Hygiene
Veterinary Sciences

Exact, Natural & Technological Sciences
Biological & Environmental Engineering
Chemistry
Engineering
Genetics & Biotechnology
Geology
Mathematics
Physics
Soil Science

Humanities & Social Sciences
Arts & Crafts
Educational Sciences
Physical Education & Sports
Economics & Sociology
Languages & Literature

AGRARIAN SCIENCES

DEPARTMENT OF PLANT SCIENCE AND AGRICULTURAL ENGINEERING

A- General description of the Department

1- ECTS Departmental Coordinator

Name: Eduardo Rosa
Address: University of Trás-os-Montes and Alto Douro
Dept. of Plant Science and Agricultural Engineering
P.O. Box 1013
5001-911 Vila Real
Telephone: 351.259.350446/51
Fax: 351.259.350327
Email: erosa@utad.pt

When unavailable, please contact:
Name: Ana Paula Silva
Telephone: 351.259.350450
Email: asilva@utad.pt

2- Structure and organization

The Department of Plant Science and Agricultural Engineering is one of the 20 Departments of the University of Trás-os-Montes and Alto Douro which began in the late seventies. The staff includes 16 Professors and Lecturers and 12 Technical Assistants, organized into nine thematic areas, as follows:

Agricultural Biology
Field Crops
Pastures & Forages
Fruit Crops
Horticulture
Viticulture
Farm Buildings
Agricultural Machinery
Irrigation

The Department is ruled by the "Regulation of Departments" adopted at the UTAD.
The management of the Department of Plant Sciences and Agricultural Engineering is conducted by a Coordinator and Vice-Coordinator elected by the teaching and non teaching staff, for a period of two years. On average, the Department meets every month or when relevant issues need urgent decision. The Assembly of Department (all teaching staff and a representant of non teaching staff) meets twice a year.
Apart from teaching, the other major activities of the Department involve research and experimentation on the Agri-Food area. This research is divided into two main thematic areas: i) food quality, and particularly the influence of different fruit and vegetable production systems on the final product compositions and effects on human health; ii) studies on sustainable agricultural systems and their relationships to food and quality and environmental impact.

Teaching staff

Name	Category
Nuno Manuel T. Moreira	Full Professor
Eduardo Augusto S. Rosa	Full Professor
Manuel João T. Oliveira	Full Professor
Alberto Silva A. dos Santos	Associate Prof.
Ana Paula C. M. Silva	Associate Prof.
Fernando Augusto dos Santos	Associate Prof.
Fernando Bianchi de Aguiar	Associate Prof.
Fernando Manuel C. Martins	Associate Prof.
Henrique Manuel F. Trindade	Associate Prof.
Nuno P. Campos Magalhães	Associate Prof.
Vicente Seixas e Sousa	Associate Prof.
Carlos Augusto B.B. e Castro	Assistant Prof.
Jaime Teixeira Cavalheiro	Assistant Prof.
Ana Alexandra R.C. Oliveira	Teaching Assist.
António José D. Pirra	Teaching Assist.
José Pedro L. Araújo Alves	Visiting Fellow

These research activities are funded from both perma-nent national sources and contracted international projects. In both cases our major roles are either as researchers and/or project and program coordinators.
Among other activities the Department plays and active role in the development of scientific networks and co-operation at national and particularly at international level in the area of research, lecturing, exchange and mobility of staff and students.
The staff are highly motivated and participate in Natural and Regional Development Programs, the last example being the classification of "Alto Douro Vinhateiro" as world heritage. Particular attention has been given to the co-operation with the Ministry of Agriculture, through the Regional Services to promote and consolidate experimental research in

nationally recognised areas of interest e.g. the improvement of production techniques in the Precision Farming concept.
The Department is also developing links with small and medium enterprises (SME) in the Agri-Food area. This is achieved by straight-forward cooperation at the research level and also at the research level and also at the student level (through their involvement in work programs, established by the companies and in cooperation with the Department, ending with the final higher degree report). Professors of the Department act as either coordinators or sub-coordinators of the expe-rimental work.

3- Facilities

In the Department there are two types of Laboratories, one for practical classes and other used mainly for research activities, although used for classes. The follo-wing Laboratories are available:
- Agricultural Biology, Field Crops and Pastures & Fo-rages
- Fruit Crops/Viticulture
- Horticulture
- Irrigation
- Post-harvest

Apart from the Laboratories there is also an experimen-tation/research room dedicated to Agricultural Machi-nery activities.
Students have access to the main Library where they can find a section dedicated to the Department with technical and scientific periodicals and a good selection of books which covered the whole subjects addressed in the Department. "On-line" research is also available.
From a long list of equipment it must be stressed: HPLC and GC equipments, infra-red gas analysers, leaf area and root measuring equipments, controlled atmos-phere chambers, agricultural machinery, irrigation studying models, growth chambers and greenhouses.

4- Degree Programmes

The lecturing activities encompass 27 disciplines within six main courses:

Agronomy
Animal Production
Forestry
Veterinary
Oenology
Landscape Architecture

The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.
The Department is responsible for the organisation of the Masters Course in Plant Science - Option Horti-culture, Fruit Production and Viticulture. Some of the Professors are also involved in lecturing in other national and international Masters Courses. Other tasks of the Professors include the supervisions of the final higher degree reports, and Masters and PhD theses of both national and international students.
Professors and researchers of recognised background are usually invited to give lectures on special subjects. Similarly, technicians and directors of companies are also invited occasionally to give a Seminar on relevant subjects according to the programmes of the discipline. Students are also invited to participate in Congresses, Seminars and similar events organised by the Depart-ment.

5- Teaching, learning and assessment methods

Theoretical, practical and mixed theoretical and practi-cal lectures are available within the group of disci-plines in the Department. The last two types of lectures are compulsory, since the practical component is of high relevance for the whole group of disciplines available in the Department.
Field trips and excursions to areas of major agriculture activity in Portugal are regularly organised with the objective of bringing the students to reality and to consolidate their knowledge.
Students evaluation is done using different methods: tests, practical and laboratory work, reports and final exams. According to the discipline these methods can be used de per se or combined. Final examinations are most frequent. Further information is available on the description of each discipline.

DEPARTMENT OF FORESTRY SCIENCE

A- General description of the Department

1- ECTS Departmental Co-ordinator

Name: Hermínio Botelho
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Dept. of Forestry Science
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When unavailable, please contact:
Name: José Tadeu Aranha
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Email: j_aranha@utad.pt

2- Structure and organization

The Dept. of Forestry Science is one of the 20 Departments of the University of Trás-os-Montes and Alto Douro which began in the late seventies. The staff includes: 11 doutorados, 8 mestres, 4 licenciados) 11 Professors and Lecturers (PhD) and 8 Teaching Assistants (MPhil) and 4 Assistants, organised into three thematic areas, as follows:

Resources Management
Forestry Planning
Silviculture

The Department is ruled by the "Regulation of Depart-ments" adopted at the UTAD.
The management of Dept. of Forestry Science is conducted by a Co-ordinator and Vice-Co-ordinator elected by the teaching and non teaching staff, for a period of two years. On average, the Department meets every month or when relevant issues need urgent decision. The Assembly of Department (all teaching staff and a representing of non teaching staff) meets twice a year.
Apart from teaching, the other major activities of the Department involve research and experimentation in Forestry Sciences. This research is divided into three main thematic areas as previously presented.

Teaching staff

Name	Category
Aloísio Moura Loureiro	Full Professor
Carlos Pacheco Marques	Full Professor
Rui Manuel Cortes	Full Professor
Jaime Sales Luís	Aggregate Prof.
Hermínio Botelho	Associate Prof.
João Santos Bento	Associate Prof.
José Tadeu Aranha	Associate Prof.
Aurora Monzón	Assistant Prof.
João Paulo Carvalho	Assistant Prof.
José Luís Penetra	Investigator
Teresa Fonseca	Teaching Assist.
Domingos Lopes	Teaching Assist.
Eugénio Varejão	Teaching Assist.
Filipa Torres Manso	Teaching Assist.
Maria João Gaspar	Teaching Assist.
Maria Emília Silva	Teaching Assist.
Luís Lopes	Teaching Assist.
Simone Varandas	Teaching Assist.
Luís Roxo	Assistant.
Paulo Fernandes	Assistant. (PhD)
Paula Bento	Assistant.
Susana Fonseca	Assistant.
Daniel Oliveira	Assistant.

These research activities are funded from both permanent national sources and contracted international projects. In both cases our major roles are either as researchers and/or project and program co-ordinators.
Among other activities the Department plays and active role in the development of scientific networks and co-operation at national and particularly at international level in the area of research, lecturing, exchange and mobility of staff and students.
The staff are highly motivated and participate in Natural and Regional Development Programs, such us Regional Plans for Forested Areas Management. Particular attention has been given to the co-operation with the Ministry of Agriculture, through the Regional Services to promote and consolidate experimental research in nationally recognised areas of interest e.g. the improvement of wood and pulp production, land resources management and timber industries.
The Department is also developing links with small and medium enterprises (SME) in the forestation area. This is achieved by straight-forward co-operation at the research level and also at the student level (through their involvement in work programs, established by the companies and in co-operation with the Department, ending with the final

higher degree report). Professors of the Department act as either co-ordinators or sub-co-ordinators of the experimental work.

3- Facilities

In the Department there are several types of Laboratories, (Hydrobiology, Forestry Fires, Geographical Information Systems, Remote Sensing) as well a Seeds Centre and a plant nursery. The Dept. of Forestry Science also has all apparatus and machinery that is used in forests clearing and management. All these facilities are used in investigation, teaching actions and to support local communities requirements.
Apart from the Laboratories there is also an experimen-tation/research room dedicated to Forestry activities.
Students have access to the main Library where they can find a section dedicated to the Forestry Sciences with technical and scientific periodicals and a good selection of books which covered the whole subjects addressed in the Department. "On-line" research is also available. They also have access to Forestry Sciences related journals and magazines in the Department Library.

4- Degree Programmes

The lecturing activities encompass disciplines within four main courses, which enrolment is:
Biological Engineering and Environment (36%)
Forestry (40%)
Ecology (36%)
Landscape Architecture (8%)
The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.
The Department is responsible for the organisation of the several Masters Course in Forestry Resources Management. Some of the Professors are also involved in lecturing in other national and international Masters Courses, such us with High School of Agriculture in the master course High Growing Forestry Species Silviculture and University of Santiago de Compostela in the master course Rural Development and Management.
Other tasks of the Professors include the supervisions of the final higher degree reports, and Masters and PhD theses of both national and international students.
Professors and researchers of recognised background are usually invited to give lectures on special subjects. Similarly, technicians and directors of companies are also invited occasionally to give a Seminar on relevant subjects according to the programmes of the discipline. Students are also invited to participate in Congresses, Seminars and similar events organised by the Depart-ment.

5- Teaching, learning and assessment methods

Theoretical, practical and mixed theoretical and practi-cal lectures are available within the group of disci-plines in the Department. The last two types of lectures are compulsory, since the practical component is of high relevance for the whole group of disciplines available in the Department. In modules whose students evaluation in made under a continuous programme, theoretical classes are also compulsory.
Field trips and excursions to areas of major forestry activity in Portugal are regularly organised with the objective of bringing the students to reality and to consolidate their knowledge.
Students evaluation is done using different methods: tests, practical and laboratory work, reports and final exams. According to the discipline these methods can be used de per se or combined. Final examinations are most frequent. Further information is available on the description of each discipline.

HYGIENE AND HEALTH DEPARTMENT

A- General description of the Department

ECTS Departmental Coordinator

Name: Jorge de Almeida Rodrigues
Addres: Universidade de Trás-os-Montes e Alto Douro
Hygiene and sanity department
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5001-911 Vila Real
Telephone: 259.350460/4
Fax: 259.350482
Email: jrodrigu@utad.pt

When unavailable, please contact:
Name: Mª Manuela Vara de Campos Rodrigues
Telephone: 259.350461/4
Email: mmvcr@utad.pt

2- Structure and organizanization

The Department of Hygiene and sanity is one of the 20 Departments of the University of Trás-os-Montes and Alto Douro which began in the middle seventies. The staff includes 18 Professors and Lecturers and 13 Technical Assistants (two of them are investigators/Superior Technical), organized into seven thematic areas, as follows:

Microbial Ecology in Animal Health
Microbiology in animal science
Parasitic Ecology in Animal Health
Epidemiology and Surveillance
Veterinary Public Health
Food Safety

Teaching staff

Name	Category
Jorge A, Rodrigues	Associate Prof./Agreg
Mª Manuela V. C. Rodrigues	Assistant Prof.
Mª José Félix Saavedra	Assistant Prof.
Victor Manuel S. Duarte	Visiting Assistant Prof.
Maria da Graça Vieira Brito	Teaching Assistant
António C. de Almeida	Visiting Teaching Ass.
Alexandra Miguéis Esteves	Teaching Assistant
Nuno Fonte Santa Alegria	Teaching Assistant
Francisco Geraldes Neto	Visiting Teaching Ass.
Helder Pereira dos Santos	Visiting Teaching Ass.
Luís Miguel Lucas Cardoso	Teaching Assistant
Francisco J. Vieira e Brito	Teaching Assistant
Cristina Saraiva	Teaching Assistant
Mª das Neves M. Cardoso	Teaching Assistant
Mª Madalena Vieira Pinto	Teaching Assistant
Ana Cláudia Coelho	Teaching Assistant
Patrícia Curado Dinis Poeta	Teaching Assistant
Maria da Conceição Fontes	Teaching Assistant

The Department is ruled by the "Regulation of Departments" adopted at the UTAD.

Apart from teaching, the other major activities of the Department involve research and experimentation on surveillance in animal science, sanity, hygiene, epidemiology and animal health, veterinary public health and food safety.

This research is divided into three main thematic areas:
Animal Heath, Public Health and Food Safety.

These research activities are funded from both permanent national sources and contracted international projects. In both cases our major roles are as researchers.
Among other activities the Department plays and active role in the development of scientific networks and co-operation at national and at international level in the area of research, lecturing, exchange and mobility of staff and students.
The staff are highly motivated in the co-operation with Regional Directions of Ministry of Agriculture, productor organizations and doing services to several public and private institutions. In that way the staff tpromote and consolidate experimental research in nationally recognised areas of interest and allows the students to do their final higher degree reports in the department.

3- Facilities

In the Department there are two types of Laboratories, one for practical classes and other used mainly for research activities and community services. The following Laboratories are available:

- Culture Media
- Practical classes (3)
- Virology
- Food microbiology
- Microbiology in animal prodution and medical microbiology
- Molecular biology
- Parasitology
- Sanitary inspection

Students have access to the Departmental Library and main Library where they can find a section dedicated to the Department with technical and scientific periodicals and a selection of books which covered the whole subjects addressed in the Department. "On-line" research is also available.
From a long list of equipment it must be stressed: Fluorescence microscope, inverted microscope, bright-field microscope ELISA spectrophotometer, PCR machine, ADN/ARN calculator, ultrasonic vibro-cell, autoclave and filter sterilization, incubation chambers, electrophoresis systems, separation systems, gel electrophoresis of DNA, laminar flow biological safety gabinet, UV transiluminator, tangencial filter system, anaerobic incubator.

4- Degree Programmes

The lecturing activities encompass 12 disciplines within 4 main courses: Biology, Biology/Geology, Animal Production and Veterinary Medicine.7 of the disciplines dure a semester and the othes dure one year
The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.
The staff is also involved in lecturing in national and international Masters Courses.

Other tasks of the Professors include the supervisions of the final higher degree reports, and Masters and PhD theses.
Professors and researchers of recognised background are usually invited to give lectures on special subjects. Similarly, technicians and directors of companies are also invited occasionally to give a Seminar on relevant subjects according to the programmes of the discipline. Students are also invited to participate in Congresses, Seminars and similar events organised by the Department.

5- Teaching, learning and assessment methods

Theoretical, practical and mixed theoretical and practical lectures are available within the group of disciplines in the Department. The last two types of lectures are compulsory, since the practical component is of high relevance for the whole group of disciplines available in the Department.
Students evaluation is done using different methods: tests, practical and laboratory work, reports and final exams. According to the discipline these methods can be used de per se or combined. Final examinations are most frequent. Further information is available on the description of each discipline.

FOOD SCIENCE DEPARTMENT

A- General description of the Department

1- ECTS Departmental Coordinator

Name: Maria Arlete Mendes Faia
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Enology degree
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2- Structure and organization

The Food Science Department is one of the 20 Departments of the University of Trás-os-Montes and Alto Douro, which began in the eighties. The staff includes 7 Professors and Lecturers and 4 Technical Assistants.
The Department is ruled by the "Regulation of Depart-ments" adopted at the UTAD.
The management of the Food Science Department is conducted by a Coordinator and Vice-Coordinator elected by the teaching and non teaching staff, for a period of two years. On average, the Department meets every two months or when relevant issues need urgent decision. The Assembly of Department (all Ph.D. staff, two representatives of the Teaching Assistants, and one of the non teaching staff) meets twice a year.

Teaching staff

Name	Category
Maria Arlete Mendes Faia	Full Professor
Alice Maria Vilela Moura	MSs
Ana Alexandra M. Ferreira	Teaching Assist.
Maria Fernanda G.C. Martins	Teaching Assist.
António Henrique F. Inês	Teaching Assist.
Maria Serpa Pimentel	Teaching Assist.
Virgilio Falco Costa	Teaching Assist.

These research activities are funded from both permanent national sources and contracted international projects.

Among other activities the Department plays and active role in the development of scientific networks and co-operation at national and particularly at international level in the area of research. The staff collaborates in natural and regional development programs.

3- Facilities

In the Department there are laboratories for practical lectures and a laboratory devoted to secondary school activities.
Students have access to the Main Library where they can find a section dedicated to the Department with technical and scientific periodicals and a good selection of books which covered the whole subjects addressed in the Department. "On-line" research is also available.

4- Degree Programmes

The lecturing activities encompass 14 disciplines within six main courses:
Food Sciences
Agricultural Engineering
Forest Engineering
Enology
Landscape Architecture
The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.
Other tasks of the Professors include the supervisions of the final higher degree reports, and Masters and PhD theses of both national and international students.

5- Teaching, learning and assessment methods

Theoretical, practical and mixed theoretical and practi-cal lectures are available within the group of disciplines in the Department. The last two types of lectures are compulsory, since the practical component is of high relevance for the whole group of disciplines available in the Department.
Student's evaluation is done using different methods: tests, practical and laboratory work, reports and final exams. According to the discipline these methods can be used de per se or combined. Final examinations are most frequent. Further information is available on the description of each discipline.

DEPARTMENT OF VETERINARY CLINICS AND PATHOLOGY

A- General description of the Department

1- ECTS Departmental Coordinator

Name: Jorge de Almeida Rodrigues
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When unavailable, please contact:
Name: Luis Marques Antunes
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2- Structure and organization

The Department of Veterinary Clinics and Pathology is one of the 20 Departments of the University of Trás-os-Montes and Alto Douro which began in the late nineties. The staff includes 28 Professors and Lecturers and 19 Technical Assistants.

Teaching staff

Name	Category
Jorge de Almeida Rodrigues	Assoc Prof.w/agre
Aura Antunes Colaço	Assoc Prof.w/agre
Maria dos Anjos Pires	Associate Prof.
Artur Severo Varejão	Assistant Prof
Anabela Antunes Alves	Assistant Prof
José Manuel Almeida	Assistant Prof
Luis Miguel Marques Antunes	Assistant Prof
Adelina Maria Gaspar Gama	Teaching Assist.
Ana Celeste Andrade Martins	Teaching Assist.
Ana Cristina Silvestre Ferreira	Teaching Assist.
Ana Margarida Calado	Teaching Assist.
Ana Patrícia de Sousa	Teaching Assist.
Carlos Antunes Viegas	Teaching Assist.
Felisbina Guedes Queiroga	Teaching Assist.
Fernanda Seixas Travassos	Teaching Assist.
Filipe da Costa Silva	Teaching Assist.
Isabel Cristina Ribeiro Pires	Teaching Assist.
João Carlos Caetano Simões	Teaching Assist.
José Eduardo Teixeira Pereira	Teaching Assist.
Justina Maria Prado Oliveira	Teaching Assist.
Maria de Lurdes Ribeiro Pinto	Teaching Assist.
Maria Isabel Ribeiro Dias	Teaching Assist.
Maria João Miranda Pires	Teaching Assist.
Mário Manuel Dinis Ginja	Teaching Assist.
Mário Gonçalves Cotovio	Teaching Assist.
Odete Catapirra de Almeida	Teaching Assist.
Paula Alexandra de Oliveira	Teaching Assist.
Paula Avelar Rodrigues	Teaching Assist.
Luís Miguel Maltez da Costa	Lea. Teac. Assist.

The Department is ruled by the "Regulation of Depart-ments" adopted at the UTAD.

The management of the Department of Veterinary Clinics and Pathology is conducted by a Co-ordinator and Vice-Co-ordinator elected by the teaching and non teaching staff, for a period of two years. On average, the Department Council (all teachers with a PhD) meets every two months or when relevant issues need urgent decision. The Assembly of the Department (all teachers with a PhD, two representant of all teaching staff and a representant of non teaching staff) meets twice a year.
Apart from teaching, the other major activities of the Department involve research and experimentation on several areas: anaesthesia, orthopedics surgery, hepatic pathology, bovine spongilosis encephalonpathology, peripheral nerve, reproduction, oncology, ictiopathology. These research activities are funded from national sources and represents a significant staff occupation.
Among other activities the Departmental staff are involved with the Veterinary Hospital and highly motivated and participate in Natural, Local and Regional activities.

3- Facilities

In the Department there are two types of Laboratories, one for practical classes and other used mainly for research and hospital activities, although used also for classes. The hospital has several consultation rooms, a pharmacy, surgery room, X ray room, intensive care units, clinical laboratory and histopathology .

Students have access to the Departmental Library and main Library where they can find a section dedicated to the Department with technical and scientific periodicals and a selection of books which covered the whole subjects addressed in the Department.

4- Degree Programmes

The lecturing activities encompass 14 disciplines from the Veterinary Degree

The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.

Other tasks of the Professors include the supervisions of the final higher degree reports, and Masters and PhD theses of both national.

5- Teaching, learning and assessment methods

Theoretical and practical lectures are available within the group of disciplines in the Department. Practical lectures are compulsory, since the practical component is of high relevance for the whole group of disciplines available in the Department.
Students evaluation is done using different methods: tests, practical and laboratory work, reports and final exams. According to the discipline these methods can be used de per se or combined. Final examinations are most frequent. Further information is available on the description of each discipline.

DEPARTAMENT OF PLANT PROTECTION

A- General description of the Department

1- ECTS Departmental Coordinator

Name: Ana Maria Nazaré Pereira
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Dept. of Plant Protection
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5001-911 Vila Real
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When unavailable, please contact:
Name: José Alves Ribeiro
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Email: jaribe@utad.pt

2- Structure and organization

The Department of Plant Protection is one of the 20 Departments of the University of Trás-os-Montes and Alto Douro and began its activity in 1977. The staff includes 5 Professors and 2 Teaching Assistents and 6 Technical Assistants (and several research workers from the projects) organized into five thematic areas, as follows:

Plant Pathology
Agricultural Entomology
Forest Pathology
Forest Entomology
Weed Science and Agrobotany

Teaching staff

Name	Category
Ana Maria Nazaré Pereira	Full Professor
Carlos Gomes de Abreu	Full Professor
Laura Monteiro Torres	Full Professor
José Alves Ribeiro	Associate Prof.
Maria Isabel G. M. Cortez	Associate Prof.
Paula Seixas Arnaldo	Teaching Assist
Luís Miguel Martins	Teaching Assist.

The Department is ruled by the "Regulation of Depart-ments" adopted at the UTAD.

The management of the Department of Plant Protection is conducted by a Coordinator and Vice-Coordinator elected by the teaching and non teaching staff, for a period of two years. On average, the Department meets every month or when relevant issues need urgent decision. The Assembly of Department (all teaching staff and a representative of non teaching staff) meets when specifics issues need decision.
Apart from teaching, the other major activities of the Plant Protection Department involve research and experimentation on the Plant Protection area. This research is divided into two main thematic areas: integrated pest and disease management of food crops and forest protection for sustainable ecosystems. The studies have the final objective of a sustainable agriculture with good environmental impact.
These research activities are funded from both permanent national sources and contracted international projects. In both cases our major roles are either as researchers and/or project and program coordinators.
Among other activities the Department plays and active role in the development of scientific networks and co-operation at national and particularly at international level in the plant protection area, lecturing, exchange and mobility of staff and students.
The staff are highly motivated and participate in Natural and Regional Development Programs, particular attention has been given to the co-operation with the Ministry of Agriculture, through the Regional Services to promote and consolidate experimental research in nationally recognised areas of interest e.g. the implementation of pest and disease management programs for grapevine, olive, vegetables, chestnut, pine, aromatic and medical plants.
The Department is also developing links with small and medium enterprises (SME) in the Plant protection area. This is achieved by straight-forward cooperation at the research level and also at the student level (through their involvement in work programs, established by the companies and in cooperation with the Department, ending with the final higher degree report). Professors of the Department act as either coordinators or sub-coordinators of the experimental work.
The teaching staff of the department teaches also in Formation Actions in Plant Protection.
The Plant Protection Department develops also Community Service with Plant Disease Diagnostic Clinic for farmers and Agricultural Pest and Disease Management Associations.

3- Facilities

In the Department there are two types of Laboratories. Two labs for practical classes and five labs used mainly for research activities. The following Laboratories are available:
- Plant Pathology (Agricultural and Forestry)
- Serological and Molecular Diagnostic
- Agricultural Entomology
- Forest Entomology
- Weed Science and Agrobotany

Apart from the Laboratories there is also a cleaning and preparation room for field material.
Students have access to the Department Library where they can find technical and scientific periodicals and a selection of books which covered the whole subjects addressed in the Department. "On-line" research is also available.
From a long list of equipment it must be stressed ELISA reader, PCR apparatus, hybridisation oven for cloning, incubators, workstation, microscope and stereomicroscope with photographic camera and video, penetrometer, resistograph, fractometer, electronic-hammer, growth chambers, -80ºC freezer and two greenhouses.

4- Degree Programmes

The lecturing activities encompass 10 disciplines within five main courses:
Agronomy
Forestry
Environmental Engineering and Natural Resources
Oenology
Landscape Architecture
The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.

The Department is responsible for the organisation of the Masters Course in Plant Science - Option Horti-culture, Fruit Production and Viticulture. Some of the Professors are also involved in lecturing in other national and international Masters Courses. Other tasks of the Professors include the supervisions of the final higher degree reports, and Masters and PhD theses of both national and international students.
Professors and researchers of recognised background are usually invited to give lectures on special subjects. Similarly, technicians and directors of companies are also invited occasionally to give a Seminar on relevant subjects according to the programmes of the discipline. Students are also invited to participate in Congresses, Seminars and similar events organised by the Depart-ment.

5- Teaching, learning and assessment methods

Theoretical, practical and mixed theoretical and practi-cal lectures are available within the group of disci-plines in the Department. The last two types of lectures are compulsory, since the practical component is of high relevance for the whole group of disciplines available in the Department.
Field trips and excursions to areas of major agriculture activity in Portugal are regularly organised with the objective of bringing the students to reality and to consolidate their knowledge.
Students evaluation is done using different methods: tests, practical and laboratory work, reports and final exams. According to the discipline these methods can be used de per se or combined. Final examinations are most frequent. Further information is available on the description of each discipline.

ANIMAL SCIENCE DEPARTMENT

A- General description of the Department

1- Department ECTS Coordinator

Nome: Maria José Marques Gomes
Endereço: Universidade de Trás-os-Montes e Alto Douro
Departamento de Zootecnia
Apartado 1013
5001-911 Vila Real
Telephone: 259.350424
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Email: mjmg@utad.pt
In the absence of the Coordinator please contact:
Name: José Luis Mourão
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2- Structure and organization

The Animal Science Department is one of the 20 Departments of UTAD and its activity dates from the end of 1970´s. 31 teachers, 1 investigator, 3 superior technicians and 28 employees, organized in thematic areas constitute personnel's structure:

Animal Anatomy and Morphology
Aquaculture and fish production
Animal welfare
Animal physiology
Animal facilities
Animal breeding
Animal nutrition
Dairy and beef cattle production
Poultry production
Equine production
Rabbit production
Sheep and goat production
Pig production
Animal reproduction

Teaching staff

Name	Category
Armando M. Ferreira	Full Professor
Arnaldo A. Dias da Silva	Full Professor
Carlos Alberto Sequeira	Full Professor
Jorge António Colaço	Full Professor
Jorge M. T. Azevedo	Full Professor
Maria Teresa R. Figueiredo	Full Professor
Virgílio Cardoso Alves	Associate Professor
José Óscar Branco Pereira	Associate Professor
Alberto M. Saraiva Cardoso	Associate Professor
Miguel A. M. Rodrigues	Associate Professor
José Luís T. A. M. Mourão	Auxiliar Professor
Rita Maria Payan Carreira	Auxiliar Professor
José Carlos M. Almeida	Auxiliar Professor
Paulo José A. Pinto Rema	Auxiliar Professor
Severiano J. C. Rocha e Silva	Auxiliar Professor
Maria José Marques Gomes	Auxiliar Professor
Victor M. Carvalho Pinheiro	Auxiliar Professor
Maria Fátima S. Petim Batista	Auxiliar Professor
António Mário D. Silvestre	Auxiliar Professor
José Júlio G. Barros Martins	Assistant
Divanildo Outor Monteiro	Assistant
Virgínia Alice C. Santos	Assistant
Paulo António Russo Almeida	Assistant
João Carlos Mateus	Assistant
Ana Luísa G. Dias Lourenço	Assistant
Luís Miguel Mendes Ferreira	Assistant
David Orlando Alves Ferreira	Assistant
Helena C. Fernandes Serôdio	Assistant
Ângela Maria Ferreira Martins	Auxiliar Assistant
Sandra Maria Rosa Sacoto	Auxiliar Assistant
Bruno Jorge Antunes Colaço	Auxiliar Assistant

The Department is governed according to the UTAD internal regulations.

A Coordinator and a Vice-coordinator chosen by the teachers and employees for a two year-old mandate manage the Department.
Besides teaching investigation activities are developed on different themes, such as:

Prediction of body chemical composition using real time ultrasonography techniques and image analysis;
Analysis of animal local breeds genetic diversity using DNA techniques;
Characterization of reproductive efficiency of animal local breeds;
Associations between milk protein polymorphism and productive and quality cheese parameters;
Genetic preservation of animal local breeds;
Utilization of molecular markers in milk production breeding parameters;
Characterization of IGP and DOP products;
Influence of amino acid profiles in larvae and post-larvae feeding of marine fish;
Influence of enzymatic supplementation in broilers fed legume-based pastures;
Evaluation of nutritive value of feeds using in vitro techniques;
Utilization of by-products in animal feeding.
The Animal Science Department is involved in several national and international projects. This

Department intends to promote partnerships with organizations that have identical interests in teaching and investigation.
It is also intended to implement partnerships with associative, cooperative and business sectors.

3- Facilities and equipment

In the Animal Science Department there are several laboratories, which are used for teaching and research purposes:
Animal physiology
Animal nutrition
Animal reproduction
Rooms with environmental control
Slaughter and dissection rooms

The Department also has several animal facilities:

Dairy cow facilities with capacity for 40 animals
Milking parlor room
Animal nutrition facilities
Beef cattle facilities with capacity for com 40 animals
Sheep and goat facilities with capacity for 200 animals
Pig facilities with capacity for 30 sows
Poultry facilities with capacity for 700 hens
Poultry facilities with capacity for 500 broilers
Rabbit facilities for 300 animals
Aquaculture facilities for several species;
A small unit for equines

The students have at their disposal a Central Library with scientific and technical publications, which may be recommended by the lecturers. On line research is also possible at the library.
It should also be stated that the Department has classrooms equipped with computers connected to the Internet.

4- Degrees

The Department is responsible for 4 annual and 32 semester subjects divided by the following Degrees:
Engenharia Zootécnica (Animal Science)
Medicina Veterinária (Veterinary Medicine)
Engenharia Agrícola (Agricultural Science)
Biologia e Geologia via ensino (Biology and Geology)

The minimum extent of a subject is one semester (15 weeks). The number of ECTS of each subject is mentioned in the general structure of the several Degrees.
Besides the degrees, the Department also cooperates in several Masters' courses.
Whenever possible teachers and technicians, of recognized merit, are invited to cooperate with the lecturers.

5- Teaching, learning and evaluation methods

The subjects comprise theoretical, practical and theoretical-practical classes, according to the nature of the program contents. The frequency to 75% of theoretical, practical and theoretical-practical classes is compulsory.
Besides the classes the students also have the opportunity to participate in all of the animal management activities.
Students also take study trips with the objective of increasing the contact with the agrarian reality consolidating their knowledge.
The evaluation methods comprise the continuous evaluation through the accomplishment of tests and practical works. However, there are disciplines where just take place final exams (for specific information on each discipline consult the respective subject description).

EXACT, NATURAL & TECHNOLOGICAL SCIENCES

DEPARTMENT OF PLANT SCIENCE AND AGRICULTURAL ENGINEERING

A- General description of the Department

1- ECTS Departmental Coordinator

Name: Ana Luísa de Figueiredo Pires
Address: University of Trás-os-Montes and Alto Douro
Dept. of Edafology
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Email: alpires@utad.pt

When unavailable, please contact:
Name: Francisco Aguiar
Telephone: 351.259.350203
Email: faguiar@utad.pt

2- Structure and organization

The Department of Edafology Engineering is one of the 20 Departments of the University of Trás-os-Montes and Alto Douro which began in the late seventies. The staff includes 7 Professors and Lecturers and 8 Technical Assistants, organized into two thematic areas, as follows:

Soils
Soil Fertility

The Department is ruled by the "Regulation of Depart-ments" adopted at the UTAD.

The management of the Department of Plant Sciences and Agricultural Engineering is conducted by a Co-
-ordinator and Vice-Coordinator elected by the teaching and non teaching staff, for a period of two years. On average, the Department meets when relevant issues need urgent decision. The Assembly of Department (all teaching staff and a representant of non teaching staff) meets twice a year.

Apart from teaching, the other major activities of the Department involve research and experimentation on the Soils and soil Fertility areas. This research is divided into two main thematic areas: I) management of agro - forestry and forestry ecosystems in order to maintain its sustainability and productivity and ii) dynamics and soil nutrient availability.

Teaching staff

Name	Category
João Filipe Coutinho Mendes	Full Professor
Ana Luísa de Figueiredo Pires	Associate Prof.
Ester Mª Abranches Portela	Associate Prof.
Fernando Falcão Raimundo	Assistant Prof.
Marta Albuquerque Roboredo	Teaching Assist.
João Ricardo M. de Sousa	Teaching Assist.

These research activities are funded from both permanent national sources and contracted international projects. In both cases our major roles are either as researchers and/or project and program coordinators.
Among other activities the Department plays and active role in the development of scientific networks and co-operation at national and particularly at international level in the area of research, lecturing, exchange and mobility of staff and students.
The Department also supports the agricultures mainly through the Soil and Plant analysis Laboratory

3- Facilities

In the Department there are Laboratories for practical classes and for research activities. Students have access to the main Library where they can find a section dedicated to the Department with technical and scientific periodicals and a good selection of books which covered the whole subjects addressed in the Department. "On-line" research is also available.
From a long list of equipment it must be stressed: AA, auto analyser, flame photometer, growth chamber and greenhouse.

4- Degree Programmes

The lecturing activities encompass 10 disciplines within seven main courses:

Agronomy
Animal Production
Forestry
Environmental Eng.
Oenology
Landscape Architecture
Biology and Geology

The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.
Some of the Professors are also involved in lecturing Masters Courses.
Other tasks of the Professors include the supervisions of the final higher degree reports, and Masters and PhD theses of both national and international students.

5- Teaching, learning and assessment methods

Theoretical, practical and mixed theoretical and practical lectures are available within the group of disciplines in the Department. The last two types of lectures are compulsory, since the practical component is of high relevance for the whole group of disciplines available in the Department.
Field trips and excursions to areas of major agriculture activity in Portugal are regularly organised with the objective of bringing the students to reality and to consolidate their knowledge.
Student's evaluation is done using different methods: tests, practical and laboratory work, reports and final exams. According to the discipline these methods can be used de per se or combined. Final examinations are most frequent. Further information is available on the description of each discipline.

DEPARTMENT OF ENVIRONMENTAL AND BIOLOGICAL ENGINEERING

A - General description of the Department

1- ECTS Departmental Coordinator

Name: José Manuel Torres Pereira
Adress: Universit of Trás-os-Montes and Alto Douro, Department of Biological and Environmental Engineering, Apt 202, 5001-911 Vila Real
Telephone: 351259350248
Fax: 351259350480
E-mail: jpereira@utad.pt

When unavailable, please contact:
José Gomes Laranjo
E-mail: jlaranjo@utad.pt

2- Structure and organization

The Department of Biological and Environmental Engineering is one of the 20 departments of the University of Trás-os-Montes and Alto Douro whichbegan in 1976. The staff includes 45 Professors and lecturers and ……Technical Assistants, organized into 16 thematic areas, as follow:

Plant physiology
Biochemistry
Animal ecophysiology
Comportamento animal
Animal and plant histology
Zoology
Botany
Ecology
Microbiology
Biophysics
Molecular and cellular biology
Study and methodology of environmental impact and environmental education
Biophysical Management
Environmental quality and ecotechnology and modelation
Management of residues
Control of air and sonorous poluition

Teaching staff

Name	Category
José M. G. Torres Pereira	Full Professor
António A. F. Fernandes	Associate Professor
Armando A. G. de Melo	Associate Professor
João A. Santos Cabral	Associate Professor
Luis F. Torres de Castro	Associate Professor
Rui M. Furtado Bezerra	Associate Professor
Amélia Mª L. Dias da Silva	Assistant Professor
António Luis Crespi	Assistant Professor
Anastássios Perdicoúlis	Assistant Professor
Carlos Manuel Correia	Assistant Professor
Dario Loureiro dos Santos	Assistant Professor
Jorge V. Ferreira Cardoso	Assistant Professor
José Carlos E. G. Laranjo	Assistant Professor
José M. Moutinho Pereira	Assistant Professor
Margarida Correia Marques	Assistant Professor
Teresa Mª dos Santos Pinto	Assistant Professor
Ana Cristina R. Sampaio	Teaching Assistant
António M. F. Fernandes	Teaching Assistant
Berta Gonçalves	Lecturer
Carla Mª Quintelas Amaral	Lecturer
Carla Torres Pereira	Lecturer
Edna Carla J. Cabecinha	Lecturer
Eunice Areal	Lecturer
José Albino G. Alves Dias	Lecturer
Mª do Rosário A. dos Anjos	Lecturer
Carlos Afonso Teixeira	Assistant Lecturer
António J. F. Santos Matos	Visiting Fellow
Artur M. Fonseca Salgado	Visiting Fellow
Luís Ruas	Visiting Fellow
Mário J. Pimentel Pereira	Visiting Fellow
Cármen Moreira	Colaborator
Celso A. de Sá Santos	Collaborator
Claúdia Patrícia Fernandes	Collaborator
João Coutinho	Collaborator
João Soares Carrola	Collaborator
Mário G. Santiago Santos	Collaborator
Paula F. Moura Lemos	Collaborator
Pedro Alexandre C. Matos	Collaborator
Pedro Teiga	Collaborator
Sandra M. Veiga Monteiro	Collaborator
Sofia G. Garcia dos Santos	Collaborator
Víctor M. F. Galhano	Collaborator

The Department is ruled by the “Regulation of Departments” adopted at the UTAD.

The Co-ordination of the Department is done by a Co-ordinator and a Vice-Co-ordinator elected by the teaching and non teaching staff, for a period of two years. Doctorals Department Counsels are done regularly or also including non-doctorals as it has justifiable subjects.

Besides from the teaching, the other major activities of the Department involve fundamental

and applied research in the scope of Environmental Sciences and Technology, Inland Natural and Agricultural Environments, and related scientific areas. As a Research Unit, the core is Ecophysiology, Applied Ecology, Environmental Biochemistry, Environmental Microbiology, and Ecotoxicology, with research falling upon inland natural and agricultural systems. Biological and physicochemical processes and its interactions are a focus of the research performed in the Unit, with a permanent concern regarding results applicability.

These research activities are supported from both permanent national and international projects and from UTAD.

ENGINEERING DEPARTMENT

A- General description of the Department

1- ECTS Departmental Co-ordinator

Name: Manuel Cabral Reis
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E-mail: mcabral@utad.pt
Should the Coordinator be unavailable, please contact:
Name: Maria LaSalete Pavão
Phone: +351 259350347
E-mail: salete@utad.pt

2- Structure and Organization

The Engineering Department is one of UTAD's 20 departments and initiated its activities at the end of the 1980s. The 69-strong faculty is assisted by 21 staff members and is organized into five Divisions, namely:
Computing Centre
Civil Engineering
Electrical Engineering
Mechanical Engineering
Informatics

Teaching staff

Name	Category
José A. Moreno Bulas Cruz	Full Professor
Manuel da R. Cordeiro	Full Professor
Alfredo da Silva Ribeiro	Associate Professor
Pedro J. Melo T. Pinto	Associate Professor
Anabela G. Correia de Paiva	Associate Professor
Isabel Mª A. M. O. Bentes	Associate Professor
Luís M. Morais Leite Ramos	Associate Professor
José Carlos Silva Cardoso	Associate Professor
José Joaquim Lopes Morais	Associate Professor
Paulo A. Cardoso Salgado	Associate Professor
Abel-Ilah Rouboa	Assistant Professor
Carlos M. J. Alves Serôdio	Assistant Professor
José Boaventura R. da Cunha	Assistant Professor
José P. B. Moura Oliveira	Assistant Professor
João Manuel Pereira Barroso	Assistant Professor
Luis Filipe Sa. Fernandes	Assistant Professor
Manuel J. Cabral dos S. Reis	Assistant Professor
Maria E. Costa Salavessa	Assistant Professor
Paula L. N. Braga da Silva	Assistant Professor
Salvador M. Ferreira da Silva	Assistant Professor
Amandio L. Sanches Yrache Teixeira Pinto	Invited Assistant Professor
Caroline E.Dominguez	Invited Assistant Professor
Eduardo Paiva Rodrigues	Invited Assistant Professor
Jorge M. da Costa Machado	Invited Assistant Professor
José Barbosa Vieira	Invited Assistant Professor
Mário Amorim Graça Moura	Invited Assistant Professor
Vitor M. Marques Ribeiro	Invited Assistant Professor
Abílio Manuel Pinho de Jesus	Teaching Assistant
Amadeu D. da Silva Borges	Teaching Assistant
António F. V. Castro Coelho	Teaching Assistant
António Luís Gomes Valente	Teaching Assistant
António M. V. Lima	Teaching Assistant
António M. M. Silva Marques	Teaching Assistant
António M. T. Silva Cunha	Teaching Assistant
Cristina Madureira dos Reis	Teaching Assistant
Eduardo José Solteiro Pires	Teaching Assistant
Francisco de Sousa Pereira	Teaching Assistant
Francisco J. P. M. Bernardo	Teaching Assistant
Jorge de J. Pereira Faustino	Teaching Assistant
Jorge T. Q. Silva Pinto	Teaching Assistant
José Benjamim R. da Fonseca	Teaching Assistant
José Manuel Alves Ribeiro	Teaching Assistant
José Ribeiro Baptista	Teaching Assistant
João A. Batista L. Pavão	Teaching Assistant
Luis Filipe Leite Barbosa	Teaching Assistant
Luís J. C. Torres Pereira	Teaching Assistant
Nuno M. M. Dourado	Teaching Assistant
Nuno P. C. e Afonso Moreira	Teaching Assistant
Paula C. R. Coutinho Oliveira	Teaching Assistant
Paulo Nogueira Martins	Teaching Assistant
Pedro M. Mestre A. Silva	Teaching Assistant
Raul M. P. Morais dos Santos	Teaching Assistant
Salviano F. Silva Pinto Soares	Teaching Assistant
Sérgio Augusto Pires Leitão	Teaching Assistant
Victor Manuel de Jesus Filipe	Teaching Assistant
António M. C. Monteiro	Invited Teaching Assistant
António Paulo Teixeira Costa	Invited Teaching Assistant
Domingos J. M. Guimarães	Invited Teaching Assistant
Francisco A. F. B. Godinho	Invited Teaching Assistant
Ilídio Manuel Miranda Faria	Invited Teaching

	Assistant
João Paulo F. C. Moura	Invited Teaching Assistant
Leonel Caseiro Morgado	Invited Teaching Assistant
Licinio Dias Azenha Jorge	Invited Teaching Assistant
Manuel C. F. Rodrigues Pires	Invited Teaching Assistant
Nuno M. Cordeiro Cristelo	Invited Teaching Assistant
Ramiro M. R. M. Gonçalves	Invited Teaching Assistant
Sandra C. A. P. da S. Cunha	Invited Teaching Assistant
Fernando M. G. de Gouveia	Training Assistant
Marta F. Moura Ribeiro Vilar	Training Assistant

Staff

Name	Prof. Category	Division
Abel J. C. Coelho	Prec. Machines Oper.	Comp. Centre
Alberto M. M. Meneses Vasconcelos	Comp. Specialist Lvl.1	Comp. Centre
Ana Rosa Pereira	Comp. Techn. Lvl.1	Comp. Centre
António J. M. Carvalho	Comp. Techn. Lvl.1	Comp. Centre
António M. A. S. Rio Costa	Comp. Specialist Lvl.1	Comp. Centre
Arsénio M. dos Reis	Comp. Specialist Lvl.2	Comp. Centre
Cristina Mª R. Santos	Technician Lvl 2ª	Mechanic. Eng.
Cristovão L. Santos	Technician Lvl 2ª	Mechanic. Eng.
Elisabete C. G. Felizardo	Main Off. Assist.	Electr. Eng.
Emanuel J. V. Pontes	Comp. Techn. Lvl.1	Electr. Eng.
Jorge J. S. Borges	Comp. Specialist Lvl.1	Comp. Centre
Jorge M. G. Santos	Comp. Specialist Lvl.1	Comp. Centre
Luís M. S. P. Monteiro	Assist. Comp. Tech.	Comp. Centre
Manuel António P. Marques	Comp. Specialist Lvl.2	Electr. Eng.
Maria A. F. S. Leandro	Technical Assistant	General Supp.
Maria C. L. L. Felizardo	Technical Assistant	General Supp.
Maria F. B. C. Rodrigues	Technical Assistant	Electr. Eng.
Maria Salete C. S. Pavão	Main Off. Assist.	Civil Eng.
Raquel L. S. Jesus Sá	Comp. Specialist Lvl.1	Comp. Centre
Ricardo F. Cardão	Profess. Tech. Lvl.2	Civil Eng.
Vitor M. Santos Sá	Comp. Techn. Lvl. 1	Comp. Centre

The Department is governed by the Departmental Statutes adopted by UTAD.
A Dean, elected by the Faculty and non-teaching staff, for a two-year mandate, manages the Engineering Department. The elected Dean nominates four deputies, representing respectively the Civil, the Electrotechnical, the Mechanical and the Computer Science divisions. The Department's Scientific Board regularly holds ordinary meetings (an average of one per month), complemented by extraordinary meetings whenever urgent issues so require. The Department's Assembly, composed by the entire Faculty and by representatives of the non-teaching staff meets twice yearly, on average.
Besides fulfilling its teaching responsibilities, the Department engages in research activities, which account for a significant occupancy percentage on the part of the Faculty. The research field is directed to the following thematic areas:

1 – Automation & Control:
Goals:
To create methodologies inspired by or applied to living and environmental systems, in order to develop biological and environmental models.
Actions:
Support to decision-making in electrical power distribution networks.
Greenhouses vegetable control production using soft computing techniques.
Dynamic systems' control and coordination, subject to analytical and logical restrictions.
Competitive electricity market optimised management.
Development of a natural gas, direct-injection engine; 3D study of flame propagation.
Development of a fermentator for red wines from the Douro region.

2 – Biomaterials
Goals:
Experimental modelling and characterization of the physical and mechanical behaviour of natural materials, for biology-oriented applications; characterization of the interaction between natural and artificial materials.
Actions:
Non-linear mechanical behaviour of wood.
Multi-layer overlay for bioactive materials.

3 – Applied hydraulics and environment
Goals:

Development of models for hydraulic systems under an environment context.
Actions:
Modelling and monitoring of water-supply systems for small villages.
Modelling and monitoring of clearance and water-treatment networks.

4 – Computer modelling
Goals:
Development and application of distinct approaches to modelling, with emphasis on biomechanics, characterization of materials and other biological and environmental applications.
Actions:
Optimization of the aerodynamic shape of an airship.
Numerical casting simulation.
Draining computer simulation using large-scale models.
Physical and numerical modelling of heat-transfer and mass-transfer phenomena in housing.

5 – Sustainable building
Goals:
Territorial development and planning methodologies application, home rehabilitation, quality evaluation and certification.
Actions:
Traditional architecture of "Alto Douro Vinhateiro - Tabuaço".
Market and development dynamics on housing in the region.
Territorial dynamics and structure of "Alto Douro Vinhateiro".
6 – Signal Processing
Goals:
Study and implementation of signal processing techniques to characterise and/or control system's behaviour; digital image processing.
Actions:
Analysis and demonstration of BSE histological images.
Video monitoring and speed control.
Mobile communications, broadband networks, IPv6.
Biomechanical analysis based on computer vision.
Advanced spectral analysis and modelling of ultrasonic Doppler signal in medicine.

7 – Intelligent Systems
Goals:
To engage in applied research in the field of intelligent systems
Actions:
Information organisation using fuzzy systems based on the concept of relevance.
Agent-based search model for multimedia information.
Remote-teaching model in environments supporting mobility.
Study and modelling of electric power supply quality.

8 – Biotelemetry
Goals:
Automated radiofrequency and biotelemetry identification of physical features in animals and humans.
Actions:
Development of piezoelectric sensors for heartbeat monitoring.
Use of accelerometers to monitor animals with zootechnical interest.
Development and testing of short-range radiofrequency transmitters for round-the-clock monitoring
In vivo testing of implantable capsules for biotelemetry.
Study and testing of data transmission and energy by inductive coupling for implantable devices.
Emphasis is due to the commitment of the entire faculty for management and/or participation in several national and international projects, supporting the ongoing research fields.
A further Department goal is the incentive to cooperation with national and international organizations, as well as to an increasing cooperation with the business world, both at the research and teaching areas, and regarding final degree projects and post-graduate projects.
The Department is also involved with several Regional Development Plans, among which "Alto Douro Vinhateiro" (UNESCO World Heritage Region) and the Cooperative Extension Service in Trás-os-Montes e Alto Douro – a.k.a. "Trás-os-Montes Digital".

3- Facilities

Two kinds of labs are available in the Department: teaching-only labs and mixed labs, mainly for research activities:

Civil Division
Materials and Soils Lab – Hangar
Physics of Buildings Lab – Hangar
Hydraulics Lab - Hangar
Geographical Information Systems Lab – Room E2.11
Electrical Division
Electronics and Lab Practice Lab – E-1.20
Networking Lab – E1.16
Digital Systems Lab – E1.17
Automation Lab – E1.18
Computers & Computing Lab – E2.17
Electric Machines Lab – E-1.17
Lab 2 – E2.02
Lab 1 – E1.05

Lab 0 – E0.06
Lab -1 – E-1.05
Mechanical Division
Dynamics Lab – Hangar
Fluids Lab – Hangar
Materials Lab – Hangar
Automation Lab – F0.07
Material Essays Lab – Hangar
Thermical Sciences Lab – Hangar
Computational Mechanics Lab – F2.01
Mechanics Workshop – Hangar

At the Main Library, the students can find several books, scientific and technical magazines, and journals. Teachers recommend those found more adequate for each course. On-line search is also available.

4- Degree Programmes

The Department teaches 160 courses (semester and year-length) for the following graduate degrees:
Civil Engineering
Electrical Engineering
Mechanical Engineering
Informatics
Environmental Engineering
Agronomy Engineering
Oenology
Forestry Engineering
Biology & Geology
Nursery School Teaching (Vila Real)
Applied Foreign Languages
Primary School Teaching (Vila Real)
Nursery School Teaching (Chaves)
Primary School Teaching (Chaves)
Professional Training (Professional Traineeship in area 39 – Informatics)
Applied Ecology
Sports and Physical Education
Recreation, Leisure and Tourism (Chaves)
Landscape Architecture.
The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.

The Department also organizes and teaches in the Masters Degree on Engineering Technology, and cooperates in teaching of other Masters Degrees at the UTAD and other national institutions. Nine courses in all are taught as part of post-graduation and masters degrees at the UTAD:
Masters Degree in Engineering Technology
Post-graduation Degree in Translation
Masters Degree in Biology
Masters Degree in Forestry Resources Engineering

The faculty is also involved in the coordination of traineeships, Masters and PhD theses.
Whenever possible, following a connection philosophy between students and the business world, respected professors and technical professionals, national and foreign, are invited to teach under their specialty. Businesspersons are also invited under the same line, to present and discuss with students several themes related to course programme.

5- Teaching, learning and assessment methods

Each course may have lectures, practical classes and/or mixed classes, depending on content. Attendance to practical and mixed classes is mandatory. At the engineering department, the practical side of courses is fundamental, and regular investment has taken place on infrastructure, equipment and workspaces, for students to work on their practical assignments – which, in turn, are mostly subject to evaluation.
It is also intended that students take part in field trips, improving their contact with the business world and consolidating their knowledge.
Evaluation under each course is performed in a continuous way, through tests and practical assignments. However, some courses only use final exams. Some courses also held seminars. For more information on each course, please see their “individual modules”/records.

DEPARTMENT OF PHYSICS

A- General description of the Department

1- ECTS Departmental Co-ordinator

Name: José Manuel Marques Martins de Almeida
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Dept. of Physics
P.O. Box 1013
5001-911 Vila Real
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Email: coordfis@utad.pt
When unavailable, please contact:
Name: José Gomes Ferreira
Telephone: 351.259.350316
Email: coordfis@utad.pt

2- Structure and organization

The Department of Physics is one of the 20 Departments of the University of Trás-os-Montes and Alto Douro which began in the early eighties. The staff includes 24 Professors and Lecturers and 4 Technical Assistants.
The Department is ruled by the "Regulation of Depart-ments" adopted at the UTAD.
The management of the Department of Physics is conducted by a Coordinator and Vice-Coordinator elected by the teaching and non teaching staff, for a period of two years. On average, the Department meets every two months or when relevant issues need urgent decision. The Assembly of Department (all Ph.D. staff, two representatives of the Teaching Assistants, and one of the non teaching staff) meets twice a year.
Apart from teaching, the other major activities of the Department involve research in areas as diverse as Materials Science, Thermodynamics and Fluids, Meteorology/Climatology, Biophysics, Optoelectronics, Thin Films and Physics Teaching, which occupy a substantial part of the staff's time.

Teaching staff

Name	Category
José M. S. Gomes Ferreira	Associate Professor
Maria Solange M. Leite	Associate Professor
José M.M.M. de Almeida	Associate Professor
Carlos M. Margarido Matias	Assistant Professor
Ednan Joanni	Assistant Professor
Joaquim B. Oliveira Lopes	Assistant Professor
Joaquim M. da Silva	Assistant Professor
Anacleto	Teaching Assistant
Armando Assunção Soares	Teaching Assistant
Eurico V. Ferreira Amorim	Teaching Assistant
Francisco José S. F.	Teaching Assistant
Marinho	Teaching Assistant
José Paulo C. C. Cravino	Teaching Assistant
José Ramiro A. Fernandes	Teaching Assistant
João Carlos A. dos Santos	Teaching Assistant
Liliana C. S. F. A. Caramelo	Teaching Assistant
Malik Amraoui	Teaching Assistant
Marco Paulo Duarte Naia	Teaching Assistant
Margarida C.R.M.R. Liberato	Teaching Assistant
Maria Adelaide P.M.	Teaching Assistant
Andrade	Teaching Assistant
Mário Jorge M.G. Pereira	Teaching Assistant
Pedro M. Cravino Serra	Teaching Assistant
Norberto J. A.P. Gonçalves	Teaching Assistant
Daniel M. L. Alexandre	
Luís F. Ferreira Morgado	
Afonso Pedrosa Pinto	

These research activities are funded from both permanent national sources and contracted international projects.
Among other activities the Department plays and active role in the development of scientific networks and co-operation at national and particularly at international level in the area of research. The staff collaborate in natural and regional development programs.

3- Facilities

In the Department there are laboratories for practical lectures and a laboratory devoted to secondary school activities.

Students have access to the Main Library where they can find a section dedicated to the Department with technical and scientific periodicals and a good selection of books which covered the whole subjects addressed in the Department. "On-line" research is also available.

4- Degree Programmes

The lecturing activities encompass 27 disciplines within six main courses:
Physics/Chemistry (teaching of)
Biology/Geology (teaching of)
Mathematics (teaching of)
Child Education
Basic Teaching-1st Cycle

Food Sciences
Agricultural Engineering
Zootechnical Engineering
Forest Engineering
Chemistry
Enology
Landscape Architecture
Civil Engineering
Electronic Engineering
Environment and Natural Resources Engineering
Mechanical Engineering

The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.

The Department is responsible for the co-organisation and teaching of a MSc course in Physics/Chemistry.
Other tasks of the Professors include the supervisions of the final higher degree reports, and Masters and PhD theses of both national and international students.

5- Teaching, learning and assessment methods

Theoretical, practical and mixed theoretical and practi-cal lectures are available within the group of disciplines in the Department. The last two types of lectures are compulsory, since the practical component is of high relevance for the whole group of disciplines available in the Department.
Student's evaluation is done using different methods: tests, practical and laboratory work, reports and final exams. According to the discipline these methods can be used de per se or combined. Final examinations are most frequent. Further information is available on the description of each discipline.

DEPARTMENT OF GEOLOGY

A- General description of the Department

1- Head of the Department ECTS

Name: Alcino de Sousa Oliveira
Address: Trás-os-Montes and Alto Douro University (UTAD)
Department of Geology
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5001-911 Vila Real
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Email: geologia@utad.pt
In case the Head is not available, please contact:
Name: Luís Manuel Oliveira Sousa
Telephone: 259 350 279
Email: geologia@utad.pt

2- Structure and Organization

The Geology Department of the Trás-os-Montes and Alto Douro University belongs to the Scientific Area of Exact, Natural and Technological Sciences of the Trás-os-Montes and Alto Douro University, created by the Dec. Lei nº60/86 of March 22. The Department initiated its activity in 1979 in the so-called Geology Division which was a part of the Geosciences Department of the Trás-os-Montes Institute, along with the Soils, Chemistry and Climatology divisions. In 1986, when the University has been created and the Geosciences Department has been broken apart, the Geology Division has been promoted to Section of Geology and subsequently (in October 2000) to Department. The staff of the department is composed of 19 researchers and 7 other personnel.

Researchers

Name	Category
António Vilela de Matos	Full Professor
Maria Alice Fontes Macedo	Associate Professor
Maria Elisa Preto Gomes	Associate Professor
Manuel Joaquim Leal Gomes	Associate Professor
Ana Maria Pires Alencoão	Auxiliary Professor
João Carlos da C. V. Baptista	Auxiliary Professor
Maria do Rosário C. Pereira	Auxiliary Professor
Carlos Jorge Madeira Coke	Auxiliary Professor
Luís Manuel Oliveira Sousa	Auxiliary Professor
Fernando A. Leal Pacheco	Assistant
Alcino de Sousa Oliveira	Assistant
José M. Martinho Lourenço	Assistant
Artur Agostinho Abreu e Sá	Assistant
Paulo Jorge Campos Favas	Assistant
Rui José Santos Teixeira	Assistant
Nuno Miguel C. M. O. Vaz	Invited Assistant
Anabela Ribeiro Reis	Probating Assistant
M. Emília Pereira S. Abreu	
José Carlos Rosas Leitão	

The Department is ruled by the “Regulamento dos Departamentos” adopted in the UTAD.
The Department of Geology is managed by a Coordinator e Vice-Coordinator that are elected for a period of two years, by the doctorate, by a non doctorate representing the group of non doctorates and by a member of the other personnel group.
The internal organization and operation of the Department is in agreement with the “Regulamento dos Departamentos da UTAD”, Circular 18/CPCC/01, where the following organs are inscribed : Plenary of the Department, Plenary of the Department’s research teachers, Counselor of the Department e Coordinator of the Department.
In parallel with the teaching scientific research is made in the following areas: mineralogy, petrology, geochemistry of granitoid rocks and associated ores; hydrogeology and water resources; neo-tectonics; rock mechanics; geophysical surveying, paleontology and palinology, Environmental geology; structural geology and ornamental rocks, teaching of sciences, origin of mankind, archeology, pre-history and Quaternary, which is a substantially time consuming activity developed by the researchers.
Focus may also be put on the involvement of the Department’s researchers in the responsibility or participation in several national (e.g. FCT) e international (e.g. Europrearte, Interreg) projects, some of which are currently supporting part of our research areas.
The Department has collaborated with other national and international universities an research institutes in the domain of scientific research.

3- Services and equipments

Apart from the teaching and scientific research, the Department’s staff is usually involved in activities of support to the local communities, namely to the high schools of the region, provided by the Museum of Geology, promoting a teaching based on the observation and experimentation. It has been developing upgrade activities supported by

the FOCO program, continuous formation of high school teachers, and formation of laboratory and field technicians. Within the scope of the "Ciência Viva", the Department is increasing the scientific occupation of young people during school holydays, and has also been promoting daily geological tours integrated in the program "Geology in the Summer".
Other types of cooperation with the local communities is standing on the development of applied geology projects, contracted by local private companies or public organisms, especially in the areas of prospecting of mineral waters or fresh waters for public supply, prospecting and characterization of non metallic mineral resources, stability of slopes, environmental impact studies, among others
In detail, the Department has the possibility to produce work on the areas of:
Cartography (basics e thematic)
Engineering Geology and rock mechanics;
Geophysical surveying;
Geological resources (waters, rocks, etc);
Environment and tourism;
Archeology;
Technological formation
Formation in the teaching of sciences
The teachers and students have at their disposal, in the Department's and UTAD's central libraries, a set of periodicals (scientific and technological journals) and non-periodicals (books, theses, etc), that are also used as supportive material for the teaching.
The Department has laboratories devoted to the support of research activities, the practical classes and the activities related to collaboration with the local communities.
The Department has equipments to be used in filed work on the areas of water resources, cartography and geophysical surveying.

4- Degree Programmes

The Department is responsible for the teaching of 39 disciplines (5 annual + 34 with duration of 1 semester) distributed by the following university degrees:
Biology/Geology (teaching of)
Biology
Applied Ecology
Kinder garden Education
Primary School (1º Cycle)
Agriculture Engineering
Zootechnics Engineering
Forest Engineering
Enology
Landscape Architecture
Civil Engineering
Environmental and Natural Resources Engineering
Anthropology Applied to the Development
Multimedia Communication

The minimum duration used for the teaching of a discipline is 1 semester. When disciplines are taught by two Departments the duration is half semester per Department. The number of ECTS of each discipline is mentioned in the general structure of the course.
Apart from the university degrees, the Geology Department is responsible for the co-organization and teaching in the Master Course of Teaching Biology and Geology, and teaching in the Master Courses of: 1) Mathematics and Natural Sciences; 2) Environmental Technology.
The Department's teachers are also involved in the orientation of probation works, final degree projects, Mater and PhD Theses.

5- Teaching, learning and assessment methods

The taught disciplines comprehend theoretical, theoretical-practical and practical lectures depending on the discipline. The frequency to theoretical-practical and to practical lectures is mandatory. In the Geology Department, the component of field work is crucial for the understanding of processes, materials and geological resources, and of subjects such as environmental impacts and remediation, management of the territory, and identification-valorization of geological patrimony. To that end, study trips are organized, and students are evaluated from trip reports, theses or other works).

The evaluation in each discipline is continuous and made by tests and practical works. However, in some disciplines only the final exam is used as criterion for the student's evaluation. For further information on each discipline, please consult the corresponding individual modulus.

DEPARTMENT OF MATHEMATICS

A- General description of the Department

1- ECTS – Departmental Coordinator

Name: Paula Maria Machado Cruz Catarino
Address: University of Trás-os-Montes e Alto Douro
Department of Mathematics
Apartado 1013
5001-911 Vila Real - PORTUGAL
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When the Co-ordinator is unavailable, please contact:
Name: Maria Cecília Rosas P. P. Costa
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Email: mcosta@utad.pt

2- Organization and Structure

Mathematics's Department is one of 20 Departments of UTAD which was begin in the end of eighty year. At present, the Department staff is about 48 academic staff are employed in this Departement.

Teaching Staff

Name	Category
Emília Joaquina Giraldes Soares	Ph. D.
Paula Maria M. Cruz Catarino	Ph. D.
Anabela Mª. F. B. V. Rodrigues	Ph. D.
José Luís dos Santos Cardoso	Ph. D.
Maria Cecília R. P. P. da Costa	Ph. D.
Maria Manuel da S. Nascimento	Ph. D.
Teresa Paula C. A. Perdicoulis	Ph. D.
Altino Manuel F. dos Santos	M. Sc.
Américo Lopes Bento	M. Sc.
Ana Paula Aires Borges Teixeira	M. Sc.
Ana Paula Florêncio Aires	M. Sc.
André Gama Oliveira	M. Sc.
Ângela Carla F. Macedo Cardoso	M. Sc.
Argentina Maria Soeima Leite	M. Sc.
Carlos Manuel S. Gonçalves Rito	M. Sc.
Catarina Pina Avelino	M. Sc.
Elisete Maria Rodrigues Correia	M. Sc.
Elza Maria Alves de S. Amaral	M. Sc.
Eurica Manuela N. L. Henriques	M. Sc.
Hélder Fernando Pedrosa e Sousa	
Helena Maria Barros de Campos	M. Sc.
Irene Cristina S. de Oliveira	M. Sc.
Isabel Alexandra F. S. V. Nicolau	M. Sc.
Joaquim João Moreira de Sousa	M. Sc.
João Luís Honório Matias	M. Sc.
Lio Fidalgo Gonçalves	M. Sc.
Luís Filipe S. Roçadas Ferreira	M. Sc.
Luís Gonzaga Mendes Magalhães	M. Sc.
Luís Miguel Faustino Machado	M. Sc.
Maria Adelaide da Cruz Cerveira	M. Sc.
Maria da Graça Pereira Soares	M. Sc.
Maria de Fátima M. Ferreira	M. Sc.
Maria Luísa Ribeiro S. Morgado	M. Sc.
Pedro Miguel Fernandes Vieira	M. Sc.
Regina de Almeida	M. Sc.
Sandra Cristina Pires Dias	M. Sc.
Sandra Isabel Ventura Ricardo	M. Sc.
Sérgio dos Reis Marques Madeira	M. Sc.
Eva Virgínia Araújo Morais	
Paulo José Martins Vasco	
Helena Maria L S. A. Monteiro	
Maria Gabriela da C. Direito	
José Félix Afonso Póvoa	
Pedro Manuel A. B. Magalhães	

The Department of Mathematics follows the general norms of all Departments adopted in UTAD.

The Department's governance is provided by a Co-ordinator elected for two years by all academic staff and by a Vice-coordinator.
In the Department the frequency of meetings of PhD academic staff is one for month and of the academic staff is twice a year. The Department is responsible for two undergraduate courses, Teaching of Mathematics and Financial Mathematics. It is also responsible for two Master's degrees, in Mathematics (Specialisation in Education) and in Mathematics and Natural Science.

The Department also runs most mathematics course units for other University degree courses, like: Landscape Architecture ; Biology; Biology/Geology; Aplied Ecology; Economics; Sports; Pre-Primary Teachers; Agricultural Engineering; Environment Engineering; Civil Engineering; Electronic Engineering; Forest Engineering; Mechanic Engineering; Animal Production; Oenology; Teaching of Phisics-Chemistry; Management; Informatics; Teaching of Mathematics ; Financial Mathematics ; Primary Teachers; Chemistry; Health Engineering; Energy Engineering; Comunications and Multimedia.

All courses are open to ECTS foreign students. In addition the teaching staff develops mathematical research in various domains such us: Algebra, Analysis, Statistics, and Operational Research. Most department staff also work in Mathematics research centres.

3- Services and Specialised equipments

The Department has one computer room with 18 computers for 36 students.
It also has a Didatics of Mathematics room. The Department has its own section in the main library, containing books and specialised journals used in teaching and research. Some of these journals are on-line.

4- Degree Programmes

The Department runs about 160 mathematics course units for other University courses. It is also responsible for the following two undergraduate's and master's courses:

- (Teaching of) Mathematics

This is a 5 year degree with the aim of preparing maths teachers for students from 12 to 18 years of age.The syllabus awards credits in the areas of Mathematics, Education and Computer Science. The last year of the degree is spent training at a school, under the close supervision of a senior school maths teacher and a teaching assist. from the University.

- Financial Mathematics

This is a 4 year degree which intends to give the students a solid and extensive knowledge problems of economics and management, specially, in financial area, which require mathematical and financial tools.
The last semester of this degree is dedicated to professional training at a proper instituition. The syllabus awards credits in the areas of Mathematics, Computer Science, Optimization Finances and Cost Accouting.

- Master's degree in Mathematics (Specialisation in teacher training)

This is a 2 year course which intends to give an up-to-date preparation specifically designed for maths school teachers (for students from the age of 12 to 18 years). In the first year, there are unit courses in Mathematics, supplemented by unit courses in optional areas.
During the last year, students write a master's thesis. These unit courses started in October 2000.

- Master's degree in Mathematics and Natural Sciences

This is a 2 year course which intends to give an up-to-date preparation specifically design for math and natural science school teachers (for students from the age of 10 to 12 years).
In the first year, there are unit courses in Mathematics, Biology, Physics, Geology supplemented by unit courses in optional areas and seminars.
During the last year, students write a master's thesis. This unit course started in October 2002.

5- Teaching/Learning/Assessment Methods

Regarding undergraduate courses, the syllabus is based on lectures and examples classes. In general, in a lecture course, the main concepts are presented, followed by results usually presented as theorems. In an examples classe, students are expected to solve proposed problems or to develop projects.

At the end of each semester, and according to the academic calendar, the students are assessed in a written examination and sometimes also in an oral examination.

For postgraduate course, assessement for unit courses is mainly based on written and oral examinations. The students have an oral examination to present their master's thesis.

There is the possibility of preparing and writing essays and thesis in this Department.

CHEMISTRY DEPARTMENT

A- General description of the Department

1- Departmental Coordinator ECTS

Name: Luís Carvalho
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Departamento de Química
Apartado 1013
P-5001-911 Vila Real
Portugal
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Email: lcarv@utad.pt

Vice-Coordinator:
Name: Pedro Tavares
Telephone: +351 259 350 227
Email: ptavares@utad.pt

2- Structure and organization

The Chemistry Department is one of the 20 UTAD Departments. Its activities began in the late 70's. The staff is composed by 24 teachers and 11 servants. One can identify ten thematic areas namely:

General Chemistry
Analytical Chemistry
Organic Chemistry
Solid State Chemistry
Physical-Chemistry
Electrochemistry
Environmental Chemistry
Food Chemistry
Biochemistry
Computational Chemistry

Teaching Staff

Nome	Category
Rui Ramos do Vale	Associate Prof.
Luís H. Melo de Carvalho	Associate Prof.
Verónica C. de Zea Bermudez	Associate Prof.
Lucinda Vaz dos Reis	Associate Prof.
Paulo Jorge dos Santos Coelho	Associate Prof.
Maria João Melo de Carvalho	Auxiliary Prof.
Fernando A. Lencart e Silva	Auxiliary Prof.
Maria Gabriela S. Figueiredo	Auxiliary Prof.
Maria Cristina Fialho Oliveira	Auxiliary Prof.
Paulo Fernando C. Santos	Auxiliary Prof.
Pedro M. Bandeira Tavares	Auxiliary Prof.
José Alcides Silvestre Peres	Auxiliary Prof.
Fernando Glenadel Braga	Auxiliary Prof.
Francisco M. Pereira Peixoto	Auxiliary Prof.
Maria Manuel Silva Oliveira	Auxiliary Prof.
Maria Cristina G. Antunes	Auxiliary Prof.
Ana Margarida D. Ferreira	Assistant
Rosa Maria Magalhães Rego	Assistant
José Manuel Ribeiro de Sousa	Assistant
Maria Cristina Á. Gonçalves	Assistant
Cristina Maria C. Marques	Assistant
Fernando Hermínio Nunes	Assistant
Ana Isabel Amorim de Barros	Assistant
João Carlos A. Ribeiro Claro	Assistant

The Chemistry Department is managed by a Coordinator and a Vice-Coordinator elected by the Department staff for a two years period. Major decisions are taken in the Department Council with all PhD teachers members that meets whenever is necessary to solve urgent problems and in the Department Assembly with all the Department teachers that meets twice a year.
An important investigating work is also developed in the Chemistry Department. The main domains of investigation are: Organic Chemistry, Solid State Chemistry and Analytical Chemistry. We emphasises the participation of the teaching staff in national and international research projects that supports the on going investigation. Recently it was created a research centre, Centro de Química – Vila Real, as a mean of increasing the research potential. Our goal is to increment the national and international recognition promoting local and national I&D.
Another important Department activity is to provide local councils with water and wastewater analysis and mineral analysis for other University Departments and public bodies.
More information can be achieved in the URL: http://web.utad.pt/pt/departamentos/acent/quimica/index.html

3- Services and specialised equipment

There are two kinds of laboratories. Four laboratories for teaching classes and five laboratories for research and extension activities (Instrumental; Fine Chemistry; Inorganic Chemistry; Analytical Chemistry; Organic Chemistry)
About Chemistry Department equipment we emphasise GC, FTIR, UV-Vis, AAS, DSC, Polarography, Cyclic Voltammetry, Potenciometry and high temperature ovens with controlled

atmosphere. Other equipment is available in shared facilities like GC-MS, HPLC, Electron Microscopy and X-ray Diffraction.
In the Central Library there are collections of specialised books and scientific journals. Usually the teachers provide information about the best suited for each subject. On-line research is also available.

4- Courses and duration

The Chemistry Department teach more than 50 annual and semester subjects in the following courses:
Landscape Architecture
Biology
Biology and Geology (teaching)
Applied Ecology
Agricultural Engineering
Environmental Engineering and Natural Resources
Civil Engineering
Electrotechnology Engineering
Forestry Engineering
Mechanical Engineering
Zootechnical Engineering
Enology
Physics and Chemistry (teaching)
Chemistry
The minimum length time of a subject is a semester. The ECTS for each discipline is mentioned in the Course general structure.
The Chemistry Department is also involved in the Master of Physics and Chemistry for Teachers. Some teachers are also collaborating in other Masters of the University and in other Universities. The teachers of the Chemistry Department are supervising training activities, Master and PhD thesis, and are also involved in seminars and promotion of scientific activities in secondary institutions.

5- Teaching methods, learning and evaluation

The subjects may have lectures, tutorial and laboratory classes. The tutorial and laboratory classes are compulsory. In the Chemistry Department the laboratory classes are fundamental and have an important rule on the evaluation. Several visits to factories and other facilities are also promoted, namely in Engineering Courses, in order to increase the contact with every day reality and knowledge consolidation.

HUMANITIES & SOCIAL SCIENCES

DEPARTMENT OF ARTS AND CRAFTS

A- General description of the Department

1- ECTS Departmental Coordinator

Name: Carlos Cardoso
Address: University of Trás-os-Montes and Alto Douro
Dept. of Arts and Crafts
P.O. Box 1013
5001-911 Vila Real
Telephone: 351.259.330110
Fax: 351.259.330169
Email: cardos@utad.pt

When unavailable, please contact:
Name: Maria de Fátima Roçadas or Florinda Santos
Telephone: 351.259.330108
Email: artes@utad.pt

2- Structure and organization

The Department of Arts and Crafts is one of the 20 Departments of the University of Trás-os-Montes and Alto Douro which began in 1987. The staff includes 8 Professors and 4 Technical Assistants, organized into three thematic areas, as follows:

Communication and Visual Arts
Musical Studies
Theatrical Studies

Teaching staff

Name	Category
Carlos José Vieira M. Cardoso	Associate Prof.
Maria João C. F. Faceira	Associate Prof.
José Carlos Monteiro Reis	Assistant Prof.
Levi Fernades Leonido	Assistant Prof.
Marcelino Sousa Lopes	Assistant Prof.
Domingos Borges D. Júnior	Assistant Prof.
Agostinho Borges	Assistant Prof.
Angela Mª Gonçalves Cardoso	Teaching Assist.

The Department is ruled by the "Regulation of Depart-ments" adopted at the UTAD.

3- Facilities

In the Department there are three rooms-ateliers, destined to practical and theoretic-practical classes Apart these, there is also a Ludoteca destined to the children of the community
The Department dispose also of a Centre of Image in Movement

4- Degree Programmes

The lecturing activities encompass 29 disciplines within six main courses:

Teachers of the First Degree School
Preschool Education
Landscape Architecture
Recreation, Leisure and Tourism
The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course. Other tasks of the Professors include the supervisions of the final higher degree reports, and Masters and PhD theses.

5- Teaching, learning and assessment methods

Theoretical, practical and mixed theoretical and practise-cal lectures are available within the group of disciplines in the Department. The last two types of lectures are compulsory.
Field trips and excursions to areas of artistic, cultural and pedagogical are regularly organised with the objective of bringing the students to reality and to consolidate their knowledge.
Student's evaluation is done using different methods: tests, practical and laboratory work, reports and final exams. Further information is available on the description of each discipline.

DEPARTMENT OF EDUCATIONAL SCIENCES

A- General description of the Department

1- ECTS Departmental Coordinator

Name: Maria da Conceição Azevedo
Adress: University of Trás-os-Montes and Alto Douro
Departments of Educational Sciences
P.O. Box 1013
5001-911 Vila Real
Telephone: 259.330114
Fax: 259.350480
Email: mazevedo@utad.pt

When unavailable, please contact:
Name: José Carlos Teixeira Costa Pinto
Telephone: 259.330124
Email: jpinto@utad.pt

2- Structure and organization

The Department of Educational Sciences is one of the twenty Departments that constitute the University of Trás-os-Montes e Alto Douro (UTAD) and it replaces the former "Escola Superior de Educação". The Department's personnel contain 40 academic staff and 5 secretarial staff.

The Department is ruled by the "Regulation of Depart-ments" adopted at the UTAD.
The Department of Educational Sciences is managed by a Head of Department elected by the Department's own personnel for a period of two years. The Head of Department works in collaboration with a Department's Deputy for Vila Real and another Department's Deputy for Chaves, both of them mandated by the Head of the University under the proposition of the elected Head of Department. The Department's academic staff holding a PhD degree meets every two months and every time there is an urgent matter to be discussed. The Assembly of Department (all teaching staff) meets twice a year.

Teaching staff

Name	Category
José Jacinto V. Raposo	Full Professor
Maria da Conceição Azevedo	Associate Prof.
Américo Nunes Peres	Associate Prof.
Carlos Alberto M. G. Mota	Associate Prof.
Carlos Fernandes Maia	Associate Prof.
Cristiana Maria Soveral	Associate Prof.
José João P. de Bianchi	Associate Prof.
José Pinto Lopes	Associate Prof.
Maria Gabriel M. Bulas Cruz	Associate Prof.
Ana Paula Simões do Vale	Assistant Prof.
Artur C. C. M. Cabugueira	Assistant Prof.
Joaquim José Jacinto Escola	Assistant Prof
José Carlos Costa Pinto	Assistant Prof
Maria Helena R. Santos Silva	Assistant Prof
Otília Maria M. Fernandes	Assistant Prof
Rosângela Bertelli	Assistant Prof
Armando Paulo Loureiro	Teaching Assist.
Carlos Alberto A. S. Ferreira	Teaching Assist.
Francisco L. da Costa Barros	Teaching Assist
Isilda Teixeira Rodrigues	Teaching Assist
Maria Isabel B. Morais Costa	Teaching Assist
Maria João C. de Carvalho	Teaching Assist
Maria José dos Santos Cunha	Teaching Assist
Maria Manuela Póvoa Jorge	Teaching Assist
Ana Maria Ferreira Bastos	Visiting Fellow
Carla Teixeira	Visiting Fellow
Cristina Rosa J. Costa Gomes	Visiting Fellow
Eduardo B. Chaves da Cruz	Visiting Fellow
Gastão L. P. de Bianchi	Visiting Fellow
Isabel M. C. Rego de Barros	Visiting Fellow
João Bartolomeu Rodrigues	Visiting Fellow
Jorge Gomes	Visiting Fellow
Luís Manuel M. de Oliveira	Visiting Fellow
Manuel Barroso Magalhães	Visiting Fellow
Maria de Fátima Assunção	Visiting Fellow
Maria Ortélia B. Machado	Visiting Fellow
Sandra Celina F. Fonseca	Visiting Fellow
Teresa Jesus M. V. Chaves	Visiting Fellow
Teresa Maria F. Carriço	Visiting Fellow
Vanda Marina S. Gonçalves	Visiting Fellow

The Department of Educational Sciences carries out both teaching and research in diverse areas, completely absorbing its academic staff: Education, Psychology, Educational Technology, Education and Society. Besides, the academic staff also participates in a number of national and international research projects that give support to those differing areas of research. The Department also aims at the implementation of cooperation with national and international educational institutions in terms of research and postgraduate enterprises. The Department cooperates in plans for regional development.

3- Facilities

The department contains a "Centro de Recursos de Apoio à Prática Pedagógica" which supports those

students working to become teachers in their professional practise as well as some other activities related to the community. The students have at their disposal a Central Library that holds technical and scientific international periodicals and books and on-line research. In the same building that houses the Department of Educational Sciences there is another library holding a considerable number of resources in Educational Sciences

4- Degree Programmes

The Department provides classes in a number of differing disciplines in a number of undergraduate courses:
Applied Antropology
Teaching of Biology and Geology
Teaching of Physics and Chemistry
Teaching of Mathematics
Teaching of Portuguese and French
Teaching of Portuguese and English
Teaching of English and Germany
Physical Education and Sports
Nursery School Teaching
Primary School Teaching
Recreation Leisure and Tourism.
The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.

The Department also provides a Postgraduate Course, a Master Course in Education, in two differing areas of specialization: Teaching Organisation and Evaluation, and History and Contemporary Educational Problems. The Department's academic staff also cooperates in Postgraduate Courses in Biology and Geology and in Physical Education. Besides, therefore, the academic staff is also involved in the supervision of Master's Dissertations and PhD's thesis.

5- Teaching, learning and assessment methods

According to the nature of each discipline, students are provided with theoretical, practical, or still theoretical-practical classes.

The University's Pedagogical Norms provide direction for the student's academic behaviours and evaluations.
Students evaluation is done using different methods: tests, practical work, reports and final exams. According to the discipline these methods can be used de per se or combined. Further information is available on the description of each discipline.

DEPARTMENT OF ECONOMICS, SOCIOLOGY AND MANAGEMENT

A- General description of the Department

1- ECTS Departmental Coordinator

Name: João Rebelo
Address: Universidade de Trás-os-Montes e Alto Douro (UTAD)
Departamento de Economia, Sociologia e Gestão (DESG)
Av. Almeida Lucena, 1
5000-660 Vila Real
Tel: 259.302200
Fax: 259.302249
Email: jrebelo@utad.pt

If the Departmental co-ordinator is unavailable, please contact:
Name: Alberto Baptista
Tel: 259.302200
Email: abaptist@utad.pt

2- Structure and Organization

The university began life in 1976, and DESG is one of the oldest and largest of the 20 Departments that now constitute UTAD. The department comprises 4 administrative staff, 1 full time researcher and 41 teaching staff. Its main activities are organised in the following 4 branches (covering 16 theoretical areas):

Economics (Economic Theory and Policy; Economic Theory and Quantitative Methods; Development Economics; Rural and Natural Resource Economics)
Management (Accountancy and Finance; Management Strategy; Management and Quantitative Methods; Institutional Organisation and Administration)
Social Sciences (Development Theory and Action, Social Theory and Research Methodology; Sociology; Anthropology)
Agrarian Social Sciences (Rural and Natural Resource Economics; Resource and Agricultural Policy; Agricultural Economics and Management; Sociology and Rural Development)

DES is governed by the Departmental regulations adopted by UTAD. Its day-to-day administration is undertake by a Co-ordinator and Vice Co-ordinator, elected for a term of two years by the Departmental Assembly, the Department's main decision-making body, which meets periodically (at least once a month) and more frequently if necessary.
Besides teaching, another of DES's key activities is research, which is currently organised and undertaken in three thematic areas:

Economics, State and Policy; Territory, Society and Resource Development; and Business, Finance and Organisational Dynamics.

Teaching Staff

Name	Status
Artur Cristóvão	Full Prof.
Chris Gerry	Full Prof.
João Rebelo	Full Prof.
José Portela	Full Prof.
Maria Isolina Poeta	Full Prof.
Alexandre Poeta	Associate Prof.
Carlos Machado dos Santos	Associate Prof.
Francisco Diniz	Associate Prof.
José Vaz Caldas	Associate Prof.
Manuela Ribeiro	Associate Prof.
Telmo Caria	Associate Prof.
Timothy Koehnen	Associate Prof.
Leonida Correia	Assistant Prof.
Lívia Madureira	Assistant Prof.
Manuel Colaço do Rosário	Assistant Prof.
Manuel Teixeira	Assistant Prof.
Alberto Baptista	Researcher
Ana Marta Costa	Teaching Assist.
Ana Paula Rodrigues	Teaching Assist.
Patrícia António	Teaching Assist.
Carla Marques	Teaching Assist.
Carlos Fonseca	Teaching Assist.
Carlos Marques	Teaching Assist.
Fernanda Nogueira	Teaching Assist.
Fernando Bessa Ribeiro	Teaching Assist.
José Maria Andrade	Teaching Assist.
Júlia Fragoso	Teaching Assist.
Manuel Luís Tibério	Teaching Assist.
Maria da Conceição Silva	Teaching Assist.
Maria José Rainho	Teaching Assist.
Maria Teresa Sequeira	Teaching Assist.
Mário Sérgio Teixeira	Teaching Assist.
Sofia Gouveia	Teaching Assist.
Vasco Rebelo	Teaching Assist.
Carlos Rui Madeira	Junior T. Assist.
Lina Sofia Lourenço	Junior T. Assist.
Patrícia Martins	Junior T. Assist.
António Pires	Invited T. Assist.
Margarida Gaspar	Invited T. Assist.
Maria José Gomes	Invited T. Assist.
Maria Margarida Matos	Invited T. Assist
Pedro Ferrão	Invited T. Assist.

Adelaide Ribeiro	Admin. Assistant
Laura Rainho	Admin. Assistant
Manuela Mourão	Admin. Assistant
Piedade Matos	Admin. Assistant

Also, most DESG teaching staff members are actively involved in various on-going national and international funded research projects: in 2002 staff were involved in 14 separate research projects. DESG also aims to stimulate cooperation with national and international teaching and research organisations; this involves exchange of staff and documentation, as well as direct research collaboration.
The Department adopts a pro-active approach to the social-economic development of the surrounding region, through applied research projects, undertaking of community service, and partnerships and joint ventures with various governmental bodies.
The undergraduate degree courses in Economics and Management promote a direct linkage between DESG and the economy via the final year project all students are required to undertake, and which typically involves a period of work experience in firms, agencies or organisations at the regional and national levels.

3- Facilities

DESG has 3 in-house computer laboratories for teaching purposes and student use, and all staff have a personal computer linked both to the Departmental and University networks.
The students, teaching staff and researchers have at their disposal both a university and departmental library with an easily accessible collection of books, scientific and technical journals, and periodicals. Also available are on-line bibliographic data bases.

4- Undergraduate degree Programmes and their duration

The Department teaches 121 modules – primarily of a semester's duration, though some are year-long. These are distributed in the following way among the various first degree schemes for which DESG is responsible or with which it collaborates:
Management (43)
Economics (35)
Agronomy (9)
Forestry & Forest Engineering (6)
Recreation. Leisure and Tourism (6)
Animal Science (5)
Environmental Engineering (4)
Oenology (4)
Teaching Practice Supervision (4)
Mechanical Engineering (2)
Veterinary Medicine (2)
Landscape Architecture & Design (1)

The minimum duration of a module is one semester. The number of ECTS credits for each can be found in the general programme structure.

Besides the undergraduate degree programme, DESG is responsible for the teaching and organisation of Master's and Post-Graduate degree Programmes in Organisational Economics, in Local Development, and in Management, and also collaborates in other Master's programmes both in UTAD and in other national and international higher education institutions.
The teaching staff is also involved in the supervision of undergraduate, Masters and doctoral dissertations being prepared by both national and foreign students.
Whenever possible, DESG invites professors and fellows with recognised merits from national and international institutions to teach in their specialist areas. At the same time, members of the business community are invited to lecture to and debate with students some of the practical aspects related to specific modules.

5- Teaching-Learning/Assessment Methods

Typically, the teaching and learning methods used include conventional lectures, seminar-based discussions and student presentations related to the content. Active participation in classes is strenuously encouraged.
A variety of assessment methods is used, including continuous assessment of coursework, short essays or reports, as well as more conventional examinations. For more specific information, please consult the programme of the module(s) in question.

DEPARTMENT OF SPORTS

A- General description of the Department

1- ECTS Departmental Coordinator

Name: Miguel Videira Monteiro
Address: University of Trás-os-Montes and Alto Douro
Dept. of Sports
P.O. Box 1013
5001-911 Vila Real
Telephone: 00.351.259.330104/5
Fax: 00.351.259.330.168
Email: mvideira@utad.pt

When unavailable, please contact:
Name: Ana Paula Silva
Telephone: 351.259.330154/104
Email: mdolores@utad.pt

2- Structure and organization

The Department of Sports one of the 25 Departments of the University of Trás-os-Montes and Alto Douro which began in the late seventies. The staff includes 27 Professors and Lecturers and 12 Technical Assistants, organized into nine thematic areas, as follows:

Educação Física e Desporto
Recreação Natureza e Lazer

The Sports Department is ruled by the "Regulation of Departments" adopted at the UTAD.
The management of the Department of Sports is conducted by a Coordinator and Vice-Coordinator elected by the teaching and non teaching staff, for a period of two years. On average, the Department meets every month or when relevant issues need urgent decision. The Assembly of the Department (all teaching staff and a representant of non teaching staff) meets twice a year.
Apart from teaching, the other major activities of the Department involve research and experimentation on the Sports area. This research is divided into three main areas.
These research activities are funded from both permanent national sources and contracted international projects. In both cases Professors major roles are either as researchers and/or project and program coordinators.
Among other activities the Department plays and active role in the development of scientific networks and cooperation at national and particularly at international level in the area of research, lecturing, exchange and mobility of staff and students.

Teaching staff

Name	Category
Miguel Videira Monteiro	Full Professor
Ágata C. M. A. M. Martins	Associate Prof.
António Jaime Eira Sampaio	Associate Prof.
António José R. Martins	Associate Prof.
António José Serôdio F.	Associate Prof.
Jorge Manuel G. Campaniço	Associate Prof.
José Carlos G. Leitão	Associate Prof.
Ronaldo Gabriel C. D. Silva	Associate Prof.
Maria Helena R. Moreira	Associate Prof.
Maria Isabel M. C. Mourão	Associate Prof.
Maria Paula G. Mota	Assistant Prof..
Victor Manuel M. Reis	Assistant Prof.
Nelson J. F. Sousa	Assistant Prof.
Carlos F. Avelens Freitas	Assistant Prof.
Eduarda M. R. T. Coelho	Assistant Prof.
Francisco J. F. Saavedra	Assistant.Prof.
José E. F. Ferreirinha	Assistant Prof
Luís F. S. Quaresma	Assistant Prof.
Vitor M. O. Maças	Assistant Prof.
Catarina Isabel N. G. Abrantes	Assistant Prof.
Nuno Miguel C. Leite	Assistant.Prof.
Fan Yanneng	Assistant Prof.
Ioan Vasilica	
Jorge Manuel A. Fernandes	
Maria Dolores A. F. Monteiro	
Luís Miguel T.Vaz	

The faculty at the Department of Sports sciences is a young and active group both in research and elite sports training programs. Indeed several of our faculty are members of the national coaching teams. Particular attention has been given to the co-operation with the Ministry of Sports, through the Regional Services to promote and consolidate experimental research in nationally recognised areas of interest namely in the identification of the motivational profiles of youngsters and conducting needs assessments relative to sports programs and infrastructures available in the region where the University is located.

3- Facilities

In the Department there are two types of Laboratories, one for practical classes and other used mainly for research activities, although used

for classes. The following Laboratories are available:

Sports Sciences
Physical Educations and
Motricity Science
Students have access to the main Library where they can find a section dedicated to the Department with technical and scientific periodicals and a good selection of books which covered the whole subjects addressed in the Department. "On-line" research is also available.

4- Degree Programmes

The studies program at our department are organized by credits. The department is responsible for 64 disciplines offered in more than one degree: Physical education and Sports, and Leisure, Recreation and Tourism, Children Educational Teaching Program, and Second level Teacher Training.
The minimum duration of a discipline is a semester. The number of ECTS for each discipline is indicated in the global structure of the course.
The Department is responsible for the organisation of the Masters Course in Sports Sciences – Some of our Professors are also involved in lecturing in other national and international Masters Courses.
Other tasks of the Professors include the supervisions of the final higher degree reports, and Masters and PhD theses of both national and international students.
Professors and researchers of recognised background are usually invited to give lectures on special subjects.

5- Teaching, learning and assessment methods

Theoretical, practical and mixed theoretical and practical lectures are available within the group of disciplines in the Department. The last two types of lectures are compulsory, since the practical component is of high relevance for the whole group of disciplines available in the Department.
Field trips and excursions to areas of major agriculture activity in Portugal are regularly organised with the objective of bringing the students to reality and to consolidate their knowledge.
Students evaluation is done using different methods: tests, practical and laboratory work, reports and final exams. According to the discipline these methods can be used de per se or combined. Final examinations are most frequent. Further information is available on the description of each discipline.

LANGUAGE DEPARTMENT

A- General description of the Departament

1- ECTS Departmental Coordinator

Name: José Belo
Address:Universidade de Trás-os-Montes e Alto Douro
Departamento de Letras
Apartado 1013
5001-911 Vila Real
Phone: 259 350 720/701
Fax: 259 350 787
Email: jbelo@utad.pt
In the absence of the Coordinator, please use the contact below at the above address:
Name: Fernando Moreira
Phone: 259 350 726
Fax: 259 350 787
Email: fmoreira@utad.pt

2- Structure and organisation

The Language Department, which began its activities in 1986, is one of the 20 Departments of the University of Trás-os-Montes e Alto Douro (UTAD). The Faculty is made up of 44 professors, associate professors, assistant professors and lecturers as well as 5 secretarial staff members, and is organized in six thematic areas, namely:

Communication
Culture
Didactics
Linguistics
Literature
Translation

Teaching staff

Name	Categoria
Carlos da Costa Assunção	Prof. Catedrático
José Nunes Esteves Rei	Prof. Catedrático
Armindo Teixeira Mesquita	Prof. Associado
Fernando Alberto T. Moreira	Prof. Associado
Henriqueta Maria Gonçalves	Prof. Associada
José Manuel C. Belo	Prof. Associado
Maria Assunção M. Monteiro	Prof. Associada
Maria Olinda R. Santana	Prof. Associada
Rui Manuel G. D. Guimarães	Prof. Associado
Isabel Alves	Prof. Auxiliar
José Eduardo P. Reis	Prof. Auxiliar
José Machado	Prof. Auxiliar
Laura Fernanda Bulger	Prof. Auxiliar
Luísa Castro Soares	Prof. Auxiliar
Manuel Gonçalo Sá Fernandes	Prof. Auxiliar
Anabela Dinis B. de Oliveira	Assistente
António Barreira Moreno	Assistente
Clara Guimarães Ervedosa	Assistente
Elisa M. O. Gomes da Torre	Assistente
Luísa Benvinda P. Álvares	Assistente
Manuel Afonso Costa	Assistente
Maria da Felicidade A. Morais	Assistente
Maria Helena Pessoa Santos	Assistente
Marta Isabel R. Correia	Assistente
Orquídea Maria M. Ribeiro	Assistente
Rosa Batista Duarte	Assistente
Sonia Maria B. M. Nogueira	Assistente
Verónique N. P. M. J. Lapa	Leitor
David James Peace	Leitor
David Stanley Shaw	Leitor
Joachim Wolfgang W. Kurth	Leitor
Maria Augusta C. S. Pinheiro	Leitor
Maria Natália S. P. Amarante	Leitor
Michael During	Leitor
Michael Andreas Laub	Leitor
Paul Driver	Leitor
Rosinha de Castro Mamede	Leitor
Stella Guedes N. Aguirre	Assistente Convid.
Idalina P. G. S. Gonçalves	Assistente Convid.
Joaquim da Costa Almeida	Assistente Convid.
José Miguel Pinto Almeida	Assistente Convid.
Manuel Falcão dos Santos	Assistente Convid.
Maria Hilma B. M. Gomes	Assistente Convid.
Teresa M. D. M. C. Capelas	

The Department follows the Departmental Regulation adopted at UTAD.

The Language Department is headed by a Coordinator and a Vice-Coordinator elected by the Faculty and Teaching Staff for a two year mandate. The Departmental Council convene regularly whenever there are issues to be dealt with. On an average, the Faculty Assembly, made up of all the teaching staff, convene twice a year.

Besides teaching; the Language Department carries out important research in Humanities, Language and Literature Education. The research domains fit in the thematic areas mentioned above: Communication, Culture, Didactics, Linguistics, Literature and Translation. It is worthwhile mentioning the significant involvement on the part of the Department's academic staff in several national and international research projects.

Another goal of the Department is the promotion of cooperation with national and international organizations in the fields of education and research.

Therefore, the Language Department holds the International Meetings of Reflection and Research (7th edition in June 2003) on a regular basis. It publishes the Revista de Letras (7th issue to appear in 2003), and the Folha Informativa de Letras, the Departmental newsletter which comes out every four months. Every year, the Language Department publishes a Student Guide, which is an essential reference for Programmes, for the students in the Department.

The Language Department has a Language Research Centre, a research unit whose working objective is based on the thematic areas along which the Department is organised.

3- Specialized services and equipment

At the Department, there is a Language Lab, a Computer Room for the teaching staff and a Translation Office.

At the Central Library, the students have both technical and scientific journals at their disposal as well as on-line research. In the building where the Department is situated – the Complexo Pedagógico –, the students have a computer room with access to the Internet.

4- Courses and respective duration

The Department is responsible for more than 140 semester and annual subjects divided amongst the following degrees:

Applied Developmental Anthropology
Pre-primary Education
Physical Education
Agricultural Engineering
Forestry Engineering
Animal Science
Enology
English-German
Mathematics Education
Portuguese-French
Portuguese-English
Physics and Chemistry
Computer Science
Applied Foreign Languages
Applied Mathematics
Primary School Education
Recreation, Leisure and Tourism
Social Work
Multimedia and Communication
The minimum duration of a subject is one semester. The quantity of ECTS of each course is mentioned in the general Course outline.
Besides the aforementioned degrees, the Department also organizes and gives lectures for the following Postgraduate and Master's Degrees:

Master's Degree in the Teaching of the Portuguese Language and Literature
Master's Degree in Portuguese Culture
Master's Degree in Children's Literature
Postgraduate Degree in Translation

The Department also cooperates in the teaching of other Master's Degrees at UTAD and other Portuguese and foreign institutions.

The teaching staff are also involved in the guidance of teacher training as well as Master's and PhD theses of Portuguese and foreign students.

Whenever possible professors and technicians of acknowledged merit, from national and foreign institutions, are invited to lecture on subjects of their speciality.

5- Teaching and learning methods and assessment

There are theoretical, practical and theoretical-practical classes depending on the contents of each course. The attendance is compulsory in two thirds of all classes.

Students are encouraged to take part in field trips with the objective of widening their contact with involving organisational and institutional realities and to consolidate knowledge.

Assessment is based on tests, practical work and final exams. There are also courses based on seminar work. For specific information about each course please consult the individual modules/descriptive files.

GENERAL DESCRIPTION OF THE MIRANDA DO DOURO CAMPUS

1. ECTS Departmental Coordinator

Name: Chris Gerry
Address: Universidade de Trás-os-Montes e Alto Douro (UTAD)
Pólo de Mirando do Douro
Rua D. Dinis,
5000-660 Mirada do Douro

5000-660 MIRANDA DO DOURO
Telefone: 00 351 273 438140
Fax: 00 351 273 438159
email: cgerry@utad.pt

Alternatively, contact either the Coordinator of the degree course in Development Anthropology, Prof. Doutor Xerardo Pereiro or the Coordinator of the degree course in Social Work, Prof. Doutor Pedro Nobre, using the above telephone numbers or to the following email address: sec@miranda.utad.pt who will be pleased to deal with your enquiry.

2- Organisation and structure

UTAD's campus in Miranda do Douro, on the border with Spain, was established in 1996. It currently has 27 teaching staff, 4 junior monitors, 3 administrative staff and 4 other support staff. Its teaching activities are in the fields of development anthropology and social work.

The Miranda campus functions in a similar way to any other of UTAD's constituent departments. Its day to day management is undertaken by an academic appointed by the Rector of the University, assisted by the Co-ordinators and Vice-Coordinators of the two degree schemes taught in Miranda do Douro (namely, Development Anthropology and Social Work). Staff meet regularly to key issues of current interest and to map out teaching and research strategies for the future.

In addition to its teaching activities, staff attached to the Miranda do Douro campus also conduct a wide range of work related to two main research areas: (1) Development Anthropology, including projects on local development; development associations and cross-border cooperation; medical anthropology; tourism and local heritage; the social history, cultural importance and heritage value of dovecotes; and the growth of the sex trade in rural urban centres; (2) Social Work & Applied Social Studies, including research on the rural impact of minimum wage/income legislation, and on social/regional differences in the incidence of different types of sexual dysfunction. These and other research interests are developed increasingly in partnership with Spanish institutions and researchers in Galicia and in Castille and Leon.

Teaching staff

Staff member	Category
Chris Gerry	Professor
Pedro Nobre	Assistant Professor
Xerardo Pereiro	Assistant Professor
António Mourinho	Assistant Professor
Berta Nunes	Assistant Professor
Carla André	Lecturer
Hermínia Gonçalves	Lecturer
Luzia Fernández	Lecturer
Margarida Simões	Lecturer
Maria João Tamagnini	Lecturer (Languages)
Maria José Tinoco	Lecturer
Nigel Lamb	Lecturer (Languages)
Octávio Gonçalves	Lecturer
Octávio Sacramento	Lecturer
Paulo Mendes	Lecturer
Pedro Silva	Lecturer
Sónia Costa	Lecturer
António Lourenço	Collaborator
Carla Martins	Collaborator
Domingos Raposo	Collaborator
Duarte Ferreira	Collaborator
Fábia Raposo	Collaborator
Margarida Preto	Collaborator
Nuno Rodrigues	Collaborator
Tânia Pires	Collaborator
Cláudia Carvalho	Collaborator/monitor
Miguel Valério	Collaborator/monitor
Vera Mendonça	Collaborator/monitor
Ana Rita Martins Lopes	Student Monitor

The Miranda do Douro campus prides itself on its pro-active approach to local development initiatives, and constantly seeks to design and implement projects that combine scientific interest with local development potential. Staff also regularly provide advisory services to the local community, and intend to expand this area of their work in the future through the establishment of psychological counselling services and cultural and heritage promotion activities.

The staff of the campus work ever more closely with a wide range of public institutions (such as local government, regional development agencies,

local health authorities.), not-for-profit organisations, business associations, and civil society organisations, not least of all through the professional work placements undertaken by final year students.

3. Facilities, services and equipment

Teaching and research are served by a wide range of facilities, services and equipment: both the campus's teaching block and staff centre have computer rooms open to all members of the university, staff offices are linked both via intranet and to UTAD's Vila Real campus, in particular its Central Library, enabling ready access to all UTAD's bibliographical and related data bases. The Miranda do Douro campus library is managed in an integrated fashion with the Municipal Library allowing staff students and the local community to maximise the benefits of a wide range of books, periodicals and specialist collections.

Teachers also supervise masters and doctoral dissertations both within UTAD and in other Portuguese and foreign universities. Whenever possible, academics from abroad are invited to work alongside teachers and researchers attached to the Miranda do Douro campus.

4. Undergraduate courses and evaluation

In 2002-2002, th staff of the Miranda do Douro campus were responsible for 95 separate (mainly semester-length) modules, 45 of which were taught to Anthropology students and 50 on the Social Work course. Staff also teach on other courses based elsewhere in the University.

Full details of the aims and content of modules taught at the Miranda do Douro campus, their duration, the ECTS credits attributed to them, and other relevant information, are to be found elsewhere in this volume. Modules typically have an integrated theoretical and practical content, and evaluation is based on continuous assessment and/or a final examination. Conversion of the quantitative grades given in UTAD-based modules into qualitative rankings can be undertaken along the following lines:

The ECTS grading scale

ECTS Grade	% of successful students normally achieving the grade	UTAD Conversion Scale	Definition
A	10	17 - 20	EXCELLENT – outstanding performance with only minor errors
B	25	15 – 16	VERY GOOD – above the average standard but with some errors
C	30	14	GOOD – generally sound work with a number of notable errors
D	25	11 – 13	SATIFACTORY – fair but with significant shortcomings
E	10	10	SUFFICIENT – performance meets the minimum criteria
FX	-	-	FAIL – some more work required before the credit can be awarded
F	-	-	FAIL – considerable further work is required

The description of individual course units of all Degree Courses taught at UTAD presently available for ECTS Students, are presented in the next section with a general student plan.

Key for the Course Units

The course unit description should include the following format:

1. Title and Code

2. Description of the content

3a) Prerequisites

3b) Objectives

3c) Bibliography

4. Compulsory or optional course units

5. Teaching Staff

6. Hours/week; Semester (1º or 2º) or annual; Year of the course

7. Teaching and learning methods

8. Assessment

9. Course units offered in language other than Portuguese (Yes/No)

10. ECTS credit allocation

DEGRE COURSES TAUGTH AT UTAD

General Study Plans and Courses Units

(You must see Key for the Course Units)

AGRARIAN SCIENCES

Agricultural Engineering Degree

Old plan of studies

(the new plan started in 2003 / 04 for the 1st, 2nd and 3th years)

1st YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Citology	6.0	Histology and Morphology	6.0
	Physics I	6.0	Physics II	6.0
	Mathematics I	6.0	MathematicsII	6.0
	Chemistry I	6.0	Chemistry II	6.0
	Technical English (Annual)	4.0		
	Introduction to Agricultural Science (Annual)	8.0		
	Total	36.0	Total	24.0
2nd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Statistical Methods	6.0	Climatology	4.0
	Sociology	6.0	Soils	4.0
	Agricultural Equipments I	6.0	Rural Extension	4.0
	Geology, Physiography and Mineralogy	6.0	Microbiology	4.0
	Biochemistry	12.0	Introduction to Computer Science and Programming	4.0
			Cartography and Land surveying	4.0
	Total	36.0	Total	24.0
3rd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Soil Fertility	6.0	Soil technology	5.0
	Genetics	5.0	Rural Economy	5.0
	Plant Physiology	5.0	Crop Scince	6.0
	Economy	4.0	Animal Production	4.0
	Agricultural System Ecology	6.0	Farm Buildings	6.0
	1 Elective Discipline	4.0	Ecology	4.0
	Total	30.0	Total	30.0
4th YEAR	ELECTIVES	ECTS	ELECTIVES	ECTS
	Applied Microbiology	4.0	Introduction to Operations Research	4.0
			Food Tecnhology I	4.0
			Agricultural Equipments II	4.0
			Complementary Plant Physiology	4.0
	1st Semester	ECTS	2nd Semester	ECTS
	Viticulture I	7.0	Forages and Pastures	7.0
	Hydraulics	6.0	Horticulture I	7.0
	Fruit tree Culture I	7.0	Plant Breeding	6.0
	Agricultural entomology	6.0	Plant Pathology	6.0
	1 Elective Discipline	4.0	1 Elective Discipline	4.0
	Total	30.0	Total	30.0

4th Y E A R	1st Semester ELECTIVES Food Tecnhology II Weed Science Plant Cell in-vitro Culture	ECTS 4.0 4.0 4.0	2nd Semester ELECTIVES Experimental Design Viticulticulture II Fruit Crop II Integrated Pest and Disease Management Breeding Field Crop, seed Protection and Distribution	ECTS 4.0 4.0 4.0 4.0 4.0
5th Y E A R	1st Semester Entreprise Management I Wine Tecnhology Agraian Politics and Legislation 3 Elective Disciplines	ECTS 6.0 6.0 6.0 12.0	2nd Semester Pratical professional work experience/training	ECTS 30.0
	Total	30.0	Total	30.0
	1st Semester ELECTIVES Farm Buildings and Equipment's Projects Irrigation tecnhology Rural Sociology Firm Management II Horticulture II Marketing of Agricultural Products Floriculture and Ornamentals	ECTS 4.0 4.0 4.0 4.0 4.0 4.0 4.0	2nd Semester	ECTS

Total credits: 300

Agricultural Engineering Degree

New plan of studies

(started in 2003/04 for the 1st, 2nd and 3th years)

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Technical English	2.0	Climatology	5.0
	Mathematics I	6.0	Mathematics II	6.0
	Fhysics I	6.0	Physics II	6.0
	Chemistry I	6.0	Chemistry II	6.0
	Botany of Crop Plants	4.0	Introduction to Agriculturalç Science	4.0
	Citology/Histology	6.0	Seminar	3.0
	Total	36.0	Total	24.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Statistical Methods	5.0	Microbiology	5.5
	Agricultural Equipments I	5.0	Ecology	4.0
	Hydraulics	5.0	Cartography Land Surveying	5.0
	Geology, Physiography and Mineralogy	5.0	Biochemistry II	5.0
	Sociology and Rural Extension	5.0	Introduction to Computer Science and Programming	5.0
	Biochemistry I	5.0	Soils	5.5
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	Genetics	5.0	Soil Tecnhology	6.0
	Plant Physiology	5.0	Crop Science	5.0
	Economy	5.0	Animal Production	6.0
	Agricultural Entomology	5.0	Foresty Production	5.0
	Soils Fertility	5.0	Plant Patology	4.0
	Agricultural System Ecology	5.0	Farm Buildings	4.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
4 th YEAR	Food Technology I	6.0	Forages and Pastures	7.0
	Viticulture I	7.0	Horticulture I	7.0
	Fruit Tree Culture I	7.0	Plant breeding	6.0
	Entreprise Management I	5.0	Agricultural Enterprise Projects	4.0
	Organic Farming	5.0	Agrarian Politics and Legislation	6.0
	Total	30.0	Total	30.0

5 th Y E A R	1st Semester Pratical professional work experience/training or five electives disciplines	ECTS 30.0	2nd Semester Pratical professional work experience/training or five electives disciplines	ECTS 30.0
	Total	30.0	Total	30.0
	1st Semester ELECTIVES DISCIPLINES Rural Economy Wine Technology Horticulture II Weed Science Plant Cells in vitro culture Florriculture and Ornamentals Firm Management II Trading and Marketing of Agricultural Products Irrigation Technology Experimental Design Disciplines of others UTAD courses	ECTS 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0	2nd Semester ELECTIVES DISCIPLINES Introduction to Operations Research Viticulture II Food Technology II Agricultural Equipments II Fruit Crop II Integrated Pest and Disease Management Agricultural Pollution and Environmental Impacts Agricultural Products Quality, Normalisation and Certification Clinical Plant Disease Disciplines of others UTAD courses	ECTS 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0

Total credits: 300

1st year.

1. Cytology - 0005
2. Cytology: Macro molecules. Types of cells. Cellular organels: structure and function. Plasmatic membrane, Membrane systems: synthesis and degradation pathways of molecules, Cytoskeleton, Nucleus, Cellular division: mitosis and meiosis. Mitochondria, Vegetal cell.
3a) Biochemistry.
3b) Study of structural, morphologic and functional features of cells.
3c) Azevedo Carlos 2000 Biologia Celular e Molecular. 3ª edição. Lidel, Lisboa. Alberts et al., 1989 Molecular Biology of the Cell. Bruce. Garland Publishing, Inc. New York
4. Compulsory.
5. Luísa Valente, Cármen Moreira.
6. 5h/week (2T + 4P)/ 1nd semester; 1th year.
7. Lectures and practical classes.
8. According to University Regulations, 2 written tests or a final exam 100%.
9. No.
10. 6.0.

1. Physics I - 0118
2. Scalar and vector quantities; units of measurement; kinematics; movement in one and two dimensions; dynamics of particles; work and energy; conservation of energy; linear momentum; collisions; rotation; equilibrium of rigid bodies.
3a) Basic knowledge of physics and mathematics.
3b) Students should get an overview of the basic concepts of newtonian mechanics (vector operations, kinematics, statics and dynamics) and learn how to apply those concepts in practical situations.
3c) Halliday, D, Resnick, R & Walker, J 1993 “Fundamentals of Physics” John Wiley, New York, 4th edition; Bueche, FJ & Jerde, DA 1995 “Principles of Physics” McGraw-Hill, New York, 6th edition; Kane, JW & Sternheim, MM 1988 “Physics” John Wiley, New York; Jong, IC & Rogers, BG 1991 “Engineering Mechanics - Statics and Dynamics” Saunders, Philadelphia.
5. Ednan Joanni, Afonso Pinto, José Ramiro Fernandes.
6. 6h/week (4TP + 2T); 1st semester; 1st year.
7. Lectures and problem-solving classes.
8. Final written exam.
9. No.
10. 6.0

1. Mathematics I – 0209
2. Introduction to complex numbers: definition of the complex numbers; properties of complex numbers. Functions of one real variable: implicit and inverse functions; the inverse trigonometric functions. Limits of functions and continuity; the Intermediate Value Theorem. Derivatives: the Chain Rule; higher order derivatives; implicit differentiation; the Mean Value Theorem; L' Hôpital' s Rule; Taylor's formula; Maximum-Minimum Problems. Antiderivatives: techniques of integration. Integration: the definite integral; the Fundamental Theorem of Calculus. Applications of integration: the area between two curves.
3a) High-school Mathematical Analysis.
3b) To provide students the basics concepts of Mathematical Analysis.
3c) Carvalho e Silva, Jaime 1994 Princípios de Análise Matemática Aplicada, Mc. Graw- Hill, Lisboa; Swokowski, EW, 1979 Calculus with Analytical Geometry, 1st vol, Weber and Schmidt; Apostol, TM 1967 Calculus (2nd edition), 1st vol, Wiley International Edition.
4. Compulsory
5. Armando Figueiredo, Pedro Barroso Magalhães.
6. 6h/week (3T + 3P); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. Chemistry - 0714
2. Chemistry tools; Chemical equations and reactions in aqueous solution; Chemical bonding; Gaseous properties; Thermodynamics; Chemical kinetics; Chemical equilibrium; Acid-base Equilibria; Solubility equilibria; Electrochemistry.
3a) No prerequisite.
3b)
3c) Chang, R 1994"Química", 5ª Edição, McGraw-Hill,; Seager, SL and Slabaugh, MR 2000 “Chemistry for Today General, Organic, and Biochemistry”, Ed. Brooks/Cole, 4th edition, UK ; Reger, D, Goode, S and Mercer, E 1997 "Química: Princípios e Aplicações", Ed da Fundação Calouste Gulbenkian, Lisboa.
4. Compulsory.
5. Francisco Manuel Pereira Peixoto.
6. 6 hours/week; 1st semester; 1st year.
7. 2 hours lectures and 4 hours practicals.
8. Final theoretical and practical examination.
9. No.
10. 6.0.

1. Histology and Morphology - 0006
2. Vegetal Histology - Theory: 1. The seed, embryo and seedling; 2 General structures of the plants; 3. Study of the structural and functional organization of three tissues systems - dermal (epidermis and periderm), ground (parenchyma, collenchyma and sclerenchyma) and vascular (xylem and phloem). 4Mo. Anatomy study of the root, stem and leaf. Practice: Observation, drawing and discussion of microscopic preparations (light microscope) containing all plants tissues studied in the theoretical classes. Morphology - 1.Plant morphology; definition and objectives. Taxonomy of vascular plants (Pteridophyta and Spermatophyta). Angiospermae and Gymnospermae. Dicotyledons and Monocotyledons. 2. Root, stem, leaf and reproductive (floral, inflorescence, fruit and seed) morphology. 3. Pollination mechanisms. Practice: Observation and descrition of basic vascular plants morphology. How to identify plants families.
3a) No prerequisite.
3b) Vegetal Histology - Study of structural, morphologic and functional features of plants tissues (General Histology). Morphology - To deliniate, define, and understand taxonomic principles and concepts; To learn basic morphology of vascular plants; To learn how to identify plants; To be able to recognize the principals families.
3c) Moreira Ilídio 1993 Histologia Vegetal. 4ª Ed. Didática; Fanh, A 1974 Plant Anatomy. 2a edição. Pergamon Press. Oxford; Esau, K 1972 Anatomia Vegetal. Ediciones Omega, S.A. Casanova, 220, Barcelona; Paniagua, R et al. 1993 Citologia y Histologia Vegetal y Animal- Biologia de las celulas y tejidos animales y vegetales. Interamericana -Mc Graw Hill. Madrid; Pinto, TMS 1994 Parênquima. UTAD, Vila Real; Strasburger , E 1990 Tratado de Botânica. Ed. Omega, Barcelona; Salisbury, FB. 1970 Vascular Plants: form and function. 2nd ed, Macmillan Press Ltd, London; Izco, J 1997 Botânica. McGraw-Hill, Interamericana; Vasconcelos, JC 1969 Noções sobre a morfologia externa das plantas superiores. 3ª edição. Min. da Economia, Direcção Geral dos Serviços Agrícolas; Bell, AD 1998 Plant Form. An Illustrated Guide to Flowering Plant Morphology. Oxford University Press, Oxford; Koe, T 1988 Morfologia Vegetal. Série Didáctica, UTAD; Sequeira, MPSM A Flor 1 Série Didáctica, UTAD; Rocha, F 1996 Nomes vulgares de plantas existentes em Portugal. Ed. Direcção Geral de Protecção das Culturas.
4. Compulsory.
5. Teresa Maria Pinto, Claudia Fernandes.
6. 6h/week (2T + 4P); 2nd semester; 1th year.
7. Lectures and practical classes.
8. According to University Regulations, 2 written tests or a final exam - 100%.
9. No.
10. 6.0.

1. Physics II - 0119
2. Fluid mechanics; heat and the 1st law of thermodynamics; kinetic theory of gases; entropy and the 2nd law of thermodynamics; charge and electric fields; Gauss law; electric potential; capacitance; electric current; electric circuits.
3a) Basic knowledge of physics and mathematics.
3b) Students should get an overview of the basic concepts of fluid mechanics, thermodynamics and electricity and learn how to apply those concepts in practical situations.
3c) Halliday, D, Resnick, R & Walker J 1993 “Fundamentals of Physics” John Wiley, New York, 4th edition; Bueche , FJ & Jerde, DA 1995 “Principles of Physics” McGraw-Hill, New York, 6th edition;. Kane, JW & Sternheim, MM 1988 “Physics” John Wiley, New York.
5. Ednan Joanni, Afonso Pinto, José Ramiro Fernandes.
6. 6h/week (4TP + 2T); 2nd semester; 1st year.
7. Lectures and problem-solving classes.
8. Final written exam.
9. No.
10. 6.0

1. Mathematics II - 0216
2. Algebraic structures. Vector spaces. Linear dependence and linear independence of vectors. Set of generators. Basis and dimension. Subspaces. Matrices. Algebra of matrices. Transpose and conjugate of a matrix. Invertible matrices. Symmetric matrices and hermitian matrices. Elementary row operation on a matrix. The row-reduced echelon form of a matrix. Linear Transformation. Algebraic operations with linear transformations. Kernel and image of a linear transformation. Matrix of a linear transformation relative to a pair of basis. Matrices of change of basis. Equivalent matrices and similar matrices. Determinants. Methods of calculation of determinants. Determinants of products, inverse and transpose of a matrix. Systems of linear equations. Method of Gaussian elimination. Method of Cramer. Inversion of matrices using method of elimination of Gauss-Jordan. Eigenvalue and Eigenvector. Characteristic equation.
3a) No prerequisite.
3b) To provide to students a preparation in concepts and standard techniques so that they can overcome certain problems that arise in their area.
3c) Giraldes, Emília; Fernandes, VH and Smith, MPM 1985 Álgebra Linear e Geometria Analítica, McGraw-Hill de Portugal; Magalhães, L 1993 Álgebra Linear com introdução à Matemática Aplicada, Lisboa, Texto Editora; Ribeiro, CS, Reis, L and Reis, SS 1990 Álgebra Linear-Exercícios e Aplicações, McGraw-Hill Port.
4. Compulsory.
5. Carlos Monteiro, Márcia Eiras.
6. 6h/week (4P + 2T); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 6.0.

1. Chemistry II - 0715
2. Introduction to Organic Chemistry. Alkanes and cycloalkanes. Stereochemistry. Nucleophilic substitution reactions and elimination reactions in alkyl halides. Alkenes and alkines. Aromatic compounds. Alcohols and ethers. Aldehydes and ketones. Amines. Carboxylic acids and their derivatives. Radical reactions.
3a) No prerequisite.
3b) To provide a wide knowledge of functional groups. To explain the reactions of organic compounds based on the reactivity of functional groups and reaction mechanisms. To stimulate the interest of the students for this important and interesting subject, emphasising the biological, medicinal and environmental applications of Organic Chemistry.
3c) Solomons, TWG, 1997 Fundamentals of Organic Chemistry, 5a Ed., John Wiley & Sons, New York; Solomons, TWG 1996 Química Orgânica, Vol. 1, 6a Ed., LTC Livros Técnicos e Científicos Editora S. A., Rio de Janeiro; Morrison, R and Boyd, R 1996 Química Orgânica, 13ª Ed., Fundação Calouste Gulbenkian, Lisboa; Carey, FA 2000 Organic Chemistry, 4a Ed., McGrawHill, Boston.
4. Compulsory.
5. Paulo Santos, Manuela Silva.
6. 6h/week (2T+ 4P); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Practical work 30%; 2 written tests or a final written exam 70%.
9. No.
10. 6.0.

1. Technical English - 0004
2. General English, Exchanging technical information, giving presentations, describing a process, technical vocabulary, reading comprehension, Sequencing instructions, extracting meaning from context.
3a) Pre-intermediate knowledge of English grammar, sentence structure and vocabulary
3b) This course is designed to meet the language needs of students studying Agricultural Engineering, by providing them with the necessary language framework needed to understand technical texts as well as communicate with a functional level of English.
3c) Bowman, FJ 1984 Agriculture: horticulture and Livestock (Collier Macmillan Publishers); Mountford, Alan 1984 English in Angriculture (Oxford); Shippen,J.M & Turner, JC 1973 Basic Farm Machinery (Oxford:Pergamon Press); Nick Hall/John Shepheard 1995 The Anti-Grammar Grammar Book (Longman 5th Edition); Raymond Murphy 1987 English Grammar In Use (Cambridge University Press).
In addition the Internet, various journals and newspapers will be used as sources of material.
4. Compulsory.
5. Paul Driver.
6. 2h/week; Anual; 1st year.
7. Lectures, communication activities, reading/listening comprehensions.
8. Final exam (80%) plus Interview (20%).
9..Yes, English.
10. 4.0.

1. Introduction to Agricultural Science - 0076
2. Use of plants in agriculture; historical aspects of the difusion of plants. General concepts of plant ecology and agronomy. Plant establishement. Bioclimatology. Phenology of the main crops. Geographic agronomic characterization of Portugal Continental.
3a) Basic knowledge of Botany, Geography and Ecology.
3b) Students will obtain basic knowledge of agronomy to be developed in posterior courses; main parameters of agronomic activities.
3c) Ribeiro, O 1986 Portugal. O mediterrâneo e o atlântico. Ed. Sá da Costa, Lisboa; Frazão, E 1991 A aventura das plantas e os descobrimentos portugueses. Ed. INICT, Lisboa; Ribeiro, JA and Fernandes, MJ 1997 Tipos fisionómicos das plantas vasculares. UTAD, Vila Real (photocopy).; Ribeiro, JA and Fernandes, M.J 1997 Ecologia da vegetação. UTAD, Vila Real (photocopy); Ribeiro, JA and Fernandes, MJ 1977 Ecologia agrária. UTAD, Vila Real (photocopy); Ribeiro, J.A and Fernandes, JM 1977 Geografia agrícola de Portugal Continental UTAD, Vila Real (photocopy).
4. Compulsory.
5. José Alves Ribeiro.
6. 2 h /week (lecture and practical class); annual; 1st year.
7. Lectures and practical classes with field work
8. Two written tests (65%) and practical work (35%), final exam.
9. No.
10. 8.0.

2nd year

1. Statistical Methods - 0008
2. Descritive Statistics and Statistical Inference. Introdution to Statistics and to data analysis. Introdution to Probability Theory. Introdution to Random Variables and to the Probability Laws. Mathematical Expectation and their Properties. Some Probability Laws Discrete and Continuous. Statistical Inference. Random Sampling. Data Description, and Some Fundamental Sampling Distributions. Bernoulli and Normal Populations. Estimation Methods. Point Estimation: Statistics and their Properties. Intervalar Estimation Cofidence Interval for the Single Mean, and for the Variance, and for the Difference Between Two means (Paired and Independent Samples), and for Two Sample Variances, and for the Proportions, and for the Difference Between Two Proportions. One and Two Sample Tests of Hypotheses. One and Two Tailed Tests. Use of p-Values in Decision Making
3a) Mathematics I.
3b) Students should be able to use the statistical methods in data analysis.
3c) Reis, E, Melo, P, Andrade, R and Calapez, T 1997 Estatística Aplicada. Edições Sílabo, 2. Ed., Vols. I e II, ISBN: 9726181615; ISBN: 9726181623; Walpole, RE and Myers, RH 1993 Probability and Statistics for Engineers and Scientists. Prentice Hall International Inc., 5.th Ed., ISBN: 0024242012; Zar, JH 1993 Biostatistical Analysis. Prentice Hall International Inc., 3rd Ed, ISBN: 0130845426.
4. Compulsory Course Unit
5. Maria Manuel da Silva Nascimento, Elisete Correia.
6. 5h/week (2T, 3P); 1st Semester; 2nd Year.
7. Theoretical and Practical Classes.
8. 100% Final Written Examination.
9. No.
10. 6.0.

1. Sociology -0033
2. The Sociology in the context of the other Social sciences. Purpose and theoretical premises of the sociological approach. Social investigation methods and techniques. The globalization and his impact on modern societies social life.
3a) It is not applied.
3b) Identify and interpret the Sociology scientific specificities. Recognize the importance of social dimension in the agricultural activity. Understand the process of knowledge production about social reality. Acquire competences in the elaboration and application of methods and research techniques. Understand the processes that sustain the globalization phenomenon.
3c) Giddens, A1997 Sociologia, Lisboa, Fundação Calouste Gulbenkian; Quivy, R and Campenhoudt, L 1992 Manual de Investigação em Ciências Sociais, Lisboa, Gradiva; Ritzer, G 1996 Teoria Sociológica Contemporânea, Madrid, McGraw-Hill; Santos, B (org.) 2001 Globalização: Fatalidade ou Utopia ?, Porto, Afrontamento; Silva, AS and Pinto, JM (orgs.) 1986 Metodologia das Ciências Sociais, Porto: Afrontamento.
4. Compulsory
5. Octávio José Rio do Sacramento.
6. 4h/week; 2nd semester; 2nd year.
7. Theoretical and practical classes. It is obligatory the attendance in 2/3 of the practical classes.
8. According to Pedagogic Norms of University, 1 frequency written test or final exam - 100%.
9. No.
10. 6.0

1. Agricultural Equipments I - 0077
2.Traction units used in agriculture; his constitution, working, regulation and maintaining.
Mobilisation, sowing, plantation, pesticides application, forage and grain collecting equipments; his constitution, working, regulation and maintaining.
3a) Physical and thermodynamic knowledge
3b) Allowing the students to have de necessary theoretical and practical knowledge to use the agricultural equipments
3c) Every subject have notes that are available in the teacher site. There is also a digital database with articles about the subjects.
4. Obligatory.
5. Fernando Santos, Carlos Pires.
6. 4.5 h/week (2 T + 2.5 P); 1st semester; 2 nd year.
7. Theoretical and practical classes.
8. Two written test during the semester.
9. No.
10. 6.0.

1. Geology, Physiography and Mineralogy - 0551
2. Concepts of Geology (structure and composition of Earth); Concepts of Crystallography, Mineralogy and Petrology (Dana's mineral classes; physical and chemical properties of minerals; formation of clay minerals and their properties; Igneous, metamorphic and sedimentary Petrology); Concepts of Physiography (physical, chemical and biological weathering; geographic distribution of weathering; soil formation; relief modelling agents.
3a) No prerequisite.
3b) To understand minerals and rocks origin; To identify minerals and rocks by their properties; To recognise the clay minerals structure and to understand their formation; To understand soil formation and to recognize the specific features inherited from each rock; To understand the rule of different weathering agents in relief construction.
3c) Galopim de Carvalho, AM 1996 Geologia: Morfogénese e Sedimentogénese. Lisboa: Univ. Aberta; Galopim de Carvalho, AM 1997 Geologia: Petrogénese e Orogénese. Lisboa: Univ. Aberta; Tarbuck, EJ & Lutgens, FK 1997 Earth science. New York: Prentice-Hall; Velde, B 1992 Introduction to clay minerals. London: Chapman & Hall.
4. Compulsory
5. Rui José dos Santos Teixeira and Maria Adelaide Vaz Guerra
6. 5h/week (2T + 3P); 1st semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final exam.
9. No.
10. 6.0.

1. Climatology - 0014
2. Introduction to Climatology. Study of climate factors: daylenght; solar radiation; air and soil temperature; atmospheric humidity; wind; rainfall; evapotranspiration; energy balance; frosts; water balance and climatic classification.
3a) Good knowledge of Physics, Maths, Soils and Statistics.
3b) Students should get an overview on the influence of the climatic factors on Agriculture and animal production systems, with special reference to the interaction between climate factors and crop production.
3c) Campbell, GS & Norman, JM. 1998 An Introduction to Environmental Biophysics. SpringeVerlag Ferreira, TC 2000 “Fotoperíodo”. Série Didáctica de Climatologia Aplicada, Universidade de Trás-os-Montes e Alto Douro, Vila Real. 38p; Instituto Nacional de Meteorologia e Geofísica 1991 O clima de Portugal, fasc. XLIX correspondentes a 1951-1980:Vol. III: 3ª Região: Normais climatológicas da região deTrás-os-Montes e Alto Douro e Beira Interior. Jones, HG 1983 Plants and Microclimate. A quantitative approach to environmental plant physiology. Edition, Cambridge. Rosenberg, NJ; Blad, BL & Verma SB 1983 Microclimate. The biological environment. John Wiley & Sons.
4. Compulsory.
5. Timóteo Ferreira, Aureliano Malheiro, Anabela Fernandes.
6. 5h/week (3P + 2T)/ 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.0.

1. Soils - 0015
2. Soil concepts, factors and processes responsible for soil formation; Soil functions on the terrestrial ecosystem, with emphasis for soil-plant relationships; Soil mineral components; Soil organic components; Soil chemistry properties – Exchange complex and soil reaction; Soil physical properties; Soil water and soil-water-plant relationships; Soil classification and land evaluation.
3a) Good knowledge on mineralogy and petrography and general chemistry;
3b) Students should get a good knowledge of: (i) plant requirements related to the soil; (ii) soil components, its properties and functions and understand the soil behavior according it composition; (iii) to know how to evaluate a soil, as a plant support, according its properties, and to identify their restrictions for that; (iii) to understand the way of soil management inside a sustainable frame.
3c) Costa, J. Botelho 1975Caracterização e Constituição do Solo. Ed. Caloust Gulbenkian, Lisboa; Brady, NC 1990 The Nature and Properties of Soils. Macmillan Publishing Company. New York; Schroeder, D 1984 Soils, Facts and Concepts. Int. Potash Institute. Bern, Switzerland; Wild, A 1993 Soils and the Environment. An Introduction. Cambridge University Press.
4. Obligatory.
5. Afonso Martins.
6. 5 h/week (2T + 3P), 2nd semester; 2nd year.
7. Theoretical classes and practical classes in the lab and in the field.
8. Continuous evaluation, with tests, about practical works and application of theoretical concepts, as obligatory and a written classic test or examination.
9. No.
10. 4.0.

1. Rural Extension - 0039
2. Objectives and global framework. Situation and trends concerning the rural areas. Rural development policies. History and concepts of Rural Extension. Other associated concepts. Extension systems and models. Extension and Animation practice: Information; Knowledge; Learning; Innovation; Animation; Participation; Planning; Evaluation.
3a) Good knowledge of introductory Sociology or Rural Sociology.
3b) The major objective is to complement the students' technical preparation, by providing a global view of agricultural and rural development issues, particularly concerning the basic concepts and instruments for Rural Extension and Animation work. In specific terms, the objectives are: to identify the critical dimensions and present challenges of agricultural and rural development; to identify the roles of Extension Education and Animation in change processes; to compare differentExtension systems and models; and to identify the major phases in the development of Rural Extension and Animation projects and activities.
3c) Cristovão, A 1995 Do Sistema de Formação e Visitas à Investigação e Desenvolvimento de Sistemas Agrários: Análise Crítica de um Percurso. Economia e Sociologia, nº 59, pp. 93-124; Cristovão, A 1998 Onde Pára a Extensão Rural? A Rede para o Desenvolvimento Local, Edição Especial, pp 39-43; Freire, P 1975 Extensão ou Comunicação? Rio de Janeiro: Paz e Terra; Moreira, MB 2001 Globalização e Agricultura: Zonas Rurais Desfavorecidas. Oeiras: Celta Editora; Portela, JFG 1984 Investigadores e Agricultores: Teses, Antiteses e Síntese. Lisboa: Associação Portuguesa de Economistas; Portela, JFG 1999 O Meio Rural em Portugal: Entre o Ontem e o Amanhã. Trabalhos de Antropologia e Etnologia, Vol. XXXIX, pp. 45-65; Puerta, FS 1996 Extension Agrária e Desarrollo Rural. Madrid: MAPA; Swanson, B, Bentz, R and Sofranko, A 1997 Improving Agricultural Extensio: A Reference Manual. Rome: FAO.
4. Compulsory.
5. Artur Cristóvão.
6. 4h/week (4TP); 2nd semester; 2th year.
7. Lectures and practical classes.
8. Five mini-tests and practical work.
9. No.
10. 4.0.

1. Microbiology - 0054
2. Introduction to the microbial world. Procariot cell structure and function. Eucaryotic cell structure of Fungi; Classification of fungi. The virus. Structure and properties of virus. Classification, replicaction and cultivation of virus. Nutrition, growth and metabolism of microorganisms. An overview on microbial nutrition. Culture media. Transport of nutrients. Kinetics of microbial growth. The influence of environmental factors on growth. Control of microorganisms by physical and chemical agents. Energetic metabolism. Fermentations. Aerobic and anaerobic respiration. Photosynthesis. Bacterial genetics. Microorganisms and the Environment.
3a) No prerequisite.
3b) This course provides a balanced introduction to the microbial world in all major areas : Structure, function of microbial cells. Growth, metabolism and control of microorganisms.
3c) Ferreira, W and Figueiredo de Sousa, JC 1998 Microbiologia. Eds. Lidel, Lisboa; McKane, L and Kandel, J 1996 Microbiology - Essentials and Applications, 2nd ed, McGraw-Hill Inc.; Schlegel, HG 1986 General Microbiology, 6th ed, Cambridge University Press; Brock, TD and Madigan, MT 1991 Biology of the Microorganisms, 6th ed, Pretince-Hall International Edition;
4. Compulsory.
5. Arlete Faia, Alice Moura.
6. 5h/week (2T + 3P); 2nd semester; 2th year.
7. Lectures and practical classes.
8. A final written exam corresponding to 80% of the final score and a practical component which corresponds to 20%.
9. No.
10. 4.0.

1. Introduction to Computer Science and Programming - 0181
2. Windows,Winword,Excel,Access,Internet
3a. Work with Computers.
3b. To provide students with the knowledge to work with Windows, using Internet and solve problems of reduce complexity in Excel and Access.
3c) Campbell,, M 1993 Iniciação aos Computadores, CETOP; Sousa, MJ 2000 Fundamental do Excel. FCA; Gomes, L and Correia, M 2000 Fundamental do Access. FCA; Magalhães, J 1995 Roteiro prático da Internet, Quetzal, 2ª ed..
4. Compulsory.
5. Paulo Costa.
6. 4h/week (2T, 2P); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Practical test 100%.
9. No
10. 4.

1. Cartography and Land Surveying - 0550
2. Concepts of Geodesy, Concepts of Cartography; Concepts of Airphotos; Surveying and mapping. Direct leveling. Angle, direction and distance measurement. Problems with distances, directions and coordinates. Types of Topographic Surveys. Topographic map construction. Working on maps. Traverse. Intersection and resection. Rigorous angle measurement. Digital Terrain Models-Applications. Land Surveying and Computer Aided Design.
3a) Good knowledge of geology and physiography; Mathematical analysis, especially plain trigonometry.
3b) To provide students with a basic understanding of topographical maps and the elements of their composition; to understand and to interpret information contained in the aerial photographs and to provide students with both surveying theory and real-world practice in mapping and engeneering surveys. To give also the ability of using topographic instruments and bringing them up to date on the technological advances that are changing the field.
3c) Alves, JAD, Cruz, JS and Norte, CG 1988 Topografia - II volume. Academia Militar; Manual de interpretação fotográfica 1968 Serviços Cartográficos do Exército; Manual de leitura de cartas 1986 Serviços Cartográficos do Exército (2ª Edição); Apontamentos Teóricos de Topografia, Dep. de Matemática, UTAD; Gaspar, JA Cartas e Projecções Cartográficas, Lidel; Elfick, M, Fryer, J and Brinker, R Wolf Elementary Surveying, P. Harper Collins Publishers; Modelos Digitais de Terreno, Dep. de Matemática, UTAD; Bannister, A, Raymond, S, Baker, Surveying , Longman Scientific & Technical; Casaca, J, Matos, J and Baio, M Topografia Geral, Lidel; Topografia Geral, Xerez.
4. Compulsory.
5. Nuno Monteiro Vaz (Cartographyc part); João Sousa (Land surveying part).
6. 5h/week (2T + 3P); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final written test to the part of Cartography and the part of Topography. The final note will be the average of the two parts.
9. No.
10. 4.0.

1. Biochemistry - 0007
2. Theory. Introduction. Amino Acids. Proteins. Enzymes. Vitamins and Coenzymes. Carbohydrates. Lipids. Biological Membranes and Transport. Carbohydrates Metabolism: Glycolysis and the Catabolism of Hexoses. The Citric Acid Cycle. Oxidative Phosphorylation. Lipids Metabolism: Introduction; Biosynthesis of Fatty Acids; Biosynthesis of Triacylglycerols and Glycerophospholipids; Biosynthesis of Sterols and Isoprenoids. Metabolism of Aminoacids. Nucleic Acids. Practice. Introduction Brief. Identification and Characterization of Amino Acids. Quantification and Characterization of Proteins. Enzymatic kinetic of phosphatase alkaline. Enzymatic kinetics of polyphenoloxidase and immobilized enzymes. Identification and Characterization of Carbohydrates. Isolation, Identification and Characterization of Lipids. Metabolism of Carbohydrates.
3a) Good knowledge on chemistry.
3b) To supply solid technical and scientific preparation in several areas, e.g. constituents of living matter and biocatalysis, general catabolic and biosynthetic pathways as well as specific plant metabolisms, which is essential for the accurate understanding of other courses in this undergraduate curriculum.
3c) Lehninger, AL, Nelson, DL and COX, MM 1993 Principles of Biochemistry. Second Edition. Worth Publishers, New York; Plummer, DT 1987 An Introduction to Pratical Biochemistry. Third Edition. McGraw-Hill Book Company, London; RAWN, JD1989 Bioquímica. Vol. II. McGraw Hill – Interamericana de España. Madrid; Stryer, L1990 Bioquímica. Tercera Edition. Editorial Reverté, S.A., Barcelona; Voet, D and Voet, JG 1992 Bioquímica. Ediciones Omega, S.A., Barcelona.
4. Compulsory.
5. Rosário Anjos, Albino Alves Dias.
6. 6h/week (2P + 4T); annual; 2nd year.
7. Lectures and practical classes.
8. Mean of four written assessments 85%; Mean of practical works 15%.
9. No.
10. 12.0

3th year

1. Soil Fertility - 0017
2. Yield limiting factors, palnt nutrition and soil-plant relationships. General concepts of movement of ions in soils to roots; ion absorption by plants. Soil acidity and alkalinity. Nutrients: functions and forms in plants; behaviour and transformations in soils and environmental relationships: macro and micronutrients Soil fertility evaluation: soil testing and plant analysis. Fertilizers and amendments. Fertilizer management.
3a) Chemistry, Soil Science and Geology.
3b) To provide knowledge in the mechanisms which affect the different nutrient movements in soil, the principles of nutrient cycling, agricultural management and its relationship with environmental constraints. The students should be able to interpret soil testing and plant analysis results and to plan the crop fertilization in different conditions.
3c) Santos, JQ 2002 Fertilização. Fundamentos da Utilização de Adubos e Correctivos, Colecção Euragro, Europa-América, Lisboa; Mengel, K and Kirkby 2001 Principles of Plant Nutrition, Academic Press, London; Brady , NC and Weil, RR 2001 Nature and Properties of Soils. Prentice-Hall Inc., New Jersey.; Havlin, JL, Beaton, JD, Tisdale, SM and Nelson, WL 1999 Soil Fertility and Fertilizers. Prentice-Hall Inc., New Jersey.
4. Compulsory.
5. João Coutinho..
6. 4 h/week; 1st semester; 3rd year.
7. Practical classes and laboratory.
8. Two written tests (50%), twelve weekly assessments (20%) and one final work based in one case study.
9. No.
10. 6.0.

1. Genetics - 0018
2. Mendelism. Chromosomal theory of inheritance. Extensions of mendelism (multiple alleles, lethal genes, penetrance and expressivity, genotypic interactions). Sex linkage. Linkage and recombination. Variation in chromosome number and chromosomal structure Quantitative inheritance and population genetics. Structure and organization of prokaryotic and eukaryotic genomes. Hybridization of nucleic acids. Construction of physic and molecular maps. DNA replication. PCR technic. Gene detection by molecular markers. DNA transcription. Genetic engineering.
3a) Knowledge of Cytology, Biochemistry, Statistics Methods and Microbiology
3b) To understand the basic process of genetic inheritance, recombination, gene expression and its control; In front of real situations, the students must be able to formulate hypothesis and to analyse the data obtained. The students should get the knowledge to understand the bases of the new methodologies and biotechnologies, in general.
3c) Tamarin, R 1996 Principles of Genetics, Wm C. Brown Publishers, 5º Ed.; Griffiths A, Miller, JF, Suzuki, D, Lewontin, C and Gelbart, M 1996 An Introduction to Genetic Analysis, W. H. Freeman and Company, New York, 6º Ed.; Pinto-Carnide, O 1999 Práticas de Genética. UTAD, Serie Didactica, Ciencias Aplicadas, 131; Stansfield, WD 1985 Genetica, Schaum McGraw-Hill, 2º Ed..
4. Compulsory.
5. Olinda Pinto Carnide, Fernanda Leal.
6. 6 hours/week (2 Theoretical + 4 practical.); 1st semestre; 3th year.
7. Lectures and practical classes.
8. 2 theoretical Tests, Minitests and practical reports. Final written examination.
9. No.
10. 5.0.

1. Plant Physiology - 0019
2. Concept of Plant Physiology. Plant Physiology and others Plant Sciences. Cell wall. Plants and water: water potential; water movement in the soil and across the root; stomatal movements; survival during water shortage. Movement of water through the whole plant. Mineral nutrients: ion uptake by roots; metabolism of ions. Photosynthesis and photorespiration. Phloem transport: assimilate partitioning and control of translocation. Hormones and their action. Photomorphogenesis.
3a) Good knowledge on Plant cell and Biochemistry.
3b) The major objective is to provide plant science students with an overview of plant physiological and biochemical processes, and how they are influenced by environmental factors.
3c) Coll, JB, Rodrigo, GN, García, BS and Tamés, RS 2001 Fisiología Vegetal. Ediciones Pirámide, Madrid; Taíz, L and Zeiger, E 1998 Plant Physiology, 2nd edition, Bejamín/Cummings, Redwood, California, USA; Hopkins, WG 1999 Introduction to Plant Physiology. 2nd edition, John Wiley, New York, USA; Salisbury, FB and Ross, CW 1992, Plant Physiology. 4th edition, Wasdsworth Publishing Company, Belmont, Califórnia, USA.
4. Compulsory.
5. José Manuel Moutinho Pereira and Eunice Areal Bacelar.
6. 6h/week (4P + 2T); 1st semester; 3rd year.
7. Lectures and practical classes.
8. 2 written tests or a final exam - 100%.
9. No.
10. 5.0.

1. Economics
2. Macro-Economics: Humanities and social science – Methodologies; Economics problems – How to resolves; Economics chain – Organization and instruments; Money – Inflationary effects; Calculate National Results.
Micro-Economics: Consumer – Preference, utility and choice; Prices – Demand, income and elasticity; Supply – Market equilibrium; Production – Product factor relations; Costs – Long and short term; Referential framework for business/industry short and long term costs.
3a) A basic knowledge of mathematical concepts.
3b) To introduce the students to the terminology in the economic literature through basic notions of the ideas related to micro and macro-economic. Concentrate on economic questions at the business level and an integrated vision of economics problems by promoting abstraction capacities and use of reasoning.
3c) Miller, RL1981 Microeconomia. McGraw-Hill, S. Paulo; Neves, JC 1995 Introdução à Economia. Introdução à Economia; Poeta, AD 1990 Alguns Elementos sobre Funções de Produção. Série Didática, Ciências Sociais e Humanas. UTAD, V. Real; Rossetti, JP 1993 Introdução à Economia. Ed. Atlas, S. A., 15ª Edi., S. Paulo.
4. Compulsory.
5. Alexandre Manuel Silva Dinis Poeta; Ana Alexandra Costa.
6. 4h/week; (2P + 2 T); 2nd semester; 3th year.
7. Lectures/Discussion/Exercises.
8. Final written exam with practical work.
9. No.
10. 5.0.

1. Applied Microbiology - 0079
2. Technological importance. Nutrients and environmental factors. Composition and preparation of culture media. Microbiological growth. Mushrooms production. Single cell protein. Yeast growth and production. Vinegar production. Alcoholic fermentation. Acid canning of vegetables. Milk fermentation. Organic acids. Enzymes. Amino acids. Vitamins and polysaccharides. Microbiological action in foods. Microbiological contamination of foods (micro-organisms, toxic-infections, infections; endogenous and exogenous contamination; indicator micro-organisms). Microbiological control of foods. Micro-organisms control and reduction processes. Death of micro-organisms. Death curves (death kinetics, thermal death kinetics, main environmental factors). Thermal processing of foods. Other technological processes for food preservation (aseptic conditions and hygienic conditions; concentration, dehydration and freeze-drying; vacuum; smoked products and addition of specific solutions; fermentation; chemical preservation; additives; food irradiation).
3a) It is important to know basic principles of general microbiology and biochemistry.
3b) Put in evidence the importance of micro-organisms in the food production and some industrial products. Study the effect of the micro-organisms on food quality loss. Study different ways for microbiological control. Introduce some technological processes for food preservation.
3c) Bourgeois, CM et al. 1988 Microbiologie Alimentaire (2 volumes); Harrigan, WF 1998 Laboratory methods in food microbiology; Eley, R 1994 Intoxicaciones alimentarias de etiologia microbiana; Shibamoto, T and Bjeldanes, LF 1996 Introducción a la toxicologia de los alimentos.
4. Optional course unit.
5. Carlos J. O. Ribeiro.
6. 5h/week (2T + 3P); 1st semester; 3rd year.
7. Lectures and practical classes.
8. 6 (six) mini-tests or final exam; b) Oral presentation of short synthesis work; c) 7 (seven) questionnaires at the end of each practical work.
9. No (occasionally, Spanish and/or English summary at the end of each class).
10. 4.0.

1. Agricultural System Ecology - 0081
2. The agroecosystem concept. The plant in its interaction with the environment. Agricultural systems: species interactions in crop communities and crop effects in rotations. The growth and development of crop species. The physiology of crop production. Main agricultural practices. Agriculture and environment.
3a) No prerequisite.
3b) Students should get basic information regarding how agricultural activities and especially plants are affected by environmental factors, and also get knowledge on main agricultural practices, tools and equipments used on crop production. Physiological processes which influence crop biomass accumulation and their manipulation by agricultural practices and techniques where considered. Students should get an overview of the main environmental impacts of agriculture.
3c) Arnon, I 1992 Agriculture in Dry Lands. Principles and Practice. Elsevier, Amsterdam, 979 pp.; Carvalho, M and Azevedo, AL 1991 Rotações de Culturas. Universidade de Évora, Évora, 92 pp.; Diehl, R and Mateo Box, JM 1988 Fitotecnia General. 2ª edición. Mundi-Prensa, Madrid, 814 pp.; Gliessman, S. R. 1998. Agroecology, Agricultural Processes in Sustainable Agriculture. Ann Arbor Press, Chelsea, 357 pp. Hay, RKM. and Walker, AJ 1989 An Introduction to the Physiology of Crop Yield. Longman Scientific & Technical, New York, 292 pp.; Le Clech, B 1998 Environnement et Agriculture. 2e édition. Édition Synthese Agricole, Bordeaux, 344pp..
4. Compulsory.
5. Henrique Trindade, Alfredo Aires, Carlos Pires.
6. 4h/week (2P + 2T); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Introdution to Operations Research - 0012
2. The role and the objectives of the Operations Research (OR). Methods in engineering. Introduction to OR. The Nature of OR. Overview of the OR Modeling Approach. Introduction to Inventory Theory. Introduction to Linear Programming (LP). Solving LP Problems: The Simplex Method. Solving LP Problems with Other Model Forms: The Big-M Method and the Penalty Method. Introdution to Duality in LP. Sensitivity Analysis in LP Problems. Introduction to the Transportation and Assignment Problems.
3a) Mathematics I and Statistical Methods
3b) Students should be able to identify Operations Research Models and to use correct algoritms to solve the models. Learn the basic rules of a Written Work.
3c) Hillier, FS and Lieberman, GJ 1995 Introdution to Operations Research. McGraw-Hill Bo. Co., 6th/Bk&dsk Ed.ISBN: 0078414474; Taha, Hamdy A 1996 Operations Research - An Introdution. Prentice Hall International Inc., New York, 6th Bk&Dk Ed. ISBN: 0132729156; Chang, Y-L and Sullivan, RS 1996 Qsb+: Quantitative Systems for Business Plus: Version 2.1. Prentice-Hall, Bk&Disk Edition ISBN: 0132390620; Tavares, LV, Oliveira, RC, Themido, IH, and Correia, FN 1996 Investigação Operacional. McGraw-Hill de Portugal ISBN: 9728298080.
4. Optional Course Unit.
5. Maria Manuel da Silva Nascimento, Maria Manuela Rodrigues.
6. 5h/week (2T + 3P); 2nd Semester; 3rd year.
7. Theoretical and Practical Classes.
8. 25% Written Work, Presentation, Oral Discution + 75% Final Written Examination.
9. No.
10. 4.0.

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1. Soil Technology - 0023
2. Study of physical properties of soils, measurement, estimation, and control of physical processes that occur in the soil. The study determines the best agricultural interventions (soil tillage, drainage, soil conservation, etc.) for a rational use of the soil capacity.
3a) Soils, Soil Fertility, Climatology.
3b) Understanding the expression and dimension of some physical phenomena that occur in the soil and their parametrical description. To apply these knowledge to some agricultural techniques: control and recovery of saline soils, soil tillage, erosion and soil conservation.
3c) Terron, PU 1993 Aplicaciones Fitotecnicas. Ed. Mundi-Prensa, Madrid.
4. Compulsory.
5. Manuel Oliveira.
6. 5h/week; 2nd Semester; 3rd year.
7. Each lecture corresponds to a unit, or sub-unit, of learning based on an explanation for 40 minutes followed by a debate with the students. In the practical classes there are the execution of a practical work relevant to the subject of the lecture.
8. Final exam.
9. No.
10. 5.0.

1. Rural Economy - 0027
2. The Agro-Food Company. Factors of Agrarian Production. Costs of Production of the Agro-Food Companies. Economic results of the Agro-Food Companies. Economic Evaluation of Agrarian Goods. Commercialization of Agrarian Products. Markets and Prices of the Agrarian Products. Alimentary consumption of Agrarian Products. Distribution and Offers of Agrarian Products. Marketing of Agrarian Products. The New Trends for the Agrarian Production. The Agrarian Politics. Agriculture and Environment.
3a) No prerequisite.
3b) To provide to the pupils some of the necessary basic concepts to a bigger agreement of the functioning of the agro-alimentary companies and the economic environment that encircles them.
3c) Boussard, JM Introduction à l'Economie Rurale. Paris: Editions CUJAS; Ballestero, E 1991 Economia de la Empresa Agraria y Alimentaria. Madrid: Ediciones Mundi-Prensa.; Caldentey, P 1986 Comercializacion de Productos Agrarios. Madrid: Editorial Agricola Espanola; Lendrevie, J et al 1992 Mercator: Teoria e Prática do Marketing. Lisboa: Publicações Dom Quixote; Agricultural Change, Environment and Economy. Keith Hoggart (Ed.). Mansell.
4. Compulsory.
5. Carlos Fonseca.
6. 4 h/week (4 TP); 2nd Semester; 3rd year.
7. Lectures and practical classes.
8. Written essay with oral discussion or a final written exam.
9. No.
10. 5.0.

1. Crop Science - 0058
2. Concepts. Problematics and importance of crop cultures. Crop physiology. General characteristics of great groups. Detail study of some of crop cultures.
3a) Good knowledge on biology, plant physiology, soil and climate.
3b) Sensitize to the importance of crop cultures. Acquire and apply important knowledge on field crop cultures.
3c) Tesar, M 1984 Physiological basis of crop growth and development, American Society of Agronomy, Madison; Soltner, D 1990 Les grandes productions végétales, Le Clos Lorelle, Angers; Moule, C 1992 Céréales and Plantes sarclées et diverses, La Maison Rustique, Paris.
4. Compulsory.
5. Carlos Castro.
6. 5h/week (3P + 2T); 2nd semester; 4 rd year.
7. Lectural and practical classes.
8. Final written test and pratical work.
9. No.
10. 6.0.

1. Animal Production – 0078
2. Basic concepts in animal production; animal production systems; animal welfare; basic animal nutrition and feeding; animal lodging facilities; basic concepts of swine, birds and rabbit production; ruminat production as a complementary activity of agriculture ; aquaculture and fish production.
3a) Basic knowledge on the areas of agriculture.
3b) The main objective is to transmit the general idea of animal production systems as a mean to obtain. increase the sustainability of the rural resources.
3c) None.
4. Compulsory.
5. Alberto Cardoso.
6. 4h/week ; 2nd semester; 3rd Year.
7. Theoretical.
8. Final exam.
9. No.
10. 4.0.

1. Farm Buildings - 0080
2. Farm buildings in EC. Buildings: technical drawing, construction materials, construction techniques and projects. Environment control for animals: termic analysis, energy and mass balance, forced and natural ventilation. Housing and equipment's for cattle and sheep; dimensions of silo forage. Greenhouses and storage of potatoes. Refrigeration, cold storage for perishable products and refrigeration load. Farm roads.
3a) Good knowledge on mathematics, physics and project creativity on farm buildings.
3b) The main purpose of the discipline is to provide students with fundamental bases to project and control the environmental of farm buildings.
3c) Albright, L.D 1990 Environment Control for Animals and Plants. The American Society of Agricultural Engineers, St. Joseph; Ashrae 1989. Handbook Fundamentals. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., Atlanta; Cunha, LV 1982 Desenho técnico. Fundação Calouste Gulbenkian, Lisboa; Ferreira, V and Farinha, B 2000 Tabelas técnicas. Associação dos Estudantes do IST, Lisboa; Garcia-Maton, A, Daelemans, J and Lambrecht, J 1985 Housing of animals. Elsevier, Merelbeke.
4. Compulsory.
5. Jaime Cavalheiro, António Pirra.
6. 5h/week (3P + 2T); 2nd semester;3th year.
7. Lectures and pratical classes.
8. Final written exam and pratical work.
9. No.
10. 6.0.

1. Food Science I - 0082
2. Fundamentals of food technology (Preliminary and Unit Operations); Concepts of preservations and deterioration. Problems related to public health. Parameters of the food used to control deterioration. Preservation procedures; Packaging; Quality control systems (HACCP)
3a) No prerequisite.
3b) General formation in food science, namely about its fundamentals, the food as a potencial hazard to the consumer, preservation, additives and packaging. It is aimed that the student acquire knowledge to act, not only at the transformation/commercialization, but also related to the quality control systems, particularly HACCP and analytical methods
3c) Branen, AL, Davidson, PM and Salminen, S 1990 Food Additives; Marcel Dekker Inc.: New York; Fellows, P 1992 Tecnología Del Precesado De Los Alimentos: Principios e Práticas.; Acribia: Zaragoza; Forsythe, SJ and Hayes, PR 2002 Higiene De Los Alimentos, Microbiologia y HACCP; Acribia: Zaragoza; ICMSF 1983 Ecologia Microbiana De Los Alimentos 1. Factores Que Afectam a La Supervivencia De Los Microrganismos En Los Alimentos; Acribia: Zaragosa; Potter, N and Hotchkiss, JH 1998 Food Science; Aspen Publishers, Inc.: Maryland.
4. Optional.
5. Conceição Martins; Luís Patarata; António Silva.
6. 5 h/week (2T + 3P); 2nd semester;3th year.
7. Lectures and pratical classes. Attendence in 2/3 of pratical classes is compulsory.
8. Final written test (T 75%; P 25%) or exam in the same conditions.
9. No.
10. 4.0.

1. Agricultural Equipments II - 0089
2. Presentation of some important subjects relationship with agricultural traction units and equipments that wasn't presented in Agricultural Equipments I (hydraulic transmissions, tyres, etc.)
3a) Got success in Agricultural Equipments I
3b) Allowing the students to know and use the general and specific agricultural equipments. Know chose the necessary equipments for a specific farm and determine the practical operations costs.
3c) Every subject have notes that are available in the teacher site. There is also a digital database with a lot of articles about the subjects.
4. Optional.
5. Fernando Santos, Carlos Pires.
6. 4 h/week, 2nd semester;3th year.
7. Theoretical -practical classes.
8. Seminars presentation and a final work.
9. No.
10. 4.0.

1. Ecology - 0096
2. The notion of natural and cultural integrity. Considerations of scale and hierarchy. Indicators of ecosystem integrity. Measuring biological integrity and monitoring for ecosystem integrity. Bioindicators of the quality of water, soil and air. Population Dynamics. Extreme environments and adaptation. Genetic variation and environmental stress. Environmental stress, selection, evolution and extinction. Air pollution. Toxic elements. Acidification. Forest decline. Fossil fuels. Eutrophication. Pesticides. Species richness. Radioactive pollution.
3a) Notions of Biology and Geology.
3b) To understand the fundamental concepts in environmental ecology, such as environmental stress, ecological integrity, bioindicators, adaptation and evolution. To apply these concepts in the evaluation of the great and actual environmental issues.
3c) Andreasen, JK, O'Neil, RV, Noss R & Slosser NC 2001Considerations for the development of a terrestrial index of ecological integrity. Ecological Indicators 1 (1), 21-36; Bijlsma R & Loeschcke V 1997 Environmental Stress, Adaptation and Evolution. Birkhauser Verlag. 325 p.; Dale VH & Beyeler SC 2001 Challenges in the development and use of ecological indicators. Ecological Indicators 1 (1), 3-10; Freedman B1989 Environmental Ecology. Academic Press. 424 p.; Fowler, J & Cohen, L 1990 Statistics for Ornithologists. British Trust For Ornithology - 22. 173 p.; Jeffrey DW & Madden B 1991 Bioindicators and Environmental Management. Academic Press. 224 p.; Kurtz, JC, Jackson, LE & Fisher, W S 2001 Strategies for evaluating indicators based on guidelines from the environmental Protection Agency's office of research and development's. Ecological Indicators 1 (1), 49-60; Popp, J, Hoag, DL & Eric Hyatt 2001 Sustainability indices with multiple objectives. Ecological Indicators 1 (1), 37-48; Ribaudo, MO, Hoag, DL, Smith ME & Heimlich 2001 Environmental indices and the politics of the conservation reserve program. Ecological Indicators 1 (1), 11-20; Soule, DF & Kleppel GS 1988 Marine Organisms as Indicators. Springer-Verlag. 229 p.; Woodley, S, Kay, J & Francis George 1993 Ecological Integrity and the Management of Ecosystems. St. Lucie Press. 210 p..
4. Compulsory.
5. João Alexandre Cabral, Pedro Teiga.
6. 3,5h/week (2T+1,5P); 2nd semester;3th year.
7. Theorectical and Practical lectures.
8. A written report 25% and two written tests and/or a final written exam 75%.
9. No.
10. 4.0.

1. Complementary Plant Physiology - 0447
2. Growth, differentiation and plant development. Morphogenesis. Plant movements. Physiological and anatomical basis of plant propagation. The physiology of plants under stress: concept of biological stress; plant responses to stress; water deficit; flooding and anoxia; salinity; high radiation; heat stress; chilling and freezing stress; environmental pollutants.
3a) Good knowledge on plant physiology under normal environmental conditions.
3b) Students should get a good domain of integration of the different levels of biological organization with effects on growth, differentiation and plant development. Later, it is looked to study the plant behaviour under unusual or extreme environmental conditions.
3c) Larcher, W 1995 Physiological Plant Ecology, 3th edition, Springer-Verlag, Germany; Coll, JB, Rodrigo, GN, García, BS and Tamés, RS 2001 Fisiología Vegetal. Ediciones Pirámide, Madrid; Taíz, L and Zeiger, E 1998 Plant Physiology. 2nd edition, Bejamín/Cummings, Redwood, California, USA; Hopkins, WG 1999 Introduction to Plant Physiology. 2nd edition, John Wiley, New York, USA; Salisbury, FB and Ross, CW 1992 Plant Physiology. 4th edition, Wasdsworth Publishing Company, Belmont, Califórnia, USA.
4. Optional course unit
5. José Manuel.
6. 5h/week (2T + 3P); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.0.

4th year

1. Viticulture I -0085
2. Vitiviniculture Mundial situation. Classification viticultural Portugal regions. Grapevine structure and function. Vine propagation and grafting classification. Vine cycle vegetative and reproductive. Cultural tilling. Pruning, training options and systems. Establishing the vineyard.
3a) Good knowledge on Biology, Plant physiology, Soil fertility, Climatology and Agricultural machine.
3b) Introduce to the students the situation of vitiviniculture in the world; characterization of the viticultural regions (DOC and IPR) in Portugal; fundamental concepts of grapevine cycle and grafting classification; aspects of setting and management of the vineyard, for maximization productivity/quality and longevity of grapevine.
3c) Branas, J 1974 Viticulture, Ed. Déhan, Montpellier; Champagnol, F 1984 Elements de physiologie de la vigne et de viticulture generale, Ed. Auteur, Montpellier; Fregoni, M 1985 Viticoltura generale, Ed. Reda, Roma; Fregoni, M 1999 Viticoltura di qualità, Ed. Informatore Agrario S.R.L., Piacenza; Galet, P 1983 Précis de Viticulture, Ed. Déham, Montpellier; Huglin, P 1986 Biologie et écologie de la vigne, Ed. Payot Lausanne, Paris; Huglin, P & Schneider, C 1998 Biologie et écologie de la vigne, Ed. Lavoisier, Paris; Pinho, AJO 1993 Compêndio de Ampelologia, Ed. Figueirinhas, Porto, Volumes I e II; Reynier, A 1992 Manual de Viticultura, Ed. Europa-America, Porto; Toda, F 1991 Biologia de la vid. Fundamentos biológicos da la Viticultura, Ed. Mundi-Prensa; Winkler, AJ; Cook, JA, Kliewer, WM and Lider, LA 1974 General Viticulture, Ed. University of California, Londres.
4. Compulsory.
5. Ana Alexandra Oliveira.
6. 5h/week; (2T + 3P); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 7.0.

1. Hydraulics -0087
2. Hydrodynamics. Pressure flow. Surface flow. Pumps and water elevation.
3a) Prerequisite on physics.
3b) The main objective of this course unit is to teach basic knowledge on general hydraulics.
3c) Azevedo Neto, JM and Alvarez, GA 1986 Manual de hidráulica, Edgard Blücher Lda., S. Paulo, Brasil; Cuenca, RH 1989 Open channel flow. In: Irrigation system Design, pp. 464-522, Prentice-Hall Inc.; Cuenca, RH 1989 Pipeline system design. In: Irrigation system Design, pp. 391-423, Prentice-Hall Inc.; Cuenca, RH 1989 Pump Systems. In: Irrigation system Design, pp. 351-390, Prentice-Hall Inc.; Finkel, HJ 1982 Pipe flow. In: Handbook of irrigation technology, Vol. 1 Finkel, H. J. ed., pp. 171-191,CRC Press, Inc.; Lencastre, A 1983 Hidráulica geral, Hidroprojecto, Lisboa; Nir, Z 1982 Hydraulics of open channels. In: Handbook of irrigation technology, Vol. 1, Finkel, H. J. ed., pp. 93-169, CRC Press, Inc.; Nir, Z 1982 Pumps and pumping. In: Handbook of irrigation technology, Vol. 1, Finkel, H. J. ed., pp. 299-338, CRC Press, Inc.; Quintela, AC 1981 Hidráulica, Fundação Calouste Gulbenkian, Lisboa; Tavares, N 1980 Escoamentos em pressão, IUTAD; Tavares, N 1980 Príncipios gerais dos líquidos em escoamento, IUTAD; Varennes de Mendonça, P 1976 Excertos das lições de hidráulica geral e agrícola, Instituto Superior de Agronomia, 5ª ed. Ciclostilada.
4. Compulsory.
5. Vicente Sousa; Carlos Pires.
6. 5h/week; 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 6.0.

1. Food Technology II -0088
2. Food science and food engineering. Dimensions and unit systems. Unit operations and food flow diagrams. Mass and energy balances. Preparation unit operations. Reception and transport systems of solid and fluid foods. Size reduction. Sedimentation. Centrifugation. Filtration. Ultra-filtration. Reverse osmosis. Heat transfer. Heat preservation and processing. Blanching. Pasteurisation. Sterilisation. Micro-waves. Ohmic heating. Refrigeration and cool storage. Freezing. Dehydration. Evaporation. Psychrometric diagrams. Freeze-drying. Enzyme technology. Food additives. Food packaging. Marketing. Agri-food industries and environment. Application of software to data sampling, simulation and treatment.
3a) Knowledge of mathematics, biochemistry, physics, statistics physiology and microbiology.
3b) Transfer basic concepts of food engineering. Study the main groups of unit operations and their applications to the food industry. Stimulate the discussion about the advantages and disadvantages of each one.
3c) Fellows, P 1994 Tecnologia del procesado de los alimentos. Principios y prácticas; Potter, N 1976 Food Science; Mafart, P 1994 Ingenieria industrial alimentaria, 2 volumes; Singh, RP and Heldman, DR 1998 Introducción a la ingeniería de los alimentos; Tirilly, Y and Bourgeois, CM 1999 Technologie des légumes.
4. Optional course unit.
5. Carlos J. O. Ribeiro.
6. 5h/week; (2T + 3P); 1st semester; 4th year.
7. Lectures and practical classes.
8. Tests (2) or final exam and a written work with oral presentation.
9. No (occasionally, Spanish and/or English summary at the end of each class).
10. 4.0.

1. Fruit tree culture (crops) I - 0090
2. General fruit tree culture (crops) . The importance of fruit tree crops: Economic, social, landscape and nutritional values. Marketing and commercialization. Methods and techniques of fruit tree production; nurseries, surveillance of sanitary condition, varietal certification and property rights. Life cycles of fruit trees; ecophysiology, quality and uniformity of return yieldings. Training systems and tree shaping; soil and plant management along each annual cycle, from the tree early phase to adulthood. Flowering and tree growth management, and fruit quality. Tree and fruit sanitary condition and quality before and after harvesting. Fruits for fresh consumption and for processing.
3a) Students must have a good knowledge of biology, biochemistry, climatology and soil science, and plant physiology.
3b) Students should have a working knowledge of the tree-soil relationships, should know how to stimulate the trees to obtain a balanced partitioning of photosynthesis products to fruit and vegetative growths. Low input and sustainable systems of fruit tree production are encouraged.
3c) Westwood, MN 1978 Temperate - Zone Pomology. Freeman & Co. San Francisco. 428 pp.; Kay Rayugo 1988 Fruit Culture, Its Science and art. UC-Davis. J. Wiley & Sons. NY. 343 pp.; Velarde, AGF 1989/94 Tratado de arboricultura frutal, Vols I, II, III, IV. Ed. Mundi-Prensa.
4. Compulsory.
5. Alberto Santos, Ana Paula Silva.
6. 5 h/week (3P + 2T); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical works.
9. No.
10. 7.0.

1. Weed Science - 0448
2. Weeds: types of weeds and classification according to phenology and biological cycles. Economic damage due to weeds in crops. Modelling weeds/crops competition. Non-chemical control measures for weeds. Chemical control measures for weeds. Herbicides-mode of action at cellular level, persistence and biodegradation. Techniques for herbicide application. Weeds and integrated crop management.
3a) Basic knowledge of Botany and Biochemistry.
3b) Students will get basic knowledge to help farmers to deal with weed integrated management in the main crops.
3c) Amaro, P 1973 Curso Livre de Herbologia. Ed. ISA, Lisboa; Moreira, I 1993 As infestantes em Vinhas e Pomares. Ed. ISA, Lisboa; Mexia, A 1997 Competição das Infestantes com as Culturas Agrícolas. Ed. ISA, Lisboa; Silva, L and Ribeiro, JA 1999 Avaliação de diversas estratégias no controlo de infestantes. Vida Rural Nº 1652, Lisboa; Ribeiro, JA 1997 Noções Gerais de Herbologia. (Cicloestilado). UTAD, Vila Real; Caixinhas, L 1985 Identificação de Plantulas de Infestantes. Ed. ISA, Lisboa; Villarias, H 1995 Atlas de Malas Hierbas. Ed. Mundi-Prensa, Madrid; Espírito-Santo, D 1998 Chaves de Identificação de Infestantes. Ed. ISA, Lisboa.
4. Optional.
5. José Alves Ribeiro.
6. 5h/week; (1T +3P); 1st semester, 4th year.
7. Lectures and practical classes with herbarium preparation.
8. Written test and practical work, final exam.
9. No.
10. 4.0.

1. Plant cells in vitro culture – 0449
2. Aims and applications of in vitro culture. Technics used in vitro culture. Culture medium and growth hormones. Methodologies of micropropagation. Meristem culture in micropropagation. Thermoterapy and virus erradication. Somatic embryogenesis. Organogenesis and multiplication of woody plants. Somaclonal variants. In vitro selection to abiotic stress and obtention of mutants/variants. Obtention of haploid plants. Protoplasts isolation, culture, fusion and somatic hybridization. Transformation and obtention of transgenic plants.
3a) Knowledge of Plant Physiology, Genetics, Biochemistry.
3b) The students must have contact with the basic methodologies used in vitro culture, understand the potentialities of the new technologies and its integration in plant breeding programs and develop a critical opinin about the advantages and desadvantages of new products and transgenic plants.
3c) Zryd, Jean-Pierre 1988 Cultures de Cellules, Tissues et Organes Vegetaux. Fondements théoriques et utilisations pratiques, Presses Polytechniques Romandes, Lausanne, Première édition; Margara, J 1988 Multiplicacion Vegetativa y Cultivo in vitro, Ediciones Mundi-Prensa, Madrid; Gautheret, RJ 1977 La Culture des Tissus et des Cellules des Végétaux. Masson, Paris; Bengochea, T and Dodds, JH 1986 Plant protoplasts. A biotechnological tool for plant improvement, Chapman and Hall, Cambridge
4. Optional.
5. Olinda Pinto Carnide, Fernanda Leal.
6. 5 hours/week; (2T + 3P); 1st semester; 4thyear.
7. Lectures and practical classes.
8. Final written examination and practical reports.
9. No.
10. 4.0.

1. Agricultural Entomology - 0564
2.The importance and diversity of insects. Insect structure and function: external anatomy; internal anatomy and physiology; sensory systems and behaviour. Insect reproduction and development. Insect systematics. Insects and their environment. Insects and plants. Principles of insect pest control.
3a) Good knowledge on biology and ecology;
3b) To provide students with the fundamental basis of the science and practice of insect pest management in agriculture;
3c) Carvalho, JP 1986 Introdução à Entomologia Agrícola. Fundação Calouste Gulbenkian. Lisboa; Chapman, RF 1969 The insects. Structure and function. American Elsevier. Publishing Co., Inc., New York; Dent, D 1995 Integrated pest management. Chapman & Hall, London; Gullan, PJ & Cranston, PS 1994 The insects. An outline of entomology. Chapman & Hall. London.
4. Compulsory.
5. Laura Torres.
6. 5h/week; (3P + 2T); 2nd semester; 4th year.
7. Lecture and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Experimental Design - 0022
2. Hypothesis Testing: Revision and Analysis of the Errors; Nonparametric Statistics: Testing for Goodness of Fit and Independency; Association Mesures and Tests for One and Two Samples; Tests for Multiple Comparisons for Dependent and Independent Samples; Single factor Analysis of Variance: Anova Model; Analysis of the Fixed Effects Model; Homogeneity of Variances Tests; Parametric and Nonparametric Tests for Multiple Comparisons; Anova Model II of Random Effects; Randomized Blocks, Latin Squares and Related Designs; Introdution to Factorial Designs: Basic Definitions and Principles; Two-Factor Factorial Design: Fixed Effects Models; Regression Analysis: Simple Linear Regression; Least Squares Method; Confidence Intervals and Hypothesis Testing in Simple Linear Regression and Anova Approach; Simple Linear Regression and Correlation; Non-Linear Simple Regressio: Simple Linear Regression and Data Transformations.
3a) Statistical Methods
3b) Students should be able to use the statistical methods and to design and analise field experiments.
3c) Montgomery, DC 1991 Design and Analysis of Experiments. John Wiley & Sons, Inc., Singapura, 3rd.Ed., ISBN: 0-471-52994-X; Walpole, RE and Myers, RH 1993 Probability and Statistics for Engineers and Scientists. Prentice Hall International Inc., 5.th Ed., ISBN: 0024242012; Zar, JH 1993 Biostatistical Analysis. Prentice Hall International Inc., 3rd Ed, ISBN: 0130845426.
4. Optional Course Unit
5. Maria Manuel da Silva Nascimento, Elisete Correia.
6. 5h/week; (2T + 3P); 2nd semester; 4th year.
7. Theoretical and Practical Classes.
8. 100% Final Written Examination.
9. No.
10. 4.0.

1. Viticulture II - 0050
2Sexual and vegetative propagation of vine plants. Clonal and massal selection. Ecology of viticulture. Soil fertility. Ecophysiology. Management in vineyard. Irrigation. Viticulture regions
3a) It is requested the approvement on the discipline of viticulture I
3b) It is intended to integrate the study of a vineyard in the environment, though the approach to the ecology of viticulture and "terroir", clone selection and characterization of the major viticulture regions. It is foreseen to integrate students in the subject particularly in the main production techniques used through the whole life cycle of vine crop, with special emphasis on propagation, soil and plant interventions and irrigation. Let know the parameter of classification of the most important varieties and grafting used in viticulture.
3c) Carneiro, L 1988 Propagação Vegetativa. ISA, Lisboa; Champagnol, F 1984 Elements de physiologie de la vigne et de viticulture generale, Montpellier ed. Autor; Fregoni, P 2000 Viticoltura di qualitá,. Univ. di Sacro Cuore ,Itália; Huglin, P 1986 Biologie et ecologie de la vigne, Ed. Payot Lausanne, Paris.
4. Optional.
5. Nuno Magalhães, Ana Alexandra Oliveira.
6. 5 h/week; (3P + 2T); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Two written tests, practical classes and final examination.
9. No.
10. 4.0.

1. Forages and Pastures - 0061
2. Overview of the role of forages and pastures in farming systems and their environmental adaptation and consequences. The morphological and physiological basis of grass and legumes growth. Alternatives and techniques for forage production. Pastures and pasture production. Forage conservation. The management and utilisation of forages and pastures in animal production/nutrition.
3a) Good knowledge on biology, biochemistry, soil and climate, chemistry and plant physiology.
3b) Students should get an overview of the potential and the constraints of the plants, the environment, the socio-economic and the political regulations for forage and pasture production. They must be able to manage the most important forage crops and pastures, their establishment, production, conservation and utilisation for animal feeding.
3c) Moreira, N 2002 Agronomia das forragens e pastagens. Edições UTAD, Vila Real, 183 pp..
4. Compulsory.
5. Nuno Moreira.
6. 5 h/week; (3P + 2T); 2nd semester; 4th year.
7. Lectures and practical classes. Field visits.
8. Practical work and written tests or final examination.
9. No.
10. 7.0.

1. Horticulture I - 0084
2. General horticulture. Horticulture crops: Economic importance; marketing and commercialization; ecophysiology. Soil and substrates for horticulture. Desinfection of soil and substrates. Plastic materials in horticulture. Greenhouse production and management. Hydroponics and soilless crops. Quality and standards for commercialization of vegetables.
3a) Good knowledge on biology, biochemistry, soil and climate, chemistry and plant physiology.
3b) Students should get an overview of the information regarding horticultural crops production in open air and under protected climatic conditions.
3c) Rubatzky, VE & Yamaguchi, M 1996 World vegetables. Principles, production and nutritive values, Chapman & Hall, NY; Salisbury FB & Ross, CW 1991. Plant physiology, Wadsworth PC; Several 1992 Les plastiques en agriculture. Comité des Plastiques en Agriculture, Paris. Lorenz, OA & Maynard, DN 1980 Knott's handbook for vegetable growers, John Wiley & Sons, NY.
4. Compulsory.
5. Eduardo Rosa, Alfredo Aires.
6. 5h/week; (3P + 2T); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 7.0.

1. Plant Breeding - 0095
2. Aims and evolution of plant breeding. Importance of plant breeding. Origin and diversity center of cultivated plants. Evolution of main crop plants. Germplasm resources. Reproduction in crop plants. Variability induction. Type of hybrids. Methods of selection for autogamous and alogamous species. Genetics engineering on plant breeding.
3a) Knowledge on Genetics, Biology and Crop Science.
3b) The students should to be able to develop a plant breeding program for any crop plant in order to increase the production, the quality or the resistance to any biotic or abiotic stress.
3c) Poehlman, JM and Sleper, DA 1995 Breeding Field Crops , Iowa State University Press/Ames, Iowa; Bosemark, MD and Ramagosa, NO 1993 Plant Breeding, Principles and Prospects. I ed., Chapman & Hall, London; Simmonds, NM 1981 Principles of Crop Improvement. Longman, Essex; Allard, R 1960 Principles of Plant Breeding, John Wiley & Sour Inc., New York.
4. Compulsory.
5. Valdemar Pedrosa Carnide, Carlos Ribeiro de Carvalho.
6. 6 h/week (2T + 4P), 2nd semester; 4th year.
7. Lectures and pratical classes with practical works.
8. Pratical evaluation, written tests and final exam.
9. No.
10. 6.0.

1. Fruit Crop II - 0102
2. Replant problems and soil sickness. Healthy and nutritional properties of fruits. Fruit and nut production areas. Distribution and production. Introduction to study of temperate fruit tree: The history, the domestication and distribution; taxonomy; Portugal, EU and World production areas; Nutritional value; The climatic and soil requirements; Plant physiology: the growth cycle, the vegetative growth and the fruit growth; Rootstocks and cultivars; Their propagation; Establishing the orchard; Tree training and pruning; Orchard layout; Cultural practices; Harvest, post-harvest and storage.
3a) Good knowledge on biology, biochemistry, soil and climate, chemistry and plant physiology.
3b) Students should get the appropriate technologies to obtain harvest of high quality with reduced costs and environmental impact.
3c) Teixeira de Sousa, A, Moniz Oliveira, C, Oliveira, H, Pereira, MJ, Rego, C Marcelo, E, Moreira, P and Silva, A 2000 Doença de Replantação em Macieiras e Pessegueiros. Manual PAMAF/ INIA; Matthew, J 2002 Fruits and vegetables are good for us-what is the evidence? In: What's new on...Healthy & Nutritional Properties of Fruit and Vegetables? Ed. Hort., S.L.Reus; Vavilov, NI 1951 Estudios sobre el origen de las plantas cultivadas. Versión española, ACME; Jourdain, JM 1989 Le Kiwi, techniques de production. Ctifl; Cobianchi, D Bergamini, A and Cortesi, A 1989 El Ciruelo. Versión española, Ed Mundi-Prensa; Grasselly, C and Duval, H 1997 L'Amandier. Ctifl; Bergougnoux, F Germain, E and Sarraquigne, JP 1978 Le Noisetier - production et culture. Invuflec; Bergougnoux, F, Verlhac, A, Breisch, H and Chapa, J 1978 Le Chataignier, Production et Culture. Invuflec; Breton, S 1980 Le cerisier. Ctifl; Lichou, J and Audubert, A 1989 L'abricotier. Ctifl; Ragazzini, D 1985 El Kaki. Ed Mundi-Prensa; Moreau, B, Biar, E and Lantin, B 1988 Le Framboisier. Ctifl; Rebour, H 1966 Les Agrumes. Manuel de Culture des Citrus por le Bassin Médit. Bibliothèque D'Horticulture Pratique; Trillot, M, Masseron, A and Tronel, C 1993 Pomme, les variétés. Ctifl; Brosse, J 1995 Les Fruits. Bibliothèque de L'Image; Charlot, G,. Germain, E and Prunet, JP s.d. Le noyer. Nouvelles techniques. Ctifl; Maillard, R 1981 L'Olivier. Invuflec, Ctifl; Masseron, A and Trillot, M 1991 Le poirier. Ctifl;Vidaud, J s.d. Le Pêcher. Références et Techniques. Ctifl;
4. Optional.
5. Alberto Santos e Ana Paula Silva.
6. 5h/week; (3P + 2T); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Written tests, final written exam and practical work.
9. No.
10. 4.0.

1. Integrated pest and disease management - 0450
2. I. Evolution of control measures in crop protection; concepts in integrated pest and disease management; OILB/SROP and integrated crop protection. II. Evolution of integrated pest management for the main insect and mite problems; use of biometrics; pest risk assessment and economic threshold, decision for control measures; examples for the main pests of grapevine, apple, pear and olive trees. III-Integrated disease management; disease risk assessment and decision for control measures; agricole forecast stations and prevision methods; modelling; examples for the main diseases of grapevine, apple, pear and stone fruits, olive trees and vegetable crops.
3a). Knowledge on Plant pathology, Entomology, Viticulture, Horticulture and Fruit crops
3b). Students should acquire knowledge on how to prepare a disease and pest management plan in an integrated ecossystem.
3c). Amaro, P 2001 A protecção integrada da vinha na Região Norte. PAMAF 6077, ISA/Press, Porto; Aata 1999 Guide pratique de défense des cultures, Paris; DGPC (ed) - cadernos de protecção integrada/culturas.
he specific references are indicated in each summary according to subject.
4. Optional.
5. Ana Maria Nazaré Pereira and Laura Torres.
6. 5h/week (2T+3P); 2nd semester; 4th year.
7. Lectures and pratical classes (lab and field).
8. Final exam (100%) with written reports at the end of each lab or field class.
9. No.
10. 4.0.

1. Breeding Field Crops, Seed Production and Distribution
2. Genetic resources and plant breeding. Breeding for abiotic and biotic stresses. Breeding program for wheat, rice, maize, tomato, potato, beet, grasses, legumes and grapewine. Variety evaluation and maintenance. Availability of new varieties. Seed production control.
3a) Knowledge mainly on Genetics, Biology and Crop Science.
3b) To provide the students with knowledges for develop a breeding program for specific situations and problems in specific crops.
3c) Kenneth J 1981 Plant Breeding II. Frey ed.. The Iowa State University Press/Ames, Iowa; Allard, R 1960 Principles of Plant Breeding, John Wiley & Sour Inc., New York Poehlman, JM and Sleper, DA 1995 Breeding Field Crops, The Iowa State University Press/Ames, Iowa; Simmonds, NM 1981 Principles of Crop Improvement, Longman, Essex, U.K.
4. Optional.
5. Valdemar Pedrosa Carnide, Fernanda Leal.
6. 5h/week; (2T + 3 P); 2nd semester; 4th year.
7. Lectures and pratical classes with pratical works and a monograph.
8. Pratical works, monograph, written testes and final exam.
9. No.
10. 4.0.

1. Plant Pathology - 0565
2. General aspects on plant protection. Concepts on plant pathology. Plant diseases caused by fungi. Plant diseases caused by bacteria and phytoplasmas. Plant diseases caused by virus, viroids and VLO. Plant diseases caused by nematodes. The main diseases affecting grapevines, apple and pears, stone fruits, olive trees and vegetable crops. Phytopharmacology, concepts and criteria on the use of chemicals. The use of chemicals on the control of fungi and bacteria. The risks of the chemical utilization and the human and environmental protection. Mechanisms of attack of pathogen to plants and of plant defense against pathogens. Antigen and antisera. Serological reactions: Serological techniques utilized on plant disease diagnostic. Other methods used in plant disease clinics.
3a). Knowledge on microbiology, entomology, viticulture and on vegetable and fruit crops.
3b). Students should acquire knowledge on how to identify a disease. They also should know the more frequent diseases affecting the main crops of Portugal as well as the control methods available and the criteria to select a control procedure based on the concept of integrated control of plant diseases.
3c) Agrios, G 1997 Plant Pathology. 4th Ed., Academic Press; Plant Pathologist Pockectbook. 3rd Ed. cabi Publishing; Fox, R 1993. Principles of diagnostic techniques in plant pathology. CAB International, UK; Llácer, G, López, MM, Trapero, A and Bello, A 2000 Patologia Vegetal, Tomo I e Tomo II, Phytoma, Sociedade Española de Fitopatologia e Grupo Mundi-Prensa..
4. Compulsory.
5. Isabel Cortez.
6. 5h/week (2T+3P); 2nd semester; 4th year.
7. Lectures and pratical classes.
8. Final exam (80%) and practical work (20%).
9. No.
10. 6.0.

1. Viticulture II - 0050
2. Sexual and vegetative propagation of vine plants. Clonal and massal selection. Ecology of viticulture. Soil fertility. Ecophysiology. Management in vineyard. Irrigation. Viticulture regions
3a) It is requested the approvement on the discipline of viticulture I
3b) It is intended to integrate the study of a vineyard in the environment, though the approach to the ecology of viticulture and "terroir", clone selection and characterization of the major viticulture regions. It is foreseen to integrate students in the subject particularly in the main production techniques used through the whole life cycle of vine crop, with special emphasis on propagation, soil and plant interventions and irrigation. Let know the parameter of classification of the most important varieties and grafting used in viticulture.
3c) Carneiro, L 1988 Propagação Vegetativa. ISA, Lisboa; Champagnol, F 1984 Elements de physiologie de la vigne et de viticulture generale, Montpellier ed. Autor; Fregoni, P 2000 Viticoltura di qualitá,. Univ. di Sacro Cuore ,Itália; Huglin, P 1986 Biologie et ecologie de la vigne, Ed. Payot Lausanne, Paris.
4. Optional.
5. Nuno Magalhães, Ana Alexandra Oliveira.
6. 5 h/week (3 practical + 2 theorical); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Two written tests, practical classes and final examination.
9. No.
10. 4.0.

5th year.

1. Enterprise Management I - 0042
2. Introduction to enterprise management: definition and objectives of the enterprise management; methods and phases of the management; production factors of the agrarian enterprise; the production system. Observation, analysis and projection of the enterprise: some concepts of general accountancy; agrarian accountancy; budgets method; linear programming. Strategy management: analysis of the involving surrounding; enterprise analysis; business attractiveness analysis; value chain.
3a) No prerequisite.
3b) It intends that students should be capable to assume decisions that are placed for the management of an agrarian company. It is searched, therefore, to supply information that that can be used for the evaluation of the economic-financial situation of the enterprise, through the calculation of the different economical results, the elaboration of main documents of accountancy, as well as the calculation of different economic-financial indicators. On the other hand, it is presented the budgets and the linear programming as important methods of planning activities of an enterprise. It is also purpose of the discipline to approach some concepts relating to the strategical management, seeing that success of any enterprise is, over all, function of the decision capacity of the managers, in a correct evaluation of the most promising chances.
3c) Avillez, F, Estácio, F and Neves, M 1988 Análise de Projectos Agrícolas no Contexto da Política Agrícola Comum. BP&SM; Ballestero, E 1988 Contabilidad Agraria. Ediciones Mundi-Prensa, Madrid; Barros, H 1973 A Empresa Agrícola. Fundação Calouste Gulbenkian, Lisboa; Borges, A, Rodrigues, A and Rodrigues, R 1995 Elementos de Contabilidade Geral. 14ª Ed. Rei dos Livros, Lisboa; Costa, FVM 1989 A contabilidade e a gestão na empresa agrícola. MAPA, Lisboa; Freire, A 1997 Estratégia – Sucesso em Portugal. Editorial Verbo, Lisboa; Poeta, MI 1991 Os resultados económicos da empresa agrícola. Série Didática Ciências Sociais e Humanas, nº 2. UTAD, Vila Real; Raymond, B and Winterboer, R 1984 Programacion lineal. Aplicacion à la Agricultura. Editorial Aedos. Barcelona.
4. Compulsory.
5. Ana Alexandra Costa.
6. 5h/week (2T + 3P); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final written test.
9. No.
10. 6.0.

1. Farm buildings and Equipment's projects - 0092
2. Agricultural and agro-industry projects. Financial support measures to agricultural and agro-industry; Environmental control and welfare in farm buildings. Cold storage of perishable products. Farm roads. Specialised seminars in the subject of the discipline.
3a) Good knowledge on Rural Engineering, Zootechnic and recent financial support programmes.
3b) The main purpose of the discipline is to help students to prepare agricultural and farm buildings/equipment's projects. Students should present their specific project in this subject in a final seminar.
3c) ASAE 1990 Standards. The American Society of Agricultural Engineers, St. Joseph; ASHRAE 1990 Refrigeration. American Society of Heating Refrigerating and Air Conditioning Engineers, Inc., Atlanta; Farm Building Progress 1978/1993. (artigos diversos); Garcia-Vaquero, E 1987 Deseño y Construcción de Alojamientos Ganaderos. Ediciones Mundi-Prensa, Madrid; IFADAP 2000. Ajudas e apoios ao investimento agrícola, Rural e Agro-industrial no 3º QCA (2000-2006); Techniques Agricoles 1977/85. (several articles).
4. Optional.
5. Jaime Cavalheiro, António Pirra.
6. 4 hours/week (theoretical-practical); 1st semester; 5th year.
7. Theoretical-practical classes.
8. Final written exam, presentation and discussion of a specific project in a final .
9. No.
10. 4.0.

1. Wine Technology - 0097
2. Introduction to wine technology. The wine. Definition of quality. Wines of Portugal. The grapes. Berry composition, ripening and evolution during ripening. Selection of state of ripeness for harvest.. Microbiology of musts and wines. Natural grape and winery microflora. Evolution of microflora during fermentation. Factors afecting growth and metabolism of yeasts. Biochemistry of fermentation. Malolactic fermentation. Microbiological spoilage of wine and its control. Wine fermentations. Winery equipment at different phases of wine processing. Juice and must treatments. Red table wines. White table wines. Sparkling wines. Natural sweet wines. Port, Madeira and Xerry. Fining clarification and stabilization of wines. Bottling operations.
3a) Good knowledge on microbiology and biochemistry.
3b) To provid a pratical and scientific understanding of the phenomena and processing of wine.
3c) Amerine, MA, Berg, HW and Cruess, WV 1980 Technology of winemaking, AVI Publishing Company INC. Westport, Connecticut; Mendes Faia, A 1991 Tecnologia de vinhos, programa, conteúdo e métodos de ensino. UTAD, Provas de Agregação 55pps; Boulton et al. 1995 Principles and practices of winemaking, The Chapman & Hall Enology Library.; Peynaud, E 1982 Connaissance et Travail du vin, Dunod Paris; Peynaud, E 1993 Conhecer e trabalhar o vinho, Biblioteca Agrícola Litexa.
4. Compulsory.
5. Arlete Mendes Faia, Luis Filipe Mota Ribeiro.
6. 5h/week (2T + 3P); 1th semester; 5th year.
7. Lectures and practical classes.
8. Lectures and practical classes. The students must attend at least 2/3 of practical classes. The students are submitted to an individual to obtain 8,5 values.
9. No
10. 6.0.

1. Irrigation Technology - 0098
2. Irrigated agriculture. Principles of irrigation : water – availability and quality; soil – soil water retention, infiltration and soil water movement; climate – evapotranspiration and rainfall; crops – water requirements. Irrigation methods: surface, sprinkler and localized. Soil water drainage
3a) Good knowledge on soil science, climatology, biology, plant physiology and crop production is required. There is no formal prerequisite.
3b) The integration of knowledge previously learned in several different courses is taken into account to allow a rational application of water in order to save resources and to reduce the impact of irrigation on the environment. The main methods of irrigation and drainage are teached.
3c) Cuenca, R 1989 Irrigation system design. An engineering approach. Prentice-Hall, Inc., New Jersey, 552 p. Doorembos, J.; Kassam, AH 1986 Yield response to water. FAO Irrigation and Drainage Paper nº 33, Rome, 193 p. Doorenbos, J.; Pruitt, WO 1977 Crop water requirements. FAO Irrigation and Drainage Paper nº 24, Rome, 144 p.; Jensen, ME 1983 Design and operation of farm irrigation systems. ASAE monograph nº3, St. Joseph, Michigan, 829 p.; Kay, M 1986 Surface irrigation. Systems and practice.Cranfield press, Bedford, 142 p.; Kay, M 1988 Sprinkler irrigation. Equipment and practice. B.T. Batsford Ltd, London, 120 p. Parcevaux, S.; Payen, D, Brochet, P, Samie, C, Hallaire, M and Mériaux, S 1990 Dictionaire encyclopédique d'agrométéorologie. INRA, 323 p.; Pizarro, F 1990 Riegos localizados de alta frequencia. Ediciones Mundi-Prensa, Madrid, 471 p.; Raposo, JR 1996 A rega. Fundação Calouste Gulbenkian, Lisboa, 485 p.; Vermeiren, L and Jobling, G 1980 Localized irrigation. FAO Irrigation and Drainage Paper nº 36, Rome, 198 p..
4. Optional.
5. Vicente Sousa; Carlos Pires.
6. 5h/week; 1st semester; 5th year.
7. Lectures and practical classes.
8. Final written exam
9. No
10. 4.0.

1. Rural Sociology - 0099
2. Basisc concepts, principles and methodological procedures in Rural Sociology; Agrarian activities, rural societies and society in the contemporary world -main trends of change; Predominant references, forms and directions of the most recent reconfigurations of the rural societies; the "new" ruralities- processes, functions actors and strategies of rural change
3a) No prerequisite.
3b) I This course on Rural Sociology aims to constitute a "space" providing the students oportunities and means to identify, to know and to discuss about some of the main and most relevant problematics of the actual rural societies, more specifically in what concerns the changes and the new functions of the rural settings and their articulation to the global society. We intend mainly to confront the students with that philosophy, assumptions and orientations underlying the contemporary proposals of rural development policies.
3c) Benito, CG 1996 Veinte años de Sociologia Rural en Agricultura y sociedad. Agricultura y Sociedad, Suplemento ao nº 80-81, pp 21-69.; Cavaco, C 1993 O mundo Rural em Portugal in O Programa de Desenvolvimento Regional e o Mundo Rural. MPAT/MA (Eds), Lisboa, pp 93-109; Delgado, FC 1992 Transformaciones del mundo rural y políticas agrarias. Revista de Estúdios Agro-Sociales, nº 162, pp 11-35; Galesky. B 1972 Basic concepts of rural sociology. Manchester Univ. Press, Manchester; IICA (Instituto Interamericano de Cooperacion para la Agricyltura) - s/d - nueva ruralidad. Reconocimiento de un nuevo escenario rural. (Dooc. Policopiado); Jollivet, M 1998 A "Vocação actual" da sociologia rural. Estudos Sociedade e Agricultura, nº 11, pp 5-25; Kayser, B 1989 Les sciences sociales face au monde rural. Methodes et moyens. Presses Universitaires du Mirail, Toulouse; Mingione, E and Pugliese, E 1987 A difícil delimitação do "Urbano" e do "Rural" Revista Crítica de C. Sociais, nº22,pp 83-99; Newby, H 1980 Rural Sociology. Sage publ., London; Newby, H and Guzmán, ES 1983 Introducción a la sociologia rural. Alianza Universidad, Madrid (ver pp 97-109); Oliveira Batista, F 1993 Agricultura, espaço e sociedade rural. Ed. Fora de Texto, Coimbra; Portela, J 1999 O meio rural em Portugal: entre o ontem e o amanhã. Trabalhos de Antropologia e Etnologia, vol 39 (1-2), pp. 45-65; Vários 1996 O vôo do arado. Ed. Museu Nac de Etnologia, Inst. Portuguiês de Museus e Minº da Cultura. Lisboa.
4. Compulsory (and optional for the students in a transicional curriculum).
5. Manuela Ribeiro.
6. 4h/week; (lectures and practical classes); 1th semester; 5th year.
7. Lectures, organized debates, group work in the class.
8. Group field plus written report - 25% and exam -75%.
9. No.
10. 4.0.

1. Entreprise Management II - 0100
2. Planning: concepts; project life cicle; studies concerning planning. Basic financial mathmatics. Cash-flow and. project appraisal. Project appraisal criteria. Design and appraisal of agricultural projects co-financed by EAGGF.
3a) No prerequisite.
3b) To provide skills on the design and appraisal of agricultural projects.
3c) Cadilhe, M 1994 Matemática Financeira Aplicada, Edições Asa, Porto; Avillez, F and al 1987 Análise de Projectos Agrícolas no contexto da Política Agrícola Comum, BPSM, Lisboa.
4. Optional.
5. Vasco Rebelo.
6. 5h/week (2 theoretical + 3 practical); 1st Semester; 5th year.
7. Lectures and practical classes.
8. 1 practical work (project) 60% and 3 written assessments 10%+10%+20%.
9. No.
10. 4.0.

1. Horticulture II - 0101
2. Study of the major produced individual horticulture crops in open air and controlled climate conditions. Technical aspects, pest and disease control (biological approach), quality, conservation and storage conditions of the respective horticultural products.
3a) Horticulture I.
3b) Students should learn the technical aspects that are requested for the production of the major horticultural crops under a sustainable agriculture system.
3c) Lorenz, OA and Maynard, DN 1980 Knott's handbook for vegetable growers, John Wiley & Sons, NY; Maroto, JV 1991 Horticultura herbácea especial, Mundi-Prensa Madrid; Vários 1981 Quality in stored processed vegetables and fruits, AP, London; Mármol, JR 1991 Enfermedades de hortalizas en invernadero, MAP, Madrid.
4. Optional.
5. Eduardo Rosa, Alfredo Aires.
6. 5 hours (3P+ 2T); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.0.

1. Agrarian Politics and Legislation - 0554
2. Characterization of the Portuguese Agrarian Situation; Resources Agro-Naturais; Agrarian Evolution of the Territory; Agrarian Structures; Characterization of the Communitarian Agrarian Politics (the CAP). Measured of Agrarian Policy. Agrarian Order Measures. Integrators Measures of the Agros. Incentivators Measures of the Agros; Practical of Agricultural Legislation (I - Order of the Agro-Naturals Resources, II - Agrarian Equipment, III - Agricultural Production, IV - Agricultural Transformation, V - Agricultural Distribuition, and VI - Agricultural Services)
3a) Agrarian Economy.
3b) Is intended, in first place, that the pupils if fit in the portuguese agrarian situation, through a synthesis of the agro-natural resources, of the agrarian evolution, the agrarian structures and the characterization of the CAP. The study of the agrarian policy measures is followed in the direction of the knowledge of the main ones guides in agrarian domain e, particularly, agriculture.
3c) Castro-Caldas, E 1978 A Agricultura Portuguesa no Limiar da Reforma Agrária, Centro de Estudos de Economia Agrária, Instituto Gulbenkian de Ciência, Oeiras ; Lei nº 11/87 de 7 de Abril - Bases do Ambiente, DR nº 81 de 7-4-87, I Série; Castro-Caldas,E. 1991 A Agricultura Através dos Tempos, Instituto Nacional de Investigação Científica ; Lei nº 86/95 de 1 de Setembro - Bases de Desenvolvimento Agrário, DR nº 202 de 1-9-95, I Série; Colaço-do-Rosário, M 1999 Contribuição para a Caracterização dos Recursos Agro-Naturais do Norte de Portugal no Contexto do Continente, Série Didática (109), UTAD, Vila Real; Colaço-do-Rosário, M 2000 Contribuição para a Caracterização Integrada das Estruturas Agrícolas do Norte de Portugal no Contexto do Continente, Série Didática (112), UTAD, Vila Real; Diplomas legislativos sobre recursos naturais e medidas de política agrária;
4. Compulsory
5. Manuel Colaço do Rosário.
6. 4h / week (2T + 3P); 1st semester; 5th year.
7. Theoretical and practical lessons.
8. 2 theoretical tests, practical works of agrarian legislation and final examination for the pupils who do not get dispense of examen.
9. No.
10. 6.0.

1. Marketing of Agricultural Products - 0555
2. Introduction to the Marketing Concept. Strategic Marketing and Marketing-Mix. Commercialization and Distribution of Agricultural and Agree-Food Products. Agricultural Products Supply Chain Analysis. Agricultural and Agree-Food Products Quality.
3a) No prerequisite.
3b) Students should get concepts and tools of agree-food marketing and to understand importance of marketing department for Agricultural enterprises management.
3c) Lendrevie, Jaques et al 2000 Mercator: Teoria e Prática do Marketing. Publicações D. Quixote, Lisboa; Pires, A 1998 Marketing : Conceitos, Técnicas e Problemas de Gestão. Editorial Verbo, Lisboa; Kotler, P 1993 Princípios de Marketing. Prentice Hall, Rio de Janeiro; Lagrange, L 1996 La Comercialization dês Produits Agricoles e Agro-Alimentaires. Techniques et Documentation, Lavoisier, Paris.
4. Optional.
5. Manuel Luis Tibério.
6. 5h/week (3P + 2T); 1st semester; 5th year.
7. Lectures and practical classes.
8. Participate in Classes (10%); Practical Work (40%); Final Written (50%).
9. No.
10. 4.0.

1. Floriculture and Ornamentals - 0552
2. Comprehensive study on the major ornamental plant species and cut flowers, including bulbs, under greenhouse. Technical aspects, pest and disease control (biological approach), quality, conservation and storage of cut flowers. Special emphasis is given to soilless production.
3a) Horticulture I.
3b) It is envisaged that students acquire knowledge on the fundaments and techniques requested for the production of the major cut flowers under greenhouse in soilless production systems with less impact on the environment.
3c) The Royal Horticultural Society 1992 Gardners' Encyclopedia of Plants and Flowers. Ed. Christopher Brickell, Dorling Kindersley, London; Castro, LFT & Ribeiro, JA 2001 Colecção de plantas ornamentais nos espaços verdes da UTAD, SDE da UTAD; Vidalie, H 1992 Producción de flores y plantas ornamentales, Mundi-Prensa, Madrid; Carvalho, SM 1997 Estudo de mercado de flores de corte na área urbana do Porto, relatório de estágio, UTAD; Arias, SB, Romo, DC, Hernandez, JAF & Benavente-Garcia, AG 1993 Gerbera, lilium, tulipán y rosa, Mundi-Prensa, Madrid; Marti, FF & Palomo, PJS 1991 El Rosal, Mundi-Prensa, Madrid; Melida, JL 1989, Produccion de claveles y gladiolos, Mundi-Prensa, Madrid; Browse, PMM 1994 La multiplicación de las plantas, Ed. Folio, Barcelona.
4. Optional.
5. Eduardo Rosa, José Pedro Alves.
6. 5 hours (3P + 2T); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.0

Animal Science Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Mathematical Analysis I	5.0	Mathematical Analysis II	5.0
	Chemistry I	5.0	Chemistry II	5.0
	General Physics I	6.0	General Physics II	6.0
	Cytology	5.0	Histology	5.0
	Zoology and Parasitology	4.0	Animal Morphology	5.0
	Animal Morphology I	5.0	Environment and Climatology	4.0
	Total	30	Total	30
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	General Biochemistry I	7.0	General Biochemistry II	7.0
	Linear Algebra and Analytical Geometry	5.0	Soils and Soil Fertility	5.0
	Statistical Methods	5.0	Operation Research	4.0
	English	2.0	Mechanics	5.0
	General Physiology	5.0	Systems Physiology	5.0
	Genetics I	5.0	Genetics II	5.0
	Total	29	Total	31
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	Animal Nutrition I	5.0	Experimental Design	4.0
	General Agriculture	4.0	Animal Nutrition II	5.0
	Economics Introduction	4.0	Animal Health and Hygiene	6.0
	Animal Breeding I	5.0	Animal Breeding II	4.0
	Microbiology	5.0	Animal Reproduction	5.0
	Applied Physiology	5.0	Animal Welfare	4.0
			Economy of the Animal Production	4.0
	Total	28	Total	32
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	Sheep and Goat Production I	5.0	Sheep and Goat Production II	4.0
	Cattle Production I	5.0	Cattle Production II	4.0
	Pig Production	6.0	Rabbit Production	4.0
	Rural Sociology	4.0	Aquaculture	4.0
	Forages and Pastures I	5.0	Farm Buildings	5.0
	Technology of Animal Products I	4.0	Forages and Pastures II	5.0
			Technology of Animal Products II	5.0
	Total	29	Total	31
	1st Semester	ECTS	2nd Semester	ECTS
5th YEAR	Fish Production	4.0	Project	30
	Equipment and Animal Housing	5.0		
	Management and Planning	4.0		
	Equine Production	4.0		
	Animal Feeding	5.0		
	Extension and Rural Development	4.0		
	Chicken Production	4.0		
	Total	30	Total	30

Total study: 300 credits

1st year

1. Mathematical Analysis I – 0174.
2. Functions of one variable: implicit and inverse functions; some special functions. Limits of functions and continuity: classification of discontinuity. Derivatives: higher order derivatives; implicit differentiation. Antiderivatives: techniques of integration. Rolle's theorem, Lagrange's theorem and Cauchy's theorem. L'Hopital's rule.
3a) High-school Mathematical Analysis.
3b) To give to the Animal Production students a preparation in concepts and standard technics so that they can overcome certain problems that arise in their area.
3c) Carvalho e Silva, Jaime, 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, Earl. W 1979 Calculus with Analytic Geometry , 1st Vol., Weberand Schmidt; Apostol, Tom M 1967 Calculus, 1st Vol., Wiley International Edition.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino; Laura Azevedo Ribeiro.
6. 5h/week (2h theoretical, 3h theoretical-practical); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 3/4 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 5.0.

1. Chemistry I – 0714.
2. Chemistry tools; Chemical equations and reactions in aqueous solution; Chemical bonding; Thermodynamics; Chemical kinetics; Chemical equilibrium; Acid-base Equilibria; Solubility equilibria; Electrochemistry.
3a) No Prerequisits.
3b) To provide the essence of chemistry and the main tools required to study the chemical reactions and the structure and properties of matter. Once a basic knowledge of chemistry has been acquired a closer look at many different topics dealing with the physical and chemical properties of matter is provided.
3c) Chang R 1994 Química, 5ª Edição, McGraw-Hill; Seager SL e Slabaugh MR 2000 Chemistry for Today General, Organic, and Biochemistry, Ed. Brooks/Cole, 4th edition, UK; Reger, D Goode, S e Mercer, E 1997 Química: Princípios e Aplicações, Ed da Fundação Calouste Gulbenkian, Lisboa.
4. Compulsory.
5. Maria João Melo de Carvalho.
6. 5 hours/week; 1st semester; 1st year.
7. 2 hours lectures and 3 hours practicals.
8. Written exam (50%) and practical mark (50%).
9. No.
10. 5.0.

1. General Physics I – 0118.
2. Scalar and vector quantities; units of measurement; kinematics; movement in one and two dimensions; dynamics of particles; work and energy; conservation of energy; linear momentum; collisions; rotation; equilibrium of rigid bodies.
3a) Basic knowledge of physics and mathematics.
3b) Students should get an overview of the basic concepts of newtonian mechanics (vector operations, kinematics, statics and dynamics) and learn how to apply those concepts in practical situations.
3c) D Halliday, R Resnick & J Walker 1993 Fundamentals of Physics John Wiley, New York, 4th edition; F J Bueche & DA Jerde 1995 Principles of Physics McGraw-Hill, New York, 6th edition; JW Kane & MM Sternheim 1988 Physics John Wiley, New York; I C Jong & BG Rogers 1991 Engineering Mechanics - Statics and Dynamics Saunders, Philadelphia.
4. Compulsory.
5. Ednan Joanni, Afonso Pinto; José Ramiro Fernandes.
6. 5h/week (1.5h practical + 1.5h theoretical-practical + 2h theoretical); 1st semester; 1st year.
7. Lectures, problem-solving classes and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Cytology – 0005.
2. Theory: Compounds on living systems – organic molecules. Levels of biologic organization – eukaryotic and prokaryotic cells. Cellular ultra-structure – organelles and membrane systems: cytoplasm membrane and cell wall; ribosomes; granular and smooth endoplasmic reticulum; Golgi complex; lysosomes; multivesicular bodies and peroxisomes. Cytoskeleton (microtubules, centrioles, cillia and flagella). Energy-
-processing: plastids and photosynthesis; mitochondria and cellular respiration. Structural and functional organization of nucleus. DNA replication and protein synthesis. General embryology – gametogenesis, hormonal regulation of sexual cycle; fertilization; general features of embryonic development on vertebrate; cleavage and blastulation, gastrulation and neurulation; origin, structure and functional significance of extraembryonic organs; derivatives of the primary germ layers.
Practice: Microscopy. Cytological and histological techniques. Cellular cycle of eukaryotic cells – mitosis and meiosis. General embryology - observation and description of microscopic preparations of bird (chick) and mammal (pig) embryos at several development stages.
3a) Basic knowledge on Biology.
3b) To acquire knowledge on: cellular and molecular basis of structure and function of the animal and vegetal cells (Cytology); embryonic development of vertebrates (General Embryology).
3c) Azevedo, C 1999 Biologia Celular e Molecular. 3ª Edição. Lidel, Edições Técnicas; Costa, AC & Morato, X 1984 Desenvolvimento Embrionário dos Vertebrados. Editora Verbo; Ferreira-da-Silva, 1993 Introdução à Técnica Histológica. Série Didática - Ciências Aplicadas, UTAD; Purves, W Orians, G & Heller, C 1995 Life – The Science of Biology. 4th Edition. WH Freeman & Co, USA.
4. Compulsory.
5. Jorge Ventura F. Cardoso; Sandra Mariza Monteiro; Sofia Santos.
6. 6h/week (3h theoretical + 3h practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Theorical (50%): 2 written tests or final exam; Practical (50%): 2 written tests or final exam.
9. No.
10. 5.0.

1. Zoology and Parasitology – 0049.
2. Generalities about Parasitolology. Technician role on prevention and control. Most important parasitosis in portuguese herds. Introduction, distribution, epidemiology, diagnosis, patogeny, economical impact and prophylaxis. Practical classes concerning these subjects.
3a) Good knowledge on biology.
3b) Give to students good knowledge and concepts of transmission and maintenance of parasitosis and your control.
3c) Cordero-Del-Campillo, M & Rojo-Vázquez, 1999 Parasitología Veterinaria. McGraw Hill. Interamericana. Georgi, JR 1988 Parasitologia Veterinária. Melhorn; H & Piekarski, G 1993 Fundamentos de Parasitologia. Editorial Acribia SA Melhorn; H Düwel, H & Raether, W 1992 Atlas de Parasitologia Veterinária. Grasse Ediciones; Olsen, W 1962 Animal Parasites; Rodrigues, MMC 1980 Guia de trabalhos práticos de Zoologia e Parasitologia. IUTAD, Vila Real. 140 pp.; Rodrigues, MMC 1982 Apontamentos de Parasitologia. IUTAD, Vila Real. 36 pp.; Soulsby, JL 1987 Parasitologia y enfermedades parasitarias en los animales domésticos. Urquhart, GM; Armour, J Duncan, JL Dunne, AM & Jenning, FW 1989 Veterinary Parasitology.
4. Compulsory.
5. Maria da Graça Queirós Capela de Vieira e Brito.
6. 4 h/week (2h theoretical; 2h practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. One test; final written examination theoretical and practical.
9. No.
10. 4.0.

1. Animal Morphology I – 0716.
2. Body anatomical planes and anatomic regions, basic notions of osteogenesis, axial and appendicular skeleton, basic notions of arthrology, myology of the domestic animals of production interest.
3a) Previous knowledge of the specimens of animal production interest.
3b) Achieve an adequate knowledge of osteology, arthrology, myology of the domestic animals of production interest, in order to be able to understand the anatomic regions and body composition.
3c) Barone, R 1978 Anatomie comparée des mammifères domestiques. Tome I Vigot Frères; Lyon, Barone, R 1989 Anatomie comparée des mammifères domestiques. Tome II Vigot Frères; Lyon, Dyce K M, Sack WO, Wensing CJG 1999 Anatomía Veterinaria. Ed. McGraw-Hill Intermericana. México, Schaller O 1996 Nomenclatura anatómica veterinaria ilustrada. Ed. Acribia, Zaragoza.
4. Compulsory.
5. David Orlando Alves Ferreira, Ana Sofia Santos.
6. 5h/week (2h theoretical + 3h practical); 1st semester; 1th year.
7. Lectures and practical classes.
8. According to University Regulations, final theoretical exam and a final practical exam.
9. No.
10. 5.0.

1. Analysis Mathematics II – 0178.
2. Taylor's formula. Integration: the definite integral. Applications of Integration. Improper Integrals. Sequences of real numbers: bounded and monotonic sequences. Series: series with nonnegative terms : comparison tests, the integral test, the ratio and root tests; absolute convergence - alternating series. Power series: expansion of functions; differentiation and integration of power series; Taylor and Maclaurin series.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, Jaime, 1994 Princípios de Análise Matemática Aplicada McGraw Hill, Lisboa; Swokowski, Earl W 1979 Calculus with Analytic Geometry, 1st Vol., Weberand Schmidt. Apostol; Tom M 1967 Calculus, 1st Vol.Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito; Helena Campos; Sandra Ricardo
6. 5h/week (2h theoretical + 3h theoretical-practical); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 3/4 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 5.0.

1. Chemistry II – 0715.
2. Carbon compounds and chemical bond. Introduction to general organic reactions and their mechanisms. Conformational analysis. Stereochemistry. Sistematic study of the major functional groups: structure of organic compounds, nomenclature, physical properties and reactivity.
3a) Chemistry I.
3b) To provide the students a background in the fundamentals of Organic Chemistry in order to develop their ability to understand the behaviour of organic chemicals in the environment.
3c) Solomons, TWG and Fryhle, CB 2000 Organic Chemistry, 7th edition, John Wiley & Sons, Inc.; Brown, WH 1995 Organic Chemistry, International Edition, Saunders College Publishing; Schwarzenbach, RP Gschwend, PM and Imboden, DM 1993 Environmental Organic Chemistry, John Wiley & Sons, Inc.
4. Compulsory.
5. Maria João Melo de Carvalho.
6. 5h/week (2h theoretical + 3h practical) 2º semester; 1º ano.
7. Lectures, practical classes and laboratory classes.
8. Written exam (50%) and practical mark (50%).
9. No.
10. 5.0.

1. General Physics II – 0119.
2. Fluid mechanics; heat and the 1st law of thermodynamics; kinetic theory of gases; entropy and the 2nd law of thermodynamics; charge and electric fields; Gauss law; electric potential; capacitance; electric current; electric circuits.
3a) Basic knowledge of physics and mathematics.
3b) Students should get an overview of the basic concepts of fluid mechanics, thermodynamics and electricity and learn how to apply those concepts in practical situations.
3c) D Halliday, R Resnick & J Walker 1993 Fundamentals of Physics, John Wiley, New York, 4th edition; F J. Bueche & DA Jerde 1995 Principles of Physics, McGraw-Hill, New York, 6th edition; JW Kane & MM Sternheim 1988 Physics John Wiley, New York.
4. Compulsory.
5. Ednan Joanni, Afonso Pinto, José Ramiro Fernandes.
6. 5h/week (2h theoretical + 1.5h practical + 1.5h theoretical-practical); 2nd semester; 1st year.
7. Lectures, problem-solving classes and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Histology – 0236.
2. Theory: General Histology – epithelial tissue (protective and glandular); connective tissue (proper and special - adipose, blood and lymph, cartilage and bone); nervous tissue; muscular tissue (skeletal, cardiac and smooth). Practice: Special Histology or Microscopic Anatomy – circulatory system (heart and blood vessels); bone marrow and hematopoiesis; digestive system (tongue, esophagus, stomach, small intestine, large intestine and annex glands - salivary glands, liver and pancreas); respiratory system (larynx, trachea and lungs); excretory system (kidney, bladder and urinary ducts); endocrine glands (thyroid and adrenal); male (testis) and female (ovaries, uterus and mammary gland) reproductive system; general structure of large bone - ossification processes; skin and appendages (epidermis, dermis and skin glands - sweat and sebaceous); central nervous system (cerebrum, cerebellum and spinal cord).
3a) Knowledge on Cytology.
3b) To acquire knowledge on structural, morphologic and functional aspects of animal tissues (General Histology) and its topography and interrelations in the diverse organs (Special Histology or Microscopic Anatomy).
3c) Junqueira, LC & Carneiro, J 1990 Histologia Básica. Editora Guanabara; Burkitt, HG Young, B & Heath, J W 1994 Wheater – Histologia Funcional. Editora Guanabara.
4. Compulsory.
5. Jorge Ventura F. Cardoso; Sandra Mariza Monteiro.
6. 5h/week (2h theoretical + 3h practical); 2ed semester; 1st year.
7. Lectures and practical classes.
8. Theorical (50%): 2 written tests or final exam; Practical (50%): oral exam.
9. No.
10. 5.0.

1. Animal Morphology II – 0717.
2. Animal Morphology II. Basic notions on the anatomy of nervous and endocrine systems. The anatomy study of the respiratory, digestive and urogenital systems of the domestic animals. Study of the morphological regions. Applied zoometry to domestic species of production interest.
3a) Good knowledge on biology.
3b) Students should get an overview of the information regarding anatomy of nervous, endocrine, respiratory, digestive and urogenital systems. They are also the knowledge of the morphology regions and the development and application of methodologies for the appreciation of the production animals.
3c) Barone, R 1989 Anatomie comparée des mammifères domestiques. Tomo I e II, Editions Vigot, Paris; Salter Cid, P 1999 Hipologia. O exterior do cavalo. Ed. MG Editores; Sotillo, LJ e Serrano, V 1985 Produccion Animal. I Etnologia zootecnica. Tomo I, Ed. Tebas Flores, Madrid.
4. Compulsory.
5. Severiano Rocha e Silva.
6. 5h/week (2h theoretical + 3h practical); 2nd semester; 1th year.
7. Lectures and practical classes.
8. Final written test or exam.
9. No.
10. 5.0.

1. Environment and Climatology – 0718.
2. Study of environmental geology, main aspects (internal and external) of Earth, the influence of man in the environment; natural disasters. The dynamic Earth, minerals, igneous rocks, sedimentary rocks and metamorphic rocks. Introduction to the geology and neotectonic of Portugal. Study of climate factors: daylenght; solar radiation; air and soil temperature; atmospheric humidity; wind; rainfall; evapotranspiration; energy balance; frosts; water balance and climatic classification.
3a) Good knowledge of Physics, Maths, Statistics and Earth Sciences.
3b) Students should get an overview on the influence of the climatic factors on agriculture and animal production systems, on the knowledge on planet Earth, its processes and its resources, with special reference to the interaction between climate factors and animal production and the dynamics of the geologic processes, being these presented in an environmental perspective.
3c) Campbell, GS & Norman, JM 1998 An Introduction to Environmental Biophysics. Springer-Verlag; Ferreira, TC 2000 Fotoperíodo. Série Didáctica de Climatologia Aplicada, Universidade de Trás-os-Montes e Alto Douro, Vila Real. 38p; Fry, N 1985 The Field Description of Metamorphic Rocks. Geological Society of London; Instituto Nacional de Meteorologia e Geofísica 1991 O clima de Portugal, fasc. XLIX correspondentes a 1951-1980:Vol. III: 3ª Região: Normais climatológicas da Região deTrás-os-Montes e Alto Douro e Beira Interior; Jones, HG 1983 Plants and Microclimate. A quantitative approach to environmental plant physiology. Edition, Cambridge; Skinner, B & Porter, S 1992 The Dynamic Earth, an introduction to physical geology. John Wiley & Sons, 570 pp; Thorpe, R & Brown, G 1985 The Field Description of Igneous Rocks. Geological Society of London; Tucker, M 1986 The Field Description of Sedimentary Rocks. Geological Society of London.
4. Compulsory.
5. Timóteo Ferreira; João Baptista; Aureliano Malheiro; Anabela Fernandes.
6. 4h/week (2h theoretical + 2h practical); 2nd semester; 1rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.0.

2nd year

1. Statistical Methods – 0008.
2. Descritive Statistics and Statistical Inference. Introdution to Statistics and to data analysis. Introdution to Probability Theory. Introdution to Random Variables and to the Probability Laws. Mathematical Expectation and their Properties. Some Probability Laws Discrete and Continuous. Statistical Inference. Random Sampling. Data Description, and Some Fundamental Sampling Distributions. Bernoulli and Normal Populations. Estimation Methods. Point Estimation: Statistics and their Properties. Intervalar Estimation Cofidence Interval for the Single Mean, and for the Variance, and for the Difference Between Two means (Paired and Independent Samples), and for Two Sample Variances, and for the Proportions, and for the Difference Between Two Proportions. One and Two Sample Tests of Hypotheses. One and Two Tailed Tests. Use of p-Values in Decision Making
3a) Mathematics I.
3b) Students should be able to use the statistical methods in data analysis.
3c) Reis, EP Melo, R Andrade e T Calapez, 1997 Estatística Aplicada. Edições Sílabo, 2. Ed., Vols. I e II. ISBN: 9726181615; ISBN: 9726181623; Walpole, RE e RH Myers 1993 Probability and Statistics for Engineers and Scientists. Prentice Hall International Inc., 5.th Ed., ISBN: 0024242012; Zar, JH 1993 Biostatistical Analysis. Prentice Hall International Inc., 3rd Ed, ISBN: 0130845426.
4. Compulsory.
5. Maria Manuel da Silva Nascimento; Elisete Correia.
6. 4h/week (2h theoretical + 4h theoretical-practical); 1st semester; 2nd year.
7. Theoretical and Theoretical-Practical Classes.
8. 100% Final Written Examination.
9. No.
10. 5.0.

1. English – 0505.
2. Exchanging information, basic grammar, technical vocabulary, reading comprehension, extracting meaning from context.
3a) Pre-intermediate knowledge of English grammar, sentence structure and vocabulary
3b) This course is designed to meet the language needs of students by providing them with the necessary language framework needed to understand technical texts as well as communicate with a functional level of English.
3c) Nick Hall/John Shepheard, 1995 The Anti-Grammar Grammar Book Longman 5th Edition; Raymond Murphy 1987 English Grammar In Use, Cambridge University Press; HH Cole WN Garett 1988 The Biology, Husbandry and Use of Domestic Animals, Peter Collins Publishing; Ruth Hayes 1988 Animal Husbandry, Peter Colin Publishing, Dictionary of Agriculture Peter Colin Publishing; Clive Oxenden, Christina Latham Koenig – 1999 English File Intermediate Oxford University Press. In addition the internet, various journals and newspapers will be used as sources of material.
4. Compulsory.
5. Paul Driver.
6. 2h/week; 1st semester; 2nd year.
7. Lectures, communication activities, reading/listening comprehensions, grammar presentations.
8. Final exam.
9. Yes, English.
10. 2.0.

1. General Biochemistry I – 0723.
2. Lecture Course. Water, solubility and pH. Aminoacids and Proteins, structure and properties. Kinetics of Biochemistry reactions. Vitamins and Coenzymes. Carbohydrates, structure and properties. ATP and energy transfer. Carbohydrate metabolism: Glycolysis; Neoglucogenesis; Cori Cycle; Krebs Cycle, Pentose Phosphate Pathway. Aspects of metabolic regulation. Lipids, structure and properties. Practical Course. Titration. Potentiometer: constituents and functioning. Laboratory titration of biological molecules. Chromatography. Fundamentals. Types. Thin layer Chromatography of biological molecules. Spectrophotometry. Constituents of a Spectrophotometer. Functioning of a Spectrophotometer. Spectrophotometry as a qualitative method. Fundamentals. Constructing Absorbance Spectra of biological molecules. Spectrophotometry as a quantitative method. Fundamentals. Constructing concentration curves of biological molecules. Electrophoresis. Fundamentals. Electrophoresis of biological molecules. Enzymatic kinetics. Michaelis-Menten kinetics. Lineweaver-Burk kinetics. Studying enzymatic kinetics in an enzyme. Fundamentals. Determination of Km and Vmáx. Practical exercises concerning information given during lectures and lab sessions.
3a) No prerequisites.
3b) To convey information in General Biochemistry using a teaching-learning strategy aiming at scholar success by motivating the Students to the themes presented, introducing, when adequate, examples concerning Animal Science. To place Biochemistry at the centre of modern Animal Science namely in the areas of nutrition, animal development, control of production and food quality, for which is important to direct Students' attention considering their importance to an Animal Sciences professional.
3c) Campos, LS 1999 Entender a Bioquímica. O metabolismo fundamental em animais e plantas. 2ª edição, revista. Escolar Editora, Lisboa, Portugal; Bezerra, RMF 2000 Bioquímica I. UTAD, Vila Real, Portugal. When adequate, complementary bibliography is supplied in lectures and practical classes.
4. Compulsory.
5. Carla Maria Calçada Torres Pereira.
6. 6 hours/week (3 h theoretical + 3 h practical); 1st semester; 2rd year.
7. Lectures, Lab Sessions and Exercise Sessions.
8. Lecture Course evaluation is done trough two written tests, T1 and T2, 60 minutes duration each. Theoretical evaluation accounts for 4/7 of the final mark. Practical Course evaluation is done through one practical test, P1, 60 minutes duration, and through a continuous evaluation of practical lab skills' parameter, APR. APR joins results from quiz-reports related to each lab session that include presentation and interpretation of results, conclusions and questions that may demand bibliographic search, rewarding Students that participate actively in the practical sessions. P1 and APR account for 3/7 of the final mark.
9. No.
10. 7.0.

1. Genetics I – 0730.
2. Mendelian Genetics. Gene interactions. Lethal genes. Multiple alleles. Sex linkage and sexual determination. Linkage. Molecular Genetics, DNA replication, transcription and translation. Recombinant DNA technology. Transgenic animals.
3a) Basic knowledge on statistics, cytology, biochemistry and microbiology.
3b) To understand the importance of mendelian Genetics and its relationship with Molecular Genetics and their recent application in animal Biotechnology.
3c) Tamarin, RH 2001 Principles of Genetics, International Edition. Ed. McGraw Hill; Griffiths, AJF, Miller, JH & Suzuki, DT 2000 An Introduction to Genetic Analysis, W H Freeman & Co.; Hartl, DL & Jones, EW, 2002 Essential Genetics, Ed. Jones and Bartlett; Stansfield, WD, 1992 Genética. 3rd Ed. McGraw-Hill. (In Spanish).
4. Compulsory.
5. Isabel Gaivão.
6. 4h/week (2h theoretical + 2h practical); 1st semester; 2rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 5.0.

1. General Physiology – 0525.
2. Introduction to Physiology. Internal Environment. Body-Fluids Compartments. Mollecular and Cellular Control Mechanisms: Homeostasis and feedback Control; Movement of Molecules Across cell membranes; Cellular Receptors; Signal Transdution Pathways. Neural Control Mechanisms: Neurons and Synapses; Neurotransmitters; Synaptic Integration; Membrane Potentials; Structural and Functional Organizatios of Nervous System; Central Nervous System; Autonomic Nervous System. Sensory Systems: Sensory Receptors. Specific Sensory Systems. Hormonal Control Systems: Hormone Structure, Synthesis, Transport, Metabolism, Excretion and Secretion; Mechanisms of Hormone Action; Endocrine Glands and Hormones. Muscle: Mechanisms of Contraction and Neural Control; Skeletal Muscle Mechanisms of Contraction, Energy Requirements and Neural Control, Cardiac and Smooth Muscles.
3a) Good knowledge on Anatomy, Histology, Biochemistry.
3b) The purpose of Physiology is to present the fundamental principles and facts of animal body function and explain how cells are coordinated to function as an organ, how organs cooperate in systems and how systems functions are controled and integrated by whole organism when adapting to internal and external needs.General Physiology foccus is on Mollecular and Cellular Control Mechanisms and Biological Control Systems: Neural Mechanisms and Hormonal Mechanisms.
3c) Cunningham, JG 1997 Textbook of Veterinar Physiology, 2nd ed. WB Saunders; Guyton, A 2000 Textbook of Medical Physiology; WB Saunders Vander, A Sherman, S and Luciano, D 2002 Human Physiology, 8th ed. McGraw-Hill; Garcia-Sacristán, A Montijano, F Palomino, L Gallego, J Silanes, M Ruiz, G 1995 Fisiologia Veterinária, McGraw-Hill.Interamericana; Eckert, Randall, Augustine, 1988 Animal Physiology, McGraw-Hill.Interamericana; Seeley, R Stephens, T Tate, P, 1997 Anatomia e Fisiologia, L-Lusodidata, Lisboa.
4. Compulsory.
5.. Teresa Rangel Figueiredo; Paulo Rema; Sandra Sacoto.
6. 5h/week (2h theoretical + 3h practical); 1nd semester; 2th year.
7. Lectures and practical classes.
8. 1 written assessments or Final written exam. (Theoretical 60%+Pratical 40%).
9. No.
10. 5.0.

1. Linear Algebra and Analytical Geometry – 0117.
2. Algebric Structures. Vector Spaces: linear independence; spanning sets; basis and dimension; vectorial subspace. Linear Mappings: the algebra of linear mappings; kernel and image; linear mappings whose domain is a vector space of finite dimension. Matrices: matrix of a linear mapping relative to fixed basis; algebra of matrices; invertible matrices; rank of matrices. Systems of Linear Equations: matricial interpretation; a systematic method of solving systems of linear equations. Determinants: basic concepts; Laplace theorem; application to matrices and systems. Eigenvalues and Eigenvectors: basic concepts.
3a) Basic knowledge in logic, theory of sets, functions and secondary school level of algebra.
3b) To develop reasoning capacity of the student and to provide the basic concepts of Linear Algebra and Analytical Geometry.
3c) Giraldes, E Fernandes, VH Smith MP, 1995 Curso de Álgebra Linear e Geometria Analítica, McGraw-Hill; Blyth, TS Robertson, EF, 1986 Matrices and Vector Spaces, Chapman and Hall; Blyth, T S Robertson, EF, 1994 Linear Algebra, Chapman and Hall.
4. Compulsory.
5. Elza Maria Alves de Sousa Amaral, Rosalina Reimão.
6. 5h/week (2h theoretical + 3h theoretical-practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Written test (100%).
9. No.
10. 5.0.

1. General Biochemistry II – 0731.
2. Main metabolisms of the cell: carbohydrate, lipid, amino acid, nucleic acid and biotransformation of xenobiotics.
3a) Chemistry, Citology e Histology.
3b) To give the students basic knowledge in biochemistry, and describe the molecular structure, organization and the function of cells. To know the main metabolisms of biological molecules, specially the chemical reactions envolved in biossynthesis, catabolism and energy production.
3c) Berg, JM Tymoczko, JL e Stryer, L 2002 Biochemistry. WH Freeman and Company, fifth edition, New York, 974 pp; Campos, LS 1998 Entender a Bioquímica. Escolar Editora, Lisboa, 683 pp; Devlin, TM 1993 Textbook of Biochemistry with Clinical Correlations. John Wiley & Sons Inc., New York, 1185 pp; Elliot, WH e Elliot, DC 1997 Biochemistry and Molecular Biology. Oxford University Press, 437 pp; Garrett, RH e Grisham, CM 1995 Biochemistry. Saunders College Publishing, 1100 pp; Koolman, J. e Rohm, KH 1996 Color Atlas of Biochemistry. Thieme, Stuttgart, 435 pp; Lehninger, AL Nelson, DL e Cox, MM 2000 Principles of Biochemistry. Third edition, Worth Publishers, 1152 pp; Marks, DB Marks, AD e Smith, CM 1996 Basic medichal biochemistry. A clinical approach. Williams & Wilkins, Baltimore, 806 pp; McKee, T e McKee, JR 1999 Biochemistry: An Introduction. Second edition, Wm CBrown Publishers, Boston, 619 pp.
4. Compulory.
5. António Augusto Fontaínhas Fernandes; Pedro Matos.
6. 6h/week (3h theoretical + 3h practical); 2º semester; 2º year.
7. Theorectical and practical lectures.
8. Final classification = two written test of theorectical lectures and one written test of practical lectures or final written.
9. No.
10. 7.0.

1. Soils and Soil Fertility - 0066.
2. Soil functions, soil formation factors and soil composition. Soil mineral composition, texture e consistency. Soil organic matter, decomposition-humification of organic residues and humus properties. Soil structure, peds and pores. Soil water, water movements, water forms and plant availability. Soil aeration, soil atmosphere, soil colour and drainage classes. Surface reactions, cation exchange and soil reaction. Occurrence and dynamic of nutrients in the soil, macro- and micronutrients. Soil fertility evaluation. Organic and mineral fertilizers. Fertilization of pastures and forages. Soil evaluation, soil qualities and limitations.
3a) Basic knowledge in the field of chemistry, land morphology and geology/mineralogy is desirable.
3b) This course is meant to be an introductory course in soil science. Students should be familiar with soil composition, some characteristics of soil profile morphology and the main soil physical, chemical and biological properties. Students must be able to make a qualitative evaluation of soils qualities and limitations in order to suggest adequate soil uses, and corrections for better conditions for plant growth.
3c) Schroeder, D 1984 Soils, Facts and Concepts. Int. Potash Inst., Berne; Foth, HD 1990 Fundamentals of Soil Science 8ª ed. J Wiley & Sons. New York; Tisdale, SL Nelson, WL and Beaton, JD 1990 Soil Fertility and Fertilizers 4ª ed. Mc Milan Pub. New York; Santos, JQ 1991 Fertilização. Fundamentos da utilização dos adubos e correctivos. Euroagro, Publicações Europa-América; Santos, JQ e Coutinho, JF 1990 As pastagens e forragens no nordeste transmontano. Pastagens e Forragens 11(1): 7-26.
4. Compulsory.
5. Ester Maria Abranches Costa Portela.
6. 5h/week (2h theoretical + 3h practical); 2nd semester; 2 nd year.
7. Lectures supported by transparencies and slides, laboratorial and field classes, and practical exercises based on calculations.
8. Two written tests both with theoretical and practical questions (80%) + four quizzes and two reports of practical exercises (20%) or a final written exam both with theoretical and practical questions.
9. Não.
10. 5.0.

1. Operations Research – 0386.
2. The role and the objectives of the Operations Research (OR). Methods in engineering. Introduction to OR. The Nature of OR. Overview of the OR Modeling Approach. Introduction to Inventory Theory. Introduction to Linear Programming (LP). Solving LP Problems: The Simplex Method. Solving LP Problems with Other Model Forms: The Big-M Method and the Penalty Method. Introdution to Duality in LP. Sensitivity Analysis in LP Problems. Introduction to the Transportation and Assignment Problems.
3a) Mathematics I and Statistical Methods
3b) Students should be able to identify Operations Research Models and to use correct algoritms to solve the models. Learn the basic rules of a Written Work.
3c) Hillier, FS e GJ Lieberman, 1996 Introdution to Operations Research. McGraw-Hill Bo. Co., 6th/Bk&dsk Ed. 1995. ISBN: 0078414474; Taha, Hamdy A 1996 Operations Research - An Introdution. Prentice Hall International Inc., New York, 6th Bk&Dk Ed. ISBN: 0132729156; Chang, Y-L. e RS Sullivan, 1996 Qsb+: Quantitative Systems for Business Plus: Version 2.1. Prentice-Hall, Bk&Disk Edition ISBN: 0132390620; Tavares, L VRC Oliveira, IH Themido e FN Correia, 1996 Investigação Operacional. McGraw-Hill de Portugal. ISBN: 9728298080.
4. Compulsory.
5. Maria Manuel da Silva Nascimento; Maria Manuela Rodrigues.
6. 4h/week (2h theoretical + 2h theoretical-practical); 2nd semester; 2nd year.
7. Theoretical and Theoretical-Practical Classes.
8. 25% Written Work, Presentation, Oral Discution + 75% Final Written Examination.
9. No.
10. 4.0.

1. Mechanics – 0417.
2. Statics of particles. Rigid bodies: equivalent system of forces; Equilibrium. Friction. Center of gravity. Moments of Inercia. Method of virtual work. Equilibrium. Rigid bodies dynamics: 2D and 3D. Mechanic vibrations: simple; with friction; forced; coupled. Applications to biomechanics systems.
3a) Minimal knowledge: vector calculus, one variable functions differentiation and integration, cinematic, Newton's Laws, work, mechanical energy, particles systems.
3b) Students should get an overview of the methods, and the theory, used in the statics and dynamics of mechanical systems analyses, applied to simple physical systems and biomechanical systems. In the end, the student should be able to do a relative complete static and dynamic analyses of the mechanical and biomechanical systems, and be able to identify the fundamental parameters which are responsible for the system work.
3c) Ferdinand Beer e E Johnston, Mecânica vectorial para engenheiros estática e dinâmica, 6ª edição, MacGraw-Hill.
4. Compulsory.
5. Francisco Marinho; Luís Morgado.
6. 5h/week (2h theoretical + 3h theoretical-practical); 2nd semester; 2nd year.
7. Lectures and theoretical-practical classes.
8. Final written exam.
9. No.
10. 5.0.

1. Systems Physiology – 0732.
2. Introduction of Coordineted Body Functions. Circulation: Blood; Overall Design of Cardiovascular System; Heart; Vascular System; Regulation of Systemic Arterial Pressure; Cardiovascular Patterns in Health and Disease; Hemostasis, the Prevention of Blood Loss. Respiration: Respiratory System Organization; Ventilation and Lung Mechanics; Exchange of Gas in Alveoli and Tissues; Transport of Oxigen and Carbon Dioxide in Blood; Control of Respiration. Kidneys and Osmotic Regulation: Basic Principles of Renal Physiology; Regulation of Sodium, and Potassium Balance; Calcium Regulation; Hidrogen Ions Regulation; Diuretics and Kidneys Diseases. Digestion and Absortion of Food: Overall Design of Digestive Tract; Digestive Systems ; Gastrointestinal Motility; Exocrine Digestive Secretions ; Digestion and Absortion , Fermentative and non-Fermentative Processes; Neuroendocrine Regulation of Gastrointestinal Processes. Organic Metabolism: Control and Integration of Carbohydrate, Protein, and Fat Metabolism; Events of Absortive and Postabsortive States; Neuroendocrine Control of Absortive and Postabsortive States
3a) Good knowledge on Anatomy, Histology, and Biochemistry.
3b) The purpose of Systems Physiology is to present the fundamental principles and facts of animal body function and explain how cells are coordinated to function as an organ, how organs cooperate in systems and how systems functions are controled and integrated by whole organism when adapting to internal and external needs. Systems Physiology foccus is on Coordineted Body Functions.
3c) Cunningham, JG 1997 Textbook of Veterinar Physiology, 2nd ed. W B Saunders; Guyton, A 2000 Textbook of Medical Physiology; WB Saunders; Vander, A Sherman, S and Luciano, D 2002 Human Physiology, 8th ed. McGraw-Hill; Garcia-Sacristán, A Montijano, F Palomino, L Gallego, J Silanes, M Ruiz, G 1995 Fisiologia Veterinária, McGraw-Hill.Interamericana; Eckert, Randall, Augustine, 1988 Animal Physiology, McGraw-Hill.Interamericana; Seeley, R Stephens, T Tate, P 1997 Anatomia e Fisiologia, L-Lusodidata, Lisboa.
4. Compulsory.
5. Teresa Rangel Figueiredo, Victor Pinheiro, Paulo Rema, Sandra Sacoto
6. 5h/week (2h theoretical + 3h practical); 2nd semester; 2th year.
7. Lectures and practical classes.
8. 1 written assessments or Final written exam. (Theoretical 60%+Pratical 40%).
9. No.
10. 5.0.

1. Genetics II – 0733.
2. Linkage and mapping in eukaryotes, prokaryotes and bacterial viruses. Cytogenetics: variation in chromosome number and in chromosomal structure. DNA mutation: different kinds of mutations, mutagenic agents, DNA repair, mutagenesis and carcinogenesis, genetic tests to detect environment mutagenesis. Quantitative Genetics: polygenes, heritability definition, QTLs. Population Genetics I: Hardy-Weinberg equilibrium, calculating allelic and genotypic frequencies, inbreeding. Population Genetics II: processes that change allelic frequencies- mutation, migration, genetic drift, and selection. Evolution and Speciation.
3a) Basic knowledge on general genetics, cytology, biochemistry and microbiology.
3b) To understand the basic process of gene mapping, the consequences of the variation in chromosome number and chromosomal structure, the importance of mutagenesis and its relationship with carcinogenesis, the interest in calculating heritability, the species biodiversity and evolution.
3c) Tamarin, RH 2001 Principles of Genetics, International Edition. Ed. McGraw Hill; Griffiths, AJF, Miller, JH & Suzuki, DT, 2000 An Introduction to Genetic Analysis, W H Freeman & Co.; Hartl, DL & Jones, EW, 2002 Essential Genetics, Ed. Jones and Bartlett; Lynch, M. & Walsh, B., 1998 Genetic Analysis of Quantitative Traits. Sinauer Assoc., Inc; Hedrick, P., 2000 Genetic of Populations. Jones &Bartlett Pub., 2nd Ed.; Stansfield, WD, 1992 Genética. 3rd Ed. McGraw-Hill. (In Spanish).
4. Compulsory.
5. José Eduardo Lima Brito; Isabel Gaivão.
6. 4h/week (2h theoretical + 2h practical); 2nd semester; 2rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 5.0.

3rd year

1. Animal Nutrition I – 0055.
2. Concepts and evolution of animal nutrition. Classification of feeds. Forage feeds. Concentrate feeds. Carbohydrates, proteins and lipids. The Nutritive value of feeds. Digestion. Voluntary intake. Metabolism. Nutritional significance of the digestive tract. Minerals and vitamins in animal nutrition
3a) Good knowledge on chemistry, biochemistry and physiology.
3b) Students should get an overview of nutrient utilization through the knowledge of the metabolism allowing them to understand the practical feeding of animals.
3c) McDonald, P, Edwards, RA, Greenhalgh, JFD and Morgan, CA 1998 Animal Nutrition. 5th edition, Longman limited, UK., 607 pp.; Pond, WG Church, DC and Pond, KR 1995 Basic Animal Nutrition and Feeding, 4th Edition John Wiley & Sons, USA, 616 pp.; Van Soest, PJ 1994 Nutritional Ecology of the Ruminant. Second edition. Cornell University Press, New York, 476 pp.
4. Compulsory.
5. Miguel Rodrigues.
6. 5h/week (2h theoretical + 3h practical); 1st semester; 3th year.
7. Lectures and practical classes.
8. Final written exam, practical work and final written paper.
9. No.
10. 5.0.

1. General Agriculture – 0241.
2. To grasp the knowledge necessary to plant production inserted in a coherent system that integrates the relevant informations on the physical, chemical and biological environments. The object of the study are the factors that control the plant production and the techniques of production to reach the best economical performance under a sustainable environment.
3a) Soils, Soil Fertility, Climatology, Botany, Vegetal Physiology.
3b) To understand the techniques of plant production regarding the environment and its alteration that best serve a sustainable production .To know how apply the technical resources to promote the production under the prevalent economical constrains.
3c) Gliessman, SR 1998 Agroecology: Ecological Processes in Sustainable Agriculture, Ann Arbor Press Chelsea MI EUA; Jones, HG 1992 Plants and Microclimate, Cambridge University Press Cambridge; Lampkin, N 1992 Organic Farming. Farming Press Books, UK; Loomis, RS & Connor, DJ 1992 Crop Ecology. Productivity and Management in Agricultural Systems, Cambridge University Press.
4. Compulsory.
5. Manuel Oliveira.
6. 4h /week (2h theoretical + 2h practical); 1st semester; 3rd year.
7. Each lecture corresponds to a unit, or sub-unit, of learning based on an explanation for 40 minutes followed by a debate with the students. In the practical classes there are the execution of a practical work relevant to the subject of the lecture.
8. Final exam.
9. No.
10. 4.0.

1. Economics Introduction - 0364
2. Macro-Economics: Humanities and social science – Methodologies; Economics problems – How to resolves; Economics chain – Organization and instruments; Money – Inflationary effects; Calculate National Results.
Micro-Economics: Consumer – Preference, utility and choice; Prices – Demand, income and elasticity; Supply – Market equilibrium; Production – Product factor relations; Costs – Long and short term; Referential framework for business/industry short and long term costs.
3a) A basic knowledge of mathematical concepts.
3b) To introduce the students to the terminology in the economic literature through basic notions of the ideas related to micro and macro-economic. Concentrate on economic questions at the business level and an integrated vision of economics problems by promoting abstraction capacities and use of reasoning.
3c) Miller, RL1981 Microeconomia. McGraw-Hill, S. Paulo; Neves, JC 1995 Introdução à Economia. Introdução à Economia; Poeta, AD 1990 Alguns Elementos sobre Funções de Produção. Série Didática, Ciências Sociais e Humanas. UTAD, V. Real; Rossetti, JP 1993 Introdução à Economia. Ed. Atlas, S. A., 15ª Edi., S. Paulo.
4. Compulsory.
5. Alexandre Manuel Silva Dinis Poeta; Ana Alexandra Costa.
6. 4h/week; (2P + 2 T); 2nd semester; 3th year.
7. Lectures/Discussion/Exercises.
8. Final written exam with practical work.
9. No.
10. 4.0.

1. Animal Breeding I – 0055.
2. Animal breeding objectives; Traits of economic importance: Selection general model; Methods for the estimation of genetic parameters; animals genetic evaluation; factors affecting the rate of genetic improvement; scientific basis of selection index.
3a) Good knowledge on statistic and genetic.
3b) To provide the students the capacity for the estimation of genetic parameters and for understanding the several selection methods consequences, including the Selection Index method.
3c) Van Vleck, LD 1993 Selection Index and Introduction to Mixed Model Methods. CRC Press, Inc.; Cameron, ND 1997 Selection Indices and Prediction of Genetic Merit in Animal Breeding. CAB International. Falconer & Mackay 1996 Introduction to Quantitative Genetics, 4ª ed., Ed. Longman.
4. Compulsory.
5. Jorge Colaço; Fátima Petim.
6. 4h/week (2h theoretical + 2h practical); 1nd semester; 3th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 5.0.

1. Microbiology – 0746.
2. Procariotic organization. Systematics and microbial evolution. Cell structure and morphology. Growth and control microbial. Antibiotic resistance. Metabolism microbial. Environmental microbiology. Micology. Virology.
3a) Good knowledge on citology, chemistry and biochemistry.
3b) Students should get on overview on the biology of microorganisms: Systematics, cell structure and function. Concepts in nutrition, biosynthesis, metabolism, growth and its control, should also be provided. General concepts of micology and virology.
3c) Pelczar, M Reid, R Chan, ECS 1980 Microbiologia. Editor McGraw-Hill; Prescott, LM Harley, JP Klein DA 2002 Microbiology Fifth Edition. Editor McGraw-Hill; Wistreich, GA Lechtman, MD 1988 Microbiology - Fifth Edition. Collier Macmillan Publishers, London; Pelczar Jr Chan, ECS Krieg, NR 1993 Microbiology - Concepts and applications. Editor McGraw-Hill; Ketchum, PA 1988 Microbiology - Concepts and applications. John Wiley & Sons; Ferreira, WFC & Sousa JC 1998 Microbiologia. Lidel – Edições Técnicas.Vol 1; Mammete, A 1989 Les virus: définition, structure et classification in Virologie médicale. Éditions C et R La Madeleine. France.
4. Compulsory.
5. Maria José Saavedra; António Conceição Almeida.
6. 4 h/week (2h theorical + 2h practical); 1nd semester; 3th year.
7. Lectures and practical classes.
8. Final written exam theorical and practical.
9. No.
10. 5.0.

1. Applied Physiology – 0750.
2. Repriduction; Reproduction sexual and asexual. Physiologic base of the reproduction in the male. Physiologic base of the reproduction in the female. Gamete formation and fertilisation. Differentiation and sexual development. Lactation; Anatomy and Physiology of the mammary gland. Secretor phase of the mammary gland. Mechanisms of the of the milk ejection. Milk primary. Lactation and reprodutifs cycles. Term of the activity and involution of the mammary gland. Growth; General aspects of the growth. Influence of factors endogenous in the growth. Defense of the Organism. Immunity. Metabolism of substances. Animal Behavior; Mediation and biological control of the behaviour. Limits of the adaptation. Basic concepts of the animal behaviour.
3a) Good knowledge on Anatomy, Histology, Biochemistry, General and Systems Physiology.
3b) The objectives of the Applied Physiology is to highlight the most practical aspects of the Animal Physiology, establishing the bridge among the fundamental concepts learned in basic chairs and the most practical concepts linked to the animal production.
3c) Cunningham, JG 1997 Textbook of Veterinar Physiology, 2nd ed. WB Saunders; Garcia-Sacristán, A Montijano, F. Palomino, L Gallego, J Silanes, M Ruiz, G 1995 Fisiologia Veterinária, McGraw-Hill. Interamericana; Seeley, R Stephens, T Tate, P 1997 Anatomia e Fisiologia, L-Lusodidata, Lisboa; Purves, G Orians, H Heller e D Sadava 1988 Life. The Science of Biology, 5ª Edição, W Editora: Sinauer/Freeman; Knobi, E I and Neil, J 1994 The Physiology of Reproduction, 2ª edição, Editora: Raven; Neil R C 2001 Physiology of Behavior, 7th ed. Ed. Allin and Bacon.
4. Compulsory.
5.. Teresa Rangel Figueiredo; Victor Pinheiro.
6. 4h/week (2h theoretical + 2h practical); 1nd semester; 3th year.
7. Lectures and practical classes.
8. 1 written assessments or Final written exam. (Theoretical 60%+Pratical 40%).
9. No.
10. 5.0.

1. Animal Welfare – 0755.
2. Animal Welfare. Importance of welfare in the animal science. The inter-action man-animal welfare. Importance of the welfare in the animal production. Basic notions on adaptation concepts and welfare. Evaluation of physiological and of behavior indicators on animal welfare. The welfare in the domestic species of production interest.
3a) Good knowledge on biology and animal physiology.
3b) Students should get an overview of the information regarding animal welfare for the principal production species.
3c) AF Fraser & DM Broom 1990 Farm Animal Behaviour and Welfare. CAB International; Neville G Gregory & T Grandin, 1999 Animal Welfare and Meat Science CABI Publishing; MC Appleby & BO Hughes 1997 Animal Welfare CAB International.
4. Compulsory.
5. Severiano Rocha e Silva.
6. 4h/week (2h theoretical + 2h practical); 2nd semester; 3th year.
7. Lectures and practical classes.
8. Final written test or exam.
9. No.
10. 4.0.

1. Animal Nutrition II - 0059.
2. Voluntary intake in farm animals: main sources of variation and mechanisms of control. Methodologies to measure feeding requirements for maintenance, growth, reproduction and lactation – sources of variation and quantitative importance. Nutritive characteristics of forages and the main raw materials used in animal feeding. Food additives. Systems of expressing the energy and the protein value of foods. Basic principles of formulation of balanced diets for farm animals.
3a) Good knowledge on animal physiology and biochemistry and basic animal nutrition.
3b) The main objectives are that students learn the principles behind the calculations of feeding requirements of farm animals, their sources of variation and how to use tables and computer programs of feeding allowances and nutritive value of feeds to gain knowledge of the basic principles of formulating balanced diets.
3c) McDonald, P, Edwards, RA, Greenhalgh, JFD E Morgan, CA 2002 Animal Nutrition, Prentice Hall (Chapters 14 to 25); Pond, WG, Church, DC e Pond, KR 1995 Basic Animal Nutrition and Feeding, John Wiley and Sons (Chapters 16 and 17); Sauvant, D, Perez, JM e Tran, G (coordinateurs) 2002 Tables de composition et de valeur nutritive des matières premières destinées aux animaux domestiques, INRA; Agricultural and Food Research Council, 1993 Energy and protein requirements of ruminants, CAB International; National Research Council (NRC), 2001 Nutrient requirements of dairy cattle, National Academy Press (NAP); NRC, 1998 Nutrient requirements of swine, NAP; NRC, 1994 Nutrient requirements of poultry, NAP.
4. Compulsory.
5 Arnaldo. Dias-da-Silva; Maria José Gomes.
6. 5 h/week (2,5 h theoretical and 2,5 h practical classes); 2nd semester; 3th year.
7. Theoretical classes: oral presentation of the more basic subjects introducing examples to make the presentation more attractive and to motivate the students to question about the topics under analysis.
Practical classes: utilization of tables and computer programs to know the nutritive value of feeds and feeding allowances of farm animals, calculating the parameters defining the nutritive value of feeds, learning different ways of expressing these parameters and solving basic problems of diets formulation.
In both theoretical and practical classes, it is intended to involve the students into the subjects, to motivate them for self-study and to prepare them to have always a rational approaching to the problems. Audiovisual support is available when necessary.
8. Two optional exams during the semester each one covering, approximately, half of the program. Those students who have grades equal or higher than 9,5 are not obliged to make the final exam, that is compulsory for all the others. All students have to attend at least 2/3 of practical classes to be assessed whatever the option chosen.
9. No.
10. 5.0.

1. Animal health and hygiene – 0060.
2. Animal health and hygiene: concepts and applications (from health to animal diseases), multifactorials aspects of the diseases. Determinants of disease He transmission and maintenance of infection. He importance of hygiene in animal science. Ecology and immunity. Study of the main of control of infectious and parasitic diseases.
3a). Good knowledge on microbiology and parasitology
3b). Give to students good knowledge and concepts of transmission and maintenance of disease and your control.
3c) Bars, J 1993 Aspects règlementaires concernant les mycotoxines dans les grains, graines et dérivés - stratégie et tendance, Recueil de Médecine Vétérinaire, 169 (1), 29-35; Dantzer, R & Mormed, P 1984 El stress en la cria intensiva del ganado, Editorial Acribia pp 130; Faye, B Lefebre, P Lancelot, R & Quirin, R, 1994 Écopathologie animale - methodologie - applications en milieu tropical, INRA, pp 117; Garniere, J. et al. 1991 L'écopathologie: une méthode d'approche de la santé en élevage, INRA Prod. Anim., 4(3):247-256; Le Petit Colin 1994 Les boiteries - Un risque a ne pas courir, Patre, 410: 36-38; Linton, A Hugo, W & Russel, A 1987 Desinfection in veterinary and farm animal practice. Blackwell Scientific Publications; Perestrelo-Vieira, R, 1993 Ecopatologia suína, Ciência e vida, pp 395; Pont, J Jordana, J Campanera, J & Arroyo, T 1989 El problema de la contaminacion fungica en la industria de piensos; Woolcoc, J 1994 Infección bacteriana e inmunidade los animales domesticos. Editorial Acribia.
4. Compulsory.
5 . Jorge de Almeida Rodrigues; Maria da Graça Queirós Capela de Vieira e Brito.
6. 6h/week (3h theorical + 3h pratical); 2 nd semester; 3 rd year.
7. Lectures and practical classes.
8. One test; final written examin theorical and practical.
9. No.
10. 6.0.

1. Animal Breeding II – 0751.
2. Selection Index Methodology; Examples of Selection Objectives and Criteria; Best Linear Unbiased Prediction of Breeding Value: Univariate Models with one Random effect; Models with random environmental effects; Multivariate Animal Models; Maternal-trait Models.
3a) Good knowledge on statistic, genetic and Animal Breeding I
3b To provide the students with the capacity to accomplish the animals genetic evaluation using the mixed model methodology.
3c) Van Vleck, LD 1993 Selection Index and Introduction to Mixed Model Methods. CRC Press, Inc.; Cameron, ND 1997 Selection Indices and Prediction of Genetic Merit in Animal Breeding. CAB International; Falconer & Mackay 1996 Introduction to Quantitative Genetics, 4ª ed., Ed. Longman; Mrode, RA 1996 Linear Models for the Prediction of Animal Breeding Values, CAB International.
4. Compulsory.
5. Jorge Colaço, Fátima Petim.
6. 4h/week (2h theoretical + 2h practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 4.0.

1. Animal Reproduction – 0754.
2. Reproductive cycles. Puberty. Estrous cycles. Sexual behavior. Heat detection and estrous cycles control. Artificial insemination: breeding soundness evaluation, semen collection, evaluation, processing, storage and handling, rectal palpation technique. Gamete transport, fertilization, gestation and parturition. Pregnancy diagnosis. Causes of reproductive failure. Puerperal anoestrus. Reproductive efficiency. Ultrasound as a complementary diagnosis tool. Biotechnology in animal reproduction.
3a) Good knowledge on morphology and physiology. .
3b) The knowledge obtained should point out the importance of a correct reproductive terminology, the phases and variation factors influencing the reproductive cycles and the evaluation of reproductive control techniques in farm animals.
3c) Hafez, ESE 1993 Reproduction in farm animals. 6th edition; Bearden, HJ e Fuquay, JW 2000 Applied Animal Reproduction. 5th edition. Davies Morel, MCG 1999 Equine reproductive physiology, breeding and stud management. CABI publishing. Gordon, I 1996 Controlled reproduction in cattle and buffaloes. CAB International; Gordon, I 1996 Controlled reproduction in sheep and goats. CAB International; Gordon, I 1996 Controlled reproduction in pigs. CAB International.
4. Compulsory.
5. José Carlos Almeida.
6. 5h/week (2h theoretical + 3h practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam, practical work and partial quizzes.
9. No.
10. 5.0.

1. Experimental Design – 0022.
2. Hypothesis Testing: Revision and Analysis of the Errors; Nonparametric Statistics: Testing for Goodness of Fit and Independency; Association Mesures and Tests for One and Two Samples; Tests for Multiple Comparisons for Dependent and Independent Samples; Single factor Analysis of Variance: Anova Model; Analysis of the Fixed Effects Model; Homogeneity of Variances Tests; Parametric and Nonparametric Tests for Multiple Comparisons; Anova Model II of Random Effects; Randomized Blocks, Latin Squares and Related Designs; Introdution to Factorial Designs: Basic Definitions and Principles; Two-Factor Factorial Design: Fixed Effects Models; Regression Analysis: Simple Linear Regression; Least Squares Method; Confidence Intervals and Hypothesis Testing in Simple Linear Regression and Anova Approach; Simple Linear Regression and Correlation; Non-Linear Simple Regressio: Simple Linear Regression and Data Transformations.
3a) Statistical Methods.
3b) Students should be able to use the statistical methods and to design and analise field experiments.
3c) Montgomery, DC 1991 Design and Analysis of Experiments. John Wiley & Sons, Inc., Singapura, 3rd Ed., ISBN: 0-471-52994-X; Walpole, RE e RH Myers 1993 Probability and Statistics for Engineers and Scientists. Prentice Hall International Inc., 5th Ed., ISBN: 0024242012; Zar, JH 1993 Biostatistical Analysis. Prentice Hall International Inc., 3rd Ed, ISBN: 0130845426.
4. Optional.
5. Maria Manuel da Silva Nascimento, Elisete Correia.
6. 4h/week ((2h theoretical + 2h theoretical-practical); 2nd semester; 3rd year.
7. Theoretical and Theoretical-Practical Classes.
8. 100% Final Written Examination.
9. No.
10. 4.0.

1. Economy of the Animal Production – 0756.
2. The Agro-Food Company. Factors of Agrarian Production. Costs of Production of the Agro-Food Companies. Economic results of the Agro-Food Companies. Economic Evaluation of Agrarian Goods. Commercialization of the Agrarian Products. Markets and Prices of the Agrarian Products. Alimentary Consumption. Distribution and Offers of Agrarian Products. Marketing of Agrarian Products. The New Trends for the Agrarian Production. The Agrarian Politics. Agriculture and Environment.
3a) No prerequisites.
3b) To provide to the pupils some of the necessary basic concepts to a bigger agreement of the functioning of the agro-alimentary companies and the economic environment that encircles them.
3c) Boussard, JM (sd) Introduction a l'Economie Rurale. Paris: Editions CUJAS; Ballestero, E 1991 Economia de la Empresa Agraria y Alimentaria. Madrid: Ediciones Mundi-Prensa; Caldentey, P 1986 Comercializacion de Productos Agrarios. Madrid: Editorial Agricola Espanola; Lendrevie, J et al 1992 Mercator: Teoria e Prática do Marketing. Lisboa: Publicações Dom Quixote; Keith Hoggart Agricultural Change, Environment and Economy. Ed. Mansell.
4. Compulsory.
5. Carlos Fonseca.
6. 4 h/week (2h theoretical + 2h practical); 2nd semester; 3th year.
7. Lectures and practical classes.
8. Written essay with oral discussion or a final written exam.
9. No.
10. 4.0.

4th year

1. Sheep and Goat Production I – 0063.
2. Theory: World sheep and goat production systems; Portuguese production of sheep and goats; Sheep and goat reproduction. Practical: Animal identification systems; restraint and immobilization; livestock management techniques; evaluation of the general welfare status; body condition score evaluation; lambing; neonatal care; reproductive efficiency control; reproductive intensification systems.
3a) Good knowledge on Morphology, Physiology, Genetics, Nutrition and Reproduction.
3b) The main objectives are the study of world modalities of sheep and goat production, with emphasis for the Portuguese situation of small ruminant flocks with prominence for the discussion of the weaknesses, threats, potentialities and opportunities of this sector, of reproduction with development of the systems of reproductive intensification. In practical classes the main management techniques of sheep and goats are studied.
3c) Buxadé, C 1996 Produccion Caprina Tomo IX. Zootecnia Bases de Produccion Animal. Ediciones Mundi-Prensa, Madrid. 336 pp; Buxadé, C 1996 Produccion Ovina Tomo VIII. Zootecnia Bases de Produccion Animal. Ediciones Mundi-Prensa, Madrid. 381 pp; Battaglia, RA 2001 Handbook of Livestock Management, 3ª Edição. 620 pp; Hunsley, RE 2001 Livestock Judging, Selection and Evaluation. 5ª Edição. 502 pp; Porter, V Liphook, Hants 2002 Mason's World Dictionary of Livestock Breeds, Types and Varieties. 5ª Edição 400 pp.
4. Compulsory.
5. Jorge Azevedo.
6. 4h/week (2h theoretical + 2h practical) 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and partial tests.
9. No.
10. 5.0.

1. Cattle Production I – 0064.
2. Theory: World beef cattle production systems; Portuguese production of cattle; Programs and areas of beef cattle production. Principles of breeding, reproduction, and feeding.. Practical: Animal identification systems; restraint and immobilization; livestock management techniques; evaluation of the general welfare status; body condition score evaluation; neonatal care; reproductive efficiency control.
3a) Good knowledge on Morphology, Physiology, Genetics, Nutrition and Reproduction.
3b) The main objectives are the study of world modalities of beef cattle production, with emphasis for the Portuguese situation with prominence for the discussion of the weaknesses, threats, potentialities and opportunities of this sector, of reproduction with development of the systems of reproductive. In practical classes the main management techniques of beef cattle are studied.
3c) Neumann, AL 1977 Beef Cattle. Ed. John Wiley e Sons. New.7ª Edição. 883 pp; Lawrence, TLJ e and Fowler, VR 1997 Growth of farm animals. Ed. Cab International. Wallingford UK. 330 pp; Albright, JL and Arave, CW, 1997 The Behaviour of Cattle. Ed. Cab International. Wallingford UK 306 pp; Pradal, M 1989 Produire de la viande bovine aujourd'hui. Ed. Technique et documentation-Lavoisier. Paris. 631 pp.
4. Compulsory.
5. Virgílio Cardoso Alves.
6. 4h/week (2h theoretical + 2h practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and partial tests.
9. No.
10. 5.0.

1. Pig Production – 0067.
2. Swine historical evolution; swine production in the world; disease prevention programs; growth; carcass grading; behaviour; lodging; reproductive efficiency; system productivity; reproductive problems; artificial insemination; new methodologies of information.
3a) Basic knowledge on the areas of anatomy, physiology and reproduction
3b) The main objective is diffusion of basic concepts of management on swine facilities.
3c) Whittemore, CT 1998 The science and practice of pig production. Longman Scientific & Technical, London.
4. Compulsory.
5. Alberto Cardoso.
6. 12h/week (3h theoretical + 9h practical); 1st semester; 4th year.
7. Lecture and pratical classes.
8. Final exam.
9. No.
10. 6.0.

1. Rural Sociology – 0099.
2. Basisc concepts, principles and methodological procedures in Rural Sociology. Agrarian activities, rural societies and society in the contemporary world -main trends of change and analysis of their basic indicators; Predominant references (EU; OMC), forms and directions of the most recent reconfigurations of the rural societies; the "new" ruralities- processes, functions, actors and strategies of rural change.
3a) No Prerequistes.
3b) I This course on Rural Sociology aims to constitute a "space" providing the students oportunities and means to identify, to know and to discuss about some of the main and most relevant problematics of the actual rural societies, more specifically in what concerns the changes and the new functions of the rural settings and their articulation to the global society. We intend mainly to confront the students with the philosophy, assumptions and orientations underlying the contemporary proposals of rural development policies, and, therefore, to reflect on the new challenges the students will face as future agrarian technicians and development agents.
3c) Benito, C Gomez 1996 Veinte Años de Sociología Rural En Agricultura Y Sociedad, Agricultura y Sociedad, Suplemento ao nº 80-81, pp 21-69; Cavaco, C 1993 O Mundo Rural em Portugal in O Programa de Desenvolvimento Regional e o Mundo Rural. MPAT/MA (Eds), Lisboa, pp 93-109; Delgado, Felisa C 1992 Transformaciones del Mundo Rural y Políticas Agrárias, Revista de Estúdios Agro-Sociales, nº 162, pp 11-35; Galesky B1972 Basic Concepts of Rural Sociology, Manchester Univ. Press, Manchester; IICA (Instituto Interamericano de Cooperacion para la Agricyltura) s/d Nueva Ruralidad. Reconocimiento de un Nuevo Escenario Rural. (Doc. Policopiado); Jollivet, M 1998 A "Vocação Actual" da Sociologia Rural, Estudos Sociedade e Agricultura, nº 11, pp 5-25; Kayser, B 1989 Les Sciences Sociales face au Monde Rural. Methodes et Moyens, Presses Universitaires du Mirail, Toulouse; Mingione, E e E Pugliese 1987 A Difícil Delemitação do “Urbano” e do “Rural”, Revista Crítica de C. Sociais, nº22,pp 83-99; Molinero, F 1990 Los Espacios Rurales: Agricultura y Sociedad en el Mundo, Ed. Ariel, Barcelona; Newby, H 1980 Rural Sociology, Sage publ., London; Newby, H e ES Guzmán 1983 Introducción a la Sociologia Rural, Alianza Universidad, Madrid (ver pp 97-109); Oliveira Batista, F 1993 Agricultura, Espaço e Sociedade Rural, Ed. Fora de Texto, Coimbra; Portela, J 1999 O Meio Rural em Portugal: Entre o Ontem e o Amanhã, Trabalhos de Antropologia e Etnologia, vol 39 (1-2), pp. 45-65; Vários 1996 O Vôo do Arado Ed. Museu Nac de Etnologia, Inst. Portuguiês de Museus e Min. da Cultura Lisboa.
4. Compulsory
5. Manuela Ribeiro.
6. 4 h /week (lectures and practical classes); 1st semester; 3rd year.
7. Lectures, organized debates, group work in the class, invited experts' presentations.
8. Group field work plus written report - 25% and exam -75%.
9. No.
10. 4.0.

1. Forages and Pastures I – 0758.
2. Characterization of the main crops used in animal feeding. Physiology of growth in grasses and legumes. Growth characteristics. Differentiation characteristics. Reproduction. Aging and death. Physiological response under stress conditions. Biology of grasses. Biology of legumes.
3a) Good knowledge on chemistry, soil science and agriculture.
3b) Students should get an overview of integrated forage production technologies analyzing the main variation factors as well as the main obstacles to the utilization of forages in animal feeding.
3c) Moreira, N, 2002 Agronomia das forragens e pastagens Vila Real, UTAD, 183 pp.
4. Compulsory.
5. Miguel Rodrigues.
6. 5h/week (2h theoretical + 3h practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 5.0.

1. Technology of Animal Products I – 1282.
2. Characteristics of raw materials, namely on nutritional and safety aspects. Foodborn Pathogens, characteristics, characteristics of the disease, control and prevention. Quality control systems, methodology of Hazard Analysis and Critical Control Points. Analytical techniques used in quality control. Sensory evaluation. General technological operations. Food conservation methods. Packing.
3a) No Prerequistes.
3b) The objective of this discipline is prepare the student for general aspects related to Food Technology namely the quality of raw materials, the problem of food borne poisoning, conservation procedures, general technology operations and systems and instruments associated to the quality control.
3c) Branen, AL Davidson, PM Salminen, S 1990 Food Additives; Marcel Dekker Inc. New York; Fellows, P 1992 Tecnología Del Precesado De Los Alimentos: Principios e Práticas, Acribia: Zaragoza; Forsythe, SJ Hayes, PR 2002 Higiene De Los Alimentos, Microbiologia y HACCP, Acribia Zaragoza; ICMSF 1983 Ecologia Microbiana De Los Alimentos 1. Factores Que Afectam a La Supervivencia De Los Microrganismos En Los Alimentos; Acribia: Zaragoza; Potter, N Hotchkiss, JH 1998 Food Science Aspen Publishers, Inc. Maryland.
4. Compulsory.
5. Conceição Martins; Luís Patarata; António Silva.
6. 4 h/week (2h theoretical + 2h practical); 1st semester; 4th year.
7. Lectures and practical classes. Attendance in 3/4 of practical classes is compulsory.
8. Final written test (T 75%; P 25%) or exam in the same conditions.
9. No.
10. 4.0.

1. Sheep and Goat Production II – 0068.
2. Theory: Age structure and flock evolution. Meat production. Wool production. Milk production. Practical: Age structure and flock evolution. Growth and development studies; carcass studies using in vivo and ex vivo prediction methodologies; shearing and wool stocking; milk test day.
3a) Good knowledge in Sheep and Goat Production I, Morphology, Physiology, Genetics, Nutrition and Reproduction.
3b) The main objectives are the study of age structure and flock evolution as well as meat, wool and milk production in small ruminant. These subjects are supported by the scientific progresses in the areas of the genetic improvement, nutrition and feeding, reproduction and animal welfare.
3c) Azevedo, JMT de, 1994 Estudo dos factores biológicos da produção de carne ovina – situação em Trás-os-Montes. Tese de doutoramento. UTAD, Vila Real, i-xxv, 1-231 pp. + 87 pp. de anexos; Azevedo, JMT de, 1985 Estrutura etária e evolução dos efectivos ovinos. Relatório sobre a aula teórico-prática, apresentada para Provas de Aptidão Pedagógica e Capacidade Científica. UTAD, Vila Real, 51 pp. (I.º Vol.), 123 pp. (2º Vol.); Direcção Geral da Pecuária., 1987 Recursos genéticos - raças autóctones - espécies ovina e caprina. DGP, Lisboa 207 pp; Ensminger, ME 2002 Sheep and Goat Science. 6ª Edição. 693 pp.; Porter, V Liphook, Hants 2002 Mason's World Dictionary of Livestock Breeds, Types and Varieties. 5ª Edição. 400 pp.
4. Compulsory.
5. Jorge Azevedo.
6. 4h/week (2h theoretical + 2h practical); 2th semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and partial tests.
9. No.
10. 4.0.

1. Cattle Production II – 0069.
2. Theory: Dairy cattle production systems. Principles of breeding, reproduction, and feeding.. Practical: Animal identification systems; livestock management techniques; evaluation of the general welfare status; body condition score evaluation; reproductive efficiency control.
3a) Good knowledge on Morphology, Physiology, Genetics, Nutrition and Reproduction.
3b) The main objectives are the study of world modalities of dairy cattle production, with emphasis for the Portuguese situation with prominence for the discussion of the weaknesses, threats, potentialities and opportunities of this sector, of reproduction with development of the systems of reproductive. In practical classes the main management techniques of dairy cattle are studied.
3c) Webster, J 1993 Understanding the dairy cow 2ª Edição Blackwell scientific Publications. 374 pp; Schmidt, GH and Van Vleck, LD 1974 Principles of dairy Science. Ed. WH Freeman and Company. San Francisco 558 pp; Martinet, J e Houdebine, LM 1993 Biologie de la lactation. Ed. INRA, Versailles.
4. Compulsory.
5. Virgílio Cardoso Alves.
6. 4h/week (2h theoretical + 2h practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and partial tests.
9. No.
10. 4.0.

1. Rabbit Production – 0070.
2. Characterization of rabbit production. Historical evolution. Selection and genetic improvement of rabbits. Main breeds and hybrids. Organization of intensive production. Rabbit reproductive physiology. Meat production. Breeders mangement. Rearing and growing of rabbits. Management of young breeders. Rabbit wool and fur production. Feeding. Cecotrofy and ingestion behaviour. Nutritive needs. Feeding programs. Housing and equipments in intensive and extensive production. Environmental conditions. Management and planning of rabbit production. Disease prevention.
3a) Good knowledge in biology, biochemistry, housing and equipment, physiology and nutrition.
3b) The main objectives are related to the development of future activities in rabbit production aiming the study of breeding and meat production, the characterization of intensive and extensive production as well as the concern with the problems dealing with animal welfare and biological production systems.
3c) Lebas, F Coudert, P Rouvier, R Rochambeau, H 1991 O coelho. Criação e Patologia. Publicações Europa América. 277 pp; Lebas, F Marionnet, D e Henaff R 1991 La production du lapin. 3º edition. Association Française de Cuniculture 206 pp; Juam Maria Rosell 2000 Efermedades de Conejo. Generalidades Tomo I. Ediciones Mindi-Prensa. 605 pp; Juam Maria Rosell 2000 Efermedades de Conejo. Enfermedades. Tomo II. Ediciones Mindi-Prensa. 598 pp; Julian Wiseman 1998 The Nutrition of the Rabbit. Cabi Publisinhg Eds C de Blas, 352 pp.
4. Compulsory.
5. José Luís Medeiros Mourão; Victor Manuel Carvalho Pinheiro.
6. 4 h/week (2h theoretical + 2h practical);. 2nd semester; 4th year.
7. Theoretical and practical classes.
8. Final written exam, practical works and partial quizzes.
9. No.
10. 4.0.

1. Aquaculture – 0074.
2. Main aquatic animal productions. Biological and commercial management of fish, molluscs, crustaceans and algae. Techniques and production systems.
3a) No pre-requisites.
3b) Students are intended to get an overview of information regarding biology, nutrition and reproduction of aquaculture species. The water must be regarded as a support and transportation vehicle for nutrients and biological waste products, so a special focus is placed on water quality control.
3c) Halver, JE and Hardy, R Fish Nutrition Editors Academic Press; Pillay, TVR 1993 Aquaculture. Principles and pratices Fishing, News Books.
4. Compulsory.
5. Paulo Rema; Óscar Pereira.
6. 4h/week (2h theoretical + 2h practical); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.0.

1. Farm Buildings – 0080.
2. Farm buildings in EC. Buildings: technical drawing, construction materials, construction techniques and projects. Environment control for animals: thermic analysis, energy and mass balance, forced and natural ventilation. Housing, construction and equipment's for cattle, sheep, horses and poultry; dimensions of silo forage. Refrigeration, cold storage for perishable products and refrigeration load. Farm roads.
3a) Good knowledge on mathematics, physics and project creativity on farm buildings.
3b) The main purpose of the discipline is to provide students with fundamental bases to project and control the environmental of farm buildings.
3c) Albright, LD 1990 Environment Control for Animals and Plants. The American Society of Agricultural Engineers, St. Joseph; Ashrae 1989 Handbook Fundamentals. American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc., Atlanta; Cunha, LV da 1982 Desenho técnico. Fundação Calouste Gulbenkian, Lisboa; Ferreira, V e Farinha, B 2000 Tabelas técnicas. Associação dos Estudantes do IST, Lisboa; Garcia-. Maton, A Daelemans, J Lambrecht, J 1985 Housing of animals. Elsevier, Merelbeke.
4. Compulsory.
5. Jaime Cavalheiro, António Pirra.
6. 5h/week (2h theoretical + 3h pratical); 1nd semester; 4th year.
7. Lectures and pratical classes.
8. Final written examination and pratical work.
9. No.
10. 5.0.

1. Forages and Pastures II – 0758.
2. Nutritive and productive value of forages. Chemical composition of forages. Digestibility and voluntary intake of forages. Evaluation of forages. Conservation methodologies. Grazing systems.
3a) Good knowledge on Animal Nutrition I and II and Forages and Pastures I.
3b) Facing the strategic positioning of ruminants students should develop the knowledge on the utilization of forages and pastures in different production systems.
3c) DI Givens, E Owen, RFE Axford and HM Omed, 2000 Forage Evaluation in Ruminant Nutrition. CAB International, UK 480 pp; GC Fahey Jr 1994 Forage Quality, Evaluation and Utilization. American Society of Agronomy, Inc., Crop Science Society of America, Inc., Soil Science Society of America, USA, 998 pp.
4. Compulsory.
5. Miguel Rodrigues.
6. 5h/week (2h theoretical + 3h practical); 2ndt semester; 4th year.
7. Lectures and practical classes.
8. Final written exam, practical exams.
9. No.
10. 5.0.

1. Tecnology of Animal Products II - 1283
2. Meat and meat products. Slaughter, facilities, procedures, preparation of carcasses. Biochemical transformations in muscle post-mortem; abnormal situations of quality of meat (PSE, DFD meat). Transformation of by-products of the slaughter. Manufacturing of meat products; raw material, other ingredients, procedures, quality control. Milk and dairy products. Composition of milk – its relationship with transformation modifications
Procedures applied to the fluid milk industry. Manufacturing of dairy products; raw material, other ingredients, procedures, quality control. Fish and egg products
3 a) No prerequisites.
3b) The objective of this discipline is prepare the student for the insertion in the professional sector with knowledge relative to the production of meat and meat products, milk and dairy products and fish egg products. The general aspects presented in Food Technology I are integrated in this discipline approach to these subjects.
3c). Keizer, C 1995 Freezing and chilling of fish, in A Ruiter (ed), Fish anf fishery products. Composition, nutritive properties and stability, Wallingford, CAN International, p. 287-313; Price, JF, BS Schweigert, 1994 Ciencia de la carne y de los productos cárneos, Zaragoza, Editorial Acribia SA; Sirorski, Z, A Gildberg, A Ruiter, 1995 Fish products, in A Ruiter (ed), Fish anf fishery products. Composition, nutritive properties and stability: Wallingford, CAN International, p. 315-346; Stadelman, W, O Cotterill, 1995 Egg Science and Technology, Binghamton, Food Products Press; Walstra,P, T J Geurts, A Noomen, A Jellema, MA van Boekel, 2001 Ciencia de la leche y tecnología de los productos lácteos, Zaragoza, Editorial Acribia SA.
4. Compulsory.
5. Conceição Martins; Luís Patarata; António Silva.
6. 4 h/week (2h theoretical + 3h practical); 2nd semester; 4th year.
7. Lectures and practical classes. Attendance in 3/4 of practical classes is compulsory.
8. Final written test (T 75%; P 25%) or exam in the same conditions.
9. No.
10. 5.0.

5th year

1. Fish Production – 0072.
2. Study of biology and habitat of main fish species produced in captivity. Study of anatomophysiology nutrition, feeding and reproduction of the more important species in the world. Water quality and environmental requirements and dynamics of pond aquaculture. Basic knowledge's aquatic about bioengineering and management of water quality. Study of techniques and systems of fish production; freshwater, estuarine water and seawater in thanks and ponds.
3a) Good knowledge on biology, chemistry, biochemistry, physiology, nutrition animal and genetic.
3b) To teach students the scientific basis under fish production with aim the maximum the production in ponds ant thanks with commercial fish species.
3c) De Silva S, Anderson, T 1995 Fish nutrition in Aquaculture. Chapman & Hall (Ed.); 1997 The Physiology of Fishes, Edited by David H. Evans Second Edition; Gary Wedemeyer, editor 2001 Fish Hatchery Management Second Edition; 1997 Dynamic of Pond Aquaculture. Edited by Hillary S. Egna & Claude E Boyd of Seabass and Gilthead Seabream 1999 Manual on Hatchery Production, Vol.1 e 2 FAO.
4. Compulsory.
5. Oscar Pereira.
6. 4h/week (2h theoretical + 2h practical); 1st semester; 5th year.
7. Lectures and pratical clsses.
8. Final theoretical written exam and one theoretical-practical test.
9. No.
10. 4.0.

1. Equipment and Animal Housing – 0759.
2. Principles and importance of equipment and housing in animal production; previous knowledgement on dimension of animal facilities; poultry equipment and facilities; rabbit equipment and facilities; swine equipment and facilities; cow equipment and facilities; sheep equipment and facilities; horse equipment and facilities; slaughter equipment and facilities; residual water treatment equipment and facilities; feeds equipment and facilities; animal by products equipment and facilities.
3a) Students should have basic knowledge on managment and exploitation on species of zootechnical importance.
3b) Students should get knowledge on principles and importance of equipment and housing in animal production, generally, and for each species, in particular; To get acquaintance of dimensioning of facilities is na important goal.
3c) Buxadé Carbó, C 1998 Alojamientos e Instalaciones (I e II); Zootecnia – Bases de Producción Animal. Ediciones Mundi-Prensa; Maton et al 1985 Housing of Animals. Developments in Agricultural Engeneering 6. Elsevier Science Publishers BV New York.
4. Compulsory.
5. Divanildo Outor Monteiro.
6. h/week (2h theorectical + 3h practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. 1 case study with presentation and discussion; 2 written assessments; final written exam.
9. No.
10. 5.0.

1. Management and Planning – 0760.
2. Management concepts of the agrarian enterprise. Incumbencies and economical results of the agrarian enterprise. Accountancy organisation of the agrarian enterprise. Study of the economical viability of the investment.
3a) No prerequisites.
3b) It intends that students should be capable to assume decisions that are placed for the management of an agrarian enterprise. It is searched, therefore, that they become equipped with the basic concepts relating to the agrarian accountancy and to the calculation of the different economic results of the agrarian enterprise. It is also purpose of the discipline to approach the study of the economical viability of the investment, given the importance that this method presents in the planning of an enterprise.
3c) Avillez, F Estácio, F e Neves, M 1988 Análise de Projectos Agrícolas no Contexto da Política Agrícola Comum. Banco Pinto e SottoMayor; Ballestero, E 1988 Contabilidad Agraria. Ediciones Mundi-Prensa, Madrid; Barros, H 1973 A Empresa Agrícola. Fundação Calouste Gulbenkian, Lisboa; Costa, FVM 1989 A Contabilidade e a Gestão na Empresa Agrícola. MAPA, Lisboa; Poeta, MI 1991 Os resultados económicos da empresa agrícola. Série Didática Ciências Sociais e Humanas, nº 2. UTAD, Vila Real.
4. Compulsory.
5. Ana Alexandra Costa and Vasco Rebelo.
6. 4h/week (2h theoretical + 2h practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final written test.
9. No.
10. 4.0.

1. Equine Production – 0761.
2. Equine production in Portugal and in the world. Equine production systems, Horse breeds and its use, equine behavior and care, equine morfology, reproductive and feeding management of the horse, feeds for horses, pastures, feeding systems, horse facilities, horse selection and improvement.
3a) Previous knowledge on biology, morfology, nutrition and feeding, reproduction, animal behavior and animal selection and improvement.
3b) Students should get an overview of information regarding equine production systems, reproductive and feeding management as to maximize production.
3c) Martin-Rosset, W 1994 Alimentation du cheval, INRA publication; Louis-Noel Marcenac, Henri Aublet, Pierre D'Autheville, 1990 Enciclopédia do cavalo, Vol I e II, Andrei Editora Ltda, São Paulo; Miranda do Vale, J 1990 O Exterior do cavalo. Editorial Notícias.
4. Compulsory.
5. Virgílio Cardoso Alves; Ana Sofia Santos.
6. 4h/week (2h theoretical + 2h practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.0.

1. Animal Feeding - 0762.
2. Least-cost diet formulation by mathematical programming – general methodology and applications. Manipulation of the composition of animal products (meat, milk and eggs) by feeding. Strategies and systems of feeding to optimise growth, reproduction and lactation of the farm animals having high economic relevance. Digestive and metabolical disorders in precision animal production – relevant biochemical parameters; strategies to prevent these risks. Consequences of feed formulation and feeding strategies on environmental pollution and food safety.
3a) Good knowledge of basic and applied animal nutrition and of the main technologies of animal production.
3b) The main objective of this course unit is that students learn how balanced diets can be used as a tool to the animal production systems and how diets and feeding affect not only animal productivity but also longevity, health, environment and food safety of animal products.
3c) J Webster, Blackwell 1993 Understanding the Dairy Cow; A Chamberlain e J Wilkinson, Chalcombe 1996 Feeding the Dairy Cow; C Whittemore, Lomgman, 1998 The Science and Practice of Pig Production; S Lesson e JD Summers Commercial Poultry Nutrition; The references mentioned as support for teaching of Animal Nutrition II have to be always available. In addition, the teacher provides some key scientific articles mainly from Animal Science and Journal of Dairy Science and from the series Recent Advances in Animal Nutrition (University of Nottingham) to help the students in preparing the seminars.
4. Compulsory.
5. Arnaldo Dias-da-Silva.
6. 4h/week (2 h theoretical and 2 practical classes); 1st semester; 5th year.
7. Introductory presentation by the teacher of the basic principles of the issues covered by the course unit; presentation by the students (20-30 minutes) of the different themes followed by discussion during the class.
8. The assessment is made taking into account seminar presentation (30%) and final examination (70%).
9. No.
10. 5.0.

1. Extension and Rural Development – 0763.
2. Extension and Rural Development: Concepts of Rural Extension, Dimension, Principles and Political Rural Development and Support. Strategy and Models of Rural Extension: Comparative Analysis, News Perspectives and Tendencies. Methodology of Rural Extension. Planning of Rural Development Programs and Projects.
3a) No prerequisites.
3b) The main objective of discipline is offer to the student a large perspective about agricultural and rural development problematic for it complements this technical Knowledge.
3c) Amaro, Roque 2000 Desenvolovimento local em Portugal: As lições do passado e as exigências do Futuro; Cristóvão, Artur Novembro; 1994 A Rede para o Desenvolvimento Local; Cristóvão, Artur Para uma Nova Extensão Rural: Reflexão em Quatro Pontos. 1995 Economia e Sociologia nº59; Do Sistema de Formação e Visitas á Investigação e Desenvolvimento de Sistemas Agrários: Análise Crítica de Um Percurso. Economia e Sociologia nº59; Cadernos LEADER, 1995 A Estruturação do Projecto de Desenvolvimento Local. Bruxelas: AEIDL.
4. Compulsory.
5. Manuel Luis Tibério.
6. 4h/week (2h theoretical + 2h practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Participate in Classes (10%); Practical Work (40%); Final Written (50%).
9. No.
10. 4.0.

1. Chicken Production – 1545.
2. Characterization and historical notes on poultry production. Intensive poultry production. General properties. Genetics in intensive production. Breeds of chickens and hybrids. Anatomy and physiology of chickens. Growth and development. Reproductive sensibility to light. SHARP´S Model. Housing and equipment. Growing egg pullets. Management and feeding of pullets. Egg production. The egg. Physiology of egg formation. Layer housing. Light management. Natural and artificial molting. Layer feeding. Breeders. Management. Incubation of eggs. Reproduction. Breeders feeding. Intensive and extensive broiler chicken production. Housing, management and feeding. Turkey production. Housing. management and feeding of breeders and broilers. Disease prevention and poultry welfare.
3a) Good knowledge in biology, biochemistry, housing and equipment, physiology and nutrition.
3b) The main objectives are related to the development of future activities in poultry production aiming the study of several kinds of production, the characterization of intensive and extensive production of eggs and meat as well as the concern with the problems dealing with animal welfare and biological production systems.
3c) Steven Leeson e John D Summers 1997 Commercial Poultry Nutrition 2nd Edition. University Books, Ontario, Canada, pp350; SP Rose 1997 Principles of Poultry Science. Cab International,UK, pp 135; R G Wells and CG Belyavin, Butterworths Egg quality – Current Problems. Poultry Science Symposium Number Twenty, London. Pp 302; Mohained K Yousef, PhD 1984 Stress Physiology in Livestock Volume III Poultry. CRC Press, Florida, pp 159; M North e Donald D Bell, 1990 Commercial Chicken Production Manual Fourth Edition Van Nostrand Reinhold, Avi Book New York. pp 913; Robert J Etches 1996 Reproduction In Poultry, Cab International, pp 318.
4. Compulsory.
5. José Luís Medeiros Mourão.
6. 4 h/week (2h theoretical + 2h practical); 1 st semester; 5th year
7. Theoretical and practical classes.
8. Final written exam, pratical works and partial quizzes.
9. No.
10. 4.0.

Landscape Architecture Degree

Programme of Studies

	1st semester	ECTS	2nd semester	ECTS
1st YEAR	Mathematics I	6.0	Biology	6.0
	Chemistry	6.0	Introduction to Biochemistry	6.0
	Climatology and Environment	6.0	Geomorphology and Physiography	6.0
	Drawing Skills I (annual)	8.0	Drawing Skills I (annual)	8.0
	Introduction to Landscape Architecture (an)	4.0	Introduction to Landscape Architecture (an.)	4.0
	Total	30	Total	30
	1st semester	ECTS	2nd semester	ECTS
2nd YEAR	Statics	5.0	Land Surveying	5.0
	Botany	5.0	Plant Physiology	5.0
	Art History	7.5	History of Landscape Architecture and Garden Art	7.5
	Drawing II (annual)	7.5	Drawing II (annual)	7.5
	Landscape Architecture (annual)	5.0	Landscape Architecture (annual)	5.0
	Total	30		30
	1st semester	ECTS	2nd semester	ECTS
3rd YEAR	Mechanics of Materials	6.0	Equipments for Preparation, Installation and Conservation of Green Spaces and gardens	6.0
	Microbiology	6.0	Plant Protection	6.0
	Soils and Fertility	7.0	Hydrology	6.0
	Ornamental Plants (annual)	4.0	Ornamental Plants (annual)	5.0
	Landscape Design I (annual)	7.0	Landscape Design I (annual)	7.0
	Total	30		30
	1st semester	ECTS	2nd semester	ECTS
4th YEAR	Ecology	5.0	Phytogeograpy and Phytossociology	5.0
	Drainage and Irrigation	5.0	Architecture and Urban Planning	5.0
	Construction Techniques and Materials (annual)	5.0	Construction Techniques and Materials (annual)	5.0
	Production Application and Management of Plant Material (annual)	5.0	Production Application and Management of Plant Material (annual)	5.0
	Computer Aided Design (annual)	3.0	Computer Aided Design (annual)	3.0
	Landscape Design II (annual)	7.0	Landscape Design II (annual)	7.0
	Total	30	Total	30
	1st semester	ECTS	2nd semester	ECTS
5th YEAR	Natural Resources Economics and Management	5.5	Turfgrass Science and Management	5.5
	Environmental Impact Study Methodology	5.5	Rehabilitation of Sensitive Areas	5.5
	Conservation of Historic Gardens and Urban Green Spaces	5.5	Protected Area Management	5.5
	Landscape Planning (annual)	5.5	Landscape Planning (annual)	5.5
	Planning and Designing the Global Landscape (annual)	8.0	Planning and Designing the Global Landscape (annual)	8.0
	Total	30	Total	30

Total credits: 240

1st year

1. Mathematics - 0001.
2. Introduction to complex numbers: definition of complex numbers; properties of complex numbers. Functions of one real variable: implicit and inverse functions; the inverse trigonometric functions. Limits of functions and continuity; the Intermediate Value Theorem. Derivatives: the Chain Rule; higher order derivatives; implicit differentiation; the Mean Value Theorem; L' Hôpital's Rule; Taylor's formula; Maximum-Minimum Problems. Antiderivatives: techniques of integration. Integration: the definite integral; the Fundamental Theorem of Calculus. Applications of integration: the area between two curves.
3a) High-school Mathematical Analysis.
3b) To provide students the basic concepts of Mathematical Analysis.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw-Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytical Geometry, 1st vol., Weber and Schmidt; Apostol, TM 1967 Calculus (2nd ed.), 1st vol., Wiley International Edition.
4. Compulsory.
5. Armando Figueiredo, Pedro Barroso Magalhães.
6. 5 h/week (2 theoretical + 3 theoretical/practical); 1st semester; 1st year.
7. Lectures and theoretical/practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. Chemistry - 0003.
2. The structure of matter, stoichiometry and aqueous solutions. Chemical bond. Chemical kinetics. Acid-base equilibria. Chemical thermodynamics. Oxidation-reduction reactions. Introduction to the nomenclature of organic compounds. Colloidal dispersions.
3a) Mathematics.
3b) To provide the basic definitions in Chemistry, as well as the tools needed to the study of the quantitative relationships in chemical reactions, physical and chemical properties of matter; functional groups of organic compounds and to attribute the name of some representative compounds.
3c) Chang, R 1994 Química, 5ª ed., John Wiley & Sons; Brady, JE & Holum, JR 1996 Chemistry - The Study of Matter and Its Changes, 2ª ed., John Wiley & Sons; Reger, D et al. 1997 Química: Princípios e Aplicações, Fundação Calouste Gulbenkian; Campos, LS & Mourato, M 1999 Nomenclatura dos Compostos Orgânicos, 1ª ed., Escolar Editora.
4. Compulsory.
5. Fernando Glenadel Braga, Lucinda Reis.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 1st year.
7. Lectures and practical (laboratories) classes.
8. Final written exam (70%) and practical work (20%).
9. No.
10. 6.0.

1. Climatology and Environment - 1133.
2. Study of environmental geology, main aspects (internal and external) of Earth, the influence of man in the environment; natural disasters. The dynamic Earth, minerals, igneous rocks, sedimentary rocks and metamorphic rocks. Introduction to the geology and neotectonic of Portugal. Study of climate factors: daylenght; solar radiation; air and soil temperature; atmospheric humidity; wind; rainfall; evapotranspiration; energy balance; frosts; water balance and climatic classification. Urban climatology. Techniques of identification and evaluation of climate constraints in urban environments. Heat Island effect. Wind flow analysis in urban and rural areas.
3a) Good knowledge of Physics, Maths, Statistics and Earth Sciences.
3b) To introduce students in (internal and external) earth's dynamic systems, natural materials and resources, natural disasters and the evolution of earth across the geologic time.Learning of theoretical and practical concepts in Applied Climatology. Basic knowledge on definitions, measurement techniques and/or evaluation of climatic variables. To relate the variations of climatic variables with landscape management aspects. To identify and assess the climate and to identify potential areas of intervention in landscape management.
3c) Campbell, GS & Norman, JM 1998 An Introduction to Environmental Biophysics, Springer-Verlag; Jones, HG 1983 Plants and Microclimate. A quantitative approach to environmental plant physiology, ed. Cambridge; Skinner, B & Porter, S 1992 The Dynamic Earth, an introduction to physical geology, John Wiley & Sons, 570 pp.
4. Compulsory.
5. Timóteo Ferreira, João Baptista, Aureliano Malheiro, Anabela Fernandes.
6. 5 h/week (3 practical + 2 theoretical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Geomorphology and Physiography - 1135.
2. The rock cycle. The concept of weathering, Factors controlling weathering and weathering types (chemical, physical and biological). Erosional and climatic systems. Surface processes shaping the terrestrial ecosystems: mass movements; water as modelling agent (wild waters, rivers, waves and other morphogenetic agents, glaciers); wind as modelling agent. The different lithologies and its reflex in the diversity of landscapes. The influence of the geologic structures in the building of relief forms. Geomorphologic maps. Photointerpretation.
3a) Knowledge of general Geology and Chemistry.
3b) To acquire the knowledge about the processes of surface geodynamics, those that are the shapers of the earth surface. To understand the origin and evolution of the different relief types. To relate the lithologic diversity and geological structures with different landscapes. To apply the learned concepts through the use of geomorphologic maps and aerial photographs.
3c) Alencoão, AMP & Reis, AR 2002 Fisiografia de bacias hidrográficas, Série Didáctica das Ciências Aplicadas, nº 179, UTAD, Vila Real, 33 pp.; Chernicoff, S & Venkatakrishnan, R 1995 Geology. An introduction to physical geology, Worth Publishers, Inc., 593 pp.; Cristofoletti, A 1980 Geomorfologia, S. Paulo: Editora Edgard Blucher; Derreau, M 1966 Geomorfologia, Barcelona: Ediciones Ariel, SA; Hamblin, WK 1992 The earth's dynamics systems, Macmillan Publishing Company, 647 pp.; Press, F & Siever, R 1985 Earth, WH Freeman & Company, 656 pp.; Press, F & Siever, R 1994 Understanding earth, WH Freeman & Company, 593 pp.; Strahler, AN 1981 Geografia Física, 5ª ed., Barcelona: Ediciones Omega; Tarbuck, EJ & Lutgens, FK 1993 The earth. An introduction to physical geology, Macmillan Publishing Company, 654 pp.; Tarbuck, EJ & Lutgens, FK 1997 Earth science, Prentice-Hall, 638 pp;. Tricart, J 1965 Principes et méthodes de la gèomorfologie, Paris: Masson et Cie, Éditeurs.
4. Compulsory.
5. Ana Maria Pires Alencoão, Anabela Ribeiro dos Reis.
6. 5 h/week (2 theoretical + 3 theoretical/practical); 2nd semester; 1st year.
7. Lectures and theoretical/practical classes.
8. Final written exam.
9. No.
10. 6.0

1. Introduction to Biochemistry - 0240.
2. Foundations of Biochemistry: the molecular logic of life; cells; biomolecules; water. Structures and Functions of Biomolecules: amino acids and proteins; enzymes; carbohydrates; lipids and biological membranes; nucleic acids. Bioenergetics and Metabolism: principles of bioenergetics; generation and storage of metabolic energy; glycolysis, the citric acid cycle, the glyoxylate cycle, oxidative phosphorylation, photosynthesis. An overall view of the biosynthesis of macromolecular precursors.
3a) General knowledge of Chemistry and Biology.
3b) To provide an introduction to the principles of Biochemistry that gives the students a command of its concepts and language. This will constitute basic tools for general and applied subjects such as: Plant physiology, Plant protection, Ecology, Soils and fertility, Microbiology and Production. Application and management of plant material.
3c) Stryer, L 1995 Biochemistry, 4th ed., WH Freeman & Company; Lehninger, AL et al. 1992 Principles of Biochemistry, 2nd ed., North Publishers.
4. Compulsory.
5. Luís Fernando Torres de Castro, Maria Rosário Anjos.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 1st year.
7. Theoretical and practical classes
8. Theoretical part: 60%; practical part: 40%.
9. No.
10. 6.0.

1. Introduction to Landscape Architecture - 1134.
2. Some advice to promote an easier adaptation to the university environment plus a method for a better performance in studying. Landscape history (from the Cosmos origins to the present Biosphere); Landscape Architecture as Art, Science and Technology; items of relevance to Landscape Architecture: Architecture and Landscape; fundamentals of Ecology, Anthropology , Sociology and Economy for the landscape approach and understanding; the importance of systems (ecosystems) in Landscape Architecture, their formal aspects and how they work, landscape at the global level (biomes); landscape at the national level (from natural ecosystem to modified ecosystems); remnants of pristine and semi-pristine landscape and their importance for biodiversity and for a new management of the landscape; threats to this kind of ancient landscapes.
3a) Ecology, Geology, Biology (for the landscape interpretation); Anthropology and Sociology and Economy (for the knowledge of man itself and his performance in the landscape, once being an important source of landscape change).
3b) The general objective is to introduce the Landscape Architecture to the newly-arrived university students, is the cornerstone of their work.
3c) Albuquerque, JPM 1950 Agrotipos do Continente Português, Lisboa, Associação Portuguesa para o Progresso das Ciências, Separata do Tomo II ou III, 2ª secção, pp. 223 a 236; Albuquerque, JPM 1954 Carta Ecológica de Portugal, Lisboa, Ministério da Economia, Direcção Geral dos Serviços Agrícolas, Serviço Editorial da Repartição de Estudos, Informação e Propaganda, pp. 58; Cabral, FC 1993 Fundamentos da Arquitectura Paisagista, Lisboa, Instituto da Conservação da Natureza, pp. 220; Lucas, MAG et al. 1995 A Terra um Planeta com Vida, Lisboa, Visão, (colecção de fichas, em cinco capítulos, com numeração própria); Moura, RM 1995 Apontamentos de Ecologia e Paisagem, Vila Real.
4. Compulsory.
5. Robert Manners Moura.
6. 2 h/week, annual; 1st year.
7. Lectures/practical classes, with active student participation.
8. Periodical assessment by written tests (3) (60%), collective travel reports (2) and individual research report (1) (40%). In a 1-to-20 scale, the final rating will be found out by taking the average of tests and reports. Above 9.5 students are released from final examination.
9. No.
10. 8.0.

1. Drawing Skills I - 0664.
2. First part (introduction to graphic and plastic expression): introduction to critical observation; recognition, representation, and recreation of outdoor space and landscape through graphic and plastic techniques - freehand drawing, copying, photography-based design, use of colour, collage/ photomontage, 3-D modelling, special graphics to Landscape Architecture. Second part (analytic geometry): orthogonal projection system - point, line, and plane; line intersection; line-plane intersection; plane intersection; plane substitution and rotation; distances and angles; polyhedral surfaces; design as an exercise for 3-D comprehension; 3-D modeling from 2-D designs.
3a) Students must have the desire to explore and express themselves graphically.
3b) First part: develop the capacity to represent and communicate ideas graphically and plastically, related to outdoor space and landscape, as well as the capacity to produce “design notes”. Second part: develop the capacity of space perception, forms, and relative positions; develop the capacity to represent abstract ideas in 3-D.
3c) Davis, AD & Walker, TD 2000 Landscape Graphics, John Wiley & Sons, NY; Hosegood, Betsy 1999 Paint! Landscapes, RotoVision, SA, Crans-Près-Céligny; Hosegood, Betsy 2000 Paint! Figure & Portrait, RotoVision, SA, Crans-Près-Céligny; Jameson, K 1982 Desenhar, 2ª ed., Editorial Presença, Lda., Lisboa; Lin, MW 1993 Drawing and Designing with Confidence - A Step by Step Guide, John Wiley & Sons, Inc., NY (existe na biblioteca); Ching, FDK 1996 Architecture - Form, Space and Order, 2nd Edition, John Wiley & Sons, Inc., NY; Reid, GW 1987 Landscape Graphics - From concept sketch to presentation rendering, Whitney Library of Design/ Watson - Guptill Publications, NY; Wester, M 1990 Design communication for Landscape Architects, Van Nostrand and Reinhold, NY; Smith, R 1994 Desenhar a Figura Humana, Editorial Presença, Lisboa; Sullivan, C 1997 Drawing the Landscape, 2nd edition, John Wiley & Sons, Inc., NY.
4. Compulsory.
5. Paulo Farinha Marques, José Luís Santos.
6. 6 h/week; annual; 1st year.
7. Lectures/practical classes.
8. Portfolio assessment.
9. No.
10. 16.

1. Biology - 0336.
2. Introduction to the study of cell biology. Biological organization levels. Animal and plant cells: plasma membrane; cell walls, cytoplasmic membrane systems; nucleus; the cell cycle, m phase: mitosis and meiosis; aerobic respiration and the mitochondrion; photosynthesis and the chloroplast. General structures of the plants. Study of the structural and functional organization of three tissues systems - dermal (epidermis and periderm), ground (parenchyma, collenchyma and sclerenchyma) and vascular (xylem and phloem). Anatomic study of root, stem and leaf.
3a) High-school knowledges.
3b) To acquire knowledge about the structure-function duality at the cellular level, general vision of the inherent biological processes of the prokaryotic and eukaryotic cells, as well as the morfo-functional interactions between the cells and the cellular organelles. Study of structural, morphologic and functional features of plant tissues (General Histology).
3c) Azevedo, C 1999 Biologia Celular e Molecular, 3ª ed., Lidel, Edições Técnicas, Lisboa-Porto-Coimbra; Paniagua, R et al. 1993 Citologia y Histologia Vegetal y Animal - Biologia de las celulas y tejidos animales y vegetales, Interamericana - McGraw Hill, Madrid; Moreira, I 1993 Histologia Vegetal, 4ª ed. Didáctica; Fanh, A 1974 Plant Anatomy, 2ª ed., Pergamon Press, Oxford; Esau, K 1972 Anatomia Vegetal, Ediciones Omega, SA, Casanova, 220, Barcelona; Pinto, TMS 1994 Parênquima, UTAD, Vila Real.
4. Compulsory.
5. Teresa Maria Pinto, Paula Lemos.
6. 5 h/week (3 practical + 2 theoretical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. According to University Regulations, 2 written tests or a final exam (90%) + 1 case study (10%)
9. No.
10. 6.0.

2nd year

1. Statics - 1095.
2. Physical quantities and units. International system of units. Notions of Metrology. Vector calculus. Newton's laws. Law of gravitation. Weight and mass. Fundamental interactions. Forces. Composition of concurrent forces. Torque. Torque of several concurrent forces. Composition of forces applied to a rigid body. Composition of coplanar forces. Center of mass. Static. Equilibrium of a particle. Equilibrium of a rigid body. Distributed forces. Virtual work principle. Stability. Notions of elasticity. Elements of hydrostatics.
3a) General Physics, Vector, Differential and integral calculus.
3b) To give a basis of Mechanics and understanding of Statics. To apply the laws and concepts of Mechanics and of Statics in real situations.
3c) Ferdinand, PB & Johnston, ER 1991 Mecânica Vectorial para Engenheiros, 5ª ed., McGraw-Hill; Alonso M & Finn, EJ 1999 Física, Addison-Wesley Iberoamericana España, SA, Madrid, Espanha; Keller FJ et al. 1993 Physics: classical and modern, McGraw-Hill; Halliday D & Resnick, R 1991 Fundamentos de Física, Livros Técnicos e Científicos Editora Lda., Brasil; Sears FW et al. 1988 Física, 2ªed, Vols. I e II, Livros Técnicos e Científicos Editora Ltda, Rio de Janeiro, Brasil.
4. Compulsory.
5. Joaquim Anacleto.
6. 5 h/week (2 theoretical + 3 theoretical/practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. One final written exam.
9. No.
10. 5.0.

1. Botany - 1199.
2. Ecological context: organisational levels of Life; the concept of species in a biological and an ecological perspective – functional, evolutionary, and taxonomic; populations and their dynamics; phyto-geography and environmental factors; vascular plant taxonomy; systematic analysis; plant evolution. Biological context: vascular plant organography; radical system; stem system; leaf system; reproductive system
3a) General knowledge of Biology.
3b) Development of botany terminology, organographic characterisation of vascular plants, knowledge of the principal taxa of the Portuguese flora, and knowledge of the analytical methods of taxonomy/ systematics.
3c) Coutinho, AXP 1939 Flora de Portugal, J. Cramer ed., Letershausen; Franco, JA 1971 Nova Flora de Portugal, vol. 1, JA Franco (ed.), Lisboa; Franco, JA 1984 Nova Flora de Portugal, vol. 2, JA Franco (ed.): Lisboa; Rivas-Martínez, S 1987 Memória del mapa de series de vegetación de España, 1:400.000, Ed. ICONA, Ministerio de Agricultura: Madrid; Valdés, B et al. 1987 Flora Vascular de Andalucía Occidental, vols. 1-3, Ketres, Barcelona; Willkom, M & Lange, J 1880 Prodromus florae hispanicae. vol. III: Stuttgart.
4. Compulsory.
5. António Luís Crespí.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 2nd year.
7. Lectures and practical classes. Case studies; elaboration of a project during the current semester.
8. Final classification = 50% theoretical examination + 50% practical examination.
9. No.
10. 5.0.

1. Art History - 1200.
2. We wish that the dimensional, temporal and functional factors are integrated in an all unity which different aspects, full of peculiarities, can show the sense of Art History. Prehistical Art, the ancient world Classical Art, Primitive Cristian and the Byzantine World, the Oriental World and his Art; Medieval Art. The Renaissance, Barroco Modern World and the Contemporaneity.
3a)
3b) Starting with the principal that Art History is indispensable to the graduation of any paisagist architect, because it offers him a sort of “radiography” of his professional field of intervention as much in terms of the object as in terms of the human intervention in general and particularly professional. So we pretend to guide the student to reflect about the past that informs the actual states of the landscape architecture, in terms of being conscientious about the concepts and relations who organize the profession.
3c) 1995 História Mundial da Arte, 6 Volumes, Livraria Bertrand; História da Arte Portuguesa – (dir. Paulo Pereira), Lisboa. Círculo de Leitores.
4. Compulsory.
5. Domingos Júnior.
6. 6 h/week; 1st semester; 2nd year.
7. Lectures/practical classes.
8. The students can be evaluated by final exams and tests as the general regime of the UTAD presupposes or by a semester work of analysis and interpretation of subjects related. With the program that may be defined case by case by the teacher of the discipline.
9. No.
10. 7.5.

1. Land Surveying - 0013.
2. This one-semester course covers: Surveying and mapping. Direct levelling. Angle, direction and distance measurement. Problems with distances, directions and coordinats. Types of Topographic Surveys. Topographic map construction. Working on maps. Traverse. Intersection and resection. Rigorous angle measurement. Digital Terrain Models-Applications. Land Surveying and Computer Aided Design.
3a) Mathematical analysis, especially plain trigonometry.
3b). To provide students with both surveying theory and real-world practice in mapping and engineering surveys. To give also the ability of using topographic instruments and bringing them up to date on the technological advances that are changing the field.
3c) Apontamentos Teóricos de Topografia, Departamento de Matemática, UTAD, Vila Real; Gaspar, JA Cartas e Projecções Cartográficas; Elfick, M et al. Lidel Elementary Surveying, Harper Collins Publishers; Modelos Digitais de Terreno, Departamento de Matemática, UTAD, Vila Real; Bannister, A et al. Surveying, Longman Scientific & Technical; Alves, J et al. Topografia, Academia Militar; Casaca, J et al. Topografia Geral, Lidel. Xerez, Topografia Geral.
4. Compulsory.
5. João Sousa.
6. 5 h/week (3 practical + 2 theoretical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. A final written test or a final written test + a presented practical work.
9. No.
10. 5.0.

1. Plant Physiology -0019.
2. Concept of physiology. The water and plant physiology. Mineral nutrition and plant physiology. Photosynthesis. Morphogenesis. Stress physiology: concept, phases and recognise. Stress types (effects and defence mechanisms): water stress, flooding, salinity, heavy metals, visible and UV-B radiation, chilling, freezing, high temperature, atmospheric CO2, pollutants (ozone, SO2).
3a) Good knowledge on Biology.
3b) Students should get a domain on the main aspects of structure and functions that interfere in the growth, differentiation and development of higher plants and on plant responses to environmental factors.
3c) Larcher, W 1995 Physiological Plant Ecology, 3rd ed., Springer-Verlag, Germany; Taíz, L & Zeiger, E 1998 Plant Physiology, 2nd ed., Bejamín/Cummings, Redwood, California, USA; Hopkins, WG 1999 Introduction to Plant Physiology, 2nd ed., John Wiley, NY, USA.
4. Compulsory.
5. Carlos M. Correia, Eunice Areal Bacelar.
6. 5 h/week (3 practical + 2 theoretical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Two written tests or a final exam - 100%.
9. No.
10. 5.0.

1. History of Landscape Architecture and Garden Art - 1202.
2. History of Landscape Architecture from the origins to the present day, focusing on the periods, places, cultures and people most significant to this narrative. The approach refers to the political, social, artistic, philosophical and technological context of each period and in which way it affected the development of landscape architecture and garden art
3a) History of art and history of human knowledge.
3b) To know and understand the different kinds of relationships between man and nature and in which way they affected the making and evolution of the landscape through history. To identify the major aesthetic ideals and works of art in this field, both in Portugal and the rest of the world
3c) Jellicoe, G & Jellicoe, Susan 1987 Landscape of Man, Thames and Hudson, London; Newton, NT 1971 Design on the Land - the Development of Landscape Architecture, The Belknap Press of Harvard University Press, Cambridge; Thacker, C 1985 The History of Gardens, Croom Helm, London; Jellicoe, G & Jellicoe, Susan (eds.) 1986 The Oxford Companion to Gardens, Oxford University Press, Oxford; Brown, Jane 2000 The Modern Garden, Thames & Hudson, London; Araújo, IA 1962 Arte Paisagista e Arte dos Jardins em Portugal, Direcção Geral dos Serviços de Urbanização, Lisboa; Carita, H & Cardoso, H 1987 Tratado da Grandeza dos Jardins em Portugal, Edição de Autores, Lisboa.
4. Compulsory.
5. Teresa Portela Marques.
6. 6 h/week; 2nd semester; 2nd year.
7. Lectures/practical classes. Development of a research project and garden visits.
8. Final exam and research project.
9. No.
10. 7.5.

1. Design II - 0665.
2. Types of technical drawing. Drawing materials and its utilisation. Normalisation. Labels. Orthogonal projections. Perspectives. Linear measures. Levelling method: straight line junction; plane intersections and perpendicularity between straight lines and planes; determination of shadows of solids in parallel light; definition of topographic surfaces; freehand sketch of landscape, urban space and construction details. The colour; primary, secondary and complementary colours; harmonies.
3a) Design I.
3b) To graduate in the ambit of the graphic representation and the rigorous interpretation of the drawings, establishing the basis to the Construction Drawings and Project. To provide a theoretical knowledge support to the course units of Topography, Construction Techniques and Materials, and Project.
3c) Alves, JAD et al. 1988 Manual de Topografia, Public. PF, Lisboa; Ching, F Manual de dibujo arquitectónico, México, Ediciones Gustavo Gili; Cunha, LV Desenho Técnico, Fundação Calouste Gulbenkian, Lisboa; Itten, J 1986 Art de la coleur, Dessain et Tolra, Paris; Ricca, G Geometria Descritiva/Método Cotado; Schaarwachter, G Perspectiva para Arquitectos; Editorial Gustavo Gili, SA, Barcelona; Sulliuvan, C 1997 Drawing the Landscape; USA, John Wiley & Sons, Inc..
4. Compulsory.
5. Maria Eunice da Costa Salavessa, Raquel Abreu Peixoto.
6. 6 h/week; annual; 2nd year.
7. Lectures/practical classes.
8. According to University Regulations, 2 written tests or a final exam – 100%.
9. No.
10. 15.

1. Landscape Architecture - 1201.
2. First part: electromagnetic spectrum and photography; photographic film and filters; notions of photogrammetry; notions of photointerpretation; types of aerial coverage; introduction to satellite images; satellite image processing and classification. Second part: landscape as a living system; landscape analysis and synthesis – the overlay process and suitability models; landform, slope analysis, aspect, landscape values, land use, and geology; optimal sites for a specific activity; optimal sites for conservation; sensitive zones.
3a) Good knowledge in Physics, Topography and Mathematics.
3b) First part: prepare the students to work with aerial photographs and satellite images. Second part: develop the capacity to analyse and interpret landscape and its dynamics, and introduce to landscape planning.
3c) Marques, CP & Aranha, JT 2000 Apontamentos de Detecção Remota, UTAD, Vila Real; Chuvieco, E 1990 Introducion a la Teledetection, Ediciones Rialpa, Madrid; Lillesand, TM & Kiefer, RW 1987 Remote Sensing and Image Interpretation, John Wiley & Sons, NY.
4. Compulsory.
5. José Aranha, Luís Roxo, Dulce Gonçalves.
6. 5 h/week (2 theoretical + 3 practical); annual; 2nd year.
7. Along theoretical classes, is presented and demonstrated the subjects that the students need to understand and participate in practical classes. Each 2 practical classes, the students need to process and classify aerial photographs or satellite images and to present a report. At the end of the semester, if student's practical remake is higher than 47.5%, he/she is allowed to be present in a theoretical test. If student's final theoretical remake is higher than 50%, he/she is free from final examination.
8. 60% theoretical + 40% practical.
9. No.
10. 10.

3rd year

1. Mechanics of Materials - 1310.
2. Introduction to the basic concepts of mechanics of materials. Designing problems related to mechanics of materials. Stress and strain analysis of bars under traction, compression, torsion and flexion. Structure stability: columns and walls. Qualitative analysis of mechanic properties used in landscape architecture projects.
3a) Calculus and Statics.
3b) The students should be able to identify, analyse the divers mechanical stress in bars and design structure according to safety criteria, and select the appropriate for a project materials according to the mechanical properties of materials.
3c) Féodosiev, V 1977 Resistência dos Materiais, Ediçöes Lopes da Silva; Branco, CMGM 1994 Mecânica dos Materiais, Fundaçäo Calouste Gulbenkian; Gere, JM & Timoshenko, SP 1993 Mechanics of Materials, Chapman & Hall; Caputo, HP 1977 Mecânica dos Solos e suas Aplicações, Livros Técnicos e Científicos; Davim, JP & Magalhães, AG 1992 Ensaios Mecânicos e Tecnológicos, Estante Editora.
4. Compulsory.
5. Norberto Jorge Gonçalves.
6. 5 h/week (2 theoretical + 3 theoretical/practical); 1st semester; 3rd year.
7. Lectures, practical classes and laboratories.
8. Final written exam 100%.
9. No.
10. 6.0.

1. Soils and Fertility - 0066.
2. Soil formation factors. Horizons and identification of parent material. Mineral and organic soil elements. Physical (texture, structure, porosity, and temperature) and chemical properties (CEC and reaction). Soil water. Environmental factors affecting plant growth. Growth expressions. Elements required in plant nutrition (N, P, K, Ca, Mg, S, Fe, Cu, Zn, Mn, B, Mo, Cl). Soil fertility evaluation: soil and plant analyses. Fertilisers: choice of the most suitable to a particular situation and calculation of the amounts to apply.
3a) Knowledge on Chemistry.
3b) Students should know the physical and chemical soil and its influence on plant growth. They should know the behaviour of the elements required in plant nutrition and its importance in landscape architecture. They should also be able to recommend a fertilisation to a particular soil and species.
3c) Costa, JB 1973 Caracterização e Constituição do Solo; Craul, PJ 1999 Urban Soils. Applications and Practices; Foth, HD 1984 Fundamentals of Soil Science, (7ª ed.); Santos, JQ 1991 Fertilização. Fundamentos da Utilização dos Adubos e Correctivos.
4. Compulsory.
5. Ana Luísa de Figueiredo Pires.
6. 6 h/week; 1st semester; 3rd year.
7. Lectures/practical classes.
8. Two mid terms and six quizzes or final exam.
9. No.
10. 7.0.

1. Microbiology - 0054.
2. Introduction to the microbial world. Procaryotic cell structure and function. Eucaryotic cell structure of Fungi; Classification of fungi. The virus. Structure and properties of virus. Classification, replication and cultivation of virus. Nutrition, growth and metabolism of microorganisms. An overview on microbial nutrition. Culture media. Transport of nutrients. Kinetics of microbial growth. The influence of environmental factors on growth. Control of microorganisms by physical and chemical agents. Energetic metabolism. Fermentations. Aerobic and anaerobic respiration. Photosynthesis. Bacterial genetics. Microorganisms and the Environment.
3a)
3b) This course provides a balanced introduction to the microbial world in all major areas: Structure, function of microbial cells. Growth, metabolism and control of microorganisms.
3c) Ferreira, W & Figueiredo de Sousa, JC 1998 Microbiologia, (eds.) Lidel, Lisboa; McKane, L & Kandel, J 1996 Microbiology - Essentials and Applications, 2nd ed., McGraw-Hill Inc.; Schlegel, HG 1986 General Microbiology, 6th ed., Cambridge University Press; Brock, TD & Madigan, MT 1991 Biology of the Microorganisms, 6th ed., Pretince-Hall International Edition.
4. Compulsory.
5. Arlete Faia, Alice Moura.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. A final written exam corresponding to 80% of the final score and a practical component which corresponds to 20%.
9. No.
10. 6.0.

1. Equipments for Preparation, Installation and Conservation of Green Spaces and Gardens - 1313.
2. Traction units; constitution, working, regulation and maintaining. Equipments used in the terrain recuperation for green space or garden use. Mobilisation, sowing, plantation, and pesticides application equipment used in green spaces and gardens; constitution, working, regulation and maintaining. Costs equipments determination used in green spaces and gardens.
3a) Physical and Thermodynamic knowledge.
3b) Allowing the students to have de necessary theoretical and practical knowledge about the equipments used in green spaces and gardens
3c) Every subject have notes that are available in the teacher site. There is also a digital database with a lot of articles about the subjects.
4. Compulsory.
5. Fernando Santos, Carlos Pires.
6. 6 h/week; 2nd semester, 3rd year.
7. Lectures/practical classes.
8. Two written tests during the semester. Reports about every practical work done in the classes.
9. No.
10. 6.0.

1. Plant Protection - 1314.
2. Fundamentals of Entomology: introduction to insects, morphology and pet management. The Fungi: nature, identification and classification of the fungi and. Fungal diseases of trees and shrubs (anthracnosis, blights, rusts, vascular wilt, powdery and root rot diseases). Abiotic (non-infectious) diseases. Diseases of turfgrass. Tree surgery. Adverse urban conditions (compaction and pruning). Site preparation practices and management of street trees.
3a) No prerequisites.
3b) To understand the diseases of biotic origin as predisposing and inciting factors involved in tree decline of urban environments.
3c) Davies, R 1991 Introduccion a la Entomologia, Mundi-Prensa Ed., Madrid [caps. 1 a 4]; Hoodge, S 1991 Urban Trees. A survey of street trees in England, Forestry Commission, Bull. 99, London; Manion, P 1991 Tree Disease Concepts, Prentice Hall, New Jersey; Shigo, A 1989 Tree Pruning. Shigo & Trees Assoc., Durham; Shigo, A 1991 Modern Arboriculture, Shigo & Trees Assoc., Durham; Tattar, L 1978 Diseases of Shade Trees, Academic Press, NY.
4. Compulsory.
5. Carlos Gomes de Abreu, Luís Miguel Martins.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Practical exam and work project done during the semester. Final examination designed to cover the whole course.
9. No.
10. 6.0.

1. Hydrology - 1315.
2. Water and the history of the Main Water Reservoirs in the Planet Earth; The Current Uses of Water; The Hydrologic Cycle; Precipitation; Water Transfers to the Atmosphere; Surface and Groundwater Runoff; Infiltration and Recharge; The water Balance; Floods; Introduction to Drainage Systems in Urban Areas; Introduction to Drainage Systems Acting by Infiltration; Other Systems of Runoff Control In Urban Areas.
3a) Notions of Mathematics and Physics. Basic notions of Geology.
3b) Introduce methods and techniques for successful learning in the hydrology of natural and urban areas. To understand the methods used in the control of runoff in natural and urban areas.
3c) Alencoão, AMP et al. 2002 Componentes Primárias do Ciclo Hidrológico, Série Didáctica das Ciências Aplicadas nº 211, UTAD, Vila Real, 60 pp.; Lencastre, A & Franco, FM 1984 Lições de hidrologia, Universidade Nova de Lisboa, Faculdade de Ciências e Tecnologia, 451 pp.; Pinto, AMR 1983 Contribuição para o estudo da drenagem de águas pluviais em zonas urbanas, vol. 2: Especialização é aperfeiçoamento. Hidráulica sanitária, LNEC, Lisboa; Maskell, AD & Sherriff, JDF 1992 Scope for control of urban runoff, vol. 2: A review of present methods and practice. Industry Research and Information Association, CIRIA Report 124.
4. Compulsory.
5. Fernando A. L. Pacheco.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Exam.
9. No.
10. 6.0.

1. Ornamental Plants - 1311.
2. Trees, shrubs and ground-cover species. Grasses. Seasonal plants. Vines. Special use plants: interior plants, ecological garden species, xeric species, aquatic plants, wetland species, plants for space division and land edges, species for habitat restoration.
3a) Plant Physiology and Botany.
3b) To study species used in green space composition, in the perspective of botanical identification and characterisation, as well as their functional and ornamental suitability in landscape design..
3c) Torres de Castro, LF & Ribeiro, JA 2001 Colecção de Plantas Ornamentais nos Espaços Verdes da UTAD; Universidade de Trás-os-Montes e Alto Douro, Vila Real, 144 pp.; Ribeiro, JA & Torres de Castro, LF 2001 Colecção de Plantas Aromáticas e Medicinais, Universidade de Trás-os-Montes e Alto Douro, Vila Real, 68 pp.; Huxler, A et al. 1992 Dictionary of Gardening, The New Royal Horticultural Society; Brickell, C 1989 Gardeners Encyclopedia of Plant & Flowers, The Royal Horticulture Society.
4. Compulsory.
5. Luís Fernando Torres de Castro, António Luís Crespí.
6. 4 h/week; annual; 3rd year.
7. Lectures/practical classes.
8. Four mid-term exams, 25% each.
9. No.
10. 9.0.

1. Landscape Design I - 1312.
2. The site planning of a low-rise, low density housing area. The design of single family outdoor space. Sustainable design. The glade-edge concept. Taking advantage of the microclimate and landform. Water in the garden. Indoor-outdoor relationship. The private garden: the playing areas, living outside; the wildlife zones; access and circulation. The aesthetic and biological diversity in the private outdoor space.
3a) Design II.
3b) Develop the ability to design private outdoor spaces regarding ecological, aesthetical and functional principles.
3c) Alexander, C 197 Timeless Way of Building, NY: Oxford University Press; Alexander, C & Ishikawa, SM 1977 A Pattern Language, NY: Oxford; Church, TD. et al. 1983 Gardens are for People, McGraw Hill Book Company, NY; Littlewood, M 1993 Landscape Detainling 1- Enclusures, 3rd ed., Butterworth-Heinemann, Oxford; Littlewood, M 1993 Landscape Detainling 2- Surfaces, 3rd ed., Butterworth-Heinemann, Oxford; Littlewood, M 1993 Landscape Detainling 3- Trees detainling, 3rd ed., Butterworth-Heinemann, Oxford; Neufert, E 1991 A Arte de Projectar em Arquitectura, 9ª ed., Gustavo Gili, São Paulo; Reid, GW 1993 Form Concept to Form in Landscape Design, Van Nostrand Reinhold, NY.
4. Compulsory.
5. Paulo Farinha Marques.
6. 6 h/week; annual; 3rd year.
7. Lectures/practical classes.
8. Final exam – design work – 100%.
9. No.
10. 12.

4th year

1. Ecology - 0096.
2. The notion of natural and cultural integrity. Considerations of scale and hierarchy. Indicators of ecosystem integrity. Measuring biological integrity and monitoring for ecosystem integrity. Bioindicators of the quality of water, soil and air. Population Dynamics. Extreme environments and adaptation. Genetic variation and environmental stress. Environmental stress, selection, evolution and extinction. Air pollution. Toxic elements. Acidification. Forest decline. Fossil fuels. Eutrophication. Pesticides. Species richness. Radioactive pollution.
3a) Notions of Biology and Geology.
3b) To understand the fundamental concepts in environmental ecology, such as environmental stress, ecological integrity, bioindicators, adaptation and evolution. To apply these concepts in the evaluation of the great and actual environmental issues.
3c) Bijlsma, R & Loeschcke, V 1997 Environmental Stress, Adaptation and Evolution, Birkhauser Verlag. 325 pp.; Freedman, B 1989 Environmental Ecology, Academic Press, 424 pp.; Fowler, J & Cohen, L 1990 Statistics for Ornithologists, British Trust For Ornithology - 22, 173 pp.; Jeffrey, DW & Madden, B 1991 Bioindicators and Environmental Management, Academic Press, 224 pp.; Soule, DF & Kleppel, GS 1988 Marine Organisms as Indicators, Springer-Verlag, 229 pp.; Woodley S et al. 1993 Ecological Integrity and the Management of Ecosystems, St. Lucie Press, 210 pp..
4. Compulsory.
5. João Alexandre Cabral, Mário Santos.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. A written report 25% and two written tests and/or a final written exam 75%.
9. No.
10. 5.0.

1. Drainage and Irrigation - 1316.
2. Basic principles on pressure flow and water pumping. Principles of irrigation : water – availability and quality; soil – soil water retention, infiltration and soil water movement; climate – evapotranspiration and rainfall; plants – water requirements. Irrigation methods: surface, sprinkler and localised. Soil water drainage
3a) Good knowledge on Soil Science, Climatology, Biology and Plant Physiology is required. There is no formal prerequisites.
3b) The integration of knowledge previously learned in several different courses is taken into account to allow a rational application of water in order to save resources and to reduce the impact of irrigation on the environment. The main methods of irrigation and drainage are taught.
3c) Cuenca, R 1989 Irrigation system design. An engineering approach, Prentice-Hall, Inc., New Jersey, 552 pp.; Doorenbos, J & Kassam, AH 1986 Yield response to water, FAO Irrigation and Drainage Paper nº 33, Rome, 193 pp.; Doorenbos, J & Pruitt, WO 1977 Crop water requirements, FAO Irrigation and Drainage Paper nº 24, Rome, 144 pp.; Jensen, ME (ed.) 1983 Design and operation of farm irrigation systems, ASAE monograph nº3, St. Joseph, Michigan, 829 pp.; Kay, M 1986 Surface irrigation. Systems and practice, Cranfield Press, Bedford, 142 pp.; Kay, M 1988 Sprinkler irrigation. Equipment and practice, BT.Batsford Ltd, London, 120 pp.; Parcevaux, S et al. 1990 Dictionaire encyclopédique d'agrométéorologie, INRA, 323 pp.; Pizarro, F 1990 Riegos localizados de alta frequencia, Ediciones Mundi-Prensa, Madrid, 471 pp.; Raposo, JR 1996 A rega, Fundação Calouste Gulbenkian, Lisboa, 485 pp; Vermeiren, L & Jobling, G 1980 Localized irrigation, FAO Irrigation and Drainage Paper nº 36, Rome, 198 pp..
4. Compulsory.
5. Vicente Sousa, Carlos Pires.
6. 5 h/week; 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 5.0.

1. Phytogeography and Phytossociology- 1320.
2. Introduction to Phytossociology; Phytossociology and Typologism. The structure of the vegetation. individualism and the chaotic organisation of the vegetation. The metapopulation approach to populations. Typologism vs. Individualism, the phytossociological approach. Phytostructuralism, structural characterisation of the behaviour tendencies, the structural parameters. Numerical analysis, multivariate methodology for the phytostructural analysis: numerical matrizes (the MEB and the MC), structural index, standardisation, variance analysis, clusters, multifactorial analysis (PCAs), tendency characterisation, DCA, HEA. Structural dynamic. Characterisation of the resistance and resilience. forecasting models.
3a) Knowledge of the taxonomy and systematic Portuguese vascular flora.
3b) The main goals of the discipline are involved in the knowledge and characterisation of the structure and dynamics of the vegetation.
3c) Braun-Blanquet, 1977 Fitossociologia; Naveh, Z & Lieberman, AS 1987 Landscape Ecology. Theory and Application; Peindado Lorca, M & Rivas-Martínez, S 1987 La Vegetación de España; Ludwig. JA & Reynolds, JF 1988 Statistical Ecology; Crawley, MJ 1989 Plant Ecology; Hair, JF et al. 1995 Multivariate data analysis with readings; Santos, VA & Vargas Luque, AP 1996 Métodos multivariados en bioestadística; Reis, E 1997 Estatística multivariada aplicada; Daniel, WW 1998 Biostatistics: a foundation for analysis in the health sciences; Collins, WW & Qualset, CO 1999 Biodiversity in agroecosystems; Hanski, W 1999 Metapopulation ecology; Pianka, ER 2000 Evolutionary ecology.
5. António Luís Crespí.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 4th year.
7. Lectures and practical classes. Transparents, articles, examples of projects already elaborated or in execution, data-show presentation elaboration of a project which will be exposed at the end of the semester
8. Final classification = 50% theoretical examination + 50% practical examination.
9. No.
10. 5.0.

1. Architecture and Urban Planning - 1321.
2. An historic perspective of urban design; from a guidance plan to the detailed plan; legal aspects of planning; reading urban space; infra-structures; comprehending the relations between private and public space; architectural forms accompanying materials, times, and lifestyles; locality characteristics as influences to architectural design; RGEU as the base for design and construction; project coordination and its relation to the various professional specialisations.
3a) No prerequisites.
3b) Comprehend urban evolution along history, urban planning as an organisation of space, notions and rules of planning, relations between house and city, architectural tendencies and expressions, and architecture as the medium of societal transformation.
3c) Jencks, C 1992 Movimentos Modernos em Arquitectura, Edições 70; Benevolo, L 1994 Projectar a Cidade Moderna, Colecções Dimensões; Teixeira, MC & Valla, M 1999 O Urbanismo Português, Livros Horizonte; Colecção Divulgação 1991 Indicadores e Parâmetros Urbanísticos, DGORDU; Pardal, S et al. 1993 Normas Urbanísticas, vol. IV, DGOTDU.
4. Compulsory.
5. José Luís Santos.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Partial and final written examination.
9. No.
10. 5.0.

1. Construction Techniques and Materials - 1317.
2. Study of Rocks, traditional binders, and cement and geopolymeric materials. Ceramic materials. Metals in general and steel in particular. Study of Woods. Geotextiles. Construction techniques – slope stability, retention walls, pavements, wood construction, rehabilitation of structures and construction, recycling of materials, roof systems, drainage works.
3.a) General knowledge of Chemistry and Strength of Materials.
3b) To apprehend the fundaments of Materials Science, in particular those that are normally connected with traditional and current construction. To know the basic characteristics of different materials, their way of processing, handling conditions and application. To connect the use of materials to the construction techniques and to develop the capacity for selecting the most adequate materials, considering their functionality, integration and cost of investments and maintenance.
3c) Materiais de Construção, Faculdade de Engenharia da Universidade do Porto; Materiais de Construção, Instituto Superior Técnico; Materiais de construção, Univ. do Minho; Ciência e Tecnologia dos Materiais, Ed. UTAD (coordenação do Prof. Gomes de Castro); Smith, W Princípios de Ciência e Engenharia dos Materiais, McGraw-Hill; Apontamentos do Professor.
4. Compulsory.
5. Amândio Teixeira Pinto.
6. 5 h/week (2 theoretical + 3 theoretical/practical); annual; 4th year.
7. Lectures and theoretical/practical classes.
8. Partial and final written examination.
9. No.
10. 10.

1. Production, Application and Management of Plant Material - 1318.
2. Apprehend the basic concepts on the plant propagation. Relate these concepts with the different possibilities of use of plants in different contexts. Understand and assimilate the main cares to have in the application and conduction of the vegetal material, in the management and maintenance of the plants in the green spaces.
3a) No prerequisites.
3b) It is envisage that students acquire knowledge on the fundaments and techniques requested for the propagation and plant production. Time to accomplishment the cultural operations and factors those influence them. Main cares to have in the preparation of the ground and rank of the plants. Application and conduction the plants in the field. Green maintenance of the garden and open spaces.
3c) Basra, AS (ed.) 2000 Plant growth regulators in agriculture and horticulture, Haworth Press; Boutherin, D & Bron, G 2000 Multiplicação de plantas, Publicações Europa-América, Mem Martins; Brickell, C 1994 The Royal Horticultural Society gardeners' encyclopedia of plants & flowers, Dorling Kindersley, London; Hartmann, HT & Kester DE 2002 Plant propagation principles and practices, 7th ed., Prentice-Hall, Inc., NJ Englewood Cliffs; Oakes, AJ 1990 Ornamental grasses and grasslike plants, An Avi Book, Published by Van Nostrand Reinhold, NY.
4. Compulsory.
5. José Pedro Alves.
6. 5 h/week (2 theoretical + 3 practical); annual; 4th year.
7. Lectures and practical classes.
8. Periodical tests or final written exam and practical work.
9. No.
10. 10.

1. Computer Aided Design - 0906.
2. Introduction: Autocad interface; file and project management; coordinate systems; access to the commands. 2D modelling: creating entities, precision elements, query and annotation functions, editing entities, using text, using blocks. Printing: using modelling and paper space, preparing a layout, plotting a design. 3D modelling: tri-dimensional space and visualisation, creating and editing objects.
3a) No prerequisites.
3b) Teach methods and techniques of computer aided design, calculations, and document production with applications in landscape design, preparing the students to elaborate professional projects.
3c) Ribeiro, CT & Pereira, VMF Conceber e representar com AutoCAD 13, McGraw-Hill; Garcia, J & Neto, PL Autocad 2002, FCA - Editora de Informática.
4. Compulsory.
5. Amândio José Ferreira de Azevedo, José Gregório.
6. 4 h/week; annual; 4th year.
7. Lectures/practical classes.
8. Two mini tests or one final exam: theoretical part: 60%, practical part: 40%.
9. No.
10. 6.0.

1. Landscape Design II - 1319.
2. Urban public grounds (parks, gardens, squares, streets).
3a) Landscape Design I.
3b) To develop the experimentation and synthesis areas in the various fields of sciences, techniques and arts by developing the project practice throughout the year.
3c) Cabral, FC & Teles, GR 1999 A Árvore em Portugal, Assírio e Alvim (ed.); Gellicoe, G 1987 The Landscape of Man, Thames & Hudson; Holden, R 1996 Diseño del espaço público internacional, Ediciones G. Gili, SA; Kirschenmann, JC 1895 Vivienda y espacio público. Rehabilitación urbana y crescimento de la ciudad, Ediciones G. Gili, SA; Littlewood, M 1995 Diseño urbano 3, Ediciones G. Gili, SA; Neufert, E 1974 A Arte de Projectar em Arquitectura, Editora G. Gili do Brasil SA.
4. Compulsory.
5. Laura Roldão e Costa.
6. 6 h/week; annual; 4th year.
7. Lectures/practical classes.
8. The student's global assessment is continuous.
9. No.
10. 14.

5th year

1. Natural Resources Economics and Management - 1322.
2. Natural resources concepts and typologies. Human pressures and natural resource scarcity. Sustainable Development: theory and practice. Market mechanism and natural resources management. Property rights, public goods and externalities. Natural resources management and social choice. Regulating natural resources uses. Efficiency in natural resource management. Applying economic efficiency concept. Environmental benefits and costs: assessment and cost-benefit analysis tool. Economic value of goods and services provided by natural resources. Economic efficiency and sustainability. Foundations of natural resources management pluri and multidisciplinary. Globalisation of environmental issues. Natural resources state in Portugal: water and mineral resources. Urban waste management. Territory planning and management tools: National Ecologic Reserve, National Agricultural Reserve, Nature 2000 network and integrated Coastal Zone Management.
3a)
3b) Improve awareness about the importance of natural resource management economic dimension. Provide basic concepts and tools in economic analysis. Apply those concepts and tools to environment and natural resources management. Supply and discuss information about environment and natural resources state in Portugal and on environmental policies and legislation in charge in Portugal and European Union..
3c) Ferrão, P 1998 Introdução à Gestão Ambiental, Instituto Superior Técnico, Lisboa; Partidário, M 1999 Introdução ao Ordenamento do Território, Universidade Aberta, Lisboa; Pearce, D & Turner, R 1990 Economia de los Recursos Naturales y dei Medio Ambiente, Tradução espanhola de C. Balboa e P. Palacin, Colegio de Economistas de Madrid, Celeste Ediciones, Madrid; Samuleson, P & Nordhaus, W 1995 Economia, l4ª ed., McGraw-Hill Portugal, Lisboa.
4. Compulsory.
5. António Pires, Lívia Madureira.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Written works in practical classes and its oral presentation (30% final note) + One written test (70% final note). Final written exam (100% final note).
9. No.
10. 5.5.

1. Environmental Impact Study Methodology - 1323.
2. Introduction; legislation; impact typology; description and communication of impacts; impact analysis and forecasting; impact assessment; mitigation; public participation; decision-making; post-evaluation; monitoring
3a) Scientific knowledge from most of the other disciplines of the degree, to permit understanding the analysis, forecasting, and assessment of environmental impacts
3b) The objective of the discipline is to offer legal and scientific/ technical background, as well as to develop the capacity for the analysis, forecasting, and assessment of environmental impacts, so much for singular projects as for development strategies; the discipline is directed towards the interests and applications of landscape architects, focusing primarily on visual aspects and the dynamics of their manifestation
3c) Canter, LW 1996 Environmental Impact Assessment, NY: McGraw-Hill, Inc.; Morris, P & Thérivel, R 1995 Methods of Environmental Assessment, London: UCL Press; Wood, C 1995 Environmental Impact Assessment: A Comparative Review, Essex: Longman Scientific and Technical.
4. Compulsory.
5. Anastássios Perdicoúlis.
6. 5 h/week (2 theoretical + 3 practical); 1st semester, 5th year.
7. Theoretical and practical classes.
8. Final exam (60%); project (40%).
9. No.
10. 5.5.

1. Conservation of Historic Gardens and Urban Green Spaces - 1324.
2. The history of conservation of the cultural heritage - the conservation of gardens and landscapes within this background. Contemporary principles and processes of conservation and restoration of gardens. Historical data collection and analysis. The protection -legislation, lists and inventories - of historical heritage. Interpretation and presentation. Case studies.
3a) History of landscape architecture and garden art; history of human knowledge; Landscape design;. Plant material.
3b) To recognise the significance of historic gardens and landscapes to the history of humankind; to understand the impact of human actions on the landscape heritage; to understand, both in theory and practice, the fundamental contemporary conservation principles and be able to criticise interventions in the light of those principles; to recognise the complexity of the interventions on the heritage and to know how to make a proposal for intervention in a historic garden or park. Be acquainted with historical data collection and analysis.
3c) Charters, Conventions and Recommendations; Custódio, J 1993 Salvaguarda do Património - Antecedentes Históricos. De Alexandre Herculano à Carta de Veneza (1837-1964), In Dar Futuro ao Passado, pp. 34-71, Lisboa: Instituto Português do Património Arquitectónico e Arqueológico; Goodchild, P 1990 Some Principles for the Conservation of Historic Gardens, Draft document presented to ICOMOS (UK), Historic Gardens and Landscapes Committee; Goulty, Sheena 1993 Heritage Gardens. Care, Conservation, and Management, London: Routledge; Jacques, D 1995 The Treatment of Historic Parks and Gardens. Journal of Architectural Conservation, 2:21-35; Lambert, D 1991 Researching a Garden's History from Documentary and Published Sources, Reigate: Landscape Design Trust and the Centre for the Conservation of Historic Gardens.
4. Compulsory.
5. Teresa Portela Marques
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 5th year.
7. Lectures and practical classes, restoration project and visits to gardens.
8. Restoration project assessment.
9. No.
10. 5.5.

1. Turfgrass Science and Management - 1325.
2. Turfgrass industry and historical overview. Ecology and adaptation of turfgrass species. Stress tolerance and physiology. Establishment and soil, nutrients and water requirements. Turfgrass maintenance - mowing Fertilisation, irrigation, pests and weed control, other turfgrass operations. Turfgrass and environment. Sustainable turfgrass management - energy and nutrient cycling, integrated pest management, water use efficiency. Other grassland community landscapes - the management of permanent pastures and biodiversity.
3a) Good knowledge of biology, soil and climate, chemistry and plant physiology.
3b) To give background knowledge on turfgrass types and uses, their history, economic importance and future perspectives. To identify, understand and be able to manage the materials and methods for the establishment and maintenance of turfgrasses. Be able to assess and discuss the environmental consequences of turfgrass management in order to reduce the environmental risks and enhance the landscape advantages and sustainability of turf communities.
3c) Emmons, R 2000 Turfgrass Science and Management, 3rd ed., Delmar Thompson Learning; Beard, JB 2001 Turf management for golf courses, 2nd ed., Wiley Publ.; Merino, DM & Ansorena, J 1997 Cesped Deportivo. Construcción y mantenimiento, Ediciones Mundi-Prensa; Waddington, DV et al. (eds.) 1992 Turfgrass, ASA, CSSA and SSSA, Agronomy nº 32, Madison.
4. Compulsory.
5. Nuno Moreira.
6. 5 h/week (3 practical + 2 theoretical); 2nd semester; 5th year.
7. Lectures and practical classes.
8. Practical work and written tests or final examination.
9. No.
10. 5.5.

1. Rehabilitation of Sensitive Areas - 1327.
2. Theoretical: 1 - Space intervention; 2 - Materials, characteristics and functions (inert, vegetable and combined material); 3 - Techniques, examples and principles (combined constructions of support and consolidation; Biotechnical drainage; Techniques of construction of stabilisation; covering construction; complementary stabilisation; Constructive techniques with inert materials; 4 - Case studies (slope stabilisation; dunes systems; riverine systems; recovery of degraded zones; mined-land rehabilitation; recovery and valorisation of urban and rural landscape). Practices: A project will be elaborated with view to the landscape recovery of some areas affected by the implementation of IP3 (Main Itinerary Vila Real-Chaves.
3a) General Ecology, Edafology, Geology, Fitossociology and Cartography knowledge.
3b) To qualify students to intervene in the domain of bioengineering understood constructive systems with vegetation with the objective of administrating ecosystems and increase his support capacity, compatibilization with land use alterations, compensation of impacts and the recovery of degraded zones.
3c) Gray, DH & Soltir, RB 1996 Biotechnical and Soil Bioengineering – Slope Stabilization. A practical Guide for Erosion Control. John Wiley & Sons, Inc.; Grime, JP 1981 Plant strategies and vegetation processes, Jonh Wiley & Sons, NY; Instituto Tecnologico Geominero de España 1991 Manual de Ingeniaria de Taludes, Gráficas Monterreina, SA, Espanha; Law, DL 1984 Mined-Land Rehabilitation, ASLA, Van Nostrand Reinhold Company.
4. Compulsory.
5. Edna Carla Janeiro Cabecinha.
6. 5 h/ week (2 theoretical + 3 practical); 2nd semester; 5th year.
7. Lectures and practical classes.
8. Practical Work (80%) + Presentation (20%).
9. No.
10. 5.5.

1. Protected Area Management - 0796.
2. General introduction: what are protected areas? Protected area categorisation system; what is protected area management? Protected areas management or nature conservation management: protected areas as tool to nature conservation management; the fundamentals of nature conservation management. Nature conservation and sustainability. Ecosystems, agrosystems and urban systems. A case study: the Alvão Natural Park. World and national nature conservation management. Integrating the national nature conservation system with the international one.
3a) It is a synthetic subject, therefore, depending on the scientific knowledge of other disciplines of the degree. The aim of the discipline is management of systems (ecosystems), and for properly management it is necessary the sectional knowledge of the other disciplines of the degree.
3b) The objective of the discipline is to integrate a large set of quantitative and qualitative factors, biotic and abiotic, to get nature conservation goals as much as possible.
3c) Moura, RM 1995 Apontamentos de Ecologia e Paisagem, Vila Real (não publicados ainda); Moura, RM 2001 Os Fundamentos e os Antecedentes da Conservação da Natureza, Vila Real, UTAD, 166 pp.; Moura, RM 2002 0 Parque Natural do Alvão. Entre o Homem e a Natureza, Vila Real, Instituto da Conservação da Natureza/Parque Natural do Alvão, 48 pp.; Odum, EP Fundamentos de Ecologia, (tradução de António Manuel de Azevedo Gomes do original inglês, intitulado Fundamentals of Ecology, 4th ed.), Lisboa, Fundação Calouste Gulbenkian, 927 pp. (optional book).
4. Compulsory.
5. Robert Manners Moura.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 5th year.
7. Lectures and practical classes, with active student participation.
8. Periodical assessment by written tests (3) (60%), collective travel reports (2) and individual research report (1) (40%). In a 1 -to-20 scale, the final rating will be found out by taking the average of tests and reports. Above 9.5 students are released from final examination.
9. No.
10. 11.

1. Landscape Planning - 0828.
2. Theoretical: Definition of terms and inherent concepts to Landscape Planning (LP). Presentation and discussion of themes relative to LP, with special meaning in Portugal (Zonation and regulations of PROTs and PDMs, politics and strategies of conservation of nature, agricultural and forest politics integrated in LP, LP of coastal areas, urban concentration, metropolitan areas, recreation and tourism, etc.). Practice: 1 - Analysis and comment of a LP instrument; 2 - analysis and prospective diagnosis of an area to elaborate an aptitude map for the implementation of IP3; LP sketch for the same area according to conflicting logics, subsequent confrontation with the actual PDM.
3a) General Ecology, Edafology, Geology, Legislation and Cartography knowledge.
3b) To qualify the students to intervene in the process of Landscape Planning, with prominence for biophysical ambit, in a sustainability vision and at national, regional and local levels. To develop reasoning power in the logic of Landscape Planning, applying theoretical knowledge and using legal norms by the available information on the landscape and territory.
3c) Cancela d'Abreu, AO 1994 Significado do Ordenamento do Território numa Perspectiva Ambiental, Universidade de Évora; Fernandes, JPA 1991 Modelo de Caracterização e Avaliação Ambiental Aplicável ao Planeamento (ECOGIS/ECOSAD), Tese de Doutoramento, Universidade Nova de Lisboa; Fidélis, T 2001 Planeamento Territorial e Ambiente, Principia: Cascais; Partidário, MR 1999 Introdução ao Ordenamento do Território, Universidade Aberta: Lisboa.
4. Compulsory.
5. Edna Carla Janeiro Cabecinha.
6. 5 h/ week (2 theoretical + 3 practical); annual; 5th year.
7. Lectures and practical classes.
8. Final written test (40%) + Report (60%).
9. No.
10. 11.

1. Planning and Designing the Global Landscape III - 1326.
2. From global to local landscape - planning and designing the fundamental ecological structure. The design of a contemporary public park in the urban context.
3a) Students should reveal ecological and systemic perception and apply that to landscape planning and design.
3b) Develop the ability to interpret, plan and design the landscape from regional level to local level, according to ecological, aesthetical, functional and economic principles.
3c) Alexander, C et al. 1977 A Pattern Language, Oxford University Press, NY; Farinha-Marques, P 1998 Jardins de Cooperativas de Habitação no Grande Porto, Actas do 1º Congresso Nacional da Associação Portuguesa de Arquitectos Paisagistas, Tapada da Ajuda, Lisboa; Farinha-Marques, P 2002 Espaços (à)parte, 'Arquitectura e Vida', Loja da Imagem, Lisboa; Geuze, A 1995 West 8 Landscape Architecture, Uitgeverij 010, Publishers, Rotterdam; Hough, M 1984 City Form and Natural Process, Croom Helm: London; McHargh, IL 1992 Design with Nature, John Wiley & Sons, NY; Ruano, M 1999 Ecourbanism, Sustainable Human Settlements: 60 case studies, Gustavo Gili, Barcelona; Telles, GR 1997 Plano Verde de Lisboa. Edições Colibri; Vroom, MJ (ed.) 1995 Outdoor Space; Environments designed by Duch Landscape Architects in the period since 1945, (2nd ed.), Thoth, Bussum.
4. Compulsory.
5. Paulo Farinha Marques.
6. 6 h/week; annual, 5th year.
7. Lectures/practical classes.
8. Project assessment.
9. No.
10. 16.

Enology Degree

Programme of Studies

1st YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Citology	6.0	Histology and Morphology	6.0
	Physics I	6.0	Physics II	6.0
	Mathematics I	6.0	Mathematics II.	6.0
	Introduction to Agricultural Science (annual)	4.0	Introduction to Agricultural Science (annual)	4.0
	General Chemistry (annual)	6.0	General Chemistry (annual)	6.0
	English (annual)	2.0	English (annual)	2.0
	Total	30.0	Total	30.0
2nd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Statistical Methods	5.0	Introduction to operations Research	5.0
	Environment	5.0	Microbiology	6.0
	Analytical Chemistry	6.0	Soil and Fertility	5.0
	Computer Science	4.0	Organic Chemistry II	6.0
	Organic Chemistry I	6.0	Biochemistry (annual)	6.0
	Biochemistry (annual)	6.0		
	Total	32.0	Total	28.0
3rd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Winemaking	8.0	Genetics	6.0
	Microbiology and Biochemistry of fermentations	5.0	Wine Stabilization	7.0
	Sensory Evaluation I	4.0	Sensory Evaluation II	4.0
	Ampelology (annual)	6.0	Ampelology (annual)	6.0
	Wine Analysis (annual)	7.0	Wine Analysis (annual)	7.0
	Total	30.0	Total	30.0
4th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Curricular stage	30.0	Subsidiary Industries	5.5
			Accountancy and Management	4.5
			Enological Engineering	5.5
			Food hygiene	4.0
			Economy	4.5
			Marketing	4.0
			Legislation	2.0
	Total	30.0	Total	30.0

Total of credits: 240

1st year.

1. Cytology - 0005
2. Cytology: Macro molecules. Types of cells. Cellular organels: structure and function. Plasmatic membrane, Membrane systems: synthesis and degradation pathways of molecules, Cytoskeleton, Nucleus, Cellular division: mitosis and meiosis. Mitochondria, Vegetal cell.
3a) Biochemistry.
3b) Study of structural, morphologic and functional features of cells.
3c) Azevedo, C 2000 Biologia Celular e Molecular. 3ª edição. Lidel, Lisboa; Bruce Alberts et al., 1989 Molecular Biology of the Cell. Garland Publishing, Inc. New York.
4. Compulsory.
5. Luísa Valente, Cármen Moreira.
6. 5h/week (3T+ 3P); 1st semester; 1st year.
7. Lectures and practical classes.
8. According to University Regulations, 2 written tests or a final exam - 100%.
9. No.
10. 6.0.

1. Physics I - 0118
2. Scalar and vector quantities; units of measurement; kinematics; movement in one and two dimensions; dynamics of particles; work and energy; conservation of energy; linear momentum; collisions; rotation; equilibrium of rigid bodies.
3a) Basic knowledge of physics and mathematics.
3b) Students should get an overview of the basic concepts of Newtonian mechanics (vector operations, kinematics, statics and dynamics) and learn how to apply those concepts in practical situations.
3c) Halliday, D Resnick, R & Walker, J 1993 “Fundamentals of Physics” John Wiley, New York, 4th edition; Bueche; FJ & Jerde, DA 1995 “Principles of Physics” McGraw-Hill, New York, 6th edition; Kane; JW & Sternheim, MM 1988 “Physics” John Wiley, New York; Jong, IC & Rogers, BG 1991 “Engineering Mechanics - Statics and Dynamics” Saunders, Philadelphia.
4. Compulsory.
5. Ednan Joanni, Afonso Pinto, José Ramiro Fernandes.
6. 6h/week (4TP+ 2T); 1st semester; 1st year.
7. Lectures and problem-solving classes.
8. Final written exam.
9. No.
10. 6.0.

1. Mathematics I - 0209
2. Introduction to complex numbers: definition of the complex numbers; properties of complex numbers. Functions of one real variable: implicit and inverse functions; the inverse trigonometric functions. Limits of functions and continuity; the Intermediate Value Theorem. Derivatives: the Chain Rule; higher order derivatives; implicit differentiation; the Mean Value Theorem; L' Hôpital' s Rule; Taylor's formula; Maximum-Minimum Problems. Antiderivatives: techniques of integration. Integration: the definite integral; the Fundamental Theorem of Calculus. Applications of integration: the area between two curves.
3a) High-school Mathematical Analysis.
3b) To provide students the basics concepts of Mathematical Analysis.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, Mc. Graw- Hill, Lisboa; Swokowski, Earl. W 1979 Calculus with Analytical Geometry, 1st vol, Weber and Schmidt; Apostol, TM 1967 Calculus (2nd edition), 1st vol, Wiley International Edition.
4. Compulsory.
5. Armando Figueiredo, Sílvia Reis.
6. 6h/week (3T + 3 TP); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 6.0

1. Histology and Morphology 0006
2. Vegetal Histology - Theory: 1. The seed, embryo and seedling; 2 General structures of the plants; 3. Study of the structural and functional organization of three tissues systems - dermal, ground and vascular. 4Mo. Anatomy study of the root, stem and leaf. Practice: Observation, drawing and discussion of microscopic preparations (light microscope) containing all plants tissues studied in the theoretical classes. Morphology - 1. Plant morphology; definition and objectives. Taxonomy of vascular plants (Pteridophyta and Spermatophyta). Angiospermae and Gymnospermae. Dicotyledons and Monocotyledons. 2. Root, stem, leaf and reproductive (floral, inflorescence, fruit and seed) morphology. 3. Pollination mechanisms. Practice: Observation and descrition of basic vascular plants morphology. How to identify plants families.
3a) No prerequisites.
3b) Vegetal Histology - Study of structural, morphologic and functional features of plants tissues. Morphology - To define, and understand taxonomic principles and concepts; To learn basic morphology of vascular plants; To learn how to identify plants; To be able to recognize the principals families.
3c) Moreira, I 1993 Histologia Vegetal. 4ª Ed. Didática; Esau, K 1972 Anatomia Vegetal. Ediciones Omega, S.A., Casanova, 220, Barcelona; Paniagua, R et al. 1993 Citologia y Histologia Vegetal y Animal- Biologia de las celulas y tejidos animales y vegetales. Interamericana -Mc Graw Hill. Madrid; Pinto, TMS 1994 Parênquima. UTAD, Vila Real; Strasburger , E 1990 Tratado de Botânica. Ed. Omega, Barcelona; J 1997 Botânica. McGraw-Hill, Interamericana; Bell, AD 1998 Plant Form. An Illustrated Guide to Flowering Plant Morphology. Oxford University Press, Oxford; Koe, T 1988 Morfologia Vegetal. UTAD.
4. Compulsory.
5. Teresa Maria Pinto, Mário Jorge Pimentel, Berta Gonçalves.
6. 6h/week; (2T + 4P); 2nd semester; 1st year.
7. Lectures and practical classes.
8. According to University Regulations, 2 written tests or a final exam - 100%.
9. No.
10. 6.0.

1. Physics II - 0119
2. Fluid mechanics; heat and the 1st law of thermodynamics; kinetic theory of gases; entropy and the 2nd law of thermodynamics; charge and electric fields; Gauss law; electric potential; capacitance; electric current; electric circuits.
3a) Basic knowledge of physics and mathematics.
3b) Students should get an overview of the basic concepts of fluid mechanics, thermodynamics and electricity and learn how to apply those concepts in practical situations.
3c) Halliday, D, Resnick, R & Walker, J 1993 “Fundamentals of Physics” John Wiley, New York, 4th edition; Bueche, FJ & Jerde, DA 1995 “Principles of Physics” McGraw-Hill, New York, 6th edition; Kane, JW & Sternheim, MM 1988 “Physics” John Wiley, New York.
4. Compulsory.
5. Ednan Joanni, Afonso Pinto, José Ramiro Fernandes.
6. 6h/week; (4TP + 2T); 2nd semester; 1st year.
7. Lectures and problem-solving classes.
8. Final written exam.
9. No.
10. 6.0.

1. Mathematics II - 0216
2. Algebric Structures. Vector Spaces: linear independence; spanning sets; basis and dimension; vectorial subspace. Linear Mappings: the algebra of linear mappings; kernel and image; linear mappings whose domain is a vector space of finite dimension. Matrices: matrix of a linear mapping relative to fixed basis; algebra of matrices; invertible matrices; rank of matrices. Systems of Linear Equations: matricial interpretation; a systematic method of solving systems of linear equations. Determinants: basic concepts; Laplace theorem; application to matrices and systems. Eigenvalues and Eigenvectors: basic concepts.
3a) Basic knowledge in logic, theory of sets, functions and secondary school level of algebra.
3b) To develop reasoning capacity of the student and to provide the basic concepts of Linear Algebra and Analytical Geometry.
3c) Giraldes, E, Fernandes, VH and Smith, MP 1995 Curso de Álgebra Linear e Geometria Analítica, McGraw-Hill; Blyth, TS and Robertson, EF 1986 Matrices and Vector Spaces, Chapman and Hall; Blyth, TS and Robertson, EF 1994 Linear Algebra, Chapman and Hall.
4. Compulsory.
5. Elza Maria Alves de Sousa Amaral, Ângela Macedo Cardoso.
6. 6h/week; (2T + 2TP); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Written test (100%).
9. No.
10. 6.0.

1. Introduction to Agricultural Science - 0076
2. Use of plants in agriculture; historical aspects of the difusion of plants. General concepts of plant ecology and agronomy. Plant establishement. Bioclimatology. Grapevine phenology. Geographic agronomic characterization of Portugal Continental. Worldwide, national and regional importance of viticulture systems. Grapevine sanitary condition and its relevance for grapes/wine quality.
3a) Basic knowledge of Botany, Geography and Ecology.
3b) Students will obtain basic knowledge of agronomy to be developed in posterior courses; main parameters of agronomic activities.
3c) Ribeiro, O 1986 Portugal. O mediterrâneo e o atlântico. Ed. Sá da Costa, Lisboa; Castro-Caldas, E 1998 A agricultura na história de Portugal. Ed. E.P.N.-Empresa de Publicações Nacionais, Lda, Lisboa; Ribeiro, JA and Fernandes, MJ 1997. Tipos fisionómicos das plantas vasculares. UTAD, Vila Real (cicloestilado); Ribeiro, JA and Fernandes, MJ 1997 Ecologia da vegetação. UTAD, Vila Real (cicloestilado); Ribeiro, JA and Fernandes, MJ 1977 Ecologia agrária. UTAD, Vila Real (cicloestilado); Ribeiro, JA and Fernandes, JM 1977 Geografia agrícola de Portugal Continental. UTAD, Vila Real (cicloestilado); Amaro , P 2001 A protecção integrada da vinha na Região norte. ISA/Press.
4. Compulsory.
5. Ana Maria Nazaré Pereira, José Alves Ribeiro.
6. 2 h /week (lecture and practical class); annual; 1st year.
7. Lectures and practical classes with field work, oral and written review work.
8. Practical work , oral and written presentation of review work, final exam.
9. No.
10. 8.0.

1. General Chemistry 0176
2. Measurement units. The structure of matter, stoichiometry and aqueous solutions. Quantitative aspects of the gases. Chemical bond. Oxidation-reduction reactions. Acid-base equilibria. Chemical kinetics. Chemical thermodynamics. Electrochemistry.
3a) Mathematics.
3b) To provide the basic definitions in Chemistry, as well as the tools needed to the study of the quantitative relationships in chemical reactions. Once a basic knowledge of chemistry has been acquired it is taken a closer look at many different topics dealing with the physical and chemical properties of matter.
3c) Chang, R 1994 Química, 5ª Ed., John Wiley & Sons; Brady, JE and Holum, JR 1996 Chemistry - The Study of Matter and Its Changes, 2ª Ed., John Wiley & Sons; Reger, D, Goode, S and Mercer, E 1997 Química: Princípios e Aplicações, Fundação Calouste Gulbenkian.
4. Compulsory.
5. Fernando Glenadel Braga.
6. 6h/week; (2T + 1TP + 3P); Annual; 1st year.
7. Lectures and laboratories.
8. Final written exam (70%) and practical work (30%).
9. No.
10. 12.0.

1. English - 0505
2. Exchanging information, basic grammar, technical vocabulary, reading comprehension, extracting meaning from context.
3a) Pre-intermediate knowledge of English grammar, sentence structure and vocabulary
3b) This course is designed to meet the language needs of students by providing them with the necessary language framework needed to understand technical texts as well as communicate with a functional level of English.
3c) Nick Hall/John Shepheard 1995 The Anti-Grammar Grammar Book (Longman 5th Edition; Raymond Murphy 1987 English Grammar In Use (Cambridge University Press; Clive Oxenden and Christina Latham Koenig 1999 English File Intermediate (Oxford University Press; Hugh Johnson & Janas Robinson – The World Atlas of Wine (5th edition).
In addition the Internet, various journals and newspapers will be used as sources of material.
4. Compulsory.
5. Paul Driver.
6. 2h/week; 1st year; 1st semester.
7. Lectures, communication activities, reading/listening comprehensions, grammar exercises, writing, presentations.
8. Final exam.
9.Yes, English.
10. 4.0.

2nd year

1. Statistical Methods - 0008
2. Descritive Statistics. Introdution to raw data analysis. Introdution to Probability Theory. Introdution to Random Variables and to the Probability Laws. Mathematical Expectation and their Properties. Some Probability Laws Discrete and Continuous. Statistical Inference. Random Sampling. Data Description, and Some Fundamental Sampling Distributions. Bernoulli and Normal Populations. Estimation Methods. Point Estimation: Statistics and their Properties. Intervalar Estimation Cofidence Interval for all the different statistical samplings situations. One and Two Sample Tests of Hypotheses. One and Two Tailed Tests. Use of p-Values in Decision Making. Non parametrics tests: qui-squares to test goodness of fit and the independence. ANOVA: Theoretical assumptions and tests for comparing means. Regression analysis: Theoretical assumptions confidence intervals, hypothesis tests and the ANOVA approach.
3a) Mathematics I.
3b) Students should be able to use the statistical methods in data analysis.
3c) Reis, E, Melo, P, Andrade, R and Calapez, T 1997 Estatística Aplicada. Edições Sílabo, 2. Ed., Vols. I e II, ISBN: 9726181615; ISBN: 9726181623; Walpole, RE and Myers, RH 1993 Probability and Statistics for Engineers and Scientists. Prentice Hall International Inc., 5.th Ed., ISBN: 0024242012; Zar, JH 1993 Biostatistical Analysis. Prentice Hall International Inc., 3rd Ed, ISBN: 0130845426.
4. Compulsory.
5. Maria Manuel da Silva Nascimento, Elisete Correia.
6. 5h/week (2T + 3P); 1st Semester; 2nd Year.
7. Theoretical and Practical Classes.
8. 100% Final Written Examination.
9. No.
10. 5.0.

1. Environment - 0046
2. Study of environmental geology, main aspects (internal and external) of Earth, the influence of man in the environment; natural disasters. The dynamic Earth, minerals, igneous rocks, sedimentary rocks and metamorphic rocks. Introduction to the Geology and Neotectonic of Portugal. Study of climate factors: daylenght; solar radiation; air and soil temperature; atmospheric humidity; wind; rainfall; evapotranspiration; energy balance; frosts; water balance and climatic classification.
3a) Good knowledge of Physics, Maths, Statistics and Earth Sciences.
3b) Students should get an overview on the influence of the climatic factors on agriculture and animal production systems, on the knowledge on planet Earth, its processes and its resources, with special reference to the interaction between climate factors and grapevine production and the dynamics of the geologic processes, being these presented in an environmental perspective.
3c) Campbell, GS & Norman, JM. 1998 An Introduction to Environmental Biophysics. Springer-Verlag; Ferreira, TC 2000 “Fotoperíodo”. Série Didáctica de Climatologia Aplicada, Universidade de Trás-os-Montes e Alto Douro, Vila Real. 38p; Fry, N.1985 The Field Description of Metamorphic Rocks. Geological Society of London; Instituto Nacional de Meteorologia e Geofísica 1991 O clima de Portugal, fasc. XLIX correspondentes a 1951-1980:Vol. III: 3ª Região: Normais climatológicas da região deTrás-os-Montes e Alto Douro e Beira Interior; Jones, HG 1983 Plants and Microclimate. A quantitative approach to environmental plant physiology. Edition, Cambridge; Skinner, B. & Porter, S.1992 The Dynamic Earth, an introduction to physical geology. John Wiley & Sons, 570 pp; Thorpe, R & Brown, G.1985The Field Description of Igneous Rocks. Geological Society of London; Tucker, M.1986 The Field Description of Sedimentary Rocks. Geological Society of London.
4. Compulsory.
5. Timóteo Ferreira, João Baptista, Aureliano Malheiro, Anabela Fernandes.
6. 5h/week (3P + 2T); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 5.0.

1. Analytical Chemistry - 0105
2. Fundamentals of Analytical Chemistry. Errors in chemical analysis. Statistical evaluation of analytical data. Gravimetric methods of analysis. Titrimetric methods of analysis.
3a) General chemistry.
3b) To provide a rigorous background in both fundamental and practical aspects of the classical quantitative chemical analysis. To sensitise students to errors and uncertainties of analytical results. To introduce statistical methods for reliability evaluation of analytical data. To teach those laboratory skills that will provide reliable analytical data.
3c) Skoog, DA, West, DM and Holler, FJ 1996 Fundamentals of Analytical Chemistry, 7th Edition International Edition, Saunders College Publishing; Harris, DC 1999 Quantitative Chemical Analysis 5th Edition, W. H. Freeman and Company; Miller, JC and Miller, JN 1993 Statistics for Analytical Chemistry, 3rd edition, Ellis Horwood Limited.; Vogel, AI 1989 Vogel's Textbook of Quantitative Inorganic Analysis, 5th Edition by Longman Scientific & Technical, U.K.
4. Compulsory.
5.Luís H. Melo de Carvalho; João Claro.
6. 6h/week (2T + 1TP + 3P), 1st Semester; 2nd Year.
7. Lectures, practical classes and laboratory classes.
8. Written exam (60%) and practical mark (40%).
9. No.
10. 6.0.

1. Computer Science - 0367
2. Windows, Winword, Excel, Access, Internet..
3a) Work with Computers.
3b) To provide students with the knowledge to work with Windows, using Internet and solve problems of reduce complexity in Excel and Access.
3c) Campbell, M 1993 Iniciação aos Computadores, CETOP; Sousa, MJ 2000 Fundamental do Excel FCA; Gomes, L and Correia, M 2000 Fundamental do Access FCA; Magalhães, J 1995 Roteiro prático da Internet, Quetzal, – 2ª ed..
4. Compulsory.
5. Paulo Costa, António Marques.
6. 4h/week (2T + 2P); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Practical test 100%.
9. No.
10. 4.0.

1. Organic Chemistry I - 1260
2. Chemical Bond - Brief Revision. Introduction to Functional Groups. Alkanes and Cycloalkanes. Stereochemistry. Spectroscopic Methods. Nucleophilic Substitution and Elimination Reactions of Alkyl Halides. Alkenes and Alkynes I: Properties and Synthesis. Alkenes and Alkynes II: Addition Reactions. Radical Reactions.
3a) General Chemistry.
3b) To identify the main functional groups of organic compounds, to explain the basic principles of stereochemistry and its importance, as well as to proportionate the knowledge of several spectroscopic methods for structural elucidation. To explain the main reactions of some organic compounds based on the reactivity of functional groups and reaction mechanisms. To stimulate the interest of the students for this important and interesting subject, emphasising the biological, medicinal and environmental applications of Organic Chemistry.
3c) Solomons, TWG 1997 Fundamentals of Organic Chemistry, 5a Ed., John Wiley & Sons, New York; Solomons, TWG 1996 Química Orgânica, Vol. 1, 6a Ed., LTC Livros Técnicos e Científicos Editora S. A., Rio de Janeiro; Morrison, R and Boyd, R 1996 Química Orgânica, 13ª Ed., Fundação Calouste Gulbenkian, Lisboa; Campos, LS and Mourato, M 1999 Nomenclatura dos Compostos Orgânicos, 1ª Ed., Escolar Editora, Lisboa.
4. Compulsory.
5. Lucinda Vaz dos Reis.
6. 5h/week; (2T + 3P); 1st semester; 2nd year.
7. Lectures and practical classes, some of these are replaced by resolution of exercises.
8. Final written exam or 2 written tests (70%), written test about the laboratory experiences (20%) and practical laboratory work (10%).
9. No.
10. 6.0.

1. Introdution to Operations Research - 0012
2. The role and the objectives of the Operations Research (OR). Methods in Engineering. Introduction to OR. The Nature of OR. Overview of the OR Modeling Approach. Introduction to Inventory Theory. Introduction to Linear Programming (LP). Solving LP Problems: The Simplex Method. Solving LP Problems with Other Model Forms: The Big-M Method and the Penalty Method. Introdution to Duality in LP. Sensitivity Analysis in LP Problems. Introduction to the Transportation and Assignment Problems.
3a) Mathematics I and Statistical Methods.
3b) Students should be able to identify Operations Research Models and to use correct algoritms to solve the models. Learn the basic rules of a Written Work and its presentation.
3c) Hillier, FS and Lieberman, GJ 1995 Introdution to Operations Research. McGraw-Hill Bo. Co., 6th/Bk&dsk Ed. ISBN: 0078414474; Taha, Hamdy A 1996 Operations Research - An Introdution. Prentice Hall International Inc., New York, 6th Bk&Dk Ed. ISBN: 0132729156; Chang, Y-L and. Sullivan, RS 1996 Qsb+: Quantitative Systems for Business Plus: Version 2.1. Prentice-Hall, Bk&Disk Edition ISBN: 0132390620; Tavares, LV, Oliveira, RC Themido, IH and Correia, FN 1996 Investigação Operacional. McGraw-Hill de Portugal ISBN: 9728298080.
4. Compulsory.
5. Maria Manuel da Silva Nascimento, Maria Manuela Rodrigues.
6. 5h/week (2T + 3P); 2nd Semester; 2nd Year.
7. Theoretical and Practical Classes.
8. 25% Written Work, Presentation, Oral Discution + 75% Final Written Examination.
9. No.
10. 5.0.

1. Microbiology - 0054
2. Introduction to the microbial world. Procariot cell structure and function. Eucaryotic cell structure of Fungi; Classification of fungi. The virus. Structure and properties of virus. Classification, replicaction and cultivation of virus. Nutrition, growth and metabolism of microorganisms. An overview on microbial nutrition. Culture media. Transport of nutrients. Kinetics of microbial growth. The influence of environmental factors on growth. Control of microorganisms by physical and chemical agents. Energetic metabolism. Fermentations. Aerobic and anaerobic respiration. Photosynthesis. Bacterial genetics. Microorganisms and the Environment.
3a) No prerequisites.
3b) This course provides a balanced introduction to the microbial world in all major areas : Structure, function of microbial cells. Growth, metabolism and control of microorganisms.
3c) Ferreira, W and Figueiredo de Sousa, JC 1998 Microbiologia. Lidel, Lisboa; McKane, L and Kandel, J 1996 Microbiology - Essentials and Applications. 2nd ed, McGraw-Hill Inc.; Schlegel, HG 1986 General Microbiology. 6th ed, Cambridge University Press.; Brock, TD and Madigan, MT 1991 Biology of the Microorganisms, 6th ed, Pretince-Hall International Edition.
4. Compulsory.
5. Arlete Faia, Alice Moura.
6. 5h/week (2T + 3P); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. A final written exam corresponding to 80% of the final score and a practical component which corresponds to 20%.
9. No.
10. 6.0.

1. Soils and Fertility - 0066
2. Soil concept. Soil composition. Soil's physical and chemical behaviour. Soil as the environment where plants grow.
3a) Students should have previous knowledge on geology, mineralogy and chemistry.
3b) To provide the student with a global knowledge of the soil (the environment where plants grow) with respect to the main physical, chemical and biological properties. The student should also be able to understand and evaluate soil fertility and recommend the fertilization of a vineyard.
3c) Santos, JQ 1996 Fertilização, Fundamentos da Utilização de Adubos e Correctivos, 2ª ed. Col. Euroagro 30. Pub. Europa-América, Lisboa; Schroeder, D 1984 Soils: Facts and Concepts. International Potash Institute. Berne; Foth, HD 1978 Fundamentals of Soil Science. (5th ed.). J. Wiley & Sons. New York; Solter, D 1978 Les Bases de la Production Vegetal. Tome I-Le sol. (7 ed.) Collection Sciences et Techniques Agricoles. Paris; Costa, JB 1975 Caracterização e Constituição do Solo. Fundação Calouste Gulbenkian. Lisboa.
4. Compulsory.
5. Marta Roboredo.
6. 5h/week; (3P + 2T); 2nd semester; 2nd year.
7. Theory and practical classes..
8. Exam admission: to obtain a minimum average grade of 10 out of 20 in 6 of 9 multiple choice questionnaires and attend 2/3 of the practical classes. Continuous evaluation: to obtain a minimum average grade of 10 out of 20 in 6 of 9 multiple choice questionnaires, attend 2/3 of the practical classes, to elaborate and obtain a minimum classification of 10 out of 20 in a final work recommending a fertilization for a vineyard and to obtain a minimum average grade of 10 in two written tests. The final classification is given by the formula: Final classification=(a+2b+3c)/6; a, average grade of the 6 best questionnaires; grade of the final work; average grade of the two written tests.
9. No.
10. 5.0.

1. Organic Chemistry II - 1261
2. Alcohols and Ethers. Alcohols from Carbonyl Compounds - Oxidation-Reduction and Organometallic Compounds. Conjugated Unsaturated Systems. Aromatic Compounds. Aldehydes and Ketones: Nucleophilic Addition to the Carbonyl Group and Aldol Reaction. Carboxylic Acids and their Derivatives. Synthesis and Reactions of □-Dicarbonyl Compounds. Amines.
3a) General Chemistry.
3b) To proportionate an exhaustive knowledge of several classes of organic compounds, in what concerns, its structure, nomenclature, main methods of synthesis and more characteristic reactions, with an explanation of the reaction mechanisms. To stimulate the interest of the students for this important and interesting subject, emphasising the biological, medicinal and environmental applications of Organic Chemistry.
3c) Solomons, TW G 1997 Fundamentals of Organic Chemistry, 5a Ed., John Wiley & Sons, New York; Solomons, TWG 1996 Química Orgânica, Vol. 1 e 2, 6a Ed., LTC Livros Técnicos e Científicos Editora S. A., Rio de Janeiro; Morrison, R and Boyd, R 1996 Química Orgânica, 13ª Ed., Fundação Calouste Gulbenkian, Lisboa,; Campos, LS and Mourato, M 1999 Nomenclatura dos Compostos Orgânicos, 1ª Ed., Escolar Editora, Lisboa.
4. Compulsory.
5. Lucinda Vaz dos Reis.
6. 5h/week (2T + 3P); 2nd semester; 2nd year.
7. Lectures and practical classes, some of these are replaced by resolution of exercises.
8. Final written exam or 2 written tests (70%), written test about the laboratory experiences (20%) and practical laboratory work (10%).
9. No.
10. 6.0.

1. Biochemistry - 0007
2. Theory. Introduction. Amino Acids. Proteins. Enzymes. Vitamins and Coenzymes. Carbohydrates. Lipids. Biological Membranes and Transport. Carbohydrates Metabolism: Glycolysis and the Catabolism of Hexoses. The Citric Acid Cycle. Oxidative Phosphorylation. Lipids Metabolism: Introduction; Biosynthesis of Fatty Acids; Biosynthesis of Triacylglycerols and Glycerophospholipids; Biosynthesis of Sterols and Isoprenoids. Metabolism of Aminoacids. Nucleic Acids.
Practice. Introduction Brief. Identification and Characterization of Amino Acids. Quantification and Characterization of Proteins. Enzymatic kinetic of phosphatase alkaline. Enzymatic kinetics of polyphenoloxidase and immobilized enzymes. Identification and Characterization of Carbohydrates. Isolation, Identification and Characterization of Lipids. Metabolism of Carbohydrates.
3a) Good knowledge on chemistry.
3b) To supply solid technical and scientific preparation in several areas, e.g. constituents of living matter and biocatalysis, general catabolic and biosynthetic pathways as well as specific plant metabolisms, which is essential for the accurate understanding of other courses in this undergraduate curriculum.
3c) Lehninger, AL, Nelson, DL and COX, MM 1993 Principles of Biochemistry. Second Edition. Worth Publishers, New York; Plummer, DT 1987 An Introduction to Pratical Biochemistry. Third Edition. McGraw-Hill Book Company, London; Rawn, JD 1989. Bioquímica. Vol. II. McGraw Hill – Interamericana de España. Madrid; tryer, L 1990 Bioquímica. Tercera Edition. Editorial Reverté, S.A., Barcelona; Voet, D and Voet, JG 1992 Bioquímica. Ediciones Omega, S.A., Barcelona.
4. Compulsory.
5. Rosário Anjos, Albino Alves Dias.
6. 4h/week; (1P + 2T); annual; 2nd year.
7. Lectures and practical classes.
8. Mean of four written assessments 85%; Mean of practical works 15%.
9. No.
10. 12.0.

3rd year

1. Winemaking - 0108
2. Winery and equipment sanitation. Berry composition. Equipment used in Winemaking. Pre-fermentation treatments. Adjustment to must. The use of Sulphur dioxide in winemaking. Red winemaking. Controlling alcoholic fermentation and maceration. Wine colour: extraction, evolution and stability. White winemaking. Protecting juice from oxidation. Clarification. Skin contact. In-Barrel fermentation. Rosé wines. Botrytized sweet wines: Sauternes and Tokay. Sparkling Wines - traditional method, charmat and continuous. Fortified wines: Port Wine and Madeira Wine. Flor wine: Sherry Wines.
3a) None.
3b) Winemaking optimization and control to improve maximum quality.
3c) Ribéreau-Gayon, P, Dubourdieu, D, Donèche, B and Lonvaud, A 2000 Handbook of Enology Volume 1 John Wiley & Sons New York;Boulton, RB, Singleton, VL, Bisson, LF and Kunkee, RE 1996 Principles and practices of winemaking, Champman & Hall, New York; Amerine, MA, Berg, HW and Cruess, WV 1980 Technology of winemaking. AVI Publishing Company INC. Westport, Connecticut
4. Compulsory.
5. Fernanda Cosme.
6. 8h /week; (4P+ 4T); 1st Semester; 3rd Year.
7. Lectures and practical classes. The students must attend at least 2/3 of practical classes.
8. The students are submitted to practical evaluation in which they have to obtain 9.0 values, only this students have conditions to be evaluated theoretically. In the end of the semester the students have a theoretical evaluation, and must obtain 10. The final score will be 20 % for the practical test and 80 % for the theoretical evaluation.
9. No.
10. 8.0.

1. Microbiology and Biochemistry of Fermentations - 0543
2. Characterization of wine-related microorganismes. The yeasts: origin, isolation and identification of wine-yeasts. Evolution of yeast during fermentation. Fermentation inoculation practices. Biochemistry of Fermentation. Metabolism of sugars. Metabolism of acids. Nitrogen metabolism. Lactic acid bacteria (LAB): origin, isolation and identification. Factors afecting growth and metabolism of lactic acid bacteria in wine. Flavor changes due to malolactic fermentation. Malolactic fermentation: importance and control. Microbiological Spoilage of wine and its control. Spoilage by yeats. Spoilage by LAB. Spoilage by acetic bacteria.
3a) Good Knowledge on biology, microbiology and biochemistry.
3b) Provide a scientific understanding of musts and wine microorganisms in order to control the biochemical process for maximize wine quality.
3c) Fleet, GH 1993 Wine Microbiology and Biotechnology, Ed. Harwood Academic Publisher; Fugelsang, KC 1996 Wine Microbiology, The Chapman & Hall Enology Library; Boulton, RB,Singleton, VL, Bisson, L and Kunkee, RE 1996 Principles and Practices of Winemaking, The Chapman & Hall Enology Library, New York.
5. Ana Alexandra Mendes Ferreira.
6. 5h/ week (2T +3P); 1st semester; 3rd year.
7. Lectures and practical classes. The students must attend at least 2/3 of practical classes.
8. The students are submitted to an individual practical test in which they have to obtain 9.0 values, only this students have conditions to be evaluated theoretically. In the end of the semester the students have a theoretical evaluation, and must obtain 10. The final score will be 20 % for the practical test and 80 % for the theoretical evaluation.
9. No.
10. 5.0.

1. Sensory Evaluation I - 0544
2. Principles of sensory evaluation and sensory physiology. Perception and sensation of stimulus. Taste and basic tastes (salty, sweet, sour, bitter and umami). Olfaction and wine aroma. The visual system and the colours of wine. To investigate factors influencing wine flavour (temperature, taster...)data from sensory analysis of model solutions and wines are analysed.
3a) Good knowledge on organic chemistry.
3b) Students initiation on sensory evaluation, pointing the importance of this analysis on wine evaluation and characterisation.
3c) Amerine, MA, Pangborn, RM and Roessler, EB 1965 Principles of Sensory evaluation of food. Academic Press, New York; Ramos, R 1992 O aroma do vinho. Monografia, Provas de aptidão pedagógica e capacidade científica, UTAD; Ramos, R, 1992 Análise Sensorial e Analítica de Vinhos. O Sentido do Gosto, Relatório de uma Teórico-prática. Provas de aptidão pedagógica e capacidade científica. UTAD.
4. Compulsory.
5. Alice Vilela Moura.
6. 3h/week; 3 TP; 1st semester; 3rd year.
7. Lectures and practical classes with tasting sessions.
8. Final written and practical exam.
9. No.
10. 4.0.

1. Genetics - 0018
2. General introduction to Genetics. Principal chronological landmarks of Genetics, importance and application. Mendelism and the Chromosomal Theory. Probability and Statistics. Extensions of mendelian analysis. Linkage and Mapping in Eukaryotes and Prokaryotes. Sexual Processes in Bacteria and Bacteriophages. Nucleic Acids Chemistry. DNA Replication. Gene Expression: Transcription and Translation. Gene Expression: Control in Prokaryotes and Phages. DNA mutation. Recombinant DNA Technology. Restriction mapping. DNA Cloning and Sequencing. Industrial application of Biotechnology.
The practical classes include resolution of problems and practical works such as linkage and mapping, mutagenesis tests, In vitro propagation of Vitis vinifera, DNA extraction, restriction plasmids DNA and visualisation in agarose gel by electrophoresis for construct the restriction maps.
3a) Basic knowledge on citology, biochemistry and microbiology.
3b) Students should be sensitized for the importance of Genetics as a fundamental basic science for understanding the basic mechanisms of the biology area, species biodiversity and evolution. Students should also get an overview of molecular genetics and its relationship to the DNA recombinant technology and biotechnology.
3c) Brown, TA 2001 Gene Cloning An introduction, Blackwell Science Inc.; Burnett, JH 2003 Fungal Population Genetics and Speciation, Oxford University Press; Lewin, B 2000 Genes VII, Oxford University Press; Maloy, SR, Cronan, J, Freifelder, D & Cronan JE 1994 Microbial Genetics, Jones & Bartlett Pub.; Snyder, L & Champness, W 2002 Molecular Genetics of Bacteria, Amer Society for Microbiology; Tamarin, RH 2001 Principles of Genetics, International Edition. Ed. McGraw Hill; Watson, JD, Gilman, M, Witkowski, J & Zoller, M 1992 Recombinant DNA, W H Freeman & Co.; Stansfield, WD 1985 Genética, Ed. McGraw-Hill
4. Compulsory.
5. Gilberto Igrejas.
6. 6h/week; (4P + 2T); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Wine Stabilization - 0545
2. Concept of clarity and stability. Colloidal phenomena. Wine clarification and/or stabilization: sedimentation, centrifugation and filtration. Fining: objectives, fining agents and mechanisms. Chemical instability and control. Protein instability in white and rose wine. Browning. Cold and tartrate stabilization. Hot stabilization: effect on chemical and microbiological stability. Wine aging and development during aging. Bottling and quality control.
3a) Winemaking.
3b) To introduce to the students the different techniques of wine clarification and stabilization.
3c) Ribéreau-Gayon, P, Glories, Y, Maujean, A and Dubourdie, D 2000. Handbook of Enology. Volume 2, John Wiley & Sons Ltd; Boulton, RB, Singleton, VL, Bisson, LF and Kunkee, RE 1996 Principles and practices of winemaking, Champman & Hall, New York.; Zoecklein, BW, Fugelsang, KC, Gump, BH and Nury, FS 1990 Production Wine Analysis. Chapman&Hall.
4. Compulsory.
5. Fernanda Cosme.
6. 6h /week; (3P+ 3T); 2nd Semester; 3rd Year.
7. Lectures and practical classes. The students must attend at least 2/3 of practical classes.
8. The students are submitted to an individual practical test in which they have to obtain 9.0 values, only this students have conditions to be evaluated theoretically. In the end of the semester the students have a theoretical evaluation, and must obtain 10. The final score will be 20 % for the practical test and 80 % for the theoretical evaluation.
9. No.
10. 7.0.

1. Sensory Evaluation II - 0549
2. The ideal sensory evaluation environment (tasting cabinets, glasses and other wine accessories). Wine sensory evaluation vocabulary (wine structure, taste and odor). Sensory evaluation of Portuguese and European wines using discrimination and descriptive tests. Ranking, descriptive analysis will be conducted in the laboratory. Data will be analyzed by appropriate statistical tests and the results interpreted.
3a) Good knowledge on organic chemistry and sensory evaluation I.
3b) Students sensory evaluation of Portuguese and European wines, focussing the techniques used on wine sensory evaluation (vocabulary, sensory tests and appropriate statistical analysis).
3c) Amerine, MA, Pangborn, RM and Roessler, EB 1965 Principles of sensory evaluation of food, Academic Press, New York; Peynaud, E 1983 Le goût du vin. Bordas, Paris; Stone, H and Sidel, JL 1992 Sensory evaluation practices, Academic Press, New York; Normas Internacionais ISO.
4. Compulsory.
5. Alice Vilela Moura.
6. 3h/week; (3 TP); 2nd semester; 3rd year.
7. Lectures and practical classes with tasting sessions.
8. Final written exam.
9. No.
10. 4.0.

1. Ampelology - 0107
2. Classification viticultural Portugal regions. Grapevine structure and function. Vine propagation and grafting classification. Vine cycle vegetative and reproductive. Cultural tilling. Pruning, training options and systems. Establishing the vineyard. Sexual and vegetative propagation of vine plants. Clonal and massal selection. Ecology of viticulture. Soil fertility. Ecophysiology. Management in vineyard. Irrigation. Ampelography.
3a) Precedence of Soil Fertility.
3b) Knowledge to students about vitiviniculture Mundial situation with classification viticultural Portugal regions (DOC and IPR), fundamental concept of grapevine cycle and grafting classification, consider care in manegement and establishing the vineyard, for maximization productivity/quality and longevity of grapevine. It is intended to integrate the study of a vineyard in the environment, though the approach to the ecology of viticulture and "terroir", clone selection and characterization of the major viticulture regions. It is foreseen to integrate students in the subject particularly in the main production techniques used through the whole life cycle of vine crop, with special emphasis on propagation, soil and plant interventions and irrigation. Knowledge the parameter of classification the must importante varieties and grafting used in viticulture.
3c) Carneiro, L 1988 Propagação Vegetativa, ISA, Lisboa; Champagnol, F 1984 Elements de physiologie de la vigne et de viticulture generale, Montpellier ed. Autor; Foulenneau, C 1971 Guide de la plantation des vignes, ITV, Paris; Fregoni, P 2000 Viticoltura di qualitá, Univ. di Sacro Cuore, Itália; Galet, P 1978 Précis de Ampelographie pratique, ed. do autor; Galet, P 1983 Précis de Viticulture, Montpellier ed. do autor; Huglin, P 1986 Biologie et ecologie de la vigne, ed. Payot Lausanne, Paris; Magalhães, N 1989 Densidade e disposição de plantação em viticultura, UTAD, Vila Real; Reynier, A 1992 Manual de Viticultura, Publicações Europa-América.
4. Compulsory.
5. Nuno Magalhães, Ana Alexandra Oliveira.
6. 6 h/week; (2P+ 2T); anual; 3rd year.
7. Lectures and practical classes.
8. Three written tests, practical classes and final examination.
9. No.
10. 12.0.

1. Wine Analysis - 0507
2. The purposes of wine and must analysis. Classic methods of wine analysis. Instrumental techniques applied to wine analysis: UV-VIS spectrophotometry, atomic absorption spectrophotometry and flame photometry, high performance liquid chromatography, gas-liquid chromatography, automated systems.
3a) Analytical Chemistry
3b) To introduce students to the principles of wine and must analysis and the reasons for use of each analysis.
3c) Ough, CS and Amerine, MA 1988 Methods for the Analysis of Musts and Wines. 2nd edition. John Wiley and Sons, New York; Ribéreau-Gayon, J Peynaud, E, Sudraud, P and Ribéreau-Gayon, P 1982 Analyse et Contrôle des Vins. Sciences et Techniques du Vin - tome 1. 2e édition. Dunod, Paris.
4. Compulsory.
5. Virgílio Falco da Costa.
6. 6 h/week (2h T + 4h P); annual; 3rd year.
7. Constraint: attendance at 2/3 of laboratory classes.
8. Written and laboratory tests.
9. No.
10. 14.0.

4th year

1. Subsidiary Industries - 0109
2. Grapes juices; Concentrated grape-juices; vinegars; Corks winery by-products; Wood in Enology; Wine Biotecnology Industry; Winery Waste Treatment.
3a) General understanding of wine processing.
3b) To provide a comprehensive overview on basic practices of production of grape and wine by products.
3c) Madrid Vincent, A 1989 Manual de Indústrias alimentares. 3º ano AMV edição; Madrid Vincent, A 1989 Manual de Enologia prática. Almansa ediciones; Donald K. Tressler – Fruit and vegetable juice production; Ward, OP 1991 Biotecnologia de la fermentacion. Editorial Acribio, S.A.; Bertrand A Les Eaux de vie traditionnels d`origine viticole. Lavoisier – TEC le Doc, Paris; Faith, N 1994 Cognac. Hamish Hamilton – London. Proceedings International specialized conference on winery wastewaters INRA, CEMAGREF e CIVS, Epernay, France; Riboulet, JM. and Alegoet C (s.d.) Aspects pratiques du bouchage des vins. Collectio – Avenir Oenologie Jean Taransaud. Le Livre de la Tonnellerie.
4. Compulsory.
5. Ana Alexandra Mendes Ferreira.
6. 4h/week (2 T + 2 P); 2nd semester; 4th year.
7. Lectures and pratical classes.
8. Final Written exam and pratical work.
9. No.
10. 5.5.

1. Accountancy and management - 0110
2. Introduction to the organisations. Management concepts of the agrarian enterprise. Notions about accountancy. Study of the financial structure of the enterprise. Study of the economical viability of the investment. Analysis of the financing decisions of the enterprise.
3a) No prerequisites.
3b) It intends that students should be capable to assume decisions that are placed for the management of an agrarian enterprise. It is searched, therefore, to supply information that can be used for the evaluation of the economic-financial situation of enterprise, through the basic concepts relating to the general accountancy, as well as the calculation of the different economic-financial indicators. It is also purpose to approach the study of the economical viability of the investment, given the importance that this method presents in the planning of an enterprise.
3c) Avillez, F, Estácio, F and Neves, M 1988 Análise de Projectos Agrícolas no Contexto da Política Agrícola Comum. BP&SM; Borges, A, Rodrigues, A and Rodrigues, R 1995 Elementos de Contabilidade Geral. 14ª Ed. Rei dos Livros, Lisboa; Cadilhe, M 1993 Matemática Financeira Aplicada. Edições ASA, Porto; Madureira, MAS 1990 Introdução à Gestão. Publicações Dom Quixote, Instituto Superior de Gestão, Lisboa; Neves, JC 1991 Análise Financeira. Texto, Lisboa; Sousa, A 1990 Introdução à Gestão: uma Abordagem Sistémica. Editorial Verbo, Lisboa - São Paulo.
4. Compulsory.
5. Ana Alexandra Costa.
6. 4h/week; (2T + 2P); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Final written test.
9. No.
10. 4.5.

1. Enological engineering - 0113
2. Harvest, transport and weight equipment. Winemaking equipment - grape stalk remover, grape crushers, centrifuge, press, pumps, clarification and fermentation vat, refrigeration systems. Storage equipment – wood, cement and stainless steel. Filtration equipment- earth; pad; membrane and cross flow filtration. Bottling equipment – bottle washer, filler, corker, capsule applicator; labeller and packer machines. Quality control equipment. Materials used in the filling line – glass, cork, carton and paper. Winery installation.
3a) No prerequisites.
3b) To show the diversity, operation, planning and dimensionation of winery equipment.
3c) Boulton RB, Singleton, VL, Bisson L. F and Kunkee, RE 1996 Principles and practices of winemaking, Champman & Hall, New York; Brugirard A, Rochard, R 1991 Aspects pratiques des traitements thermiques des vins. Ed. Bourgogue – Publications; Gautier B 1984 Aspects pratiques de la filtration des vins. Ed. Bourgogue – Publications; Molina R 1992 Técnicas de filtration en la Industria Enologica. A. Madrid Vicente, Ediciones; Ribéreau Gayon J, Peynaud, E, Ribéreau Gayon, P and Sudraud, P 1972 Sciences et Techniques du vin - Tome 3, Dunod Paris; Ribéreau Gayon J, Peynaud, E, Ribéreau Gayon, P and Sudraud, P 1976 Sciences et Techniques du vin - Tome 4, Dunod Paris; Ruiz HM 1994 Crianza y envejecimento del vino tinto - 1ª edición. Madrid A. Madrid Vicente, Ediciones.
4. Compulsory.
5. Jorge Pinto.
6. 4h /week (2P+ 2TP); 2nd Semester; 4thYear.
7. Lectures and teoretical-practical classes. The students must attend at least 2/3 of theoretical-practical classes.
8. In the end of the semester the students have a theoretical evaluation, and must obtain 10 values.
9. No.
10. 5.5.

1. Food Hygiene - 0115
2. General aspects of food hygiene. General Food Safety Legislation: Codex Alimentarius. Cleaning and desinfection. Control of desinfection. Food borne diseases, food poisoning microorganisms. Epidermiology and control. Rapid methods for microbiological control of food. Food contaminants. Contamination sources. Additives. Residues: Hazard Analyses of critical control points (HACCP). Implementation in a winerie.
3a) Good knowledge on microbiology.
3b) To develop an understanding the principles and pratical issues in food hygiene and food food safety.
3c) Dillon ,V and Board, R 1994 Natural Antimicrobial Systems and Food Preservation, Cab International, Bristol; Eley, R 1992 Aditivos e auxiliares de fabrication en las industrias agro-alimentares, Editorial Acribia SA, Zaragoza; Eley, R 1992 Intoxicacciones alimentares de etiologia microbiana, Editorial Acribia SA, Zaragoza; Forsythe, SJ 1998 Microbiologia da segurança alimentar. Artmed Editora SA; Harrigan, W. and Park, R 1991 Making Safe Food, Academic Press; Leistner L and Gorris, L 199 Food Preservation by Combined Processes. EUR 15776; Lindner, E 1990 Toxicologia de los alimentos, Editorial Acribia SA, Zaragoza; Ray, B and Daeschel, M 1992 Food biopreservatives of Microbial origin, CRC Press; Reilly, C 1991 Metal Contamination of Food , Elsevier science Publishers.
Publishers.
4. Compulsory.
5. Arlete Mendes Faia.
6. 2h/week (2T); 2nd semester; 4th year.
7. Lectures classes.
8. Final Written exam and pratical work.
9. No.
10. 4.0.

1. Economics - 0269
2. Macro-Economics: Humanities and social science – Methodologies; Economics problems – How to resolves; Economics chain – Organization and instruments; Money – Inflationary effects; Calculate National Results.
Micro-Economics: Consumer – Preference, utility and choice; Prices – Demand, income and elasticity; Supply – Market equilibrium; Production – Product factor relations; Costs – Long and short term; Referential framework for business/industry short and long term costs.
3a) A basic knowledge of mathematical concepts.
3b) To introduce the students to the terminology in the economic literature through basic notions of the ideas related to micro and macro-economic. Concentrate on economic questions at the business level and an integrated vision of economics problems by promoting abstraction capacities and use of reasoning.
3c) Amaral, JF et al 2002 Introdução à Economia. Escolar Editora, Lisboa; Miller, R L 1981 Microeconomia. McGraw-Hill, S. Paulo; Poeta, AD 1990 Alguns Elementos sobre Funções de Produção. Série Didática, Ciências Sociais e Humanas. UTAD, Vila Real; Sequeira, MT 1997 Introdução à teoria da inflação. Relatório de uma aula teórico-prátca. UTAD, Vila Real.
4. Compulsory.
5. Alexandre Manuel Silva Dinis Poeta; Ana Alexandra Costa.
6. 4h/week (2P + 2T); 2nd semester; 4th year.
7. Lectures/Discussion/Exercises.
8. Final written exam with practical work.
9. No.
10. 4.5.

1. Marketing - 0391
2. Introduction to the marketing concept (nature, evolution and limits of marketing, marketing environment, marketing ethics); Market research; Consumer behaviour; Strategic marketing decisions, segmentation and positioning; Marketing-mix (product, price, place, promotion).
3a) No prerequisites.
3b) To provide the students an understanding of basic concepts of marketing, of the principal tecnics of market analysis and the strategic decisions in marketing. To sensitise students to the diverse marketing instruments available (marketing-mix).
3c) Lendrevie, J, Lindon, D, Dionísio, P and Rodrigues, V 1996 Mercator: Teoria e prática do marketing, Publicações D. Quixote; Lambin, JJ 2000 Marketing estratégico, McGraw-Hill.
4. Compulsory.
5. Mário Sérgio Teixeira.
6. 2h/week (T); 2nd Semester; 4th Year.
7. Lectures; discussion; exams.
8. Final exam; Individual and group assignments; class participation.
9. No.
10. 4.0.

1. Legislation - 0508
2. Viticulture and wine order (demarcated regions; denominations of origin). Viticulture and wine equipment (register in cadastre; rustic lease; viticulture and wine equipments). Viticulture production (plantation; chaste; productivity; benefit). Wine transformation (practical enological; common wines; regional wines; wines VQPRD; wines VLQPRD; firewater; husk and lees). Viticulture and wine distribution (market of grapes, wines and firewater). Viticulture and wine services (Institute of Vine and the Wine; Institute of “Porto Wine”; viticulture and wine Commissions; Centers of Viticulture and Wine Studies).
3a) Basic knowledge on economy.
3b) Students should be sensitized for the importance of vine normative, particularly in the Portuguese and the communitarian Europe.
3c) Mourão, L, Marrana, I 1990 Legislação Vitivinícola Comunitária, vol. I, II, III, Edição IVP; Pintado, Fátima 1989 Legislação da Vinha e do Vinho, Porto Editora, Lda; Legislação da Vinha e do Vinho, Diário da República, Imprensa Nacional Casa da Moeda; Internet: http://www.min-agricultura.pt; Internet: http://www.europa.eu.int/.
4. Compulsory.
5. Manuel Colaço do Rosário.
6. 2h/week; 2nd semester; 4th year.
7. Lectures and practical classes (bibliographical research, treatment and management of viticulture and enology legislation).
8. One written test, final written exam and practical works.
9. No.
10. 2.0.

Food Science Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Biomathematics	6.0	Biostatistics	6.0
	Physics of Food	6.0	Biochemistry and Metabolism	6.0
	General Chemistry	6.0	Organic Chemistry	6.0
	Cell and Molecular Biology	6.0	Environment Crop Production	6.0
	Introduction to Food Science	3.0	Molecular Genetics and Biotchenology	6.0
	Seminar	3.0		
	Total	30.0	Total	30.0
2nd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Principles of Food Engineering	6.0	Cropping Systems	6.0
	Animal and Plant Structure and Function	6.0	Horticulture Production	6.0
	Microbiology	6.0	Fruit Tree Culture Systems	6.0
	Pharmacology	6.0	Vitiviniculture	6.0
	Animal Production Systems	6.0	Animal Production Sectors	6.0
	Total	30	Total	30
3rd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Food Composition I	6.0	Food Composition II	6.0
	Food Analysis I	6.0	Food Analysis II	6.0
	Agriculture Production and Environment	6.0	Packing Materials and Methodologies	3.0
	Post-Harvest	3.0	Food Quality and Safety	6.0
	Processing of Animal Products	3.0	Packing and Transport	3.0
	Food Microbiology	6.0	Toxicology	6.0
	Total	30.0	Total	30.0
4th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Nutrition and Health	6.0	Product Certification, Traçability and Normalisation	6.0
	Business and Management	6.0	Health Education	3.0
	Food Sensory Evaluation	6.0	Nutrition and Dietetic	6.0
	Marketing	6.0	Hygiene and Safety	6.0
	Culture and Health	3.0	Bioethics and Feeding Biossecurity	3.0
	Health and Infant Nutrition	3.0	Fitness and Health	6.0
	Total	30.0	Total	30.0

Total of crédits: 240

1st year

1. Biomathematics - 0431.
2. Introduction to complex numbers: definition of the complex numbers; properties of complex numbers. Functions of one real variable: implicit and inverse functions; the inverse trigonometric functions. Limits of functions and continuity; the Intermediate Value Theorem. Derivatives: the Chain Rule; higher order derivatives; implicit differentiation; the Mean Value Theorem; L' Hôpital's Rule; Taylor's formula; Maximum-Minimum Problems. Antiderivatives: techniques of integration. Integration: the definite integral; the Fundamental Theorem of Calculus. Applications of integration: the area between two curves.
3a) High-school Mathematical Analysis.
3b) To provide students the basics concepts of Mathematical Analysis.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw- Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytical Geometry, 1st vol., Weber and Schmidt; Apostol, TM 1967 Calculus (2nd ed.), 1st vol., Wiley International Edition.
4. Compulsory.
5. Carlos Monteiro.
6. 4 h/week; 1st semester; 1st year.
7. Lectures/practical classes.
8. Final written exam 100%.
9. No.
10. 6.

1. Physics of Food - 2093.
2. Thermodynamics: The Zero Law and the Concept of Temperature, The First and Second Laws of Thermodynamics, The Carnot Cycle and the Thermodynamic Temperature Scale, Entropy, Conservation Principles, Mass and Linear Momentum Transfer, Energy Transfer, Atmospheric Phenomena. Fluid Mechanics: Fundamental Law of Hydrostatics, Pascal and Archimedes Laws, Continuity Equation, Bernoulli Equation, Venturi Tube, Stokes and Poiseuille Laws, Reynols Number. Strength of Materials: Deformation of Solids, Tension and Deformation, Hooke's Law, Traction, Compression, Torsion and Flexion, Elastic Coefficients.
3a) Basic knowledge on Physics and Mathematics.
3b) To prepare students to understand the physical properties and the behavior of food products.
3c) Çengel, YA & Boles, MA 2001 Termodinâmica (3ª ed.), McGraw-Hill; Young & Freedman (Sears e Zemansky) 2003 Física I – Mecânica (10ª ed.), Addison Wesley, São Paulo; Young & Freedman (Sears e Zemansky) 2003 Física II –Termodinâmica e Ondas (10ª ed.), Addison Wesley, São Paulo.
4. Compulsory.
5. Maria Adelaide Andrade.
6. 4 h/week; 1st semester; 1st year.
7. Lectures-practical classes.
8. Two written tests (50% + 50%) or a final written exam.
9. No.
10. 6.

1. General Chemistry - 0176.
2. Chemistry tools; Chemical equations and reactions in aqueous solution; Chemical bonding; Thermodynamics; Chemical kinetics; Chemical equilibrium; Acid-base Equilibria; Solubility equilibria; Electrochemistry.
3a) No prerequisites.
3b) Basic concepts on Inorganic Chemistry.
3c) Chang, R 1994 Química, 5ª ed., McGraw-Hill; Seager, SL & Slabaugh, MR 2000 Chemistry for Today General, Organic, and Biochemistry, Ed. Brooks/Cole, 4th ed., UK; Reger, D et al. 1997 Química: Princípios e Aplicações, Ed. da Fundação Calouste Gulbenkian, Lisboa.
4. Compulsory.
5. Maria Manuel Silva Oliveira.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final theoretical and practical examination.
9. No.
10. 6.

1. Cell and Molecular Biology.- 2094.
2. Instruments and techniques used in the study of the cell. Basic cellular properties. Origin of the life. Biological molecules. Origins and cellular evolution. Cellular diversity. Main differences between procariotas and eucariotas. Theories of the cellular evolution. The study of the cell: cellular surfaces and junctions; the citosol; the cytoskeleton; the endomembrane system; other membranous organelles: the nucleus. The hereditary material: cromossomas, genes and genoma. Relation between genes and proteins. Genetic expression. Cellular cycle. Mitosis. Meiosis. Global vision of the metabolism.
3a) No prerequisites.
3b) To provide to the students a global perspective of the functioning of the cell (molecular organization, structure, function and interaction of its constituents). Study of the cellular diversity. The learning of the basic techniques of microscopy.
3c) Karp, G 2003 Cell and Molecular Biology: Concepts and Experiments, John Wiley & Sons; Lodish, H et al. 2000 Molecular Cell Biology, 4th ed., WH Freeman & Co.; Azevedo, C 1999 Biologia Celular e Molecular, 3ª ed., Lidel, Lisboa; Becker, WM et al. 2000 The World of the Cell, 4th ed., The Benjamin/Cummings Publishing Company, Inc. (ed.), San Francisco.
4. Compulsory.
5. Ana Lúcia Pinto Sintra, Carlos Ribeiro de Carvalho.
6. 4 h/week; 1st semester; 1st year.
7. Lectures-practical classes.
8. Final written exam (or intercalate written tests) and reports of the practical work.
9. No.
10. 6.

1. Introduction to Food Science - 2095.
2. General concepts on food science. Principal food groups (bread and cereals, fruits and vegetables, meat, fish, eggs, milk and milk products, olive oil and other fats, drinks). Food group importance on fresh markets and food industries. Main physical and chemical properties of foods. Food constitution and quality. Quality loss and shelf-life of foods. Preservation of fresh and processed foods. Food processing diagrams. Role of the food science on quality development and maintenance along the chain. Food Science, Human Nutrition and Health.
3a) No prerequisites.
3b) Students must be able to use basic terminology and concepts of food science of great importance for the best knowledge of further subjects (systems of production, food engineering, food processing, food composition, food safety, packaging and handling).
3c) Vaclavik, Vickie 2002 Fundamentos de ciencia de los alimentos, Editorial Acribia, SA, Zaragoza, Espanha; Belitz, H-D & Grosch, W 1999 Food Chemistry, Springer, Berlim, Alemanha.
4. Compulsory.
5. Carlos Ribeiro.
6. 2 h/week; 1st semester; 1st year.
7. Lectures-practical classes.
8. Tests (2) or final exam and written works with oral presentation.
9. No (unless the presence of Erasmus/Socrates students).
10. 3.

1. Seminar - 2096.
2. I - Writing: style of scientific writing; writing of reports, final degree reports and journal papers; how to prepare a scientific paper and how to cite the references; preparation of Tables and Figures; submission of an article to a referee journal; how to prepare research proposals; preparation of a Curriculum vitae. II - Oral presentations: preparation according to audience; how to prepare the introduction and the conclusion; discussion; oral or/and poster presentation of a research proposal. III - Seminar: oral presentation (15 min.) and writing of an article (6-8 pp.) in the food science area.
3a) Introductory and basic course.
3b) Students should acquire knowledge on how to write a report and a scientific paper as well as how to present technical information in seminars or scientific meetings.
3c) Booth, V 1993 Communicating in science: writing and speaking, 2nd ed., Cambridge University Press; Day, RA 1989 How to write and publish a scientific paper, 3rd ed., Cambridge University Press; Fernandes, AJ 1993 Métodos e regras para elaboração de trabalhos académicos e científicos, Porto Editora Lda.; Frada, JC 1991 Guia prático para elaboração e apresentação de trabalhos científicos, Edições Cosmos, Lisboa; Sussams, JE 1990 Como fazer um Relatório, Editorial Presença, 2ª ed., Lisboa.; Vidal-Hall, J 1992 Elaborar relatórios, Publicações Europa-América.
4. Compulsory.
5. Ana Maria Nazaré Pereira.
6. 2 h/week; 1st semester; 1 st year.
7. Lecture-practical classes
8. Oral and written report.
9. No.
10. 3.

1. Biostatistics - 1816.
2. Descriptive statistic: univariated and bivariated statistical variables. Theory of probability: probability, conditional probability e independence of events. Unvariated random variables: discrete and continuous. Expected value and order parameters. Special distributions. Central limit theorem. Point estimation. Methods of estimation.
3a) Knowledge on Combinatory and Calculus.
3b) To provide an introduction to probability and statistics.
3c) Reis, E et al. 1996 Estatística aplicada, Edições Sílabo, Lisboa; Guimarães, RC & Cabral, J 1998 Estatística, McGraw-Hill de Portugal Lda, Lisboa; Pestana, DD e Velosa, SF 2002 Introdução à probabilidade e à estatística, Fundação Calouste Gulbenkian, Lisboa; Murteira, BJ 1990 Probabilidades e estatística, McGraw-Hill de Portugal Lda, Lisboa; Rohatgi, V 1976 An introduction to probability theory and mathematical statistics, John Wiley & Sons, NY; Ross, SM 1987 Introduction to probability and statistics for engineers and scientists, John Wiley & Sons, NY.
4. Compulsory.
5. Maria da Graça Pereira Soares.
6. 4 h/week (2 theoretical + 2 theoretical-practical); 2nd semester; 1st year.
7. Lectures and theoretical-practical classes.
8. Final written exam.
9. No.
10. 3.

1. Biochemistry and Metabolism - 2097.
2. Enzymology: basic aspects of enzymology, enzymatic action mechanism. Vitamins and coenzymes: integration of the vitamin concept and coenzymes function. Membrane transport: biological membranes and membrane transport. Oxidative phosphorylation: ATP-synthetase, electron transport chain. Glycolysis and gluconeogenesis: reactions, enzymes, regulation and energetic balances, fermentation's. Pentose phosphate pathway: importance and principal reactions. Tricarboxylic acid cycle (TAC): reactions, enzymes, regulation and balances. Lipid Metabolism: reactions, enzymes, regulation and energetic balances. Amino acids metabolism: Nitrogen metabolism. Sulfur metabolism. Photosynthesis: Photosystems, electron transport chain, ATP synthesis, Calvin cycle. Metabolism of secondary compounds. Metabolism interrelationships: metabolism strategies and its global integration. Molecular transmission of the genetic information and DNA technology. Xenobiotics compounds: biotransformation reactions.
3a) No prerequisites.
3b) To provide to the students the basic principles of Biochemistry, supplying to them the concepts and basic language of this science. The biochemistry knowledge in a global integration of the molecular life.
3c) Stryer, L 2002 Biochemistry Extended, 5th ed., Worth Publishers, Inc.; Devlin, TM 2001 Textbook of Biochemistry with clinical correlations, 5th ed., John Wiley & Sons; Micklos, DA & Freyer, G 2002 DNA Science: A first course in DNA technology, Cold Springer Harbor Laboratory Press.
4. Compulsory.
5. Isabel Gaivão, Raquel Chaves.
6. 4 h/week; 2nd semester; 1st year.
7. Lectures-practical classes.
8. Final written exam, written minitests and reports and oral presentation of the practical work.
9. No.
10. 6.

1. Organic Chemistry - 0103.
2. Hydrocarbons, their derivatives. Functional groups constituted by sigma bonds. Nucleophilic substitution and elimination reactions. Functional groups with double bonded oxygen. Carbohydrates. Amino acids, peptides, proteins and nucleic acids. UV and IR spectroscopy. Industrial and economical aspects of the organic chemistry.
3a) General Chemistry.
3b) To instruct basic knowledge in Organic Chemistry: nomenclature, stereochemistry, characteristic reactions and its mechanisms, as well as the tools needed to the understanding of the processes controlling the transport and fate of organic chemicals in the environment.
To provide cognition about the main analytical techniques used in organic chemistry.
3c) Solomons, TW 2000 Organic chemistry, 7ª ed., John Wiley & Sons; Allinger, et al. 1988 Química Orgânica, Ed. Guanabara Koogan SA; Criddle, WJ & Ellis, GP 1991 Caracterização Espectroscópica e Química de Compostos Orgânicos, Livraria Almedina. Campos, LS & Mourato, M 1999 Nomenclatura dos Compostos Orgânicos, 1ª ed., Escolar Editora.
4. Compulsory.
5. Fernando Glenadel Braga.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and laboratories classes.
8. Final written exam (70%) and practical work (30%).
9. No.
10. 6.

1. Environment Crop Production - 2098.
2. The plant and the environment; The soil and climate; Crop distribution in the world. Agriculture systems. Growth and development of the cultivated plants; Plant biology. Main plant families. Main agricultural techniques. Planing in the farm.
3a) Good knowledge on Biology.
3b) Students should get the appropriate information about the factors, climate and soil, that influence the agricultural activities and the main techniques applied in the agricultural farms to obtain harvest of high quality with reduced environmental impact.
3c) Maroto Borrego, JV 1998 Historia de La Agronomia, Ed. Mundi-Prensa, Madrid; Feio, M 1991 Clima e Agricultura, Ministério da Agricultura Pescas e Alimentação, Lisboa; Soares Chaves, JA 1988 Inimigos das Culturas, Direcção Regional de Agricultura do Algarve; Ribeiro, O 1987 Portugal o Mediterrâneo e o Atlântico, Livraria Sá da Costa Editora, Lisboa; Diehl, R 1975 Agriculture Générale, Encyclopédie Agricole, Paris.
4. Compulsory.
5. Ana Paula Silva.
6. 4 h/week; 2nd semester; 1st year.
7. Lectures-practical classes.
8. Written tests, final written exam and practical work.
9. No.
10. 6.

1. Molecular Genetics and Biotechnology - 0340.
2. DNA organization and function. Methods for DNA analysis, RFLPs, RAPDs, AFLPs, SCARs, SSRs, SSCP, etc. Comparative study of the advantages and disadvantages of each analysis method and validation for the characterization at the molecular variability level. Biotechnologies applications on products traceability for food resources. Restriction enzymes, restriction maps and DNA recombinant methodologies. Application of DNA technology on vectors construction. Methods of DNA transfer in vegetable and animal cells: biolistic, microinjection, electroporation, agrobacterium mediation, etc. Screening methods for genetic modified organisms. GMOs problematic: potentialities and ethical aspects.
3a) No prerequisites.
3b) Understanding of genomic organization, methodologies for the DNA study and manipulation.
3c) Watson, JD et al. 2003 Molecular Biology of the Gene, 5th ed., Benjamin-Cummings Publishing Company.
4. Compulsory.
5. Henrique Guedes-Pinto, Raquel Chaves, Estela Bastos.
6. 4 h/week (2 theoretical-practical + 2 theoretical); 2nd semester; 1st year.
7. Lectures-practical classes.
8. Final written exam, written minitests and reports and oral presentation of the practical work.
9. No
10. 6.

2nd year

1. Principles of Food Engineering - 2135.
2. Main unit operations: fundamentals and effects on food quality. Mass and energy transfer. Bio-reactors: fundamentals, types and applications.
3a) Basic concepts of food science, physics, chemistry, biochemistry and bio-mathematics.
3b) Students must well know the unit operations on food industry. They must be able to know theoretical and practical aspects of the unit operations and calculate processing times in order to reduce the risks for the consumers and maintain the quality of the products. Basic knowledge of bio-reactors.
3c) Singh, RP & Heldman, DR 1998 Introducción a la ingenieria de los alimentos, Editorial Acribia, SA, Zaragoza, Espanha; Fellows, P 1994 Tecnologia del procesado de los alimentos, Editorial Acribia, SA, Zaragoza, Espanha; Maroulis, ZB & Saravacos, GD 2003 Food process design, Marcel Dekker, Inc., NY, USA.
4. Compulsory.
5. Carlos Ribeiro, Miguel Rodrigues.
6. 4 h/week; 1st semester; 2nd year.
7. Theoretical-practical classes.
8. Tests (2) or final exam and written works with oral presentation.
9. No (unless the presence of Erasmus/Socrates students)
10. 6.

1. Animal and Plant Structure and Function - 2136.
2. Pseudotissues, tissues and/or animal and plant organs used in feeding; their histological characterisation and biochemical, energetic and vitaminic contributions in relation to: a) invertebrates and vertebrates, b) algae, fungi, music, ferns, gymnosperms and angiosperms. Inter- and intraspecific variations. Metabolism, growth, differentiation and development of standard examples. Ecologically clean strategies for the promotion of the quality of food. Minimisation of growth/production factors (e.g. fertilisers, growth regulators, pesticides). Conservation of feeds and Feeding Biossecurity. Metabolic adaptation to environmental stresses (high temperature, low temperature, water availability, salinity, heavy metals, photonic irradiance – low PAR and high PAR, high UV-B levels and peroxidation), atmospheric pollution (nitroxides, sulfoxides, acid rain, other gases and particles), global climatic change: reflexes on the composition, quality and security of feeds.
3a) No prerequisites.
3b) The objectives are to present animal and plant structure and function and their relation with feed composition, quality and security: present situation and historical perspective.
3c) Keller, DB & Botkin, EA 2000 Environmental Science – Earth as a Living Planet, 3ª ed., John Wiley & Sons, NY, USA; Lacasse, D 1995 Introdução à Microbiologia Alimentar, Instituto Piaget, Lisboa; Ricklefs, RE 1996 A Economia da Natureza, 3ª ed., Editora Guanabara Koogan, SA, Rio de Janeiro, Brasil.
4. Compulsory.
5. José Torres Pereira, Carla Torres Pereira, Teresa Rangel.
6. 4 h/week; 1st semester, 2nd year.
7. Theoretical-practical classes.
8. Written test or written final examination(100%).
9. No. However, the Lecturers have no problem in teaching in English the full Course.
10. 6.

1. Microbiology - 0054.
2. Introduction to the microbial world. The Procariote cell: structure and function. Eucaryotic cell structure of Fungi; Classification of fungi. The virus. Structure and properties of virus. Classification, replicaction and cultivation of virus. Nutrition, growth and metabolism of microorganisms. An overview on microbial nutrition. Culture media. Transport of nutrients. Kinetics of microbial growth. The influence of environmental factors on growth. Control of microorganisms by physical and chemical agents. Energetic metabolism: Fermentation; Aerobic and anaerobic respiration. Photosynthesis. Bacterial genetics. Microorganisms in the Environment.
3a) No prerequisites.
3b) This course provides a balanced introduction to the microbial world in all major areas: Structure, function of microbial cells. Growth, metabolism and control of microorganisms.
3c) Ferreira, W & Figueiredo de Sousa, JC (eds.) 1998 Microbiologia, Lidel, Lisboa; McKane, L & Kandel, J 1996 Microbiology - Essentials and Applications, 2nd ed., McGraw-Hill Inc.; Schlegel, HG 1986 General Microbiology, 6th ed., Cambridge University Press; Brock TD & Madigan, MT 1991 Biology of the Microorganisms, 6th ed., Prentice-Hall International Edition.
4. Compulsory.
5. Arlete Mendes Faia, Ana Mendes Ferreira.
6. 4 h/week; 1st semester; 2nd year.
7. Theoretical-practical classes.
8. Final exam.
9. No.
10. 6.

1. Pharmacognosy - 2137.
2. Pesticides classification: spectrum, active substances, its behaviour on the organisms and the environmental and human health risks. Characteristics of drugs and pesticides: composition, formulation and toxicity. Residues: maximum admissible concentration and life time. Pesticides and drugs on human health: exposed population, toxicology, aspects that determine the pesticide toxicology and the absorption. Measures that allow the reduction of pesticide application in agriculture. Good-agricultural practices related with pesticide application.
3a) Knowledge on Microbiology, Chemistry and Agriculture Ecology.
3b) Students should acquire knowledge about the pesticides and drugs utilised, their characteristics and their secondary effects towards environment and human health.
3c) Beres, S 2003 Pesticides Greenhaven Press; Moreno Grau, MD 2003 Toxicología Ambiental, McGraw Hill, Madrid; Hamilton, D & Crossley, S 2003 Pesticides Residues in Food and Drinking Water, John Wiley & Sons, Inc.; Adams, HR 2001 Veterinary Pharmacology and Therapeutics, 8th ed., Iowa State University Press/Ames.
4. Compulsory.
5. Isabel Cortez, José Manuel Almeida.
6. 4 h/week; 1st semester; 2nd year.
7. Theoretical-practical classes.
8. Final exam (80%) and practical work (20%).
9. No.
10. 6.

1. Animal Production Systems - 2138.
2. Provides an overview of animal production systems, examining the relationships, which exist along animal production 'chains' to the end product. Areas covered may include animal nutrition and grazing management, aspects of animal physiology, and factors determining product quality in each of the eggs, red meat and dairy industries. Explores sustainable development options for high and low input animal production systems.
3a) Good knowledge on Biology and Animal Physiology.
3b) Have an overview of livestock production systems with knowledge of the main types of stock used, their products and by-products Be familiar with the latest scientific thinking in the fields of animal nutrition, breeding and selection, reproductive physiology , and adaptation to extreme environments. Understand the scientific basis of recent developments in animal production and management, including welfare
3c) Allen, D 1990 Planned beef production and marketing, Blackwell Scientific Publications; Fayez, I et al. 1987 New techniques in sheep production, Butterworths, London; Webster, AJF 1996 Understanding the dairy cows, BSP Professional Book; Whittemore, C 1999 The science and practice of pig production, Longman Scientific and Technical; Fraser, AF & Broom, DM 1990 Farm Animal Behaviour and Welfare, 4. Compulsory.
5. Severiano Rocha e Silva.
6. 4 h/week; lst semester; 2nd year.
7. Theoretical-practical classes.
8. Final written test or exam.
9. No.
10. 6.

1. Cropping Systems - 2139.
2. Concepts. Problematics and importance of crop cultures. Crop physiology. Agricultural systems. General characteristics of great groups. Detail study on production, storage and transformation of crop cultures.
3a) Good knowledge on Biology and Agriculture.
3b) Sensitise to the importance of crop cultures in terms of agriculture, economy and nutrition. Understand how the agricultural systems work, their requirements and sustentability. Acquire and apply important knowledge on field crop culture, their storage and transformation.
3c) Tesar, M 1984 Physiological basis of crop growth and development, American Society of Agronomy, Madison; Soltner, D 1990 Les grandes productions végétales, Le Clos Lorelle, Angers; Moule, C 1992 Céréales et plantes sarclées et diverses, La Maison Rustique, Paris.
4. Compulsory.
5. Carlos Castro, Nuno Moreira.
6. 4 h/week; 2nd semester; 2 nd year.
7. Theoretical-practical classes.
8. Final written test and practical work.
9. No.
10. 6.

1. Horticulture Production Systems - 2140.
2. General horticulture. Horticulture crops: Economic and food importance. Ecophysiology. Open air and forced production systems, e.g., greenhouses and similars. Hydroponics and soilless crops. Production techniques and inputs and their influence on the quality of vegetables.
3a) Good knowledge on biology, biochemistry, chemistry and plant physiology.
3b) Students should get an overview of the information regarding horticultural crops production in open air and under protected climatic conditions and the influence of the inputs on the quality.
3c) Rubatzky, VE & Yamaguchi, M 1996 World vegetables. Principles, production and nutritive values, Chapman & Hall, NY; Salisbury FB & Ross, CW 1991 Plant physiology, Wadsworth PC; Garnaud, JC et al. 1992 Les plastiques en agriculture. Comité des Plastiques en Agriculture, Paris; Lorenz, OA & Maynard, DN 1980 Knott's handbook for vegetable growers, John Wiley & Sons, NY.
4. Compulsory.
5. Eduardo Rosa.
6. 4 h/week; 2nd semester; 2nd year.
7. Theoretical-practical classes.
8. Two written tests and practical work.
9. No.
10. 6.

1. Fruit Tree Culture Systems - 2141.
2. Contents: Economic and geographic situation of fruit culture in the EU and in Portugal. Major Portuguese fruit crops and trading systems. Current limitations and production alternatives of Portuguese fruit culture in a communitarian context: quality and typicality. Orchard establishment and management strategies. Harvest and post-harvest. Evaluation of the decisions made. Nutritional and dietetic value of fruits.
3a) Students must have a good knowledge of Cellular and Molecular Biology, and Agrarian Environment.
3b) Objectives: Students are meant to understand the regional potential, as well as production alternatives in fruit production in a communitarian context. They should be familiar with tree-soil relationships and capable of promoting sustainable culture systems.
3c) IDFTA Apple Orchard Systems; Westwood, MN 1978 Temperate-Zone Pomology, Freeman & Co. San Francisco; Rayugo, K 1988 Fruit Culture, Its Science and Art, UC-Davis, J. Wiley & Sons, NY; Velarde, AGF 1989/94 Tratado de arboricultura frutal, vols. I, II, II e IV, ed. Mundi-Prensa.
4. Compulsory.
5. Alberto Santos, Ana Paula Silva.
6. 4 h/week; 2nd semester; 2nd year.
7. Theoretical-practical classes.
8. Periodic evaluation, final written exam and practical works.
9. No.
10. 6.

1. Vitiviniculture - 2142.
2. Wine regions and "terroir". Influence of the canopy management in the productivity and quality. Wine nutrition and quality. Pesticides residuals on the grape and wine. Table grape and nutrition value. Maturity control and must quality. Must and wine compounds and its relationship with human health.
3a) Good knowledge on Biology, Biochemistry and Agricultural Environment.
3b) Fundamental concepts in viticulture and its techniques will be done on the aim to obtain the best products to be consumed. Also the techniques of production, reported with the "terroir" will be studied in order to have grapes for wine or to be consumed like fruit, with a good nutritive value and might contribute for a rational diet.
3c) Champagnol, F 1984 Elements de physiologie de la vigne et de viticulture generale, Montpellier (ed. Autor); Fregoni, M 1999 Viticolture di qualitá, edizione d'informatore agrário; Huglin, P 1986 Biologie et ecologie de la vigne, ed. Payot Lausanne; Jackson, R 1994 Wine Science, Academic Press.
4. Compulsory.
5. Nuno Magalhães, Ana Alexandra Oliveira.
6. 4 h/week; 2nd semester; 2nd year.
7. Theoretical-practical classes.
8. Two periodic avaliations, practical works and final exam.
9. No.
10. 6.

1. Animal Production Sectors - 2143.
2. The animal sectors of meat (beef, sheep, goats, pork and poultry), milk (cow, sheep and goats) and eggs productions and aquaculture. The main animal sectors in Portugal and Europe national. production, organisation, and market systems and products commercialisation. Activities of production, transformation, distribution and consumptions of animal products. Relationship between animal feeding and rearil1g and nutritive and technological quality of the end products. Animal sectors and society: the main challenges that animal sectors face, as environment and welfare. The implementation of animal health programs as a way to increase the quality of anima1 products. Organisation of animal sectors and products certification. Systems to control and maintain the quality of animal products.
3a) Good knowledge on Microbiology, Animal Physiology and Animal Production Systems.
3b) To have an overview of main animal production systems and knowledge that the quality of food derived from animal products is depend on of all factors that affect the rearing conditions. Be able to enhance animal products implementing the development of animal sectors with certified products.
3c) Gregory, ANG 1998 Animal Welfare and Meat Science, CAB International; Spriggs, J & Isaac, GE 2001 Food Safety and International Competitiveness. The Case of Beef, CAB International; Sim, S & Nakai, S 1994 Egg Uses and Processing Technologies, New Developments, CAB International; Grandin, T 2001 Livestock Handling and Transport, 2nd ed., CAB International; Fraser, AF & Broom, DM 1990 Farm Animal Behaviour and Welfare, CAB International.
4. Compulsory.
5. José Luís Medeiros Mourão.
6. 4 h/week; 2nd semester; 2nd year.
7. Theoretical-practical classes.
8. Final written test or exam.
9. No.
10. 6.

3rd year

1. Food Composition I - 2144.
2. Study of the structure and the properties of the main chemical groups in foods: water, carbohydrates, proteins, lipids, vitamins, minerals, pigments and aromatic compounds.
3a) Basic concepts on Food Science, Chemistry and Biochemistry.
3b) Students must understand the importance of each individual component of foods and the interactions among them. Structure, properties, functions and changes of each group of compounds must be well understood.
3c) Alais C & Linden, G 1991 Food Biochemistry, Ellis Horwood Séries in Food Science and Technology, London; Belitz, HD & Grosch, W 1999 Food Chemistry, 2nd ed., Springer Verlag, Berlin; Mc Williams, M 1989 Foods. Experimental perspectives, Macmillan Publishing Company, NY.
4. Compulsory.
5. Eduardo Rosa, Carlos Ribeiro, Fernanda Cosme, Miguel Rodrigues, Maria José Gomes.
6. 4 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. Tests (2) or final exam and reports and written work with oral presentation.
9. No (unless the presence of Erasmus/Socrates students).
10. 6.

1. Food Analysis I - 2145.
2. Methods in food analysis. Sampling and preparation of food samples. Validation of methods. Determination of the most common parameters of food analysis, according to the official methods of analysis: moistness and total solids; ashes and minerals; total nitrogen and protein; carbohydrates; Fiber and dietetic fiber; lipids, pH and acidity. Densimetry and refractometry.
3a) No prerequisites.
3b) Sampling procedures. Determination of moisture in solid samples. Determination of protein. Determination of total sugars and reducing sugars. Determination of fibre. Determination of fatness. Determination of total acidity and pH of food. Analysis of the results. Familiarization with the official methods of food analysis.
3c) Pomeranz Y & Meloan, CE 2002 Food Analysis. Theory and Practice, 3rd ed., Aspen Publishers Inc., NY; Harris, DC 1995 Quantitative Chemical Analysis, 6th ed., NY; Miller, JC & Miller, JN 2001 Statistics and Chemometrics for Analitical Chemistry, Prentice Hall, NY.
4. Compulsory.
5. Virgílio Falco, Luís Mendes Ferreira, Cristina Guedes, Miguel Rodrigues.
6. 4 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. Tests (2) or final exam.
9. No.
10. 6.

1. Agricultural Production and Environment - 2146.
2. Changes in agriculture during the last century. Effects arising from the CAP and recent market globalisation. Main contemporary agricultural pollution issues; processes, origin, contribution of different activities and measures to decrease risks: erosion, sealing, acidification, salinization and soil contamination; carbon and greenhouse effect, nitrogen and phosphorus pollution; animal excreta and other organic effluents; pesticides; changes of the country-side; loss of habitats and biodiversity; heavy-metals; plastics and farm wastes; farm buildings and animal well-fair; agro-industrial waste production and treatment. Ecological, social and economic beneficial effects arising from a sustainable agricultural activity.
3a) Good knowledge on Agricultural Ecology and Crop Production Systems.
3b) Students should get basic information regarding main environmental impacts of agriculture and to study methods and best management practices to minimize harmful processes or activities. To evaluate the beneficial effects of agriculture according to an ecological, socio-economical and political point of view.
3c) Merrington, G 2002 Agricultural Pollution, Routledge mot E.F. & N. Spon, 256 pp.; Harper, LA et al. 1993 Agricultural Ecosystem Effects on Trace Gases and Global Climate Change, ASA Special Publication No. 55, ASA, CSSA e SSSA, Madison, Wisconsin, USA, 206 pp.; Le Clech, B 1998 Environnement et Agriculture, 2e ed., Édition Synthese Agricole, Bordeaux, 344 pp.; Martí, MC 2002 Principios de Ecotoxicología, McGraw Hill, Madrid, 314 pp.; Moreno Grau, MD 2003 Toxicología Ambiental, McGraw-Hill, Madrid, 370 pp..
4. Compulsory.
5. Henrique Trindade, António Pirra.
6. 4 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. Continuous assessment (2 written tests + practical works) or a final exam.
9. No.
10. 6.

1. Postharvest - 2147.
2. Post-harvest physiology and biochemistry. Most probable changes in products after picking time. Pre-harvest, harvest and post-harvest factors that affect the quality of commodities. Storage technologies. Modified and controlled atmosphere. Minimally processed products. Quality of fresh products. Distribution and consumers. Post-harvest of fruits, vegetables and cereals.
3a) Basic concepts of Production of Fruits and Vegetables, Food Science, Food Engineering, Biochemistry and Microbiology.
3b) Students must understand the importance of fresh products (not processed products) on human feed. Specific requirements for handling of fruits and vegetables. Procedures and techniques for quality and nutritional value maintenance of perishable commodities as well as potential use in processing plants.
3c) Weichmann, J 1987 Postharvest Physiology of Vegetables, Ed. Marcel Dekker, Inc., NY and Basel; Kader, AA 1992 Postharvest technology of horticultural crops, University of California, Oakland; Seymour, GB et al. 1993 Biochemistry of fruit ripening, Chapman & Hall, Norfolk, Inglaterra; Brett, C & Waldron, K 1996 Physiology and Biochemistry of Plant Cell Walls, 2nd ed., Chapman & Hall, UK; Willey, RC 1997 Frutas y hortalizas mínimamente procesadas y refrigeradas, Editorial Acribia SA, Zaragoza, Espanha; Wien, HC 1997 The Pysiology of Vegetables Crops, CAB International, USA; Tirilly, I & Bourgeois, CM 1999 Technologies des légumes, Technique et Documentation, Paris, França.
4. Compulsory.
5. Ana Paula Silva, Alberto Santos, Jaime Cavalheiro, Carlos Ribeiro.
6. 4 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. Tests (2) or final exam and written works with oral presentation.
9. No (unless the presence of Erasmus/Socrates students).
10. 3.

1. Processing of Animal Products - 2148.
2. Meat technology: slaughterhouses. Meat conservation methods: refrigeration and freezing, thermal treatment, fumage, dehydration, salt and irradiation. Milk technology and dairy products (fermented milks, cheeses, creams, butters, ice cream, whey of milk and crud cheese). Conservation and packing methods. Technology to produce portuguese traditional cheeses. Egg technology: constitution, inspection, classification, packing and conservation. Technology to produce portuguese traditional sausages. Evaluation of fish quality (evaluation methods). Fish manipulation. Storage of fish. Packing. Industry of fish transformation.
3a) No prerequisites.
3b) Knowledge transmission of different processing technologies of raw material of animal origin. In this scope processing and conservation technologies of meat and meat products, milk and dairy products, eggs and fish will be approached.
3c) Madrid, A et al. 2001 Nuevo manual de industrias alimentarias, AMV Ediciones, Madrid; Carballo, B 2001 Tecnología de la carne y de los productos cárnicos, AMV Ediciones, Madrid; Laval, A 2003 Manual de industrias lácteas, A. López Gómez & A. Madrid Vicente, AMV Ediciones, Madrid; Vieira de Sá, e Barbosa, Manuela 1990 O leite e os seus produtos, Nova colecção técnica agrária, 5, Clássica Editora.
4. Compulsory.
5. Luís Patarata, Divanildo Monteiro.
6. 2 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes. The students must attend at least 2/3 of practical classes.
8. The students are submitted to an individual practical test in which they have to obtain 9.0 values, only these students have conditions to be evaluated theoretically. At the end of the semester the students have a theoretical evaluation, and must obtain 10. The final score will be 20 % for the practical test and 80 % for the theoretical evaluation.
9. No.
10. 3.

1. Food Microbiology - 2149.
2. Microorganisms. Microbial growth. Factors that affect microbial growth in food. Food born diseases. Starters. Fermented foods. Water microbiology. Microbiology of dairy products, meat, fish and products of vegetal origin. Food contaminants. General principles of food preservation. Microbiological control of foods. Predictive models in food microbiology.
3a) Good knowledge on Biology and Microbiology.
3b) Factors that affect microbial growth in food. Isolation and counting microorganisms in food. Major groups of microorganisms involved in the food processing. Control of contaminants in food and equipment. Principles and methods to prevent microbial growth in the row material and processed food.
3c) Adams MR & Moss, MO 1995 Food Microbiology, Turpin Distribution Service Ltd., UK; Deak, TL & Beuchart, R (eds.) 1996 Handbook of Food Spoilage Yeast, CRC Press, Boca Raton; Jay, JM 1996 Modern Food Microbiology, 5th ed., D van Nostrand Co.; Pierson MD & Stern, NJ (eds.) 1986 Foodborne Microorganisms and Their Toxins: Developing Methodology, Marcel Dekker, Inc., NY; Mc Meekin, TA et al. 1993 Predictive Microbiology. Theory and Application. Research Studies, Press Ltd. England; Doyle, MP et al. 1997 Food Microbiology Fundaments and Frontiers, ASM Press, Washington DC; WHO, 2002 WHO Library Cataloguing in Guidelines for Drinking Water Quality, 2nd ed., Genebra.
4. Compulsory.
5. Arlete Mendes Faia, António Inês, Maria José Saavedra.
6. 4 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. Final exam.
9. No.
10. 6.

1. Food Composition II - 2150.
2. Study of the structure and the composition of the main food groups. The importance of food composition on human diet.
3a) Basic concepts of food engineering, chemistry, biochemistry and microbiology.
3b) Students must understand the importance of the main food groups on human diet according to its composition and structure.
3c) Alais C & Linden, G 1991 Food Biochemistry, Ellis Horwood Séries in Food Science and Technology, London; Belitz, HD & Grosch, W 1999 Food Chemistry, 2nd ed., Springer Verlag, Berlin; Mc Williams, M 1989 Foods. Experimental perspectives, Macmillan Publishing Company, NY.
4. Compulsory.
5. Eduardo Rosa, Carlos Ribeiro, Fernanda Cosme, Miguel Rodrigues, Maria José Gomes.
6. 4 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes.
8. Tests (2) or final exam and reports and written work with oral presentation.
9. No (unless the presence of Erasmus/Socrates students).
10. 6.

1. Food Analysis II - 2151.
2. Principles and applications of instrumental food analysis: Chromatography: theoretical bases. Applications: Thin layer chromatography, high performance liquid chromatography, and gas chromatography-mass spectrometry. UV-VIS Spectrophotometry, atomic absorption spectrophotometry. Applications in food analysis.
3a) Food Analysis I.
3b) Analysis of residues, contaminants and biogenic amines by thin layer chromatography and high performance liquid chromatography. Analysis of fatty acids profile of oils and other fatty matter. Determination of contaminant metals in food and beverages by atomic absortion.
3c) Pomeranz Y & Meloan, CE 2002 Food Analysis. Theory and Practice, 3rd ed., Aspen Publishers Inc., NY; Harris, DC 1995 Quantitative Chemical Analysis, 6th ed., NY.
4. Compulsory.
5. Virgílio Falco, Miguel Rodrigues, Cristina Guedes.
6. 4 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes.
8. Tests (2) or final exam.
9. No.
10. 6.

1. Packaging Materials and Methodologies - 2152
2. The function of packaging. Risks associate with potential food contaminations caused by packaging. Packaging regulations. Packaging materials (metallic, glass, plastic films, plastics, paper, card, wood, comestible films). Standardization of packaging. Packaging procedure for finished foodstuffs. Automatic packaging. Aseptic packaging. Packaging under controlled atmosphere. Cleaning and disinfecting reusable packaging. Packaging for transport. Examples of applications in the food industry (chilled and frozen products, meat products, dairy products, biscuit, IV gamma). Process control and methods of assays of packaging. Quality assurance - functional analysis. Stock control.
3a) No prerequisites.
3b) Presentation of the main used materials in the packaging of food products and the advantages of the respective use. Methodologies of food packaging.
3c) Bureau, GJ & Multon, L 1996 Food Packaging Technology, VCH Publishers, INS, NY; Brody, AL 1989 Controlled/Modified Atmosphere/Vacuum Packaging of Food, Food & Nutrition Press; CCI (Centro de Comércio Internacional) 1999 Envase y embalaje de alimentos, Genebra; Bureau, G & Multon, J 1995 Embalaje de los alimentos de gran consumo, Editorial Acribia, Zaragoza, Espanha; Ryall, A & Pentzer, W 1974 Handling, transportation and storage of fruits and vegetables, AVI Publishing company Inc., Connecticut, USA; Castro, A & Pouzada, A 1991 Embalagens para a indústria alimentar, UTAD, Vila Real; Salunkhe, D et al. 1991 Storage, processing and nutricional quality of fruits and vegetables, 2nd ed., vol. 1, Boston, USA.
4. Compulsory.
5. António Pirra, Jaime Cavalheiro, Fernanda Cosme.
6. 2 h/week;2nd semester; 3rd year.
7. Theoretical-practical classes.
8. Tests (2) or final exam and written works.
9. No.
10. 3.

1. Food Quality and Safety - 2153
2. Concepts of food quality and safety. Risk analysis and critical control points in the processing phases and during the product distribution. HACCP. Hygiene, microbiology and chemistry in food safety. Contaminants, toxins and residues of pesticides, veterinary drugs and food additives. Contamination sources and human health risks. Effects of processing, storage and packaging on food quality and safety. International standards for food safety.
3a) Concepts of Food Science and Technology, Microbiology, Food Composition and Analysis.
3b) Students must understand the importance of food quality and safety on processing, human feed and public health, identifying and using techniques to detect contaminants and residues and further analysis of risks on the basis on international standards.
3c) van der Heijden, K et al. 1999 International Food Safety Handbook – Science, international regulation and control, Marcel Dekker, NY, USA; Rees, N & Watson, D 2000 International standards for food safety, Aspen Publishers, Maryland, USA; Sutherland, JP et al. 1986 A colour atlas of food quality control, Awalfe Science Book, Weert, Netherlands; Early, R 199. Guide to quality management systems for the food industry, Backie Academic & Professional Chapmann & Hall; Newslow, DL 2001 The ISSO 9000 Quality System. Application in Food and Technology, Wiley - Interscience, John Wiley & Sons, INC, Publications; NY; Heijden, KM et al. 1999 International Food Safety Handbook Science, International regulation and control, Marcel Dekker, INC, NY; Reilly, C 1991 Metal Contamination of Food, Reilly C., 2nd ed., Elsevier Science Publishers.
4. Compulsory.
5. Eduardo Rosa, Carlos Ribeiro, Virgílio Falco, Maria José Gomes.
6. 4 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes.
8. Tests (2) or final exam and reports and written work with oral presentation.
9. No (unless the presence of Erasmus/Socrates students).
10. 6.

1. Packing and Transport - 2154.
2. Food packing; raw materials, intermedium and finishing products. Specific packing: fresh, iced or dehydrated products, packed or in bulk. Sensibility to physical factors (temperature, light and humidity); Transportation characteristics and types; Cold food chain maintenance from production to consumption.
3a) No prerequisites.
3b) Packing and storage conditions of different kinds of food products. Main quality aspects of transport of the commodities for quality and safety preservation and consumer satisfaction.
3c) ASHRAE 1990 Handbook Refrigeration, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., Atlanta; Bureau, G & Multon, J 1995 Embalaje de los alimentos de gran consumo, Editorial Acribia, Zaragoza; CCI (Centro de Comércio Internacional) 1999 Envase y embalaje de alimentos, Genebra; IIR (International Institute of Refrigeration) 1986 Recommendations for the processing and handling of frozen foods, Paris; Kader, AA 1992 Postharvest technology of horticultural crops, University of California, Oakland; Mitra, S 2001 Postharvest physiology and storage of tropical and subtropical fruits, Cab International; Ryall, AL & Pentzer, WT 1974 Handling, transportation, and storage of fruits and vegetables, The Avi Publishing Company, Inc. Westport, Connecticut; Thompson, AK 1996 Postharvest Technology of Fruit and Vegetables, Blackwell Science Ltd, London.
4. Compulsory.
5. Jaime Cavalheiro, António Pirra, Divanildo Monteiro.
6. 2 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes.
8. Final written exam and practical work.
9. No.
10. 3.

1. Toxicology - 0263
2. General principles of toxicology. Toxic substances of natural origin. Toxic substances of resultants of the technology of foods. Toxic substances of resultants of the chemical and microbiological alteration of foods. Toxic substances proceeding from the alimentary additive use. Toxic substances produced by the chemical contamination of foods. Nutritional toxicology: the diet as toxic substance source. Toxic substances proceeding from materials in contact with foods. The antibiotic use in the animal production. Toxicity of the alcohol. Foods and cancer.
3a) No prerequisites.
3b) Identification and quantification of risk of exposure of humans to toxic compounds and the study of response origin to the toxic source. To know the risks associates to the food consumption displayed to the natural and anthropogenic pollutants of the alimentary chains. To develop a critical capacity in Alimentary Toxicology, as well as a basic health care and prophylactic measures vis-à-vis the modern agricultural practices, veterinary medicine and the alimentary industry.
3c) Timbrell, J 2001 Introduction to Toxicology, Taylor & Francis, 3ª ed.; Timbrell, J 1999 Principles of Biochemical Toxicology, 3ª ed., Taylor & Francis; Hobbs, Betty & Roberts, Diane 1993 Food Poisoning and Food Hygiene, Edward Arnold; Klaassen, CD 1996 Casarett and Doull's Toxicology: the Basic Science of Poisons, 5º ed., McGraw Hill, NY.
4. Compulsory.
5. Sandra Fonseca.
6. 4 h/week; 2nd semester; 3rd year.
7. Lectures-practical classes.
8. According to University Regulations, 1 written test and 1 work group or a final exam – 100%.
9. No.
10. 6.

4th year

1. Nutrition and Health - 2155.
2. It influences of nutrition on individual and populations health. Information and research practices applied by nutritionists and other disciplines interested in nutrition.. Assessment of food consumption. Health indicators of health and nutrition. Evaluation of nutritional practices among populations. Specific health problems and nutrition (obesity, hunger, feeding and poverty in the developed countries, alcohol, alimentary support in emergency situations, etc.).
3a) No prerequisites.
3b) Recognise nutrition as a primary factor in the determination of the quality and life expectancy.
3c) CNAN 1997 Recomendações para a educação alimentar da população portuguesa, Conselho Nacional de Alimentação e Nutrição (CNAN), Comissão de Educação Alimentar, Lisboa; Gonçalves Ferreira, FA 1982 Moderna Saúde Pública, 5ª ed., Fundação Calouste Gulbenkian; Peres, E 1997 Bem comidos e bem bebidos, Caminho, Lisboa.4. Compulsory.
5. Sandra Fonseca.
6. 4 h/week; 1st semester; 4th year.
7. Lectures-practical classes.
8. According to University Regulations, 1 written test and 1 work group or a final exam – 100%.
9. No.
10. 6.

1. Business and Management - 2156.
2. Accounting in the organisational context of the company. Accounting as management instrument. Ownership. Rights and obligations. Planning. Keeping accounts. Balance and performance of the organisation. Fiscal system. Information systems. Management control systems.
3a) No prerequisites.
3b) One intends that the pupils are capable to understand the techniques and methods of accounting to be used in the management and administration of the companies.
3c) Appointments of the professor. Borges, A et al. 1999 Elementos de Contabilidade Geral, Rei dos Livros, Lisboa; Silva, H & Matos, M 1990 Contabilidade e Gestão, Texto Editora, Lisboa; Jordan, H et al. 1993 O Controlo de Gestão - Ao Serviço da Estratégia e dos Gestores, CIFAG, Amadora.
4. Compulsory.
5. Manuel Joaquim Teixeira.
6. 4 h/week; 1st semester; 4th year.
7. Lectures-practical classes.
8. Final written exam.
9. No.
10. 6.

1. Food Sensory Evaluation - 2157.
2. Feeding: nutricional habits and necessities. The sensorial quality of food. Concepts, importance and necessities of the sensory evaluation of food. Thresholds of sensation and perception. Principles of sensory evaluation and sensory physiology. Perception and sensation of stimulus. Problems and errors of perception. Taste and basic tastes. Flavour evolution. Conjugation and balance of flavours. Temperature influence. Smell. Anatomy and physiology. Nasal direct way and the rectro-nasal way. Aromatically compounds. Aroms recognition. Balance of aroms. The vision and sensory evaluation. Vision mechanisms. Sensory evaluation vocabulary. The taster and the importance of training. Selection of the tasters. Test cards and discrimination tests. The sensory evaluation room. Localisation. Environment conditions. Equipment. Application of sensorial methods to some food products.
3a) No prerequisites.
3b) Importance of sensory evaluation of food and its contribution for a healthful feeding. Understanding of the phenomena associated to the sensory evaluation of food. Knowledge of food sensory evaluation.
3c) Amerine, MA & Pangborn, RM 1965 Principles of Sensory Evaluation of Food, Academic Press, NY; Carr, BT et al. 1991 Sensory Evaluation Techniques, CRC Press, Inc., 2ª ed.; Lawless, HT & Klein, P 1991 Sensory Science Theory and Applications in Foods, Marcel Dekker, Inc., NY; Lea, P 1998 Analysis of variance for sensory data, John Wiley ed., Chichester; Powers, JJ 1988 Descriptive methods of analysis, In: Sensory Analysis of Foods (Piggott, JR, ed.), Elsevier Applied Science.
4. Compulsory.
5. Alice Vilela Moura.
6. 4 h/week;1st semester; 4th year.
7. Theoretical-practical classes.
8. Tests or final exam.
9. No.
10. 6.

1. Marketing - 2158.
2. Introduction to the marketing concept (nature, evolution and limits of marketing, marketing environment, marketing ethics); Marketing research; Consumer behaviour; Strategic marketing decisions (marketing strategies and objectives, segmentation and target markets, market sources, positioning and differentiation); Marketing-mix (product, price, place, promotion and sales force management); Specificities of food products commercialisation.
3a) No prerequisites.
3b) To provide the students an understanding of basic concepts of marketing, of the principal techniques of market analysis and the strategic decisions in marketing. To sensitise students to the diverse marketing instruments available (marketing-mix).
3c) Lendrevie, J et al. 2000 Mercator: Teoria e prática do marketing, Publicações D. Quixote, 9ª edição.
4. Compulsory.
5. Mário Sérgio Teixeira.
6. 4 h/week; 1st semester; 4th year.
7. Lectures-practical classes.
8. Final exam; Individual and group assignments; class participation.
9. No.
10. 6.

1. Culture and Health - 2159.
2. Operational definitions of the concepts of culture and health. How culture influence and determine people's choices and eating behaviours and the influence of these in health, illness and disease. The concept of health system: the lay reference-system and the medical-reference system. The interaction between the definition of agricultural production policies and the health of the populations: comparative analysis at a world level. Discussion of ethical considerations in the context of health in a transcultural perspective. The state of health in Portugal and its relationship with culture and society.
3a) No prerequisites.
3b) To develop an understanding contextual of the culture concept, including the forms as this is influenced by other such domains as: social class, sexual gender and ethnicity. To develop a critical understanding on how the agricultural policies of the developed countries are incompatible with an ETHOS that aims at the maintenance of practices that guarantees the levels of health of the populations in the non-western countries. To promote critical analysis ability that capacitates students to analyse, criticise and develop programs that respect the interactive relationships between culture and the offer of medical services. To suggest forms of sociocultural interventions in a critical perspective.
3c) Helman, C 1994 Health and illness: An introduction for health professionals, 3rd ed., Boston: Butterworth Heinenmann; Kinsley, D 1996 Health, healing, and religion: A cross-cultural perspective, Upper Saddle River, NJ: Prentice Hall; Critser, G & Crister, G 2003 Fat Land: How Americans became the fatest people in the world, Boston: Houghton Miffin; Schlosser, E 2002 Fast food nation: The dark side of al-american meal, NY: Harper Collins; Willet, W & Skerrett, M 2002 Eat, drink, and be health, The Harvard Medical School guide to healthy heating, NY: Simon &Schuster Adult.
4. Compulsory.
5. J. Vasconcelos-Raposo
6. 2 h/week; 1st semester; 4th year.
7. Theoretical-practical classes.
8. Final exam and (or) practical works along the semester.
9. English, whenever the number justifies him/it or in regime tutorial for foreign students.
10. 3.

1. Health and Infant Nutrition - 2160.
2. Pediatric nutritional assessment. Nutrition during the firs year of life. Nutrition for infants. Nutritional management of diseases and disorders for infants.
3a) No prerequisites.
3b) Capacitate students for the pediatric nutritional assessment and the nutritional management of diseases and disorders for infants.
3c) Walker, AW & Watkins, JB 1985 Nutrition in Pediatrics. Basic science and clinical application, MD Little, Brown & Company, Boston/Toronto; Mac Laren, DS & Burman, D 1982 Testbook of pediatric nutrition, ed. Churchil, Livingstone, Edimburgh; Ricour, C et al. 1993 Traité de nutrition pédriatique, Éditions Maloine.
4. Compulsory.
5. Sandra Fonseca.
6. 2 h/week; 1st semester; 4th year.
7. Lectures-practical classes.
8. According to University Regulations, 1 written test and 1 work group or a final exam – 100%.
9. No
10. 3.

1. Product Certification, Traçability and Normalisation - 2161.
2. Definitions and legislation. Quality labels DOP, IGP and ETG. Food products with quality labels. Traçability and product identity and is importance in growth consumer confidence. Ingredients identification and ways of production. Purity and handling. Great productions versus small productions. Commercial circuits. Codex Alimentarius.
3a) No prerequisites.
3b) The main purpose of the discipline is to provide students with fundamental bases to understand the importance of food products with quality labels. We also pretend to encourage diversity in food production, protecting labels and traditional ways of production and to inform students about the different small production quality products protected.
3c) MADRP-DGDR 2001 Guia dos produtos de qualidade: DOP, IGP, ETG, DOC, IPR, AB, PI e DGDR, Lisboa; Thompson, AK 1996 Postharvest Technology of Fruit and Vegetables, Blackwell Science Ltd, London; DGDR, Lisboa; Bureau, G & Multon, J 1995 Embalaje de los alimentos de gran consumo, Editorial Acribia, Zaragoza, Espanha; Ryall, A & Pentzer, W 1974 Handling, transportation and storage of fruits and vegetables. AVI Publishing company, Inc., Connecticut. USA; Salunkhe, D et al. 1991 Storage, processing and nutricional quality of fruits and vegetables, 2nd ed., volume 1 - Fresh fruits and vegetables, Boston, USA; Shewfelt, R & Prussia, S 1993 Postharvest handling – a systems approach, Academic Press, Inc., California; Cheftel, J et al. 1989 Introduccion a la bioquimica y tecnologia de los alimentos, vol. I, Editorial Acribia, Zaragoza, Espanha.
4. Compulsory.
5. António Pirra, Carlos Ribeiro, Paulo Rema.
6. 4 h/week; 2nd semester; 4th year.
7. Theoretical-practical classes.
8. Final written exam and practical work.
9. No
10. 6.

1. Health Education - 1154.
2. Health – the evolution of the concept. Strategies and methods in health promotion. Planification, application and evaluation on nutritional education projects.
3a) No prerequisites.
3b) To recognise the importance and the role nutritional sciences on health education/promotional interventions.
3c) Andrade, Mª Isabel 1995 Educação para a Saúde, Texto Editora; Egger, G et al. 1995 Health promotion – strategies and methods, McGraw-Hill Book Company, Sidney; WHO, 1980 Ottawa charter for health promotion. An international conference on health promotion. The move towards a new public health, Ottawa, Canada.
4. Compulsory.
5. João Mocho, Sandra Fonseca.
6. 3 h/week; 2nd semester; 4th year.
7. Lectures-practical classes.
8. According to University Regulations, 1 written test and 1 work group or a final exam – 100%.
9. No.
10. 3.

1. Nutrition and Dietetic - 2162.
2. Assessment of the patient's needs relative to his or her health status; development of a nutritional care plan; implementation of that plan, which includes provision of nutrients via oral, enteral, or parenteral routes; education of the patient; and evaluation of the effectiveness of the intervention.
3a) No prerequisites.
3b) Enable students to assess the nutritional needs and intervene in the development of nutritional care in health and diseased groups.
3c) National Research Council 1989 Recommended Dietary Allowances, 10th ed., Washington DC, National Academy Press; Mahan, LK & Escott-Stump, S 2000 Krause's Food, Nutrition and Diet Therapy, WB Saunders Company, USA; Shils, ME et al. 1999 Modern Nutrition in health and Disease, Williams & Wilkins, Maryland.
4. Compulsory.
5. Sandra Fonseca.
6. 4 h/week; 2nd semester; 4th year.
7. Lectures-practical classes.
8. According to University Regulations, 1 written test and practical work or a final exam – 100%.
9. No.
10. 6.

1. Hygiene and Safety - 2163.
2. General aspects of food hygiene and safety. Legislation. Prevention of contamination. Personal hygiene of the food handler. Cleaning and disinfection methods. Selection of cleaning systems and method. Hygiene and safety in the work. Environmental control. Pest control and hygiene. Health in the work. HACCP implementation in food processing and catering. Hygienically food production. Price/ration of hygiene and safety operations.
3a) Basic knowledge on Food Microbiology and Food Quality and Safety
3b) Importance of hygiene and safety of food and the implications in public health. Application of norms of hygiene and safety.
3c) Dillon, V & Board, R 1994 Natural Antimicrobial Systems & Food Preservation, Cab International, Bristol; Harrigan, W & Park, R 1991 Making Safe Food, Academic Press; Faber JM & Todd, ECD 2000 Safe Handling of foods. Ed. by Jeffrey M. Faber & Ewen C.D. Tood, Canada, Marcel Dekker Inc., NY, Heijden, KM et al. 1999 International Food Safety Handbook, Science, International Regulation & Control, Marcel Dekker, Inc., NY.
4. Compulsory.
5. Arlete Mendes Faia, António Inês.
6. 4 h/week; 2 nd semester; 4th year.
7. Theoretical-practical classes.
8. Final exam.
9. No.
10. 6.

1. Bioethics and Feeding Biossecurity - 2164.
2. Interdisciplinary knowledge and the development of the principles of Bioethics and of Feeding Biossecurity. Environmental problems and scientific principles: environmental problems, their causes, and sustainability; critical thinking (science, models and systems); matter and energy resources (types and concepts). Human population, resources and sustainability: growth, demography, and reproductive capability; food resources; water; mineral and edaphic resources; non renewable energetic resources; energetic efficiency and renewable energetic resources. Environmental quality and pollution: risks, toxicology and human health; atmospheric pollution; global warming and ozone loss; water pollution; protection of feeding resources; solid residues; dangerous residues. Soil use, biodiversity, and conservation: sustainability. Biological feeding quality: ecoproducts. Pollutant chemical compounds in animal and human feeding. Genetic engineering and the production of feeds. Specific problems e.g. Dioxins and BSE.
3a) Non subject to the precedence regimen.
3b) The objectives are to transmit the principles that must govern Mankind behaviour in relation to Nature and assure the security of the existing Biodiversity and the Feeding biossecurity of Mankind.
3c) Keller, DB & Botkin, EA 2000 Environmental Science – Earth as a Living Planet, 3ª ed., John Wiley & Sons, NY, USA; Lacasse, D 1995 Introdução à Microbiologia Alimentar, Instituto Piaget, Lisboa; Ricklefs, RE 1996 A Economia da Natureza, 3ª ed., Editora Guanabara Koogan, SA, Rio de Janeiro, Brasil. Several Internet sites.
4. Compulsory.
5. José Torres Pereira.
6. 2 h/week; 2nd semester, 4th year.
7. Theoretical-practical classes.
8. Written test or written final examination(80%) and a Group Monography about a theme of Bioethics and Feeding Biossecurity.
9. No. However, the Lecturer has no problem in teaching in English the full Course.
10. 3.

1. Fitness and Health - 0771.
2. Exercise, Fitness and health: the basic paradigm and key definitions; Physical activity and physical fitness as determinants of health and longevity. Assessment of physical activity and physical fitness. Relationship of pulmonary, cardiovascular, hormonal, metabolic and muscle-skeletal adaptations to fitness and health.
3a) Good knowledge on Human Anatomy, Physiology and Biochemistry.
3b) Provide and introduction to Exercise, Fitness and health paradigm, which include a review of fundamentals concepts and mechanisms adaptations that can be considered the prerequisite for a course in Health and Fitness.
3c) ACSM 1995 ACSM´s guidelines for exercise testing and prescription, Williams & Wilkins, Baltimore; Cotton, R 1998 Exercise for Older Adults: ACE'S Guide to Fitness Professionals, Human Kinetics, Champaign; Heyward, VH 1991 Advanced Fitness Assessment & Exercise Prescription, Human Kinetics Books, Champaign; Heyward, VH & Stolarczyk, LM 1996 Applied Body Composition Assessment, Human Kinetics, Champaign; Swain, D & Leutholtz, B 2002 Exercise Prescription, Human Kinetics, Champaign.
4. Compulsory.
5. Helena Moreira.
6. 3 h/week; 2nd semester; 4th year.
7. Lectures-practical and laboratories classes.
8. Written work, both essay type and problem solving, is an integral part of all semester. Assessment is based on coursework (CW) and end-of-semester exam (E). The final degree (FD) is based on this formula: FD = (CW + 2E)/3.
9. No.
10. 6.

Veterinary Medicine Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Zoology	6.0	Biophysics	4.0
	Medical Statistics	6.0	Ecology	4.0
	General Agriculture	4.0	Introduction to Biochemistry	4.0
	Anatomy I	6.5	Exognosia	6.0
	Histology	6.5	Anatomy I	6.5
			Histology	6.5
	Total	29.0	Total	31.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Animal Nutrition and Feeding	6.0	Animal Behaviour	3.0
	Biochemistry	4.0	Biochemistry	4.0
	Genetics	5.5	Genetics	5.5
	Anatomy II	6.0	Anatomy II	6.0
	Physiology	6.0	Physiology	6.0
	General Pathology	4.0	General Pathology	4.0
	Total	31.5	Total	28.5
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	Surgery Basics	6.0	Anesthesiology and Surgery Techniques	6.0
	Medical Semiology	5.0	Medical Semiology	5.0
	Special Veterinary Pathology	5.0	Special Veterinary Pathology	5.0
	Pharmacology	4.0	Pharmacology	4.0
	Microbiology e Immunology	5.0	Microbiology e Immunology	5.0
	Parasitology	5.0	Parasitology	5.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	Reproduction and Artificial Insemination	6.0	Andrology, Gynaecology and Obstetrics	6.0
	Technology of Animal Products I	4.0	Technology of Animal Products II	4.0
	Internal Medicine	5.0	Internal Medicine	5.0
	Surgical Pathology	5.0	Surgical Pathology	5.0
	Pathology of Infectious Diseases	5.0	Pathology of Infectious Diseases	5.0
	Pathology of Parasitic Diseases	5.0	Pathology of Parasitic Diseases	5.0
	Total	30.0	Total	30.0

	1st Semester	ECTS	2nd Semester	ECTS
5th Y E A R	Toxicology Clinical Radiology Economics Sanitary Inspection Zootechny and Animal Breeding Large Animal Clinics Small Animal Internal Medicine	4.0 4.0 3.0 8.0 5.0 4.0 4.0	Veterinary Public Health Sociol., Hist. Med. Vet. and Deontologic Principles Sanitary Inspection Zootechny and Animal Breeding Large Animal Clinics Small Animal Internal Medicine	6.0 1.0 8.0 5.0 4.0 4.0
	Total	32.0	Total	28.0

Total dos Créditos: 300

1st Year

1. Zoology – 0238.
2. Slight knowledge of zoological systematic - classification criteria; Study of the more representative protozoa: Phyla Sarcomastigophora, Apicomplexa and Ciliophora; Study of the metazoans - origin, general characteristics, form and function, classification, phylogeny and adaptive radiation of the Phyla: Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca (Classes Gastropoda, Bivalvia and Cephalopoda); Annellida; Arthropoda (Classes Arachnida, Crustacea, Diplopoda, Chilopoda and Insecta); Echinodermata; Chordata - Subphylum Vertebrata - Superclasses Agnatha and Gnathostomata - Classes Chondrichthyes (cartilaginous fishes), Osteichthyes (bony fishes), Amphibia (amphibians), Reptilia (reptiles), Birds and Mammalia (mammals).
3a) No prerequisites.
3b) To know the rules and criteria established for zoological systematic. Understand the diversity of the protozoa with similar characteristics to the animals - Protozoan Phyla. To identify characteristics and to interpret data related to the evolutionary history of the main animal groups. To relate structural and functional characteristics of the animals with the environment conditions where they live.
3c) Hickman, CP *et al.* 2001 *Integrated Principles of Zoology*, McGraw-Hill International Edition; Kukenthal, W *et al.* 1986 *Guia de Trabalhos Práticos de Zoologia,* Livraria Almedina, Coimbra; Storer, TI & Usinger, RL 1984 *Zoologia Geral*, Companhia Editora Nacional, S. Paulo, Brasil.
4. Compulsory.
5. Carla Torres Pereira.
6. 6 h/week (2 theoretical + 4 practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Theoretical written test (85%) + practical written test (15%).
9. No.
10. 6.

1. Medical Statistics – 0680.
2. Descriptive Statistics: measures of central trend, dispersion and association; probability basic concepts; probability distributions; estimation; hypothesis testing, analysis of variance; linear regression; non parametric statistics; vital statistics. Use of informatics means for problems resolution.
3a) It is required from the students good knowledge on Mathematics and Biology at the high school level.
3b) It is intended that the students will be able to: organize and summarize biological data, choosing correct methodologies for the data analysis taking decisions in function of the obtained results.
3c) Daniel, WD 1987 *Biostatistic: A foundation for analysis in the health sciences*, 5th ed., John Wiley & Sons; Petrie, A & Watson, P 2000 *Statistics for Veterinary and Animal Science*, Blackwell Science Ltd.; Dagnelis, P 1973 *Estatística, teoria e métodos*, 1º e 2º Volumes, Publicações Europa América; Urteira, BJF & Black, GHJB 1983 *Estatística descritiva*, McGraw-Hill; Haiger, A 1983 *Métodos Biométricos em Produção Animal*, Instituto Universitário de Trás-os-Montes e Alto Douro.
4. Compulsory.
5. Jorge Colaço, Mário Silvestre.
6. 6 h/week (4 practical + 2 theoretical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final exam.
9. No.
10. 6.

1. General Agriculture – 0241.
2. The agroecosystem: concept and definition. The plant in its interaction with the environment. The growth and development of crop species. The physiology of crop production. Main agricultural practices. Vegetable crops for animal feeding. Crop production, environmental impacts and EU agricultural policies. Agriculture and environment.
3a) No prerequisites.
3b) Students should get basic information regarding how agricultural activities and especially plants are affected by environmental factors, and also get knowledge on main agricultural practices, tools and equipments used on crop production. Physiological processes which influence crop biomass accumulation and their manipulation by agricultural practices and techniques where considered. The main crops used on animal feeding are studied. Students should get an overview of the main environmental impacts of agriculture.
3c) Diehl, R & Mateo Box, JM 1988 *Fitotecnia General*, 2ª edición. Mundi-Prensa, Madrid; European Comission 1998 *The Agricultural Situation in the European Union - 1997 Report*, Ed. European Communities, Luxemburgo; Gliessman, SR 1998 *Agroecology, Agricultural Processes in Sustainable Agriculture*, Ann Arbor Press, Chelsea; Le Clech, B 1998 *Environnement et Agriculture*, 2éme ed., Édition Synthese Agricole, Bordeaux; Moreira, N 2002 *Agronomia das Forragens e Pastagens*, UTAD, Vila Real; Rolo, JC 1996 *Imagens de meio século da agricultura portuguesa*, In O voo do arado, ed. Museu Nacional de Etnologia, Lisboa; Trindade, H 1992 *Identificação de espécies pratenses e forrageiras*, Série Didáctica - Ciências Aplicadas, nº 20, UTAD, Vila Real.
4. Compulsory.
5. Henrique Trindade.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.

1. Anatomy I – 0235.
2. Compared osteology and arthrology; Compared myology; Compared anatomy of the respiratory system; Compared anatomy of the digestive system; Compared anatomy of the urogenital system.
3a) Previous knowledge of the specimens of veterinary interest.
3b) The aim of Anatomy is to teach the students how to investigate and explore the form, situation and functions of organs and locomotor system of the various species, as well as the way they are related. In order to achieve that, we use theoretic and practical classes in a way that the students achieve sufficient knowledge of osteology, arthrology, myology and splanchnology of the animals with veterinary interest.
3c) Barone, R 1978 *Anatomie comparée des mammifères domestiques*, Vigot Frères, Lyon; Climent, S *et al.* 1998 *Manual de Anatomía y Embriología de los animales domésticos*. *Conceptos básicos y datos aplicativos: Embriología General.* Ed. Acribia. Zaragoza; Dyce, KM *et al.* 1999 *Anatomía Veterinaria*. Ed. McGraw-Hill Intermericana. México; Nickel, R *et al.* 1977 *Anatomy of the domestic birds*. Paul Parey, Berlin; Ferreira, D 2000 *Atlas de dissecação do cão*, McGraw-Hill de Portugal; Schaller, O 1996 *Nomenclatura anatómica veterinaria ilustrada*, Ed. Acribia, Zaragoza.
4. Compulsory.
5. José María Villar Lacilla, José Gabriel Fernandez Alvarez, Maximino Fernandez Caso, David Orlando Ferreira, Bruno Jorge Colaço, Carlos Alberto Venâncio.
6. 6 h/week (4 practical + 2 theoretical); annual; 1st year.
7. Lectures and practical classes.
8. 2 written tests or a final theoretical exam, and a final practical exam.
9. No.
10. 13.

1. Histology – 0236.
2. Study of cellular biology, morphology and histophisiology of basic tissues and organs integrated in the structural and functional complexity of the animal body. Histological and microanatomical organisation of the different systems of mammals and birds, focusing on the species with relevance in Veterinary Medicine.
3a) No prerequisites.
3b) Practical and theoretical histological knowledge of the different anatomical organs and structures.
3c) Dellmann, HD & Eurell, J 1999 *Textbook of Veterinary Histology*, 5th ed., Lippincott Williams & Wilkins; Banks, WJ 1986 *Applied Veterinary Histology*, 2nd ed., Williams & Wilkins; Bacha, W & Bacha, Linda 2000 *Colour Atlas of Veterinary Histology*, 2nd ed., Lippincott Williams & Wilkins; Wheater, PR *et al.* 2000 *Functional Histology - A Text and Colour Atlas*, 4th ed., Guanabara-Koogan.
4. Compulsory.
5. Paula Avelar Rodrigues, Ana Margarida Calado, Maria de Lurdes Pinto.
6. 6 h/week (4 practical + 2 theoretical); annual; 1st year.
7. Lectures and practical classes.
8. 2 written assessments; Final written and practical exam.
9. No.
10. 13.

1. Biophysics – 0239.
2. Membrane biophysics: Transport of molecules and ions. 1st Fick's law. Rate of diffusion (J) of solutes (non-ionic and ionic) and of water through homogeneous and porous membranes. Osmosis, osmolarity and tonicity. Van't Hoff equation. Electrochemical equilibrium: Nernst's equation. Membrane potential: Goldman's equation. Action potential. Concepts of stimulus-secretion. Fluid biophysics: Stress and Pressure in a fluid at rest. Pascal's principle. Archimedes' principle. Surface tension. Contact angle and capillarity. Laminar and turbulent flow. Bernoulli's equation. Viscosity. Poiseuille's Law. Reynolds's number. Elastic fibres: Hook's and Laplace's equation. Biophysics of the circulatory system. Starlling's phenomena and edema. Nuclear physics and radiation: Energy and nuclear forces. Nuclear models. Radioactivity. Radiation - alpha, beta and gamma. Period and half-life of a radio-nuclide. Interactions of radiation with mater. Chemical and biological effects of radiation. Medico-biological applications.
3a) Not prerequisites.
3b) To explain several physiological mechanisms (at the cell and organ level), recurring to the knowledge of Physic's laws and concepts, thus, constituting a base for understanding biomedical sciences.
3c) Sears, F *et al.* 1984 *Física*, Livros Técn. e Cient. Ed., vols. II e IV; Salgueiro, L & Gomes Ferreira, J 1991 *Introdução à Biofísica*, Ed. F.C. Gulbenkian; Coletta, VP 1995 *Physics*, Ed. McGraw-Hill; Textos de apoio às aulas teóricas: Pedroso de Lima, JJ 1993 *Conceitos gerais sobre biofísica de membranas*; Pedroso de Lima, JJ 1993 *Princípios básicos de física nuclear e das radiações*; Pedroso de Lima, JJ 1995 *Conceitos gerais sobre biofísica dos líquidos*; Silva, A. 2002 *Practical exercises and problems for biophysics*.
4. Compulsory.
5. Amélia Maria Lopes Dias da Silva.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Theoretical and practical lectures.
8. Continuous evaluation (2 written tests) or a final exam.
9. No.
10. 4.

1. Ecology – 0096.
2. The notion of natural and cultural integrity. Considerations of scale and hierarchy. Indicators of ecosystem integrity. Measuring biological integrity and monitoring for ecosystem integrity. Bioindicators of the quality of water, soil and air. Population Dynamics. Extreme environments and adaptation. Genetic variation and environmental stress. Environmental stress, selection, evolution and extinction. Air pollution. Toxic elements. Acidification. Forest decline. Fossil fuels. Eutrophication. Pesticides. Species richness. Radioactive pollution. Environmental Pathology.
3a) Notions of Biology and Geology.
3b) To understand the fundamental concepts in environmental ecology, such as environmental stress, ecological integrity, bioindicators, adaptation and evolution. To apply these concepts in the evaluation of the great and actual environmental issues.
3c) Andreasen, JK *et al.* 2001 Considerations for the development of a terrestrial index of ecological integrity, *Ecological Indicators* 1(1):21-36; Bijlsma, R & Loeschcke, V 1997 *Environmental Stress, Adaptation and Evolution*, Birkhauser Verlag; Dale, VH & Beyeler, SC 2001 Challenges in the development and use of ecological indicators, *Ecological Indicators* 1(1):3-10; Freedman, B 1989 *Environmental Ecology*, Academic Press; Kurtz, JC *et al.* 2001 Strategies for evaluating indicators based on guidelines from the environmental Protection Agency's office of research and development's, *Ecological Indicators* 1(1):49-60.
4. Compulsory.
5. João Alexandre Cabral, Mário Santos, João Carrola.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. A written report - 25% and two written tests and/or a final written exam - 75%.
9. No.
10. 4.

1. Introduction to Biochemistry – 0240.
2. Theoretical – I. Introduction – Molecular logic of life. II. Physical-chemistry basis of biological processes: Structural basis; Thermodynamic basis; Kinetic basis; Proton-transfer reactions; Electron-transfer reactions. III. Chemical-organic basis of biological processes: Organic compounds and stereochemistry; Organic compounds functional groups; Organic compounds reactions; Biomolecules. Practical – 1 Introduction: basic knowledge of gravimetry, volumetric and statistic analysis. 2. Thermodynamics and bioenergetics – calculation of reaction heat; 2. Chemica kinetics – determination of reaction orders; 3. Acid, base and buffers – preparation of buffer solutions 4. Organic chemistry – basic organic reactions. 5. Algebric problems: thermodinamic, chemical kinetic, buffer solutions and organic chemistry.
3a) No prerequisites.
3b) A good knowledge of chemical/biochemical topics such as acid/bases or redox reactions, chemical kinetics and bioenergetics (energy in living organisms) are essential and important for several medicine areas, p.e. genetic, physiology, pharmacology, microbiology, toxicology, nutrition and pathology.
3c) Denniston, KJ *et al.* 2001 *General, Organic, and Biochemistry*, 3rd Ed., McGraw-Hill, Boston; McKee, T & McKee, JR 2003 *Biochemistry: An introduction,*. 3rd Ed., WCB McGraw-Hill, Boston; McMurry, JE & Castellion, ME 1999 *Fundamentals of General, Organic, and Biological Chemistry,* 3rd Ed., Prentice Hall, New Jersey.
4. Compulsory.
5. Dario Loureiro dos Santos, Celso Santos.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 1st year.
7. Lectures, practical classes and laboratories.
8. Written assessment/exams (theoretical and practical). Final classification: theoretical program – 75% e practical program – 25%.
9. No.
10. 4.

1. Exognosia – 0242.
2. Morfology: parts of animals, skeletal structure, limits, the identification of desirable and undesirable points of conformation, knowledge of the ideal or standard type of each breed of animals. Statics and Dynamics, Mensuration, Animal Identification and Estimate of age.
3a) Knowledge on biology.
3b) The main objective of this subject is to prepare students towards a clear and integrated knowledge of varying animal parts. The extensive use of descriptive terms is necessary to animal identification and make decision for judging.
3c) Marmet, R 1983 *La connaissance du betail*, Tome 1. Les bovins, Technique and Documentation, Lavoisier; Sanudo, C *et al.* 1984 *Manual de diferenciacion etnologica*, Libreria General, Zaragoza; Vasconcelos, R 1995 *Raças de Cães Portugueses*, Editorial Presença; Miranda do Vale, J 1990 *O Exterior do Cavalo*, Editorial Notícias.
5. José Carlos Almeida, Ana Sofia Santos.
6. 6 h/week (4 practical + 2 theoretical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 6.

2nd Year

1. Animal Nutrition and Feeding – 0247.
2. Theoretical - Nutrition and feeding concepts. Current state of the art and objectives of the study of Animal Nutrition and Feeding. General aspects of chemical composition of the feeds and of the animal body. Common methods of analysis of feeds and specialized analytical methods. Anatomy and function of the gastrointestinal tract. Classification, digestion and metabolism of carbohydrates, lipids, proteins and other nitrogenous compounds. Inorganic minerals and vitamins. Feed evaluation and animal feeding standards. Voluntary feed intake. Metabolic disorders. Practical - Analysis of feeds: feed sampling and preparation for analysis; the proximate analysis; the Van Soest system. Digestibility *in vivo* and alternative measures. Feeds: classification and nutritional value; tables of feed composition. Tables of nutrient requirements of the domestic animals. Computorized least-cost rations.
3a) Good knowledge on Biochemistry and on Anatomy, Physiology and Microbiology of the gastrointestinal tract of domestic animals.
3b) Students must be able to understand the basic nutrition concepts related with the nature of the nutrients, their metabolism and physiological functions, to interpret tables of feed composition and nutrient requirements of the domestic animals, must be able to formulate balanced diets and to identify situations of malnutrition and nutritional disorders.
c) McDonald P *et al.* 2002 *Animal Nutrition*, 6th Ed., Longman Scientific and Technical, NY; Pond, WG *et al.* 1995 *Basic Animal Nutrition and Feeding*, 4 th Ed., John Wiley & Sons.
4. Compulsory.
5. Maria José Gomes.
6. 6 h/week (4 practical + 2 theoretical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Two partial written assessments. Final written exam.
9. No.
10. 6.

1. Biochemistry – 0007.
2. Theoretical: 1 - Introduction; 2 - Aminoacids; 3 - Proteins; 4 - Enzimology; 5 – Vitamins and coenzymes; 6 - Carbohydrates; 7 - Lipids; 8 – Membrane transport; 9 – Carbohydrate metabolism; glicolyse and gliconeogenesis; Krebs cycle (citrate); Oxidative phosphorylation; 10 – Lipid metabolism: triglicerides and fatty acid catabolism; triglicerides, fatty acid, phospholipid and cholesterol/cholesterol derivatives anabolism; poli-isoprenic compounds; 11 – Nitrogen compound metabolism: aminoacids catabolism; aminoacids anabolism; synthesis of aminoacids derivatives. Practical: Qualitative and quantitative analysis of aminoacidss, proteins, carbohydrates, lipids and. vitamins. Enzyme kinetics analysis. Qualitative and quantitative study of energetic (carbohydrate) metabolism.
3a) Good knowledges on General (Inorganic) and Organic Chemistry.
3b) To provide students with molecular and cellular (biochemical) concepts needed to a suite understanding Biochemistry co-related areas of Medicine: physiology, genetic, pharmacology, microbiology, nutrition, toxicology and animal health (pathology).
3c) McKee, T & McKee, JR 2003 *Biochemistry: An introduction,.* 3rd Ed., WCB McGraw-Hill, Boston; Nelson, DL & Cox, MM 2000 *Lehninger Principles of Biochemistry.* 3rd ed., Worth Publishers, NY; Berg, JM *et al.* 2002 *Biochemistry*, 5th ed., WH Freeman & Company, NY.
4. Compulsory.
5. Dario Loureiro dos Santos, Celso Santos.
6. 4 h/week (2 theoretical + 2 practical); annual; 2nd year.
7. Lectures, practical classes and laboratories.
8. Written assessment/exams (theoretical and practical). Final classification: theoretical program – 75% e practical program – 25%.
9. No.
10. 8.

1. Genetics – 0018.
2. Mendelian Genetics: Mendel's principles, gene interaction, sex linkage and sex determination, multiple alleles, variability of the gene effect, heredopathology; Molecular Genetics: the genetic material, DNA replication, gene expression and its control in prokaryotes and eukaryotes, recombinant DNA technology, mutations. Microorganism Genetics: the bacteria chromosome, transformation, conjugation, sexoduction, transduction, antibiotic action at molecular level. Linkage and mapping in prokaryotes and eukaryotes. Crossing-over. Cytogenetics: structure of eukaryotic chromosome, variation in chromosomal structure and number. Quantitative inheritance. Population Genetics. Evolution and Speciation
3a) Good knowledge on Biology, Cytology, Biochemistry, Chemistry, Mathematics and Statistics.
3b) To give a solid understanding on Molecular Genetics as a tool to characterize biological strains, and breeds, and biodiversity within animal breeds by molecular markers; to have a comprehensive understanding of the mechanisms of antibiotic actions, and a perspective of Biotechnology applied to Molecular Assisted Selection, molecular diagnostic tools, new vaccines, DNA recombinant technology and transgenic animals. Bases on Microbiology Genetics. Integrated approach of genetic concepts on management and conservation of wild animal species.
3c) Tamarin, RH 2001 *Principles of Genetics*, International Edition, Ed. McGraw Hill; Griffiths, AJF *et al.* 2000 *An Introduction to Genetic Analysis*, WH Freeman & Co.; Hartl, DL & Jones, EW 2002 *Essential Genetics*, Ed. Jones and Bartlett. Klug, WS & Cummings, MR 2002 *Concepts of Genetics*. International Edition, Ed. P. Hall College Div..
4. Compulsory.
5. Henrique Guedes-Pinto, José Eduardo Lima Brito, Gilberto Igrejas, Raquel Chaves, Maria do Carmo Varejão, Paula Lopes and Estela Bastos.
6. 6 h/week (4 practical + 2 theoretical); annual; 2nd year.
7. Lectures and practical classes.
8. Two partial written tests or final written exam and practical evaluation.
9. No.
10. 11.

1. Anatomy II – 0243.
2. Embrionary development and compared anatomy of Cardiovascular System, Lymphatic System, Nervous System, the Organ of Vision and Vetibulocochlear Organ (ear).
3a) Previous knowledge of Osteology, Arthrology; Myology, and Splanchnology.
3b) Achieve a adequate knowledge of embrionary development and congenital malformations of the domestic animals, as well as a sufficient knowledge of the Cardiovascular System, including the Lymphatic System. Concerning the Nervous System, it's of extreme importance that the student recognize how the Nervous System works in the domestic animals, in order to understand the neurologic manifestations on practical veterinary clinic.
3c) Barone, R 1978 *Anatomie comparée des mammifères domestiques*, Vigot Frères, Lyon; Climent, S *et al.* 1998 *Manual de Anatomía y Embriología de los animales domésticos*. *Conceptos básicos y datos aplicativos: Embriología General*, Ed. Acribia, Zaragoza; Dyce, KM *et al.* 1999 *Anatomía Veterinaria*, Ed. McGraw-Hill Intermericana, México; Ferreira, D 2000 *Atlas de dissecação do cão*, McGraw-Hill de Portugal; Nickel R *et al.* 1981 *The anatomy of the domestic animals*, vol 3: the circulatory system, the skin and the cutaneous organs of the domestic animals, Paul Parey, Berlin.
4. Compulsory.
5. José María Villar Lacilla, José Gabriel Fernandez Alvarez, Maximino Fernandez Caso, David Orlando Ferreira, Helena Cristina Serôdio, Bruno Jorge Colaço, Carlos Alberto Venâncio.
6. 6 h/week (4 practical + 2 theoretical); anual; 2nd year.
7. Lectures and practical classes.
8. 2 written tests or a final theoretical exam, and a final practical exam.
9. No.
10. 12.

1. Physiology – 0244.
2. Introduction to Physiology. Internal Environment. Body-Fluids Compartments. Mollecular and Cellular Control Mechanisms. Neural Control Mechanisms. Sensory Systems. Circulation. Kidneys and Osmotic Regulation. Digestion and Absortion of Food. Organic Metabolism.
3a) Good knowledge on Anatomy, Histology, Biochemistry.
3b) The purpose of Physiology, including pathophysiological aspects, is to present the fundamental principles and facts of animal body function and explain how cells are coordinated to function as an organ, how organs cooperate in systems and how systems functions are controled and integrated by whole organism when adapting to internal and external needs.
3c) Cunningham, JG 1997 *Textbook of Veterinary Physiology*, 2nd ed., W. B. Saunders; Guyton, A 2000 *Textbook of Medical Physiology*, WB Saunders; Vander, A *et al.* 2002 *Human Physiology*, 8th ed. McGraw-Hill; Garcia-Sacristán, A *et al.* 1995 *Fisiologia Veterinária*, McGraw-Hill Interamericana; Seeley, R *et al.* 1997 *Anatomia e Fisiologia*, L-Lusodidata, Lisboa.
4. Compulsory.
5. Teresa Rangel-Figueiredo, Victor Pinheiro, Paulo Rema, Divanildo Outor, Ana Luisa Guimarães, Sandra Sacoto.
6. 6 h/week (4 practical + 2 theoretical); annual; 2nd year.
7. Lectures and practical laboratorial classes.
8. According to UTAD Regulations: Attendance in 2/3 practical classes is compulsory ; 2 written assessments or a final written exam (60% theoretical + 40% practical).
9. No.
10. 12.

1. General Pathology – 0246.
2. Causes of disease. Cellular adaptation. Growth disturbances. Cellular lesion. Degeneration. Abnormal metabolic pathways. Pigments and crystals. Lisosomal disorders. Necrosis and apoptosis. Cadaveric phenomena. Disorders of blood and lymph volume and fluid balance. Inflammation. Immunity: mechanisms of immunity; hypersensitivity disease, immunodeficiency disease, tolerance. Healing and repair. General oncology: causes and organization of neoplasma, the neoplasic cell, pathologic effect of neoplasia. Immunity to tumors.
3a) Good knowledge on Biology, Histology, Biochemistry, Physiology, Anatomy and some in Genetics.
3b) The objectives are to introduce new scientific information on mechanisms of general tissue injury and mechanic, chemical, physiologic effects, to concern the specie, age and environment. It evolves the study of cells, tissues organs, body fluids and the immune system. It's the link between basic sciences and clinical study.
3c) Cotran, RS *et al.* 1999 *Pathologic Basis of Disease*, 5ª ed., WB Saunders Company; Slauson, DO & Cooper, BJ 2002 *Mechanisms of Disease*, 2ª ed., Mosby; Huether, SE & McCance, KL 2000 *Understanding Pathophysiology*, 2ªed., Mosby; Jones, TJ & Hunt, RD 1997 *Veterinary Pathology*, 6ª ed., Lea & Febiger; Pires, MA & Seixas, F 2001 *Caderno de Aulas Práticas de Patologia Geral*, Série Pedagógica nº 139, Vila Real, UTAD.
5. Maria dos Anjos Pires, Fernanda Seixas Travassos, Maria de Lurdes Pinto.
6. 4 h/week (2 theoretical +2 practical); annual. 2nd year.
7. Lectures and practical classes. The practical classes include microscopic and macroscopic observation of basic pathology.
8. Two theoretical evaluation (each positive test is 50% of final theoretical note). Final oral examination of practical course. Final note is 50% theoretical and 50% of practical.
9. No.
10. 8.

1. Animal Behaviour – 0248.
2. Lecture Course.Veterinary Ethology. Concepts, Principles and Fundamentals of Ethology. Genetic, Physiological and Endocrine Bases of Behavior. Instinctive Behavior. Acquired Behavior. Animal Learning. Social Organisation. Social Behavior. Play Behavior. Communication. Reproductive Behaviour. Ingestive and drinking Behavior. Agonistic Behavior. Animal Welfare. Domestication. Stress. Stereotypes and other Farm Animal Behavior Problems. Poor Well Being. Introduction to Farm Animal Clinical Ethology. Introduction to Small Animal Clinical Ethology. Practical Course. Animal Welfare: Farm Animal Handling and Transportation; Welfare related to Physical, Dietary and Social Environments of Large and Small Animals. Introduction to Clinical Ethology.
3a) No prerequisites.
3b) Our purpose is to present the most significant aspects of Domestic Animal Behavior and Welfare important to Animal Management and Production and to Clinical Medicine. Knowledge conveyed will be important for Welfare assessment according to European Union Legislation and Welfare and Behavioral Counseling at a professional level.
3c) Houpt, Katherine 1998 *Domestic Animal Behaviour for Veterinarians and Animal Scientists*, 3rd ed., Iowa State University Press, EUA; Fraser, AF & Broom, DM 1998 *Farm Animal Behaviour and Welfare*, 3rd ed., CAB International, Wallingford, UK.
4. Compulsory.
5. Carla Maria Calçada Torres Pereira.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 2nd year.
7. Lectures, lab and field classes.
8. Course Evaluation is done trough a Written Examination (80%), duration 60 minutes, covering both Lectures and Practical Sessions, and trough a Group Report on a Behavior or Welfare theme of practical relevance (20%).
9. No.
10. 3.

3rd Year

1. Surgery Basics – 0254.
2. Surgery basics: Asepsis. Tissues manipulation. Hounds. Sutures. Hemorrhage. Drainage. Pre, intra and post operative care. The surgery team. The behavioral in the operation room. Operation room: organization and surgical instruments Surgical diagnostic techniques. Endoscopy.
3a) No prerequisites.
3b) Development and understanding of the concepts of: Asepsis. Tissues manipulation. Hounds. Sutures. Hemorrhage. Drainage. Pre, intra e post operative care. Allow students to have contact with instruments and equipments in a surgery theatre, the surgery team and the behavioural in the operation room. Operation room: organization and instruments.
3c) Fossum, TW 2001 *Small Animal Surgery*, 3rd ed.; Turner, AS & McWraight, CW 1989 *Techniques in large animal surgery*, 2nd ed., Lea & Gebiger; Knecht, A & William, J 1989 *Técnicas Fundamentais em Cirurgia Veterinária*, Roca ed.; Gonzalo, JM 1994 *Cirurgia Veterinária*, Interamericana ed..
4. Compulsory.
5. Luís Antunes, José Eduardo Pereira.
6. 6 h/ week (4 practical + 2 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final examination.
9. No.
10. 6.

1. Medical Semiology – 0249.
2. Concepts of Medical Semiology. Semiotechny, symptoms, clinical signs, syndromes, clinical frame and clinical judgement. Clinical history, general examination, termorregulation physiopathology. Pathophysiology and clinical approach to all the body systems in large and small animals: digestive system, respiratory system, cardiovascular system, blood and hematopoietics organs, urinary system, nervous and senses system, endocrine system.
The practical lectures include lab practices on haematology, blood and urine biochemical profiles, urine sediment, pancreatic and hepatic enzimology. Practical lectures with live animals are intended to learn how to explore and interpret clinical symptoms in all the body systems of large and small animals.
3a) Good knowledge on Anatomy, Histology, Biochemistry and Physiology.
3b) The objectives of this discipline are the understanding of the physiopathologycal mechanisms which led to functional disorders of a system and the consequent clinical expressions, taking into account the different animal species, enabling the student to reach a diagnostic. It gives the basic and fundamental background to the disciplines of Medical Pathology.
3c) Rijnberk, A & Vries, HW 1995 *Medical History and Physical Examination in Companion Animals*, Kluwer Academic Publishers; Ettinger, SJ 1999 *Textbook of Veterinary Internal Medicine*, WB Saunders Company; Meyer, DJ & Harvey, JW 1998 *Veterinary Laboratory Medicine*, *Interpretation & Diagnostics*, WB Saunders Company; Smith, BP 2002 *Large Animal Internal Medicine*, Mosby.
4. Compulsory.
5. Aura Colaço, Ana Cristina Ferreira, Felisbina Queiroga, Maria João Pires.
6. 6 h/week (2 theoretical + 4 practical); annual; 3rd year.
7. Lectures and practical classes.
8. Two written tests (each positive test is 50% of final theoretical note). Final examination of practical course. Final note is 50% of theoretical and 50% of practical.
9. No.
10. 10.

1. Special Veterinary Pathology – 0250.
2. Cardiovascular system; Respiratory system and serosal membranes; Gastrointestinal system; Liver, biliary system and exocrine pancreas; Urinary system; Endocrine system; Central nervous system; Bones, joints, muscle and tendons; Hemopoietic system; Integumentary system; Reproductive system (M/F) and mammary gland. The practical classes include necropsies, macroscopic and microscopic observation of different systems pathology.
3a) Knowledge on Histology and General Pathology.
3b) Knowledge and understanding of the most important pathological entities, studied by major body systems and animal species: evidentiation of domestic animals particularities study of causes (etiology), action and development mechanisms of disease (pathogeneses) tissular and organicals modifications study, induced to structural and ultra structural seal (morphological study), and molecular. Consequences and evolution modalities of the most relevant pathologic entities.
3c) Carlton, WW & McGavin, MD 2001 *Thomson's Special Veterinary Pathology*, 3rd ed., Mosby; Jones, TJ & Hunt, RD 1997 *Veterinary Pathology*, 6th ed., Lea & Febiger; Jubb, KVF *et al.* 1993 *Pathology of Domestic Animals,* 4th ed., Academic Press; Mouwen, JMVM & Groot, ECBM 1982 *A colour atlas of veterinary pathology*, Wolfe Medical Publications Ltd; Gil, JI & Durão, JC 1985 *Manual de Inspecção Sanitária de Carnes*, Fundação Calouste Gulbenkian.
4. Compulsory.
5. Anabela Alves, Isabel Pires, Justina Oliveira, Adelina Gama.
6. 6 h/week (2 theoretical + 4 practical); annual; 3rd year.
7. Lectures and practical classes.
8. Two theoretical evaluation (T), one practical (P) (slides (L) and anatomical pieces diapositives (S) and necropsy execution (N) one necropsy report (R). Final classification = 0,45 x T+ 0,45 x P (0,15 x S + 0,35 x N + 0,5 x L) + 0,10 x R.
9. No.
10. 10.

1. Pharmacology – 0251.
2. Theoretic: General principles. Drugs acting at synaptic and neuroeffector junctional sites. Drugs action on the central nervous system. Anti-inflammatory drugs. Autocoids. Drugs affecting: renal, cardiovascular, respiratory and gasterointestinal functions. Drug acting on reproductive organs. Hormones and hormone antagonists. Drugs acting on blood and blood-forming organs. Chemotherapy of parasitic infections. Chemotherapy of microbial diseases. Chemotherapy of viral diseases. Chemotherapy of neoplastic diseases. Drugs used in dermatology and ophthalmology. Using drugs in exotic animals. Practice: Different kinds of disposition of drugs. Pharmacography. Routs of administration of drugs. Pharmacokinetics. Pharmacodinamics.
3a) Knowledge in Biochemistry and Physiology.
3b) Theoretic: To introduce students to the source, physical and chemical properties, compounding, biochemical and physiological effects, mechanisms of action, absorption, distribution, biotransformation and excretion, and therapeutics and other uses of drugs. Practice: To introduce the students to the different kinds of disposition of drugs, prescribing drugs, routs of administration of drugs, working with basic concepts of pharmacokinetics and pharmacodinamics.
3c) Garret, J *et al.* (ed.) 2000 *Terapêutica medicamentosa e suas bases farmacológicas*, Porto Editora, 4ª ed.; Adams, HR 2001 *Veterinary Pharmacology and Therapeutics*, 8th ed., Iowa State University Press/Ames; Hardman, JG *et al.* 2001 *Goodman and Gilman's The Pharmacological Basis of Therapeutics*, 10th ed., Pergamon Press, NY.
4. Compulsory.
5. José Manuel de Melo Henriques de Almeida, Paula Alexandra Oliveira, Mário Pedro Gonçalves Cotovio.
6. 4 h/week (2 practical + 2 theoretical); annual; 3rd year.
7. Lectures and practical classes.
8. Theoretical final exam (50%) and practical final exam (50%).
9. No.
10. 8.

1. Microbiology and Immunology – 0252.
2 Theoretical Course The scope of the microbial world and the development of microbiology. Study of micro-organisms. Gene manipulation (recombinant DNA technology). The control of micro-organisms. Chemicals and physical methods in microbial control. Antimicrobial chemotherapy. Drug resistance. Infectious dynamic diseases. Host-parasite relationships. Parasitism. The immune response. Practical: Orientation to the Microbiology Laboratory: material and equipment, sterilisation methods; safety considerations. Microbiological culture media. Solutions and suspensions. Utilisation of biological subtracts. Study of micro-organisms. Bacterial culture techniques. The study of biochemical and serological activities of bacteria. Cultivation and fungi identification. The cultivation of virus.
3a) Good knowledge on biochemistry, Cytology, and Genetics.
3b) To increase the student's sensibility to the global importance of microbiology as a fundamental science, as well as to the microbial interaction and their relation with the other living organisms, their activities and relevance, how they are involved with the fundamental situation of the beneficial for every principles of biology, especially the molecular biology of great contemporary interest. To study the defences of the body against infections, understanding molecular basis for the body's resistance to invasion by foreign substances and the consequences of failures of the immune system.
3c) Brock, TD & Madigan, TM 1997 *Biology of Microrganisms*, Prentice-Hall; Fenner, F *et al.* 1993 *Veterinary virology*, Academic Press, Inc., San Diego; Male, D *et al.* 1996 *Advanced immunology*, Mosby, London; Pelczar, JM *et al.* 1993 *Microbiology concepts and applications*, McGraw-Hill, Inc., NY; Prusiner, SB 1995 *The prior diseases*. Scientific American; Tizard, I 1996 *Veterinary Immunology*, WB Saunders Company, NY.
4. Compulsory.
5. Jorge Rodrigues, António Conceição d'Almeida, Patrícia Poeta, Daniela Costa.
6. 6 h/week (2 theoretical + 4 practical);annual; 3rd year.
7. Lectures and practical classes.
8. Two tests; final written examination theoretical and practical.
9. No.
10. 10.

1. Parasitology – 0253.
2. Theoretical classes: Study of parasites from Kingdom Protista and Kingdom Animalia. Taxonomic and morphological classifications. Parasites and their environment. Practical classes: Course with one academic year long. Four practical hours a week
3a) Good knowledge on Biochemistry, Cytology, Zoology and Ecology.
3b) To increase student's sensibility to the global importance of parasitology as a basic science essential for the further comprehension of the pathology of parasitary diseases.
3c) Colville, J *1991 Diagnostic Parasitology for Veterinary Technicians*, Goleta: American Veterinary Publications; Cox, FEG *1993 Modern Parasitology: a textbook of parasitology*, 2nd ed., Oxford: Blackwell Scientific; Matthews, BE 1998 *An Introduction to Parasitology*, Cambridge University Press; Mehlhorn, H & Piekarski, G 1993 *Fundamentos de Parasitología: parasitos del hombre y de los animales domesticos*, Zaragoza: Editorial Acribia; Mehlhorn, H *et al.* 1992 *Atlas de Parasitología Veterinaria*, Barcelona: Grass Ediciones; Quinn, PJ *et al.* 1997 *Microbial and Parasitic Diseases of the Dog and Cat*, London: WB Saunders; Soulsby, EJL 1988 *Parasitología y Enfermedades Parasitárias en los Animales Domésticos*, 7ª ed., México: Interamericana.
4. Compulsory.
5. Manuela Rodrigues, Francisco Neto, Carmen Nóbrega.
6. 6 h/week (2 theoretical + 4 practical); annual; 3rd year.
7. Lectures and practical classes.
8. Two tests; final written examination theoretical and practical.
9. No.
10. 10.

1. Anesthesiology and Surgery Techniques – 0255.
2. Anaesthesiology: General anaesthesia, local and regional anaesthesia, pain, monitoring and equipments. Practical problems resolutions related with anaesthesia from different patients and emergency situations. Participation in the induction and maintains of anaesthesia. Surgery Techniques: study and practice of basic surgery techniques.
3a) No prerequisites.
3b) The student should be able to understand the concepts of: general anaesthesia, local and regional anaesthesia and pain. Must be able to monitor patients and use anaesthetic equipments. Should be able to solve practical problems related with anaesthesia from different patients, emergency situations and participate in the induction and maintains of anaesthesia. Surgery Techniques: study and practice of basic surgery techniques.
3c) Wall, LW & Clarke, KW 2000 *Veterinary Anaesthesia*, 10th ed., Bailliére Tindall ed.; Lumb & Jones 1996 *Veterinary Anesthesia*, by John C. Thurmon (ed.) *et al*.; Short, CE 1987 *Principles and Practice of Veterinary Anaesthesia*, Williams & Wilkins eds..
4. Compulsory.
5. Luís Antunes, José Eduardo Pereira.
6. 6 h/ week (4 practical + 2 theoretical); 2nd semester; 3 rd year.
7. Lectures and practical classes.
8. Final exam.
9. No.
10. 6.

4th Year

1. Reproduction and Artificial Insemination – 0053.
2. Introduction: Reproduction and the productive cycle of farm animals and the impact of reproduction on small animals insertion; the reproduction in endangered species survey. Anatomical, physiologic and endocrine bases of reproduction: Embryology of the reproductive system; Clinical anatomy and physiology of the female and male genitalia; Semen. Fertilization, pregnancy and parturition. External factors that regulate reproduction. Estrous cycle management (estrous synchronization, estrous induction and estrous suppression); Animal behaviour and reproduction. Artificial insemination. Reproductive technology.
3a) Good knowledge on Anatomy and Histology of the genital structures, on Ethology and basic concepts on endocrinology.
3b) Prepare the student on the physiologic mechanisms of reproduction, and on the basic reproductive biotechnology. Prepare the student to understand the physiopathological mechanism of reproductive diseases.
3c) Knobil, E & Neill, JD 1994 *The Physiology of Reproduction*, 2nd ed., Raven Press; Knobil, E & Neill, JD 1998 *Encyclopedia of Reproduction*, Academic Press, USA; Arthur, GH *et al.* 1996 *Veterinary Reproduction and Obstetrics*, 7th ed., Bailière Tindall; Youngquist, RS 1997 *Current Therapy in Large Animal Theriogenology*, Saunders, WB Co., 1st ed.; Johnston, Shirley *et al.* 2001 *Canine and Feline Theriogenology*, Saunders, WB Co..
4. Compulsory.
5. Rita Payan Carreira, José Carlos Almeida, Sandra Sacoto.
6. 6 h/week (2 theoretical + 4 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final exam (theoretical and practical, 50% each).
9. No.
10. 6.

1. Technology of Animal Products I – 0261.
2. Characteristics of raw materials, namely on nutritional and safety aspects. Food born Pathogens, characteristics, characteristics of the disease, control and prevention. Quality control systems, methodology of Hazard Analysis and Critical Control Points. Analytical techniques used in quality control. Sensory evaluation. General technological operations. Food conservation methods. Packing.
3a) No prerequisites
3b) The objective of this discipline is prepare the student for general aspects related to Food Technology namely the quality of raw materials, the problem of food borne poisoning, conservation procedures, general technology operations and systems and instruments associated to the quality control.
3c) Branen, AL *et al.* 1990 *Food Additives*, Marcel Dekker Inc.: NY; Fellows, P. 1992 *Tecnología del Precesado de los Alimentos: Princípios e Práticas*, Acribia: Zaragoza; Forsythe, SJ & Hayes, PR 2002 *Higiene de los Alimentos, Microbiologia y HACCP*, Acribia: Zaragoza; ICMSF 1983 *Ecologia Microbiana de los Alimentos*. 1. Factores que Afectam a la Supervivencia de los Microrganismos en los Alimentos, Acribia: Zaragosa; Potter, N & Hotchkiss, JH 1998 *Food Science*, Aspen Publishers, Inc.: Maryland.
4. Compulsory.
5. Conceição Martins, Luís Patarata, António Silva.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written test (T 75%; P 25%) or exam in the same conditions.
9. No.
10. 4.

1. Internal Medicine – 0256.
2. General status: disorders of hidroelectrolitic and acid-base balances; fluid therapy; shock; toxaemia. Large animal and equine medicine: metabolic diseases; gastroenterology; diseases of the respiratory system and equine acute abdomen. Small animal medicine: clinical nutrition in the critical patient; dentistry; gastroenterology; urology and nephrology; diseases of the respiratory system; hematology; oncology and ophthalmology.
3a) Good knowledge on Anatomy, Physiology, Medical Semiology, Pharmacology and Special Veterinary Pathology.
3b) Prepare the student for the clinical approaches, diagnosis and treatment of pathologies named in item 2.
3c) Ettinger, SJ & Feldman, EC 2000 *Textbook of Veterinary Internal Medicine. Diseases of the Dog and Cat*, 3rd ed., Saunders, WB Co.; Radostits, OM *et al.* 2000 *Veterinary Medicine. A Textbook of the diseases of Cattle, Sheep, Pigs, Goats and Horses*, 9th ed., Saunders, WB Co., Philadelphia; Smith, BP 1996 *Large Animal Internal Medicine. Diseases of Horses, Cattle, Sheep and Goats*, Mosby-Year Book, Inc., St Louis; Robison, NE 1997 *Current Therapy in Equine Medicine 4,* Saunders, WB Co., Philadelphia; DiBartola, SP 2000 *Fluid Therapy in Small Animal Practice*, 2nd ed., Saunders, WB Co., Philadelphia.
5. Carlos Viegas, Filipe Silva, Odete Almeida, Mário Cotovio.
6. 6 h/week (2 theoretical + 4 practical); annual, 4th year.
7. Lectures and practical classes.
8. One practical work with discussion and presentation (25%); two written assessments or final exam (75%).
9. No.
10. 10.

1. Surgical Pathology – 0257.
2. Small Animals – Traumatology. Orthopaedic surgery and osteosynthesis. Surgery of the digestive, urinary and respiratory systems. Gynaecological and obstetrical surgery. Ophthalmic surgery. Neurosurgery. Surgical resolution of hernias. Oncology. Large Animals (ruminants) – Traumatology. Foot pathology. Surgery of the digestive system and obstetric. Large Animals (equine) – Surgery of the digestive and upper respiratory systems and obstetric.
3a) General knowledge on Veterinary Anaesthesiology and Operative Veterinary Techniques.
3b) To provide to the students the acquisition of the theoretical and practical knowledge necessary to the resolution of the most frequent clinical cases that demand surgical resolution and to the realization of the convenience surgeries.
3c) Slatter, D 1993 *Textbook of Small Animal Surgery*, 2nd ed., vols. I e II, WB Saunders Co., Philadelphia; Fossum, TW *et al.* 2002 *Small Animal Surgery*, 2nd ed., Mosby, St. Louis; Piermattei, DL 1993 *An Atlas of Surgical Approaches to the Bones and Joints of the Dog and Cat*, 3rd ed., WB Saunders Co., Philadelphia.
4. Compulsory.
5. Luís Antunes, Maria Isabel Ribeiro Dias, Luís Maltês da Costa, Margarida Costa.
6. 6 h/week (2 theoretical + 4 practical); annual; 4th year.
7. Lectures and practical classes.
8. 2 written tests or a final exam – 100%.
9. No.
10. 10.

1. Pathology of Infectious Diseases – 0258.
2. Theoretical Course: General epidemiological concepts and principles of the infectious diseases. The cause of disease. Description and mechanisms of diseases occurrence. Patterns of disease. Surveys and observational studies. General measures of sanitary prophylaxis. The control and eradication of disease. Vaccines and vaccination. Presentation of the principal infectious diseases, comprising the etiopathogenesis, epidemiology, diagnostic, prophylaxis and the control measures. Invitees professors give seminaries of different subjects like avian and rabbit pathology of infectious nature, ecopathologie in intensive exploitation
3a) Good knowledge on Microbiology, Immunology Epidemiology and Pathology.
3b) Prepare the student for the comprehension of the infectious processes with impairment on the health of the livestock and pets, with special emphasis to the zoonosis and the diseases of major economic impact; and to understanding the cynetic of the infectious diseases in animal populations in view of establishment the best measures of control.
3c) Pensaert, MB 1990 *Virus infections of porcines*, Elsevier Science Publishers BV, Amsterdam; Thrusfield, M 1997 *Veterinary epidemiology*, Blackwell Science; Toma, B *et al.* 1997 *Epidemiologie appliquee à la lute collective contre les maladies animales transmissibles majeurs*, AEEMA, Alfort; Brand, A *et al.* 1996 *Herd health and production management in dairy practice*, Wageningen Pers.; Quinn, PJ *et al.* 1997 *Microbial and parasitic diseases of the dog and cats*, WB Saunders Co.; Quinn, PJ *et al*. 1994 *Clinical veterinary microbiology*, Wolfe; Calnek, BW *et al.* 1994 *Disease of poultry*, Iowa State University Press, Ames, Iowa; Greene, CE 1990 *Infectious diseases of the dog and cat*, WB Saunders Co..
4. Compulsory.
5. Jorge Rodrigues, Victor Duarte, Ana Cláudia Coelho, Patrícia Poeta.
6. 6 h/week (2 theoretical + 4 practical); annual; 4th year.
7. Lectures and practical classes.
8. Two tests; final written examination theoretical and practical.
9. No.
10. 10.

1. Pathology of Parasitic Diseases – 0259.
2. Theoretical Course: Introduction to the study of parasitic diseases: ethiology, biology, epidemiology, pathogeny, lesions, diagnosis, therapy, control and prophylaxis. Diseases caused by *Nemathelminthes*, *Acantocephala*, *Trematoda*, *Cestoda*, *Sarcomastigophora* and *Apicomplexa*. Diseases caused by *Insecta* and *Arachnoidea*. Identification of parasitic zoonosis and main control systems. Practical Course: Pick up and sending of materials to the laboratory for identification. Study of parasite morphology.*Ante-mortem* and *post-mortem* diagnosis. Practical visits to abattoirs and observation of parasitic lesion and sampling pathological material. Field work concerning prophylaxis and therapeutics of parasitary diseases.
3a) Good knowledge on Parasitology, Pathology, Immunology and Epidemiology.
3b) Prepare the students for the comprehension of the parasitic processes and the clinical exercise of veterinary medicine, concerning parasitary diseases of large and small domestic animals, knowing the ethiological agents, transmission forms and disease significance, as well as the potentialities of diagnosis, treatment and prophylaxis. To focus the attention for the importance of some diseases in public health. Special interest to diseases of social and economic character.
3c) Colville, J 1991 *Diagnostic Parasitology for Veterinary Technicians*, Goleta: American Veterinary Publications; Cox, FEG 1993 *Modern Parasitology: a textbook of parasitology*, 2nd ed., Oxford: Blackwell Scientific; Matthews, BE 1998 *An Introduction to Parasitology*, Cambridge University Press; Mehlhorn, H & Piekarski, G 1993 *Fundamentos de Parasitología: parasitos del hombre y de los animales domésticos*, Zaragoza: Editorial Acribia; Mehlhorn, H *et al.* 1992 *Atlas de Parasitología Veterinária*, Barcelona: Grass Ediciones; Quinn, PJ *et al.* 1997 *Microbial and Parasitic Diseases of the Dog and Cat*, London: WB Saunders Co..
4. Compulsory.
5. Manuela Rodrigues, Hélder Pereira, Luís Lucas Cardoso.
6. 6 h/week (2 theoretical + 4 practical); annual; 4th year.
7. Lectures and practical classes.
8. Two tests; final written examination theoretical and practical.
9. No.
10. 10.

1. Andrology, Gynaecology and Obstetrics – 0260.
2. Therapeutics on reproduction; evaluation of therapeutic response; reproductive side effects of drugs; hormonal and drugs residues. Reproductive diseases of genetic origin. Andrology: Breeding soundness examination; structural and functional diseases; clinical approaches to the male reproductive pathology. Gynaecology: reproductive evaluation of the female; structural and functional diseases; clinical approaches to infertility. Pregnancy diseases. Parturition and puerperium diseases. Obstetrical manipulation; C-section
3a) Good knowledge on Veterinary Pathology, Pharmacology and Reproduction and Artificial Insemination.
3b) Prepare the student to approaches any reproductive complaint, to make a diagnosis and by consequence propose a medical or surgical treatment, and to make a prognosis either on reproductive and vital capacity; to be able to make the association between the physiopathology of the process to its evolution, and chose the better therapy and to preview the success of the therapy.
3c) Arthur, GH *et al.* 1996 *Veterinary Reproduction and Obstetrics*, 7th ed., Bailière Tindall; Youngquist, 2000 *Large Animal Theriogenology*, WB Saunders Co.; Johnston, Shirley *et al.* 2001 *Canine and Feline Theriogenology*. WB Saunders Co.; Noakes, DE 1997 *Fertility and Obstetrics in Cattle*, 2ª ed., Library of Veterinary Practice.
4. Compulsory.
5. Rita Payan Carreira, Ana Celeste Martins.
6. 6 h/week (2 theoretical + 4 practical); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Final exam (theoretical and practical, 50% each).
9. No.
10. 6.

1. Technology of Animal Products II – 0266.
2. Meat and meat products. Slaughter, facilities, procedures, preparation of carcasses. Biochemical transformations in muscle post-mortem; abnormal situations of quality of meat (PSE, DFD meat). Transformation of by-products of the slaughter. Manufacturing of meat products; raw material, other ingredients, procedures, quality control. Milk and dairy products. Composition of milk – its relationship with transformation modifications. Procedures applied to the fluid milk industry. Manufacturing of dairy products; raw material, other ingredients, procedures, quality control. Fish and egg products.
3a) No prerequisites.
3b) Prepare the student for the insertion in the professional sector with knowledge relative to the production of meat and meat products, milk and dairy products, fish and egg products. The general aspects presented in Food Technology I are integrated in this discipline approach to these subjects.
3c) Keizer,C 1995 *Freezing and chilling of fish*, in A Ruiter (ed), Fish and fishery products. Composition, nutritive properties and stability: Wallingford, CAN International, pp. 287-313; Price, JF & Schweigert, BS 1994 *Ciencia de la carne y de los productos cárneos*, Zaragoza, Editorial Acribia SA; Sirorski, Z *et al.* 1995 *Fish products*, in A Ruiter (ed), Fish and fishery products. Composition, nutritive properties and stability: Wallingford, CAN International, pp. 315-346; Stadelman, W & Cotterill, O 1995 *Egg Science and Technology*, Binghamton, Food Products Press; Walstra, P *et al.* 2001 *Ciencia de la leche y tecnología de los productos lácteos*, Zaragoza, Editorial Acribia SA..
4. Compulsory.
5. Conceição Martins, Luís Patarata, António Silva.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Final written test (T 75%; P 25%) or exam in the same conditions.
9. No.
10. 4.

5th Year

1. Toxicology – 0263.
2. Theoretic: General principles of toxicology. Xenobiotics mechanism of action, toxicokinetics. Clinical toxicology. Dopping. Environemental toxicology. Residues. Analytical/Forensic toxicology. Risk assessment. Experimental toxicology. Practical: Forensic and therapeutic thecniques. Experimental assays related with toxicology. Toxicokinetics. Analytical toxicology.
3a) Knowledge on Biochemistry, Physiology and Pharmacology.
3b) Theoretic: To introduce the student to the study of toxic substances, their source, physical and chemical properties, compounding, biochemical and physiological effects, mechanisms of action, absorption, distribution, biotransformation and excretion, toxic effects, interaction with the environment and also resolution of toxic cases and toxicologic epidemiology. Pratical: To introduce the students to forensic and therapeutic techniques, experimental assays related with toxicology, toxicokinetics and basic processes of analytical toxicology.
3c) Klaassen, CD 2001 *Casarett and Doull's Toxicology the Basic Science of Poisons*; 6th ed., Pergamon Press, NY; Timbrell, JA *2001 Introduction to Toxicology*, 3rd ed., Taylor & Francis, London.
4. Compulsory.
5. José Manuel de Melo Henriques de Almeida, Paula Alexandra Oliveira, Mário Pedro Gonçalves Cotovio.
6. 3 h/week (2 practical + 1 theoretical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Theoretic and practice final exam.
9. No.
10. 4.

1. Clinical Radiology – 0267.
2. Radiation physics, X-ray machine. Radiographic equipment. Radiographic quality. Terminology used to describe radiographic positioning. Radiation safety. Techniques of small and large animal diagnostic imaging. Diseases of immature skeleton. Clinical radiography of the dog and the cat: thoracic, abdominal, head, pelvis, forelimb and pelvic limb. Special (contrast) radiographic procedures. Radiography of the horse's hoofs (forelimb and hind limb) and thoracic. Basic physics of ultrasound. Clinical ultrasound of the dog and cat: abdominal, cardiac and the eye. Clinical ultrasound of the horse: fore and hind limb.
3a) No prerequisites.
3b) To introduce students, in a systematic way, to theoretical notions of specific imaging techniques in veterinary medicine. To prepare the students for working with X-ray and ultrasound machines and interpretation of the X-ray ultrasound imaging.
3c) Thrall, DE 2002 *Textbook of Veterinary Diagnostic Radiology*, WB Saunders Company, Philadelphia; Burk, RL & Norman, A 1996 *Small Animal Radiology and Ultrasonography*, 2nd ed., WB Saunders Company; Butler, Janet *et al.* 1997 *Clinical Radiology of the Horse*, Blackwell Science; Morgan, JP 1993 *Techniques of Veterinary Radiography*, 5th ed., Iowa State University Press.
4. Compulsory.
5. Mário Ginja.
6. 3 h/week (2 practical + 1 theoretical); 1st semester; 5th year.
7. Theoretical and practical classes. In practical classes the students follow the radiological examination of the patient and radiographic interpretation and observation of slides of diseases where the radiographic diagnostic is important.
8. Final written (theoretical and practical) exam.
9. No.
10. 4.

1. Economics – 0269.
2. Agricultural Production Theory: factor product relations; Analysis of the factors Labour, Capital and Entrepreneur; Agricultural firm results – Gross product and Expenses; Investment Project Appraisal – Uniform annual cost, Present value and Internal rate; Learn programming – the mathematical model, problem formulation and economic interpretation.
3a) No prerequisites.
3b) Firstly is to allow the contact with basic economics/management notions, applied to the agricultural sector, which facilitate the understanding of the factors and products relations and the obtaining of the consequent economics results. Secondly, it intends to provide the students with analysis tools needed to support decision making, towards two main issues: financial analyses of alternative investments and operations research.
3c) Boussard, JM 1987 *Economie de l´Agriculture*, Ed. Económica, Paris; Miller, RL 1981 *Microeconomia*, McGraw-Hill, S. Paulo; Poeta, AD 1990 *Alguns Elementos sobre Funções de Produção*, Série Didática, Ciências Sociais e Humanas, UTAD, Vila Real; Ramalhete, M *et al.* 1985 *Programação linear*, vols. I e II, McGraw-Hill, Lisboa; Rossetti, JP 1993 *Introdução à Economia*, Ed. Atlas, SA, 15ª ed., S. Paulo.
4. Compulsory.
5. Alexandre Manuel Silva Dinis Poeta.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final written exam with practical work.
9. No.
10. 3.

1. Veterinary Public Health – 0271.
2. Veterinarian sphere of influence and abilities in the scope of Public Health and his multidisciplinary intervention; Legal aspects and framing of national and European Community programs relative to: Epidemiological surveillance and control of zoonosis and education for health; Hygiene in animal production and food processing industries and their environment impact/protection (treatment and elimination of residues and effluents); Plagues and disown animals control; Dealing with catastrophe situations.
3a) Basic knowledge on Epidemiology and Pathology of Zoonosis;
3b) Students should understand the importance of Veterinarian regarding the public health defence, conceptual and legislative knowledge application to a present case study concerning public health: Promotion of team work spirit and dynamic, knowledge application, self-learning, analytical and critical spirit development, as well as the elaboration of intervention proposals concerning the improvement of public.
3c) Gonçalves Ferreira, FA 1990 *Moderna Saúde Pública*, Ed. Fundação C. Gulbenkian; DGV, 1979 *Medicina Veterinária e Saúde Pública,* Boletim Pecuário; Thrusfield, M 1990 *Epidemiologia veterinária*, Editorial Acribia; Paiva-Cardoso, MN 2003 *Epidemiologia das Doenças Infecciosas e Estatísticas de Saúde Pública*, UTAD, Vila Real; Paiva-Cardoso, MN 2003 *Saúde Pública*, UTAD, Vila Real; Paiva-Cardoso, MN 2003 *Medicina Veterinária e a Saúde Pública*, UTAD.
4. Compulsory.
5. Maria das Neves Paiva Cardoso.
6. 6 h/week (2 theoretical + 4 practical); 2nd semester; 5th year.
7. Lectures and practical classes. The goal of practical classes is the application of theoretical knowledge and group work (4-5 students/group): written essay and public presentation of a thematic seminar (self-learning method in tutorial system).
8. Test or final written exam regarding all studied subjects including seminars (70 %) written essay (20 %) and seminar (10 %).
9. No.
10. 3.5.

1. Sociology and Veterinary Deontology – 0272.
2. The deontology statutes and rules of the OMV: philosophical and normative aspects; Social Interaction: communication, social institutions and social stereotypes; Professionalism: ideology and social beliefs about work of the specialist/expert, social processes of professionalization, professional identities and the socialization process.
3a) No prerequisites.
3b) To transmit information and knowledge about the ethical rules and statutes for the profession (deontology) as Doctors of Veterinary Medicine (OMV); to make students aware of their future responsibility as OMVs to the normative problems and social interactions with their clients and with their peers; to understand the theoretical-sociological framework for the development of professionalism and the professional identities in modern societies and industries with other occupations .
3c) Marc, E & Picard, D 1996 *A interacção social*, Porto, Rés; Dubar, C 1997 *A socialização - construção das identidades sociais e profissionais*, Porto, Porto Editora; Rodrigues, Maria de Lurdes 1997 *Sociologia das profissões*, Lisboa, Celta.
4. Compulsory.
5. Telmo H. Caria, Guilherme Guimarães.
6. 2 h/week; 2nd semester; 5th year.
7. Theoretical classes.
8. Final exams and written essays.
9. No.
10. 1.

1. Sanitary Inspection – 0264.
2. Notions on food product's toxicity. Meat e meat products - transport, acceptance, *ante* and *post mortem* inspection of cattle, poultry, rabbit and hunting species. Concepts on meat anomalies (insalubrious, repugnant, an-nutritious or from ill animals). Fish and it's by-products – Grounds for fish classification and methods for conservation and for freshness level evaluation. Inspection of eggs, egg products, milk and milk-food. Inspection techniques, applicable legislation – sanitary decisions. Chemical product's residues in food products of animal origin. Detection methods and surveillance programs. Practical teaching lessons consist of attendance of inspection acts *ante* and *post mortem*, and of sanitary decisions in different slaughterhouses and the attendance of fish inspection acts at the Municipal Market. These lessons are complemented with laboratory techniques, study visits to an egg classification centre, fish harbour and to milk and meat product's industries.
3a) No prerequisites.
3b) To apply and integrate acquired knowledge, as well as to understand the main purposes of the subject, in order to assure that only food products with proper sanitary, hygienic and nutritional conditions reach the consumer. Perfect theoretical and practical knowledge of food and food product's control and inspection techniques.
3c) Forsythe, SJ & Hayes, PR 2002 *Higiene de los Alimentos*, *Microbiologia y HACCP*, Acribia: Zaragoza, España; Garcia, BM 1991 *Higiene e Inspección de Carnes*. Univ. de Léon, España; Gil, JI 2000 *Manual de Inspecção Sanitária de Carnes*, Vols. I e II, Fundação Calouste Gulbenkian; Gracey, J *et al.* 1999 *Meat Hygiene*, 10th ed., WB Saunders Co.; Crosby, NT 1991 *Determination of Veterinary Residues in Food*, Ellis Horwood Publication; Walstra, P *et al.* 2001 *Ciencia de la leche y tecnología de los productos lácteos*, Ed. Acribia, SA, Zaragoza (España).
4. Compulsory.
5. Conceição Martins, Alexandra Esteves, Cristina Saraiva, Madalena Vieira Pinto, Maria da Conceição Fontes.
6. 8 h/week (2 theoretical + 6 practical); annual; 5th year.
7. Lectures and practical classes.
8. Theoretical classification weighs 75% of final classification, and consists of 2 objective (theoretical) tests. Practical evaluation (25% of final classification): 2 practical tests, resolution of practical problems illustrated with slides, attendance of inspection acts and making of respective reports.
9. No.
10. 16.

1. Zootechny and Animal Breeding – 0265.
2. Production and breeding of the species bovine, ovine, goat, swine, chicken, rabbit and equine.
3a) Good knowledge on Medical Statistic, Genetics, Animal Physiology, Biochemistry and Nutrition.
3b) Teach to the students the scientific basis under Animal Production and Breeding activities, integrating the knowledge they already have from the prior disciplines making them able to manage data banks of productive and reproductive traits and to use the information for farm management and animal selection.
3c) Nicholas, FW 1987 *Veterinary Genetics*, Oxford Science Publications, 578 pages; Buxadé Carbó, C 1997 *Producción Porcina: aspectos claves*, 2ª edición, MundiPrensa; Buxadé Carbó, C 1998 *Ovino Carne: aspectos claves*, 2ª edición. Mundi Prensa; Buxadé Carbó, C 1998 *Vacuno de Leche: aspectos claves*, 2ª edición, MundiPrensa.
4. Compulsory.
5. Jorge Colaço, Ângela Martins, Fátima Petim, Mário Silvestre.
6. 6 h/week (4 practical + 2 theoretical); annual; 5th year.
7. Lectures and practical classes.
8. Final theoretical written exam and two practical tests.
9. No.
10. 10.

1. Large Animal Clinics – 0268.
2. Farm clinical approach of different food animal species and different production systems. The clinical approach is based upon the establishment of diagnosis, treatment and the medical and sanitary prophylaxis of the main diseases in: dairy and beef cattle farming; small ruminant farming, aiming at either the milk or beef production; equine; swine farms; industrial rabbit production and industrial poultry production. Neonatology. Diseases of the alimentary, respiratory, and urinary tracts. Diseases of nervous and musculoskeletal systems. Metabolic and nutritional diseases. Dermatology. Legislation for animal identification and transport, compulsive report of diseases, control and eradication of diseases and animal welfare. Practical classes include clinical management of animals admitted to University Hospital and in farms that belong to UTAD.
3a) Good knowledge on Parasitic and Infectious diseases and Pharmacology.
3b) The objectives are acquisition and integration of scientific and technical information for clinical approach considering diagnosis, treatment and prophylaxis of large animal species diseases in different production systems. Relationship of this clinical assessments and the optimization of the animal production, animal welfare and public health.
3c) Blood, DC & Raostits, OM 1994 *Veterinary Medicine*, 8th ed., London: Baillière Tindall; Howard, JL 1993 *Current Veterinary Therapy 3: Food Animal Practice*, Philadelphia, WB Saunders Company; Jordan, FTW & Pattison, M 1996 *Poultry Diseases*, 4th ed., London: WB Saunders Company; Leman, AD & Straw, BE 1994 *Disease of Swine*, 7th ed., Iowa: Iowa State University Press; Okerman, L 1994 *Diseases of Domestic Rabbits*, 2nd ed., Oxford: Blackwell Scientific Publications; Robinson, NE 1997 *Current Therapy in Equine Medicine 4*, Philadelphia: WB Saunders Company; Smith, BP 1996 *Large Animal Internal Medicine*, 2nd ed., Toronto: The CV Mosby Company.
4. Compulsory.
5. João Carlos Caetano Simões, Mário Pedro Madureira, Teresa Martins.
6. 4 h/week (1 theoretical + 3 practical); annual; 5th year.
7. Lectures and practical classes.
8. Two written assessments (75% of final note), one case study with presentation and discussion (25% of final note).
9. No.
10. 8.

1. Small Animal Internal Medicine – 0270.
2. Congestive heart failure. Disturbances of Cardiac Rhythm. Valvular diseases. Myocardial diseases in the dog and cat. Pericardial diseases. Behavior problems. Parasitic and fungal diseases of the skin. Allergic skin diseases. Immune-mediated skin diseases. Miscellaneous diseases of the skin. Bacterial skin diseases. Pancreatic diseases. Diseases of the adrenal gland. Diseases of the thyroid gland.. Vestibular syndrome. Disc diseases. Seizures and epilepsy. Medullar trauma.
3a) No prerequisites.
3b) The objectives are to introduce and prepare the students for small animal veterinary practice. The aim of this discipline is to provide the basis for simple, rational diagnostic approach and therapeutic regimen for common internal medicine complaints dealt with in small animal veterinary practice.
3c) Ettinger, SJ & Feldman, EC 2000 *Textbook of Veterinary Internal Medicine*, 5th ed., Philadelphia, WB Saunders Company; Birchard, SJ & Sherding, RG 1994 *Saunders Manual of Small Animal Practice*, Philadelphia, WB Saunders Company; Nelson, RW & Couto, CG 1992 *Essentials of Small Animal Internal Medicine*, St Louis, Mosby; Oliver, JE *et al.* 1997 *Handbook of Veterinary Neurology*, 3rd ed., Philadelphia, WB Saunders Company; Fox, PR *et al.* 1999 *Textbook of canine and feline cardiology*, 2nd ed., Philadelphia, WB Saunders Company.
4. Compulsory.
5. Artur Varejão, Ana Patrícia Sousa, Elisabete Espinheira.
6. 4 h/week (3 practical + 1 theoretical); annual; 5th year.
7. Lectures and practical classes.
8. 2 written assessments (75% of the final note); 1 case study with presentation and discussion (25% of the final note).
9. No.
10. 8.

1. Veterinary Public Health – 0271.
2. Veterinarian sphere of influence and abilities in the scope of Public Health and his multidisciplinary intervention; Legal aspects and framing of national and European Community programs relative to: Epidemiological surveillance and control of zoonosis and education for health; Hygiene in animal production and food processing industries and their environment impact/protection (treatment and elimination of residues and effluents); Plagues and disown animals control; Dealing with catastrophe situations.
3a) Basic knowledge on Epidemiology and Pathology of Zoonosis;
3b) Students should understand the importance of Veterinarian regarding the public health defence, conceptual and legislative knowledge application to a present case study concerning public health: Promotion of team work spirit and dynamic, knowledge application, self-learning, analytical and critical spirit development, as well as the elaboration of intervention proposals concerning the improvement of public.
3c) Gonçalves Ferreira, FA 1990 *Moderna Saúde Pública*, Ed. Fundação C. Gulbenkian; DGV, 1979 *Medicina Veterinária e Saúde Pública,* Boletim Pecuário; Thrusfield, M 1990 *Epidemiologia veterinária*, Editorial Acribia; Paiva-Cardoso, MN 2003 *Epidemiologia das Doenças Infecciosas e Estatísticas de Saúde Pública*, UTAD, Vila Real; Paiva-Cardoso, MN 2003 *Saúde Pública*, UTAD, Vila Real; Paiva-Cardoso, MN 2003 *Medicina Veterinária e a Saúde Pública*, UTAD.
4. Compulsory.
5. Maria das Neves Paiva Cardoso, Ana Cláudia Coelho.
6. 6 h/week (2 theoretical + 4 practical); 2nd semester; 5th year.
7. Lectures and practical classes. The goal of practical classes is the application of theoretical knowledge and group work (4-5 students/group): written essay and public presentation of a thematic seminar (self-learning method in tutorial system).
8. Test or final written exam regarding all studied subjects including seminars (70%) written essay (20%) and seminar (10%).
9. No.
10. 6.

1. Sociology, History of Medicine Veterinary and Deontologic Principles – 0272.
2. The deontology statutes and rules of the OMV: philosophical and normative aspects; Social Interaction: communication, social institutions and social stereotypes; Professionalism: ideology and social beliefs about work of the specialist/expert, social processes of professionalization, professional identities and the socialization process.
3a) No prerequisites.
3b) To transmit information and knowledge about the ethical rules and statutes for the profession (deontology) as Doctors of Veterinary Medicine (OMV); to make students aware of their future responsibility as OMVs to the normative problems and social interactions with their clients and with their peers; to understand the theoretical-sociological framework for the development of professionalism and the professional identities in modern societies and industries with other occupations .
3c) Marc, E & Picard, D 1996 *A interacção social*, Porto, Rés; Dubar, C 1997 *A socialização - construção das identidades sociais e profissionais*, Porto, Porto Editora; Rodrigues, Maria de Lurdes 1997 *Sociologia das profissões*, Lisboa, Celta.
4. Compulsory.
5. Telmo H. Caria, Guilherme Guimarães.
6. 2 h/week; 2nd semester; 5th year.
7. Theoretical classes.
8. Final exams and written essays.
9. No.
10. 1.

EXACT, NATURAL & TECHNOLOGICAL SCIENCES

Applied Ecology Degree

Programme of Studies

	1st semester	ECTS	2nd semester	ECTS
1st YEAR	Mathematics Elements	5.0	Organic Chemistry	5.0
	Chemistry	5.0	Informatics	5.0
	Biophysics	5.0	Zoology	5.0
	Cellular Biology and Histology	5.0	Botany	5.0
	Geology	5.0	Structure and Function of Ecosystems	5.0
	Software Applications	5.0	Bioclimatology	5.0
	Total	30	Total	30
	1st semester	ECTS	2nd semester	ECTS
2nd YEAR	Biostatistics and Experimental Design	5.0	Remote Sensing	5.0
	Biochemistry	5.0	Plant Ecophysiology	5.0
	Pedology and Soil Conservation	5.0	Dendrology and Phytossociology	5.0
	Hydrology	5.0	Quantitative Ecology	5.0
	Environmental Microbiology	5.0	Sampling and Inventory Techniques	5.0
	Natural Resources Economics	5.0	Population Genetics	5.0
	Total	30		30
	1st semester	ECTS	2nd semester	ECTS
3rd YEAR	Geographical Information Systems	5.0	Ecotecnology	5.0
	Ecological Modelling	5.0	Cynegetics	5.0
	Animal Ecophysiology	5.0	Environmental impact Study	5.0
	Ecotoxicology	5.0	Ecological Integrity	5.0
	Sylviculture	5.0	Fire Ecology and Management	5.0
	Limnology	5.0	Urban and Peri-Urban Forest	5.0
	Total	30		30

	1st semester	ECTS	2nd semester	ECTS
	Branch of Ecosystem Management		Final Project	30
	Landscape Management	2.5		
	Decision Models	2.5		
	Landscape Ecology	5.0		
	Restoration of Forest Ecosystems	5.0		
	River Rehabilitation	5.0		
	Monitoring of Soil Quality	5.0		
4th	Wildlife Conservation	5.0		
	Branch of Wild Resources Management			
Y	Protected Areas	2.5		
E	Mycology	2.5		
A	Range Management	5.0		
R	Etnobotany	2.5		
	Beekeeping	2.5		
	Fish Management in Fresh Waters	5.0		
	Game Restocking	5.0		
	Plant Production Systems	5.0		
	Branch of Environment Diagnosis			
	Landscape Management	2.5		
	Environmental Education	2.5		
	Eco-Management and Audit	5.0		
	Air Pollution and Quality	5.0		
	Monitoring of Soil Quality	5.0		
	Water Pollution and Quality	5.0		
	Solid Residuals	5.0		
	Total	30	Total	30

Total credits: 240

1st year

1. Mathematics Elements – 1688
2. Introduction to complex numbers: definition of the complex numbers; properties of complex numbers. Functions of one real variable: implicit and inverse functions; the inverse trigonometric functions. Limits of functions and continuity; the Intermediate Value Theorem. Derivatives: the Chain Rule; higher order derivatives; implicit differentiation; the Mean Value Theorem; L' Hôpital' s Rule; Taylor's formula; Maximum-Minimum Problems. Antiderivatives: techniques of integration. Integration: the definite integral; the Fundamental Theorem of Calculus. Applications of integration: the area between two curves.
3a) High-school Mathematical Analysis.
3b) To provide students the basics concepts of Mathematical Analysis.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw-Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytical Geometry, 1st vol., Weber and Schmidt; Apostol, TM 1967 Calculus, 2nd ed., 1st vol., Wiley International Edition.
4. Compulsory
5. Armando Figueiredo, Sílvia Reis.
6. 4 h/week (2 theoretical + 2 theoretical/practical); 1st semester; 1st year.
7. Lectures and theoretical/practical classes.
8. Final written exam 100%.
9. No.
10 . 5.

1. Chemistry - 0003.
2. Chemistry tools; Chemical equations and reactions in aqueous solution; Chemical bonding; Thermodynamics; Chemical kinetics; Chemical equilibrium; Acid-base Equilibria; Solubility equilibria; Electrochemistry.
3a) No prerequisites.
3b) To instruct basic knowledge in General Chemistry: nomenclature, characteristic reactions and its mechanism, with relevance at ecological processo level.
3c) Chang. R 1994 Química, 5ª ed., McGraw-Hill; Seager SL & Slabaugh, MR 2000 Chemistry for Today General, Organic, and Biochemistry, Ed. Brooks/Cole, 4th ed., UK; Reger, D et al. 1997 Química: Princípios e Aplicações, Ed. da Fundação Calouste Gulbenkian, Lisboa.
4. Compulsory.
5. Maria Manuel Silva Oliveira.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final theoretical and practical examination.
9. No.
10. 5.

1. Biophysics - 0239.
2. I – Membrane biophysics. Fick diffusion equation. II – Concepts about fluid biophysics: Hydrostatics: Stress in a fluid. Pressure in a fluid at rest. III General concepts of nuclear physics and of radiation: Energy and nuclear forces. Radioactivity. Radiation - alpha, beta e gamma. Period and half-life of a radio-nuclide. Interactions of radiation with mater.
3a) No prerequisites.
3b) To supply the basic knowledge to permit the application of ideas, concepts and techniques used in physics to biological phenomena. It pretends to explain how physical processes, such as electricity, fluid mechanics, diffusion, nuclear radiation nuclear, etc.; are applied to increase the comprehension of biological mechanisms, such as: nervous impulse, circulatory system and regulation of blood flow, transport and distribution of substances between the interior and the exterior of the cell, radiation and radioactivity, constituting the learning basis of biological sciences. It also pretends to give a rational basis to the students in order that they can equation the biological events and apply the acquired knowledge to similar situations.
3c) Sears, F et al. 1984 Física, Livros Técnicos e Científicos Editora, vol. IV; Salgueiro, Lídia & Gomes Ferreira, J 1991 Introdução à Biofísica, Ed. Fundação Calouste Gulbenkian; Coletta, VP 1995 Physics, College of Physics/Vincent Colleta, Ed. McGraw-Hill; Pedroso de Lima, JJ 1993 Conceitos gerais sobre biofísica de membranas, Textos de apoio às aulas teóricas; Pedroso de Lima, JJ 1995 Conceitos gerais sobre biofísica dos líquidos, Textos de apoio às aulas teóricas; Pedroso de Lima, JJ 1993 Princípios básicos de física nuclear e das radiações, Textos de apoio às aulas teóricas; Silva, Amélia 2002 Fichas de problemas de apoio às aulas práticas.
4. Compulsory.
5. Amélia Maria Lopes Dias da Silva.
6. 4 h/week (2 theoretical + 2 theoretical/practical); 1st semester ; 1st year.
7. Lectures and theoretical/practical classes.
8. As described on the Pedagogic Norms. Continuos evaluation (2 written test, covering the theoretical and theoretical/practical lectures) or a final exam.
9. No.
10. 5.

1. Geology - 0144.
2. Basic concepts of Environmental Geology. Geohazards to man - earthquakes and vulcanoes. External earth dinamics and human interference -mass movements, floods, groundwater (exhausting and poluttion), coastal environments. Geological resources exploitation and environmental implications.
3a) None.
3b) Show the importance of Geology in life aspects, considering geological hazards and resources.
3c) Coch, NK 1995 Geoharzards. Natural and human, Ed.: Prentice-Hall, Inc.; Plummer & McGeary 1996 Physical geology, 7th ed., Ed.: Wm. C. Brown Publishers.
4. Compulsory.
5. Mª do Rosário Costa Pereira, Anabela Ribeiro Reis.
6. 4 h/week (2 theoretical + 2practical); 1stsemester; 1st year.
7. Lectures and practical classes.
8. Final teoric exam (60%) + Final practical exam (40%).
9. No.
10. 5.

1. Cellular Biology and Histology - 1689.
2. Cellular Biology – Theory: Biological organization levels. Animal and plants cells: plasma membrane. Practice: Optical microscope. Prokaryotic cell. Vegetal Histology – Theory: General structures of the plants. Practice: Observation, drawing and discussion of microscopic preparations containing all plants tissues. Animal Histology – Theory: Structural and functional organization of animal tissues: epithelial, connective, muscular and nervous. Practice: Histological technique. Observation of microscopic preparations of gills, livers and ovaries of fishes not exposed to pollution, captured in polluted rivers and exposed to pollution for metals.
3a) Basic knowledge on Biology.
3b) Cellular Biology – To acquire knowledge about the structure-function duality at the cellular level, general vision of the inherent biological processes of the prokaryotic and eukaryotic cells. Vegetal Histology – Study of structural, morphologic and functional features of plants tissues. Animal Histology – Study of structural, morphologic and functional features of animal tissues. Tissues alterations.
3c) Azevedo, C 1999 Biologia Celular e Molecular, 3ª ed., Lidel, Edições Técnicas; Paniagua, R et al. 1993 Citologia y Histologia Vegetal y Animal - Biologia de las celulas y tejidos animales y vegetales, Interamericana - McGraw-Hill; Purves, WK et al. 1995 Life-the science of Biology. 4th ed., WH Freeman & Co, USA; Moreira, I 1993 Histologia Vegetal, 4ª ed., Didática; Fanh, A 1974 Plant Anatomy, 2a ed., Pergamon Press, Oxford; Esau, K 1972 Anatomia Vegetal, Ediciones Omega, SA, Barcelona; Pinto, TMS 1994 Parênquima, UTAD, Vila Real; Junqueira, LC & Carneiro, J 1990 Histologia Básica, 7ª ed., Editora Guanabara; Burkitt, HG et al. 1994 Wheater - Histologia Funcional, 3ª ed., Editora Guanabara.
4. Compulsory.
5. Teresa Maria Pinto, Jorge Ventura F. Cardoso, Sofia Santos, Claudia Fernandes.
6. 4 h/week (2 teoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. According to University Regulations, 2 written tests or a final exam - 100%.
9. No.
10. 5.

1. Software Applications - 1551.
2. Computing Systems; Operative Systems; Operative Systems in a graphic Environment; net work environments; Text processor; Calculus Processor; Power point; Data base processor; CAD
3a) not applicable.
3b).Students should be able to use the most well know software as a tool for all their academic progression. As a final goal we try to get the same stage of knowledge and capacity to use these tools by all the students.
3c) Campbell, M 1993 Iniciação aos computadores, Edições CETOP; Amaro, N 1996 Iniciação Windows 95, Edições CETOP; Anónimo 1995 Guia prático: Windows, Word, Excell, Acess, Ed. McGraw-Hill; Fonseca, MI & Silva, MF 2002 Microsoft Excel 97, FMV/UTL; Fonseca, MI & Vaz, Y 2002 Microsoft Word 97, FMV/UTL; Silva, MF& Fonseca, MI 2002 Microsoft PowerPoint 97, FMV/UTL.
4. Compulsory.
5. Domingos Lopes, Eugénio Varejão.
6. 4 h/week; 1st semester; 1st year.
7. Lectures/practical classes.
8. Final written exam and practical work.
9. No.
10. 5.

1. Organic Chemistry - 0103.
2. Hydrocarbons, their derivatives. Functional groups constituted by sigma bonds. Nucleophilic substitution and elimination reactions. Functional groups with double bonded oxygen. Polymers. Selection of plastics, its processing and recycling. UV and IR spectroscopy. Industrial and economical aspects of the organic chemistry.
3a) General Chemistry.
3b) To instruct basic knowledge in Organic Chemistry: nomenclature, stereochemistry, characteristic reactions and its mechanisms, as well as the tools needed to the understanding of the processes controlling the transport and fate of organic chemicals in the environment.
To provide cognition about the main analytical techniques used in organic chemistry.
3c) Solomons, TW 2000 Organic chemistry, 7ª ed., John Wiley & Sons; Allinger et al, 1988 Química Orgânica, Ed. Guanabara Koogan SA; Criddle, WJ & Ellis, GP 1991 Caracterização Espectroscópica e Química de Compostos Orgânicos, Livraria Almedina; Campos, LS & Mourato M 1999 Nomenclatura dos Compostos Orgânicos, 1ª Ed., Escolar Editora.
4. Compulsory.
5. Fernando Glenadel Braga.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Final written exam (70%) and practical work (30%).
9. No.
10. 5.

1. Informatics - 0367.
2. Introduction to informatics. Introduction to programming. Programming in Visual Basic. Concepts of programming. Database concepts. Programs with databases.
3a) Basic fundamentals of Informatics.
3b) To develop algorithms in order to solve simple problems. Develop small applicatios in Visual Basic. To project. a simple database. To develop applications accessing databases.
3c) Nina, N 1999 Visual Basic 6 – Curso Completo, FCA – Editora de Informática.
4. Compulsory.
5. António Coelho, Renato Madureira.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and laboratories classes.
8. Final test 60%; Practical works 40%.
9. No.
10. 5.

1. Zoology - 0238.
2. Slight knowledge of zoological systematic - classification criteria; Study of the more representative protozoa: Phyla Sarcomastigophora, Apicomplexa and Ciliophora; Study of the metazoans - origin, general characteristics, form and function, classification, phylogeny and adaptive radiation of the Phyla: Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca (Classes Gastropoda, Bivalvia and Cephalopoda); Annellida; Arthropoda (Classes Arachnida, Crustacea, Diplopoda, Chilopoda and Insecta); Echinodermata; Chordata - Subphylum Vertebrata - Superclasses Agnatha and Gnathostomata - Classes Chondrichthyes (cartilaginous fishes), Osteichthyes (bony fishes), Amphibia (amphibians), Reptilia (reptiles), Aves (birds) and Mammalia (mammals).
3a) Knowledge on Cell Biology and Histology.
3b) To know the rules and criteria established for zoological systematic. Understand the diversity of the protozoa with similar characteristics to the animals - Protozoan Phyla. To identify characteristics and to interpret data related to the evolutionary history of the main animal groups. To relate structural and functional characteristics of the animals with the environment conditions where they live.
3c) Hickman, CP et al. 2001 Integrated Principles of Zoology, McGraw-Hill International Edition. Kukenthal, W, Mathes, E & Renner, M 1986 Guia de Trabalhos Práticos de Zoologia, Livraria Almedina, Coimbra.
4. Compulsory.
5. Jorge Ventura F. Cardoso, Sofia Santos.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Theorical written test (50%) + Practical written test (25%) + Teamwork - Bibliographic review (25%).
9. No.
10. 5.

1. Botany - 1199.
2. Plant classification systems. Divison Schizophyta: diferential patterns of Procariota and Eucariota. Sub-kingdoms Thallophyta and Cormophyta. Subkingdom Thallophyta, Divison Schizophyta, Class Cyanophyceae. Division Prochlorophyta and the chloroplast origin of Chlorophyta and of terrestrial plants. Subkingdom Thallophyta: Divisions of Eucariotic Algae. Clorophyta: Prainophyceae; Trebouxiophyceae; Chlorophyceae; Charophyceae; and Ulvophyceae. Heterokontophyta: Phaeophyceae, Chrysophyceae; Parmophyceae; Sarcinochrysidophyceae; Xanthophyceae; Eustigmatophyceae; Bacillariophyceae; Raphidophyceae; and Dictyochophyceae. Rhodophyta. Pyrrophyta. Euglenophyta. Glaucophyta. Haptophyta. Criptophyta. Fungi. Lichens. Heterotrophic Protists. Divison Bryophyta. Sub-kingdom Cormophyta (Embryophyta). Filicophyta. Cycadophyta and Coniferophyta. Anthophyta. Examples.
3a) No prerequisites.
3b) It is intended that the students plants in an ecological perspective.
3c) Raven, PH et al. 1999 Biology of Plants, 6th ed., WH Freeman and Company/Worth Publishers, NY; Moore, R et al. 1998 Botany, 2nd ed., The McGraw-Hill Companies, Inc., Boston; South, GR & Whittick, A 1987 Introduction to Phycology, Blackwell Scientific Publications, Oxford; Van den Hoek, C et al. 1995 Algae, Cambridge University Press, Cambridge. Texts by the staff covering the full program.
4. Compulsory.
5. José M.G. Torres-Pereira, Victor M.F. Galhano.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. One practical test (1 h) and 1 theoretical test (1 h) or 1 theoretical and practical final examination (2 h).
9. Yes.
10. 5.

1. Structure and Function of Ecosystems - 1690.
2. Evolutionary Ecology and Conservation Biology. Behavioural Ecology. Population Ecology. Community Ecology. Ecosystems Ecology.
3a) Knowledge on biology, mathematics and statistics.
3b) Students should get an overview of the information and applications of the functioning and structure of the ecosystems.
3c) Stiling, P 1999 Ecology, Theories and Applications, Prentice Hall; Molles, MC Jr 1999 Ecology, Concepts and Applications, WCB/McGraw-Hill.
4. Compulsory.
5. Mário Santos.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. 1 final work 20%; 2 written assessments or final written exam 80%.
9. No.
10. 5.

1. Bioclimatology - 1691.
2. Introduction to Climatology. Study of climate factors: daylenght; solar radiation; air and soil temperature; atmospheric humidity; wind; rainfall; evapotranspiration; energy balance; frosts; water balance and classification of climate. Physical mechanisms underlining spatial and temporal variability of climate variables. Patterns of variation of climate variables in micro and mesoscale.
3a) Good knowledge of Physics, Maths, Soils and Statistics.
3b) Students should get an overview on the influence of the climatic factors on rural and urban systems, with special reference to the interaction between climate factors and the biosphere.
3c) Campbell, GS & Norman, JM 1998 An Introduction to Environmental Biophysics, Springer-Verlag; Ferreira, TC 2000 Fotoperíodo, Série Didáctica de Climatologia Aplicada, UTAD, Vila Real, 38 pp.; Instituto Nacional de Meteorologia e Geofísica 1991 O clima de Portugal, fasc. XLIX correspondentes a 1951-1980: vol. III: 3ª Região: Normais climatológicas da região de Trás-os-Montes e Alto Douro e Beira Interior; Jones, HG 1983 Plants and Microclimate. A quantitative approach to environmental plant physiology, Edition, Cambridge; Rosenberg, NJ et al. 1983 Microclimate. The biological environment, John Wiley & Sons.
4. Compulsory.
5. Timóteo Ferreira, Aureliano Malheiro, Anabela Fernandes.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 5.

2nd year

1. Biostatistics and Experimental Design - 1692.
2. Introduction to Descriptive Statistics and Statistical Inference in Data Analysis; to Probability Theory, to Random Variables and to Probability Laws. Mathematical Expectation and Properties. Probability Laws Discrete and Continuous. Random Sampling and Some Sampling Distributions. Point Estimation Methods: Statistics and Properties. Statistics for the Interval Confidence Interval and Tests of Hypotheses; The Use of p-Values in Decision Making; Nonparametric Statistics: Testing for Goodness of Fit and Independency; Association Measures; Tests for Multiple Comparisons for Dependent and Independent Samples; ANOVA Model I; Homogeneity of Variances Tests; Parametric and Nonparametric Tests for Multiple Comparisons; ANOVA Model II; Randomised Blocks; Simple Regression Analysis: Confidence Intervals and Hypothesis Testing in Simple Linear Regression and ANOVA; Correlation; Non-Linear Simple Regression: Simple Linear Regression and Data Transformations.
3a) Elements of Mathematics.
3b) Students should be able to use the statistical methods and experimental designs in data analysis.
3c) Reis, E et al. 1997 Estatística Aplicada, Edições Sílabo, 2ª ed., vols. I e II; Walpole, RE & Myers, RH 1993 Probability and Statistics for Engineers and Scientists, Prentice Hall International Inc., 5th ed.; Montgomery, DC 1991 Design and Analysis of Experiments, John Wiley & Sons, Inc., Singapura, 3rd ed..
4. Compulsory Course Unit
5. Maria Manuel da Silva Nascimento.
6. 4 h/week (2 theoretical + 2 theoretical/practical); 1st semester; 2nd year.
7. Lectures and theoretical/practical classes.
8. 25% Written Work, Presentation and Discussion and 75% Final Written Examination.
9. No.
10. 5.

1. Biochemistry - 0007.
2. Theory. Introduction. Amino Acids. Proteins. Enzymes. Vitamins and Coenzymes. Carbohydrates. Lipids. Biological Membranes and Transport. Carbohydrates Metabolism: Glycolysis and the Catabolism of Hexoses. The Citric Acid Cycle. Oxidative Phosphorylation. Practice. Introduction Brief. Identification and Characterization of Amino Acids. Quantification and Characterization of Proteins. Enzymatic kinetic of phosphatase alkaline.
3a) Good knowledge on Chemistry.
3b) To supply solid technical and scientific preparation in several areas, e.g. constituents of living matter and biocatalysis, which is essential for the accurate understanding of other courses in this undergraduate curriculum.
3c) Lehninger, AL et al. 1993 Principles of Biochemistry, 2nd ed., Worth Publishers, NY; Plummer, DT 1987 An Introduction to Pratical Biochemistry, 3rd ed., McGraw-Hill Book Company, London; Rawn, JD 1989 Bioquímica, vol. II, McGraw Hill - Interamericana de España, Madrid; Stryer, L 1990 Bioquímica, Tercera Edition, Editorial Reverté, SA, Barcelona; Voet, D & Voet, JG 1992 Bioquímica, Ediciones Omega, SA, Barcelona.
4. Compulsory.
5. Rosário Anjos.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Mean of two written assessments 85%; Mean of practical works 15%.
9. No.
10. 5.

1. Pedology and Soil Conservation - 0814.
2. Soil concepts, factors and processes responsible for soil formation; Soil functions on the terrestrial ecosystem, with emphasis for soil-environment relationships; Soil mineral components; Soil organic components; Soil chemistry properties – Exchange complex and soil reaction; Soil physical properties; Soil water; Soil classification.
3a) Good knowledge on General Chemistry.
3b) Students should get a good knowledge of: (i) soil-environmental relationships and involved properties and components; (ii) soil components, its properties and functions and understand the soil behavior according its composition; (iii) to understand the way of soil management inside a sustainable frame.
3c) Costa, J 1975 Caracterização e Constituição do Solo, Ed. Caloust Gulbenkian, Lisboa; Brady, NC 1990 The nature and properties of soils, Macmillan Publishing Company, NY; Schroeder, D 1984 Soils, Facts and Concepts, Int. Potash Institute, Bern, Switzerland; Wild, A 1993 Soils and the Environment. An Introduction, Cambridge University Press.
4. Compulsory.
5. Afonso Martins, Fernando Raimundo.
6. 3 h/week; 1st semester; 2nd year.
7. Theoretical/practical classes in the lab and in the field.
8. Continuous evaluation, with tests, about practical works and application of theoretical concepts, as obligatory and a written classic test or examination.
9. No.
10. 5.

1. Hydrology - 1315.
2. Geomorphology characterization of watershed. Streamflow hydrograph. Hydrologic processes Surface water hydrologic measurement . Hydrologic analysis. Water erosion and control practices.. Water quality simulation.
3a) No uncommon knowledge required.
3b) Students should get an overview of the information regarding surface water hydrologic measurement and hydrologic analysis. They should rum hydrodynamics and water quality simulation and interpret them.
3c) Chow et al. 1992 Applied hydrology, McGraw-Hill Interational editions, Civil Engineering Series; Lencastre, A & Franco FM 1992 Lições de Hidrologia, Universidade Nova de Lisboa; Ribeiro, A 1987 Hidráulica Aplicada, Hidrologia; Quintela, AC 1996 Hidráulica, Fundação Calouste Gulbenkian; Sardinha, AM & Macedo, FW 1981 Hidráulica Florestal, IUTAD, Vila Real.
5. Luís Lopes.
6. 4 h/week; 1st semester; 2nd year.
7. Lectures/practical classes.
8. Final written exam and practical work.
9. No.
10. 5.

1. Dendrology and Phytossociology - 0465.
2. Introduction to phytossociology; phytossociology and typologism. The structure of the vegetation. The individualism and the chaotic organisation of the vegetation. The metapopulation approach of the populations. Phytostructuralism, structural characterisation of the behaviour tendencies, the structural parameters. Numerical analysis, multivariate methodology for the phytostructural analysis: numerical matrixes (the MEB and the MC), structural index, standarization, variance analysis, clusters, multifactorial analysis (PCAs), tendencies characterisation, DCA, HEA. Structural dynamics. Characterization of the resistance and resilience. Prevision models.
3a) Knowledge of the taxonomy and systematic portuguese vascular flora and multivariate ecology.
3b) The main goals of the discipline are involved in the knowledgement and characterisation of the structure and dynamic of the vegetation.
3c) Ludwig, JA & Reynolds, JF 1988 Statistical Ecology; Crawley, MJ 1989 Plant Ecology; Hair, JF et al., 1995 Multivariate data analysis with readings; Santos, VA & Vargas Luque, AP 1996 Métodos multivariados en bioesta-dística; Reis, E 1997 Estatística multivariada aplicada; Daniel, WW 1998 Biostatistics: a foundation for analysis in the health sciences; Collins WW & Qualset, CO 1999 Biodiversity in agroecosystems; Hanski, W 1999 Metapopulation ecology; Pianka, ER 2000 Evolutionary ecology.
4. Compulsory.
5. António Maria Luis Crespí, Aloísio Loureiro.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 2nd year.
7. Lectures, practical classes and laboratories.
8. One case study with presentation and discussion 50%; final written exam 50%.
9. No.
10. 5.

1. Natural Resources Economics - 0562.
2. Introduction to economics: resources scarcity and social choices for its allocation between alternative uses. Economic growth and Economic development. Human pressures over natural resources and Sustainable Development. Governments role in market economy. Market mechanism and natural resources management: externalities, public goods and property rights issue. Social choice and property rights definition over natural resources. Microeconomics concepts. External costs total and marginal. Natural resources efficient allocation from the economic perspective: the case for renewable resources.
3a) No prerequisites.
3b) To introduce concepts and tools for understating economic dimension of environmental problems and the need of natural resources use regulation in the market economies. Provide knowledge for economic analysis of natural resources management and to identify solutions for its efficient allocation. Supply information over regulating instruments for natural resources allocation used by the governments and provide knowledge for its analysis.
3c) Kolstad, C 2000 Environmental Economics, Oxford University Press, NY e Oxford; Neves, J 2000 Introdução à Economia, 5ª ed., Editorial Verbo, Lisboa; OCDE 1994 La Fiscalidade y el Medio Ambiente, co-edição da OCDE e Mundi-Prensa, Madrid; Pearce, D & Turner, R 1990 Economia de los Recursos Naturales y del Medio Ambiente, Edições Celeste, Madrid; Samuelson, P & Nordhaus, W 1995 Economia, 14ª Edição, McGraw-Hill de Portugal, Lisboa; Perman, R et al. 1996 Natural Resources & Environmental Economics, Longman Publishing, NY.
4. Compulsory.
5. Lívia Madureira, António Pires.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Written essay with oral discussion (30%); written exam (70%).
9. No.
10. 5.

1. Remote Sensing - 0474.
2. Spectral reflection and photography. Films and filters. Notions of photogrammetry. Notions of photo. Introduction to satellite images. Satellite image processing and classification.
3a) Good knowledge in Physics, Topography and Mathematics.
3b) To provide students with skills to work with aerial photographs and satellite images.
3c) Marques, CP & Aranha, JT 2000 Apontamentos de Detecção Remota, UTAD, Vila Real; Chuvieco, E 1990 Introducion a la Teledetection, Ediciones Rialpa, Madrid; Lillesand, TM & Kiefer, RW 1987 Remote Sensing and Image Interpretation, John Wiley & Sons, NY.
4. Compulsory.
5. José Aranha, Luís Roxo.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 2nd year.
7. The course is presented in 26 theoretical classes and 13 practical classes. Along theoretical classes, is presented and demonstrated the subjects that the students need to understand and participate in practical classes. Each 2 practical classes, the students need to process and classify aerial photographs or satellite images and to present a report. At the end of the semester, if student's practical remake is higher than 47.5%, he/she is allowed to be present in a theoretical test. If student's final theoretical remake is higher than 50%, he/she is free from final examination.
8. 60% theoretical + 40% practical.
9. No.
10. 5.

1. Plant Ecophysiology - 1693.
2. Concept of ecophysiology. The water and plant physiology. Mineral nutrition and plant physiology. Photosynthesis. Stress physiology: concept, phases and recognise. Stress types (effects and defence mechanisms): water stress, flooding, salinity, heavy metals, visible and UV-B radiation, chilling, freezing, high temperature, atmospheric CO2, pollutants (ozone, SO2).
3a) Good knowledge on biology and biochemistry.
3b) Students should get a domain on the main aspects of structure and functions that interfere in the growth, differentiation and development of higher plants and on plant responses to environmental factors.
3c) Larcher, W 1995 Physiological Plant Ecology, 3rd ed., Springer-Verlag, Germany; Taíz, L & Zeiger, E 1998 Plant Physiology, 2nd ed., Bejamín/Cummings, Redwood, California, USA; Hopkins, WG 1999 Introduction to Plant Physiology, 2nd ed., John Wiley, NY, USA.
4. Compulsory.
5. Carlos M. Correia, Eunice Areal Bacelar.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Two written tests or a final exam - 100%.
9. No.
10. 5.

1. Environmental Microbiology - 1694.
2. Microorganisms. Structural organisation of the prokaryotic cell. Prokaryotic versus eukaryotic cells. Microbial nutrition. Control of microorganisms growth: physical and chemical agents. Major groups of bacteria, fungi and algae with environmental importance. Microbial metabolism: fermentation, and respiration. Basic notions of microbial genetics. Viruses: morphology and organisation. Symbiotic relations. Microbiology of the biogeochemical cycles.
3a) We have the presuppose that the audience has prior knowledge of Biology and Chemistry.
3b) Acquire the fundamental knowledge of the ultrastructure, metabolism and diversity of the microorganisms since they are involved on nearly every aspects of human existence, with both beneficial or detrimental effects. Realise their importance on biogeochemical cycles, the resolution of environmental problems, biomonitoring and on the production of valuable products.
3c) Prescott, LM et al. 1996 Microbiology, WCB Ed.; Canas Ferreira, WF & de Sousa, JCF 1998 Microbiologia, vol. I, Editora Lidel; Brock, TD et al. 1994 Biology of Microorganisms, Prentice Hall, Inc..
4. Compulsory.
5. Ana Sampaio.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Written examinations, practical work.
9. No.
10. 5.

1. Quantitative Ecology - 1695.
2. Introduction to data analysis in Ecology. Basic descriptors of populations and communities (density, frequency, biomass, cover) and estimation as a function of the sampling technique. Quantitative methods to assess habitat quality and analyse populations (growth, dispersion, competition, predation), communities (structure, diversity, similarity) and productivity.
3a) Prior knowledge of biostatistics and experimental design and proficiency on the use of data input worksheets.
3b) To acquaint and train students on quantitative methods and tools to approach ecological data, with a special emphasis on the practical issues of data manipulation and analysis.
3c) Brower, JE et al. 1990 Field and Laboratory Methods for General Ecology, WCB Publishers, Dubuque.
4. Compulsory.
5. Paulo Fernandes.
6. 4 h/week; 2nd semester; 2 nd year.
7. Theoretical/practical classes.
8. Final written exam (60%) and laboratory / homework assignment reports (40%).
9. No.
10. 5.

1. Sampling and Inventory Techniques - 1696.
2. Aims of sampling. Decisions about the collection of information. The use of statistical methods in inventory procedures. Sampling methods: simple random sample; stratified sampling;ssystematic sampling; ratio estimation; sampling of qualitative characteristics; multi-phase sampling; sequential sampling; multi-stage sampling.
3a) Good knowledge on Mathematics and Statistics.
3b) Students should get an overview of inventory planning and know the sampling techniques normaly applied to natural resources data collection.
3c) Cochran, WG 1977 Sampling techniques, McGraw-Hill Publishing Company; Elliott, JM 1979 Some methods for the statistical analysis of benthic inverterbrates, Freshwater Biological Association, Scientific Publication No.25; Shiver, BD & Borders, BE 1996 Sampling techniques for forest resource inventory, J. Wiley & Sons; Tellería, JL 1986 Manual para el censo de los vertebrados terrestres, Ed. Raices.
4. Compulsory.
5. Carlos Pacheco Marques, Teresa Fonseca.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 2 nd year.
7. Lectures and practical classes.
8. Two tests during the semester and practical works or final written exam.
9. No.
10. 5.

1. Population Genetics - 1697.
2. Population genetics: Hardy-Weinberg equilibrium, extensions of Hardy-Weinberg equilibrium; non random mating. Processes that change allelic frequencies: mutation, migration, small size population, natural selection. Quantitative inheritance. DNA: its mutation, repair and recombination. Molecular genetics; Genetics of the evolutionary process: darwinian evolution; genetic variation; sociobiology.
3a) Biology and Biochemistry.
3b) To understand that evolution is a process that takes place in populations of organisms, the way in which allelic frequencies change in populations over time and that populations change, or evolve, through natural selection and other forces.
3c) Hartl, DL & Clark, AG 1989 Principles of population genetics, Sinauer Associates, Inc. Publishers, Sunderland; Wallace, B 1974 Génétique des populations, Masson et Cie ed., Paris; Metller, LE & Gregg, TG 1969 Populations genetics and evolution, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
4. Compulsory.
5. Isabel Gaivão, Fernanda Leal.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Practical evaluation, written testes and final exam.
9. No.
10. 5.

3rd year

1. Geographical Information Systems (GIS) - 1565.
2. Introduction to Geographical Information Systems; Graphical bases; Data bases; Information sources; Components of a Geographical Information System; Information processing; Types of Geographical Information Systems; Simulation using Geographical Information Systems.
3a) Good knowledge in Topography, Mathematics and Computer Science.
3b) To provide students with skills to work with geo-information and GIS.
3c) Sendra, JB 1992 Sistemas de Información Geográfica, Ediciones Rialp, Madrid; Antenucci, J. et al. Geographic Information Systems: a guide to the technology, Van Nostrand Reinhold, NY; Aronoff, S 1989 Geographic Information Systems: a management perspective, WDL Publications, Ottawa; Burrough, 1986 Principles of Geographic Information Systems for Land Resources Assessment, Clarendon Press, Oxford.
4. Compulsory.
5. José Aranha.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 3rd year.
7. The course is presented in 26 theoretical classes and 13 practical classes. Along theoretical classes, is presented and demonstrated the subjects that the students need to understand and participate in practical classes. Each 2 practical classes, the students need to process and classify aerial photographs or satellite images and to present a report. At the end of the semester, if student's practical remake is higher than 47.5%, he/she is allowed to be present in a theoretical test. If student's final theoretical remake is higher than 50%, he/she is free from final examination.
8. 60% theoretical + 40% practical.
9. No.
10. 5.

1. Ecological Modelling - 1698.
2. Introduction to Ecological Engineering. Principles, classification and exemples of Ecological Engineering. Study cases (e.g. the role of wetlands in the control of nutrientes; treatment and utilization of wastewater; agriculture and Ecotechnology). Fundamentals of Ecological Modelling. Basic concepts of modelling. Submodels in ecological models. Conceptual models. Static models. Modelling population dynamics. Biogeochimical models. Application of ecological models in environmental management. The ecological importance of ecotones. The socio-economic value of ecotones. Ecological models and ecotones.
3a) Notions of General Mathematics and Ecology.
3b) To give the students basic knowledge in ecological engineering domain, specially for the development of ecological models and for its applicability in investigation and in environmental management. To employ and to apply the knowledge acquired in environment issues domain, namely by the construction of small models able to describe simple situations, involving biogeochimical and biological processes.
3c) Décamps, H & Naiman RJ 1990 The ecology and management of aquatic-terrestrial ecotones, UNESCO; Jørgensen, SE 1988 Fundamentals of Ecological Modelling, Elsevier; Jørgensen SE et al. 1991 Handbook of ecological parameters and ecotoxicology, Elsevier Science Publishers BV, Amsterdam, The Netherlands; Mitsch, WJ & Jorgensen, SE 1989 Ecological Engineering, John Wiley & Sons; Chistofoletti, A 1999 Modelagem Ambiental, 1ª ed., Editora Edgard Blecher Ltda. S. Paulo, Brasil.
4. Compulsory.
5. João Alexandre Cabral, Mário Santos.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 3rd year.
7. Theorectical and Practical lectures.
8. A written report 45% and two written tests and/or a final written exam 55%.
9. No.
10. 5.

1. Animal Ecophysiology - 1699.
2. The importance of studying Animal Ecophysiology. The Study of Compare d Vetebrate Structure and Function motivated by Environmental Adaptations. Survey of Vertebrate Animals. The Principal Structural Patterns. Revision of their Origin and Classification. Fishes. Tetrapods. Phylogeny and Ontogeny of Structure and Function. Evolution motivated by Environmental Adaptations, in relation to Time and Major Taxa. Specific Structural and Functional Adaptations motivated by a diversity of Habits and Habitats.
3a) No prerequisites.
3b) After acquiring basic knowledge of structural, functional and environmental aspects, the student studies the interrelation animal-environment, through the awareness of Vertebrate Adaptations and their evolutionary aspects, in relation to Habits and Habitats.
3c) Hildebrand, M & Goslow, G 2001 Analysis of Vertebrate Structure, 5th ed., Jonh Wiley & Sons, NY, EUA; Pough, FH et al. 1999 Vertebrate Life, 5th ed., Prentice-Hall, Inc., New Jersey, EUA.
4. Compulsory.
5. Carla Maria Calçada Torres Pereira, Sofia Gabriel Garcia dos Santos.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Course Evaluation is done trough a Written Examination (80%), duration 60 minutes, covering both Lectures and Practical Sessions, and trough a Group Report on a Environmental Adaptations theme of practical relevance in Vertebrate Life (20%).
9. No.
10. 5.

1. Ecotoxicology - 1576.
2. The notion of toxicology and ecotoxicology. Ecotoxicology of tolerant plants to stress caused by metals and arsine, methods to test the tolerance. Ecophisiology of absorption of metals by tolerant plants. Mechanisms of resistance to metals in superior plants. Ecotoxicology of pharmaceutical products.
3a) Chemistry, Biochemistry and Physiology
3b) To give the students basic knowledge in ecotoxicology domain; study cases about avaliation and monitorization. To know the limitations and the potentialities of ecotoxicolgy to the resolution of environmental problems. To know the different tools and research methods that promove the knowledge of the ecotoxicological state of the ecossystems and to contribute to a better management of environmental impacts according to the adopted strategie. The notion of animal ecotoxicology and study cases. Biomarkers and biological role. Entry processes and exposition of contaminants in aquatic organisms.
3c) Walker, CH et al. 2001 Principles of Ecotoxicology, 2nd ed.; De Koe, T & Teiga, P 2000 Trabalhos práticos de ecotoxicologia: ecofisiologia de plantas tolerantes a metais e outras situações de stress, Série didáctica, Ciências Aplicadas nº 145, UTAD, Vila Real; Baker, JM & Walker, PL 1989 Ecophysiology of metal uptake by tolerant plants, In: Shaw, AJ (ed.); Bradshaw, AD et al. 1989 The essential Qualities, In: Shaw, AJ (ed.); De Koe, T et al. 1992 Measuring maximum rotgrowth insteas of longest root elongation in metal tolerance tests for grasses (Agrostis capillaris, Agroistis delicatula and Agrostis castelana).Plant and Soil, 144:305-308; Hoffman, DJ et al. 1995 Handbook of Ecotoxicology, Lewis Publishers.
4. Compulory.
5. António Augusto Fontaínhas Fernandes, Pedro Miguel Teiga, João Soares Carrola.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final classification = written report of a practical lecture 15% + written report 20% + one written test or final written exame 65%
9. No
10. 5.

1. Sylviculture - 0038.
2. The forest in Portugal, silvicultural system, techniques of site preparation, seedbed and out-planting, stands conduction. Silvics of some forest species.
3a) No prerequesites.
3b) Characterization of the forest sector in Portugal. Importance and functions of the forest. Orientations of the sylviculture. Type of forest formations, characterization and treatment. Techniques of reforestation. Growth and production stands. Silvics interventions in the perspective of its functionality. Silvics of some forest species.
3c) Loureiro, A 1991 Apontamentos de Silvicultura, UTAD, Vila Real; Loureiro, A 1994 Apontamentos de Silvicultura Especial, UTAD, Vila Real.
4. Compulsory.
5. Aloísio Loureiro, João Paulo Carvalho.
6. 4 h/week; 1st semester; 3rd year.
7. Lectures/practical classes.
8. Final written exam and practical work.
9. No.
10. 5.

1. Limnology - 1700.
2. The relationship between the hydrobiology and forestry. Lotic and lentic ecosystems. Physico and chemical characterization of running waters. Patterns of longitudinal variation in lotic ecosystems and of vertical variation in lentic ones. Aquatic communities: micro-organisms, plankton, macrophites, benthic invertebrates, fishes. Human impacts and bio-assessment. Management of inland waters and river rehabilitation, with special mention to the riparian ecotones. River district plans, the national water plan and their links to the water framework directive.
3a) No prerequisites.
3b) Characterization of the biotic and abiotic components of running waters establishing the relationship between those components and the watershed.
3c) Cortes, RMV et al. 1991 Caracterização Físico-Química das Águas Dulciaquícolas. Implicações Biológicas, UTAD, Vila Real, 131 pp.; Cortes, RMV & Ferreira, MT 1993 Metodologia para o Estudo da Estrutura das Populações de Ictiofauna em Águas Interiores, UTAD, Vila Real, 66 pp.; Wetzel, RG 1993 Limnologia, Edições da Fundação Calouste Gulbenkian, Lisboa, 898 pp.
4. Compulsory.
5. Rui Manuel Vitor Cortes, Simone Varandas de Oliveira, Daniel Gustavo de Oliveira.
6. 4 h/ week (2 theoretical + 2 practical); 1st semester; 3rd year.
7. Lectures and practical classes looking for a complete integration between both types of classes.
8. Reports of the practical classes (or the presentation of a specific subject) together with written tests and a final examination.
9. No.
10. 5.

1. Ecotechnology - 1578.
2. Theoretical: Concepts and theories of Environmental Planning; Sustainability - concepts and scales; Coastal, estuarine and freshwater ecosystems; Beginnings and basis of ecological recovery and Ecological Engineering; Key aspects of wastewaters treatment by artificial wetlands; The self depuration paper of macrophytes; Macrophytes treatment of wastewaters; Mechanisms of solid suspended removal, NO3, PO4-- and organic load; Treatment methodologies (plants flotation, emergent, submerged and combined systems); Dimension of artificial wetlands; Advantages and disadvantages of these systems vs conventional treatments. Practices: Development of an artificial wetlands construction project.
3a. General Ecology, Edafology, Hydrology, Fitossociology, Modelling
3b. development of simple and cheap technologies, based on the interface tecnology/environment through basic beginnings of operation of aquatic ecosystems, namely through the creation of artificial wetlands, supply means of control of water quality and conservation of these ecosystems that can have an important paper in the plans of administration of watersheds. The main objective is that the students are capable to develop ecological systems that allow answering to complex subjects of use and preservation of natural resources that humanity faces on this new century.
3c) Décamps, H & Naiman, RJ 1990 The ecology and management of aquatic-terrestrial ecotones, UNESCO; Jørgensen, SE 1988 Fundamentals of Ecological Modelling, Elsevier; Jørgensen, SE et al. 1991 Handbook of ecological parameters and ecotoxicology, Elsevier Science Publishers BV, Amsterdam, The Netherlands; Mitsch, WJ & Jorgensen, SE 1989 Ecological Engineering, John Wiley & Sons; Chistofoletti, A 1999 Modelagem Ambiental, 1ª ed., Editora Edgard Blecher Ltda. S. Paulo, Brasil.
4. Compulsory.
5. Edna Carla Janeiro Cabecinha.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written test (40%) + report (60%).
9. No.
10. 5.

1. Cynegetic - 0472.
2. Historical context. Ecological principles. Population structure: Sex and age ratios; density; monitoring and census. Disease. Legislation. Ecology and biology of big/small game. Habitat analysis and improvement. Guidelines for game resource management and exploration.
3a) Good knowledge on Biology, Ecology, Statistic and Botanic.
3b) To introduce students to the basic principles of game and habitat management. To familiarize them with the legislation. Technical and methodological strategies for game sustainable management.
3c) Bookhout, TA 1994 Research and management techniques for wildlife and habitats, The Wildlife Society. Maryland; Buruaga, MS et al. 1991 Reconocimiento de Sexo y Edad en Especies Cinegeticas, Gobierno Vasco, 127 pp.; Covisa, J 1998 Ordernación cinegética: Proyectos de Ordenación y Planes Técnicos, Cinegética y Naturaleza ediciones, Madrid, 167 pp.; Monzón, A & Bento, P 2001 Trabalhos Práticos de Cinegética, Série Didáctica Ciências Aplicadas 162, UTAD, Vila Real, 39 pp..
4. Cumpulsory.
5. Aurora Monzón, Paula Bento.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical project.
9. No.
10. 5.

1. Environmental Impact Studies - 1701.
2. Introduction; legislation; impact typology; description and communication of impacts; impact analysis and forecasting; impact assessment; mitigation; public participation; decision-making; post-evaluation; monitoring
3a) No prerequisites.
3b) The objective of the discipline is to offer legal and scientific/ technical background, as well as to develop the capacity for the analysis, forecasting, and assessment of environmental impacts, so much for singular projects as for development strategies
3c) Canter, LW 1996 Environmental Impact Assessment, NY: McGraw-Hill, Inc.; Morris, P & Thérivel, R 1995 Methods of Environmental Assessment, London: UCL Press; Wood, C 1995 Environmental Impact Assessment: A Comparative Review, Essex: Longman Scientific and Technical.
4. Compulsory.
5. Anastássios Perdicoúlis.
6. 4 h/week (2 teoretical + 2 practical); 2nd semestre; 3rd year.
7. Lectures and practical classes.
8. Final exam
9. No.
10. 5.

1. Ecological Integrity - 1702.
2. The notion of natural and cultural integrity. Considerations of scale and hierarchy. Indicators of ecosystem integrity. Measuring biological integrity and monitoring for ecosystem integrity. Bioindicators of the quality of water, soil and air. Extreme environments and adaptation. Genetic variation and environmental stress. Environmental stress, selection, evolution and extinction. Air pollution. Toxic elements. Acidification. Forest decline. Fossil fuels. Eutrophication. Pesticides. Species richness. Radioactive pollution.
3a) Notions of General Ecology.
3b) To understand the fundamental concepts in evaluation, monitoring and rectification of environmental quality, such as environmental stress, ecological integrity, bioindicators, adaptation and evolution. To apply these concepts in the evaluation of the great and actual environmental issues.
3c) Andreasen, JK et al. 2001 Considerations for the development of a terrestrial index of ecological integrity, Ecological Indicators 1(1):21-36; Bijlsma, R & Loeschcke, V 1997 Environmental Stress, Adaptation and Evolution, Birkhauser Verlag; Dale, VH & Beyeler, SC 2001 Challenges in the development and use of ecological indicators, Ecological Indicators 1(1):3-10; Freedman, B 1989 Environmental Ecology, Academic Press; Jeffrey, DW & Madden, B 1991 Bioindicators and Environmental Management, Academic Press; Popp, J et al. 2001 Sustainability indices with multiple objectives, Ecological Indicators 1(1):37-48; Woodley, S et al. 1993 Ecological Integrity and the Management of Ecosystems, St. Lucie Press.
4. Compulsory.
5. João Alexandre Cabral, Pedro Teiga.
6. 4 h/week (2 theoretical + 2 practical); 2nd semestre; 3rd year.
7. Theorectical and Practical lectures.
8. A written report 25% and two written tests and/or a final written exam 75%.
9. No.
10. 5.

1. Fire Ecology and Management - 1703.
2. Introduction. The wildfires in Portugal: statistics, prevention, detection and suppression structures. Wildland fuels and fire behaviour. Fuels classification and characterisation. Factors influencing fire behaviour: fuel, topography and weather. Fire behaviour modelling and simulation. 3. Fire Ecology. 3.1. The role of fire in ecosystems and fire regimes. Plant adaptations to fire and strategies for survival and regeneration. Fire effects on soils, water vegetation, fauna and air. Fire management. Basic principles. Components. Wildfire prevention. Fire danger rating. Prescribed burning.
3a) Good knowledge on Ecology, Biology, Biochemistry, Soil and Climate, Chemistry and Plant Physiology.
3b) To provide the students the knowledge related with fire regimes, fire ecology and the role of fire in the forest environment and ecosystems, and the prevention and suppression of wildfires.
3c) Bond, WJ & van Wilgen, BW 1996 Fire and Plants, Population and Community Biology Series, Kluwer Academic Publishers, NY; Trabaud, L 1992 Les Feux de Forêts, Éditions France, Selection, Aubervilliers; Chandler, C et al. 1983 Fire in Forestry, vols. I & II, Forest Fire Management and Organization, John Wiley and Sons, NY; Wright, HA & Bailey, AW 1982 Fire Ecology, United States and Southern Canada, John Wiley & Sons, NY; Odum, EP 1988 Fundamentos de Ecologia, 4ª ed., Fundação Calouste Gulbenkian, Lisboa.
4. Compulsory.
5. Hermínio Botelho, Paulo Fernandes.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 5.

1. Urban and Peri-Urban Forest - 1704.
2. Characterization of the urban landscape and the urban-rural interface. The phenomenon of the urban expansion. Biophysical structure of landscape: relief, climate, soil, water, and vegetation. Culture and history in the identity of space. Land use planning and instruments: Municipal Director Plan, Urban Plan, and Detail Plan: urban green structure, space tipology, and their relation with the planning instruments. Functions of the green space in urban environments. Design principles for urban forests. Planting, maintenance and protection of urban forests. Species for wet and dry systems.
3a) Cellular Biology and Histology; Botany; Structure and Function of Ecosystems; Bioclimatology; Plant Ecophysiology; Dendrology and Phyto-sociology.
3b) Comprehend the value and the vulnerability of green spaces in urban landscape; promote intervention capacity in defence of the ecosystems integrated in the urban space.
3c) Gilman, E 1997 Trees for Urban and Suburban Landscape, Publisher: Delmar Learning; Miller, RW 1996 Urban Forestry: Planning and Managing Urban Greenspaces, Publisher: Pearson Education POD.
4. Compulsory.
5. Luís Fernando Torres de Castro, José Miguel Esteves Lameiras.
6. 4 h/ week (2 theoretical + 3 practical); 2nd semestre; 3rd year.
7. Theoretical and practical classes.
8. Mid-term exam and final exam: theoretical: 60%; practical: 40%.
9. No.
10. 5.

4th year

Branch of Ecosystem Management

1. Landscape management - 1705.
2. Sustainable land use. Constrains for landscape management. Framework of the National Landscape Management Law. Organization and relationships on landscape management. Main institutional elements of landscape management. Regional, local and special regulation applied for land use planning.. Sectorial planning and its relationships with landscape management.
3a) Knowledge of GIS and Quantitative Ecology.
3b) To provide students with the theoretical and practical concepts of landscape management
3c) Forman, RT & Godron, M 1986 Landscape Ecology; Castroviejo, M & Diaz, V 1996 Practicas para la planificacion de espacios naturales, Colección Técnica, Organismo Autónomo Parques Nacionales, Madrid, Espanha.; Pardal, S 1988 Planeamento do território.
4. Compulsory.
5. João Bento.
6. 2 h/week; 1st semester; 4th year.
7. Lectures-practical classes and training.
8. A case study presentation; final examination.
9. No.
10. 2.5.

1. Decision Models- 1706.
2. The nature of decision; human cognition and decision styles; acquisition, management, and representation of information; decision-making in a planning framework; decision support systems; linear programming; temporal and spatial models; neuronal networks; genetic algorithms; fuzzy logic; the human factor in decision-making; interest groups; decision-making in groups.
3a) Not applicable.
3b) The objective of the discipline is to offer methodological and technological knowledge on decision-making and the respective support means, as well as to develop human capacity for adequate and efficient decision-making
3c) Turban, E 1995 Decision Support and Expert Systems, 4th ed., Englewood Cliffs, NJ: Prentice-Hall; Bronson, R & Naadimuthu, G 2001 Investigação Operacional, 2ª ed., Lisboa: McGraw-Hill.
4. Compulsory.
5. Anastássios Perdicoúlis.
6. 2 h/week; 1st semestre; 4th year.
7. Lectures-practical classes.
8. Final exam.
9. No.
10. 2.5.

1. Landscape Ecology - 1707.
2. Introduction to Landscape Ecology. Study of the structure and landscape changes. Habitats management and biodiversity. Application of quantitative methods in landscape analysis. Models and techniques in landscape ecology. Application of landscape ecology to nature conservation and land management.
3a) Knowledge of basic concepts in Ecology.
3b) Students should get an overview of methods and techniques applied to management an nature conservation, habitats and biodiversity.
3c) Farina, A 1998 Principles and methods in Landscape ecology, Chapman & Hall. Londres; Forman, RTT & Godron, M 1986 Landscape Ecology, Wiley, NY; Vos, W & Stortelder, A 1992 Vanishing Tuscan Landscapes, Pudoc Scientific Publishers, Wageningen; Barbault, R 1995 Biodiversity dynamics: from population and community ecology approaches to a landscape ecology point of view, Landscape and Urban Planning 31; Cale, PG & Hobbs, RJ 1994 Landscape heterogeneity indices: problems of scale and applicability, with particular reference to animal habitat description, Pacific Conservation Biology, 1.
4. Compulsory.
5. Luís Manuel Lobo dos Santos Ruas.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Test or final written exam and practical work.
9. No.
10. 5.

1. Restoration of Forest Ecosystems - 1708.
2. Factors of degradation. Indices to identify desertification prone areas. Restoration processes. Limiting factors for restoration strategies Soil erosion control. Reclamation and rehabilitation. Planning revegetation. Restoration of burned areas.
3a) Good knowledge on Ecology, Botany, Soil and Climate, Chemistry and Plant Physiology.
3b) Students will get an overview of the global forest environment and ecosystems degradation and the susceptibility to desertificação, and the knowledge of the scientific and technical processes for restoring degraded areas.
3c) Le Houérou, HN 2000 Restoration and Rehabilitation of Arid and Semiarid Mediterranean Ecosystems in North Africa and West Asia: a review, Arid Soil Research and Rehabilitation; Odum, EP 1988 Fundamentos de Ecologia, 4ª ed., Fundação Calouste Gulbenkian, Lisboa; Partidário, MR & Jesus, J 1994 Avaliação do Impacte Ambiental, Ed. CEPGA; MMA 1998 Guia para la elaboración de estudios del medio físico. Contenido y metodología, Secretaria General de Medio Ambiente, Ministerio de Medio Ambiente; Vallejo, R 1997 La restauración de la cubierta vegetal en la Comunidad Valenciana, Ed. de R. Vallejo, Fundación Centro de Estúdios Ambientales del Mediterráneo, Valencia; DGF 2002 Manual de Silvicultura para a Prevenção de Incêndios, Direcção Geral das Florestas, Lisboa.
4. Compulsory.
5. Hermínio Botelho.
6. 4 h/week (practical + 2 theoretical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 5.

1. River Rehabilitation - 1709.
2. Objectives of rehabilitation versus restoration and spatial and temporal scales of action. Concepts of fluvial hydraulics applied to rehabilitation. Connectivity of fluvial hydrosystems and disturbance factors. Characterization of habitats and disturbance assessment. The role of riparian vegetation in restoration. Mitigation of river regulation.
3a) No prerequisites.
3b) It is intended to present a multitude of bio-engineering techniques to mitigate the human impacts on fluvial ecosystems, with a special mention on habitat rehabilitation.
3c) Gonzalez del Tanago, M & Garcia del Jalón, D 1995 Restauración de Rios y Riberas, Universidad Politecnica de Madrid; Klapper, H 1991 Control of Eutrophication in Inland Waters, Ellis Horwood; Gordon, ND et al. 1992 Stream Hydrology, John Wiley & Sons; Petts, G & Calow, P (eds.) 1996 River Flows and Channel Forms, Blackwell Science; Waal, LC et al. (eds.) 1998 Rehabilitation of Rivers, John Wiley & Sons; Chow, VT et al. 1988 Applied Hydrology, McGraw-Hill International Editions.
4. Compulsory.
5. Rui Manuel Vitor Cortes, Simone Varandas de Oliveira, Daniel Gustavo Oliveira.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 4th year.
7. Theoretical classes focusing river rehabilitation and practical classes mainly treating aspects of catchment characterisation .
8. Reports of practical calsses and test, or final examen.
9. No.
10. 5.

1. Monitoring of Soil Quality - 1710.
2. General soil quality parameters and your relationship with environment, economic and social aspects; most important contaminant of soils, properties that influence your behaviour in soil, transports and transference phenomena's; description, analysis and quantification of risk associated to pollution; treatment technologies, type and local treatment classification; General aspects of Bioremediation, Phytoremediation, Soil Vapour Extraction, Air Sparging; Vacuum-Enhanced Recovery, Stabilization and Solidification methodologies, others methodologies of in situ Reactive Walls and Reactive Zones.
3a) Good requiring knowledge on Soil, Chemistry, Hydrology, Hydraulics and Biology Aspects.
3b) Provide the students with an overview of physical, chemical and biological aspects of soil pollution. The students should be able to develop a project for soil pollution analysis, integrating all issues referenced in the class, integrated the risks analysis, selection and implementation of methodology and monitorization procedures.
3c) Suthersen, SS 1996 Remediation Engineering: Design Concepts, Geraghty & Miller, Environmental Science and Engineering Series, 362 pp.; Eweis, JB et al. 1998 Bioremediation Principles, McGraw-Hill Series in Water Resources and Environmental Engineering, 295 pp.; Harris, M & Herbert, S 1994 Contaminated land. Design and practice guides, Institution of Civil Engineers, Thomas Telford (eds.), 78 pp..
4. Compulsory.
5. João Ricardo Sousa.
6. 4 h/week (2 theoretical + 2 pratical); 1st semester; 4th year.
7. Lectures and practical classes.
8. One case study with presentation and discussion (25%) and final written exam (75%).
9. No.
10. 5.

1. Wildlife Conservation - 1711.
2. Biodiversity. Policy of conservation. Conservation and management of flora/fauna. Threatened and endangered species. Habitat. Current themes.
3a) Good knowledge on ecology, statistic, genetic and legislation.
3b) To introduce students to the basic principles of wildlife management, and the processes and principles globally recognizable ecological communities. To sensitize the relevance of biodiversity and offer general guidelines of conservation.
3c) Bolen, EG & Robinson, WL 1995 Wildlife ecology and management, Prentice Hall, New Jersey; Wilson, EO 1994 La diversidad de la vida, Crítica, Barcelona; Morrinson, ML, Marcot, BG & Mannan, RW 1992 Wildlife-Habitat relationship, concepts and applications, The University of Wisconsin Press., R.W., Wildlife-Habitat relationship, concepts and applications, The University of Wisconsin Press, 1992.
4. Obrigatória.
5. Aurora Monzón, Paula Bento.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical project.
9. No.
10. 5.

Branch of Wild Resources Management

1. Protected Areas - 0796.
2. European and international strategies for natural landscapes protection. Protection and conservation. Historical integration of protected areas. Concept evolution for protected areas. Protected areas in Portugal. General issues: biological diversity, conservation and environmental education. Rural desertification/ /human density; landscape degradation; natural environment integration.Natural resources detereoration. Protected areas classification and Natura 2000 network. International conventions. Local development and nature conservation
3a) Knowledge of GIS and Quantitative Ecology.
3b) To provide students with the theoretical and practical concepts, typologies and management tools.
3c) Ceballos-Lascuráin, H 1996 Tourism ecotourism and protected areas; Forman, RT & Godron, M 1986 Landscape Ecology; Castroviejo, M & Diaz, V 1996 Practicas para la planificacion de espacios naturales; Pardal, S 1988 Planeamento do território.
4. Compulsory.
5. João Bento.
6. 2 h/week; 1st semester; 4th year.
7. Lectures/practical classes and field visits.
8. A case study presentation; final examination.
9. No.
10. 2.5.

1. Mycology - 1712.
2. Introduction to the world of fungi. Importance, distribution and ecology of the fungi. Systematic position and phylogenetic relationships. Structure of Fungi. Ultrastructure of Fungi cell. Structure and growth of hypha. Nutrition and metabolism. Sexual and asexual reproduction. Main taxonomic divisions of fungi. Symbiotic associations with plants. The fungi in plant diseases.
3a) Not applicable.
3b) This course provides a balanced introduction to the world of the fungi.
3c) Alexoupoulos, CJ et al. 1996 Introductory mycology, 4th ed., John Wiley & Sons, NY.
4. Compulsory.
5. Arlete Faia.
6. 2 h/week; 1st semester; 4th year.
7. Lectures/practical classes.
8. As described on the Pedagogic Norms, Final exam.
9. No.
10. 2,5.

1. Range Management - 0075.
2. General range management. Ecological concetps in a range management view. Vegetation analisis. Range development and improvements. Typical portuguese range management situations.
3a) Good knowledge on botanic, ecology and statitics.
3b) Students should get concepts, methods and technics that may turn be possible a correct improvement and management on vegetatation of natural and/or forestry landscape, conciliating forestry and animal production.
3c) Rego, F Apontamentos (não publicado); Rego F Apontamentos sobre determinações do coberto (não publicado); Torres Manso, F 1996 Comparação de duas metodologias para avaliação do coberto vegetal,g Método da Linha de Intercepção/Método das Bandas. Provas de Aptidão Científica e Pedagógica, UTAD, Vila Real; Torres Manso, F 1996 Gestão de comunidades arbustivas numa perspectiva silvopastoril. Provas de Aptidão Científica e Pedagógica - trabalho de síntese, UTAD, Vila Real; Crespo, D 1975 Pastagens Temporárias e Permanentes de Sequeiro. INIA, Oeiras; Moreira, N 1986 O melhoramento das pastagens de montanha. UTAD, Vila Real.
4. Compulsory.
5. Filipa Torres Manso.
6. 4 h/week (2 theoretical + 2 pratical); 1st semester; 4th year.
7. Lectures and pratical classes. Studing visits.
8. Final written examination, pratical work and reports.
9. No.
10. 5.

1. Ethnobotany - 1713.
2. The use of vegetal resources by human societies (historical review). The different tips of wild plants used as natural resources: eatable plants; spices; aromatic plants; medicinal plants and species for handcraft manufactures. Elements for the botanic and taxonomic caractherazation and identification of this kind of species. Ecology of wild plants. Technology of cropping, conservation and use of wild plants. Ethnophytoterapy. Methodology of registation of field data. Methods to the management of Ethnobotanical projects.
3a) Basic knowledge of Botany, Phytossociology and Antropology.
3b) Give to the students fundamental methodologies to manage research and operacional projects correlated with the use of natural resources in a sustainable way.
3c) Font-Quer, P 1990 Plantas Medicinales, Editorial Labor, Barcelona; Hernández-Bermejo, E 1996 Métodos em Etnobotânica, Ed. Jardin Botánico de Córdoba, Córdoba; Martim, G 1997 Ethnobotany, Ed. Chapman & Hall, Londres; Clevely, A 1995 Manual de Plantas e Ervas Medicinais, Ed. Estampa, Lisboa; Lipp, F 1977 O simbolismo das Plantas, ed. Evergreen, Colónia; Stuart, M 1994 The Encyclopedia of Herbs and Herbalism, ed: Black Cat, Leicester.
4. Compulsory.
5. José Alves Ribeiro
6. 2 h/week; 1st semester; 4th year.
7. Lectures-practical classes.
8. Final examen and avaliation of field survey.
10. 2.5.

1. Beekeeping - 0073.
2. Importance of the beekeeping. Biology of Apis mellifera. Anatomophysiology. Equipment and material bee-keeper. Rearing queens and artificial insemination. Install of the colonies. Handling of the hive. Bee products, properties, applications and apitherapy. Removing honey of colonies bees and technology and value-added of products from beekeeping. Bee diseases. Pollination.
3a) General Biology, Physiology Animal, Biochemistry and Botany.
3b) To teach the scientific basis under bee products to exploitation and management of the plant natural resources from bee, more output vegetal and ecology balance from pollination.
3c) Gojmerac, WL s.d. Honey-Guide To Efficient Production, University of Wisconsin - Madison, USA; Mizrahi, A & Lensky, Y (eds.) 1997 Bee products, properties, applications and apitherapy, Plenum Press, New York; Hooper, T 1981 Guia do Apicultor, Publicações Europa-America, 5ª ed.; Krell, R 1996 Value-added products from beekeeping, Agricultural Services Bulletin 124, FAO.
4. Compulsory.
5. Óscar Pereira.
6. 2 h/week, 1st semester; 4th year.
7. Lectures-pratical classes.
8. Final theoretical- written exam and practical test.
9. No.
10. 2.5.

1. Fish Management in Fresh Waters- 1714.
2. Study of fish environment and assessment of the potential for fish production. Structure of fish assemblages, spatial and temporal dynamics and biological interactions. Fish behaviour and spatial patterns. Fish production in freshwaters related to the different species. Rehabilitation of freshwater fisheries: impacts associated with stocking, fish transference, habitat modification and remedial measures. Strategies for the conservation of stream fish populations.
3a) No prerequisites.
3b) Presentation of procedures for the management of inland fish from intensive fish production to the rehabilitaion of native species.
3c) Cowx, I 1994 Rehabilitation of Freshwater Fisheries, Fishing News Books; Weatherly, AH 1997 Growth and Ecology of Fish Populations, Academic Press; Cowx, I & Grady, O 2001 Fisheries Management and Ecology, Blackwell; Bagenal, T 1978 Methods for Assessment of Fish Production in Fresh Waters, Blackwell; Mathews, WJ 1998 Patterns in Freshwater Fish Ecology, Chapman & Hall .
4. Compulsory.
5. Rui Manuel Vitor Cortes, Daniel Oliveira.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 4th year.
7. Theoretical and practical classes looking for a complete integration between both types of classes.
8. Reports of the practical classes (or the presentation of a specific subject) together with written tests and a final examination
9. No.
10. 5.

1. Game Restocking - 1715.
2. Legislative aspects; cinegetic species to consider: particularities and specifications in the process. Farm: Infrastructures and equipment; Design. Animals source. Disease prevention. Pathologies. Food. Rearing methods. Breeding success. Breeding stock renovation. Adaptation process to natural conditions. Capture and transport. Restocking. Other opportunities of market.
3a) Good knowledge on Cinegetic.
3b) To transmit the philosophy inherent in the rearing process of captive animals to restocking. To provide the student with the necessary knowledge to perform and to monitor this activity.
3c) Bolen, EG & Robinson, WL 1995 Wildlife ecology and management, Prentice Hall, New Jersey; Fuentes, A et al. (eds.) Manual de ordenación y gestión cinegética, Ifeba, Badajoz, Espanha.
4. Compulsory.
5. Aurora Monzón, Paula Bento.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical project.
9. No.
10. 5.

1. Plant Production Systems - 1716.
2. Forest nursery. Soil and Water management. Methods and stages of plant production. The greenhouse in forest nurseries. Seed management. Cultural practices. Growth and physiological plant aspects. Plant production in tree Improvement. Plagues and diseases in forest nursery.
3a) No prerequisites.
3b) Provide scientific and technical knowledge related to the plant production for the several actions that involve green areas, such as nursery installation, seed collecting and treatment, plant stock management and plant production methodologies.
3c) Bonga, JM 1985 Tissue Culture in Forestry, Martinus Nijhoff & W. Junk Publishers, Boston; Hayward, MD et al. 1993 Plant Breeding Principles and Prospects, Chapman & Hall (eds.).
4. Compulsory.
5. Aloísio Loureiro, Maria João Gaspar.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 5.

Branch of Environmental Diagnosis

1. Landscape Management - 1705.
2. Sustainable land use. Constrains for landscape management. Framework of the National Landscape Management Law. Organization and relationships on landscape management. Main institutional elements of landscape management. Regional, local and special regulation applied for land use planning.. Sectorial planning and its relationships with landscape management.
3a) Knowledge of GIS and Quantitative Ecology.
3b) To provide students with the theoretical and practical concepts of landscape management.
3c) Forman, RT & Godron, M 1986 Landscape Ecology; Castroviejo, M & Diaz, V 1996 Practicas para la planificacion de espacios naturales, Colección Técnica, Organismo Autónomo Parques Nacionales, Madrid, Espanha.; Pardal, S 1988 Planeamento do território.
4. Compulsory.
5. João Bento.
6. 2 h/week; 1st semester; 4th year.
7. Lectures-practical classes and training.
8. A case study presentation; final examination.
9. No.
10. 2.5.

1. Environmental Education - 1579.
2. Perspectives and approaches to environmental education; human attitudes and values; sustainable development in a systemic perspective; human interventions; environmental awareness; methodology of environmental education; activities of environmental education; assessment in environmental education.
3a) No prerequisites.
3b) The objective of the discipline is to introduce fundaments of environmental education, so much at a philosophical level as at a practical and applied level.
3c) Novo, M 1998 La educación ambiental: bases éticas, conceptuales y metodológicas, Paris: UNESCO, Madrid: Editorial Universitas; Goldsmith, E 1998 The Way: An Ecological World-View, Athens: University of Georgia Press.
4. Compulsory.
5. Anastássios Perdicoúlis.
6. 2 h/week; 1st semestre; 4th year.
7. Lectures-practical classes.
8. Final exam.
9. No.
10. 2.5.

1. Eco-Management and Audit - 1717.
2. Environmental Management at organisations level: principles and challenges. Eco-management tools for organisations. Environmental performance evaluation. Environmental Management Systems (EMS). Implementation of EMS according ISO 14001 specifications. Proceedings for EMS certification. Audit concepts and principles. Audit standards for ISO 14001. Environmental audits preparation and conduction. Case studies. Eco-management tools for products: Life-Cycle Assessment; Products ecodesign; European Union Eco-label.
3a) No prerequisites.
3b) Provide eco-management concepts and tools for environmental management at organisations level. Provide knowledge for Environmental Management Systems implementation and environmental audits conduction. The advantages of using eco-management and audit tools for the organisations, namely for firms.
3c) Apemeta 1999 Implementação de Sistemas de Gestão Ambiental, Lisboa; Direcção Geral do Ambiente 1999 Práticas de Sistemas de Gestão Ambiental. NPF Pesquisa e Formação Publicações; Fernández-Vítora, V 1997 Auditorías Medioambientales: Guia Metodológico, 2ª ed., Ed. Mundi-Prensa, Madrid; Ferrão, P 1998 Introdução à Gestão Ambiental, Colecção Ensino da Ciência e da Tecnologia, IST, Lisboa.
4. Compulsory.
5. Lívia Madureira.
6. 4 h/week (2 theoretical + 2 practical); 1st semester ; 4th year.
7. Lectures and practical classes.
8. Practical work or Case study with presentation and discussion (30%); written test (70%).
9. No.
10. 5.

1. Air Pollution and Quality - 1718.
2. Scales of the Air Pollution Problem, Emission Inventory, Measurement and Monitoring of Air Pollution, Acidic Deposition, Transport and Dispersion of Air Pollutants, Air Pollution Modelling.
3a) Good knowledge on Thermodynamics, Environmental Chemistry, Fluid Mechanics and Environmental Physics.
3b) To provide students with the theoretical and practical basis in air quality monitoring. The Students should be able to use and choose between different air pollution measurement techniques.
3c) Boubel, WR et al. 1994 Fundamentals of Air Pollution, Academic Press, San Diego; Warneck, P 1988 Chemistry of the Natural Atmosphere, San Diego: Academic Press, International Geophysics Series, vol. 41.
4. Compulsory.
5. Margarida Maria Correia Marques.
6. 4 h/week (2 theoretical + 2 practical); 1st semester ; 4th year.
7. Lectures, practical classes and laboratories.
8. Three case study and oral presentation with discussion (70%); final written exam (30%).
9. No.
10. 5.

1. Monitoring of Soil Quality - 1710.
2. General soil quality parameters and your relationship with environment, economic and social aspects; most important contaminant of soils, properties that influence your behaviour in soil, transports and transference phenomena's; description, analysis and quantification of risk associated to pollution; treatment technologies, type and local treatment classification; General aspects of Bioremediation, Phytoremediation, Soil Vapour Extraction, Air Sparging; Vacuum-Enhanced Recovery, Stabilization and Solidification methodologies.
3a) Good knowledge on Soil, Chemistry, Hydrology, Hydraulics and Biology aspects.
3b) Provide the students with an overview of physical, chemical and biological aspects of soil pollution. The students should be able to develop a project for soil pollution analysis, integrating all issues referenced in the class, integrated the risks analysis, selection and implementation of methodology and monitorization procedures.
3c) Suthersen, SS 1996 Remediation Engineering: Design Concepts, Geraghty & Miller, Environmental Science and Engineering Series, 362 pp.; Eweis, JB et al. 1998 Bioremediation Principles, McGraw-Hill Series in Water Resources and Environmental Engineering, 295 pp.; Harris, M & Herbert, S 1994 Contaminated land. Design and practice guide, Institution of Civil Engineers, Thomas Telford (eds.).
4. Compulsory.
5. João Ricardo Sousa.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. One case study with presentation and discussion (25%) and final written exam (75%).
9. No.
10. 5.

1. Water Pollution and Quality - 1719.
2. Cycle of the water. Contamination of the water: topical and diffuse pollution, ecosystems eutrofization, micro-pollutants. The quality of the water in function of the different goals. Water and wastewater characterisation. Sampling processes. Main parameters of water quality: physical, chemical (organic and inorganic) and biological parameters. Water treatment processes for human consumption. Wastewater treatment: preliminary, primary, secondary and tertiary treatments. Monitorization in aquatic ecosystems (lotic and lenthic) and in unit treatment systems.
3a) Good knowledge on general chemistry.
3b) This discipline seeks to provide students with concepts about water quality characterisation, trying help to understand the meaning of physical, chemical and biological parameters. It also intends to give to know the basic of treatment processes for water and wastewater.
3c) Sawyer, CN et al. 2003 Chemistry for Environmental Engineering, 5th ed., McGraw-Hill, NY; Baird, C 1999 Environmental Chemistry, 2nd ed., WH Freeman Pub., NY; APHA 1998 Standard Methods for the Examination of Water and Wastewater, 19th ed.; Metcalf & Eddy 2003 Wastewater Engineering. Treatment and Reuse, 4th ed., McGraw-Hill, NY.
4. Compulsory.
5. Rui Cortes José Alcides Peres.
6. 4 h/week (2 theoretical + 2 theoretical/practical); 1st semester ; 4th year.
7. Lectures and theoretical/ practical classes.
8. Final written exam.
9. No.
10. 5.

1. Solid Residuals/Waste - 1720.
2. Integrated solid waste management. Solid waste characterisation. Recovery and transfer. Physical process. Recycling. Biological treatment. Thermic process. Sanitary embankment.
3a) No prerequisites.
3b) To supply the basic knowledge to permit the application of ideas, concepts and techniques used in integrated solid waste management.
3c) Tchobanoglous, G et al. 1993. Integrated Solid Waste Management, McGraw-Hill, Inc.; LaGrega, MD et al. 1994 Hazardous Waste Management, McGraw-Hill, Inc.; Nemerow, NL & Dasgupta, A 1991 Industrial and Hazardous Waste Treatment, van Nostrand Reinhold; Vesilind, PA & Rimer, AE 1981 Unit Operations in Resource Recovery Engineering, Prentice-Hall International.
4. Compulsory.
5. Margarida Correia Marques.
6. 4 h/week (2 theoretical + 2 practical); 1st semester ; 4th year.
7. Lectures and practical classes.
8. As described on the Pedagogic Norms. Continuos evaluation (2 written test, covering the theoretical and practical lectures) or a final exam.
9. No.
10. 5.

Natural Resources and Environmental Engineering Degree

Programme of Studies

1st YEAR	1st Semester	ECTS	2nd Semester	ECTS
	General Physics I	5.0	General Physics II	5.0
	Analysis Mathematics I	6.5	Analysis Mathematics II	6.5
	Chemistry I	6.5	Zoology	4.0
	Introduction to the Environmental Problems	2.0	Chemistry II	6.5
	Geodynamic	4.5	Pedology and Soil Conservation	4.0
	Molecular Biology and Histology	5.5	Botanic	4.0
	Total	30	Total	30
2nd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Microbiology	5.0	Organic Chemistry	5.0
	Linear Algebra and Analytical Geometry	6.5	Numerical Methods	5.0
	Mineralogy and Petrology	3.5	Cartography and Geographic Information Systems	5.0
	Population Genetics and Evolution	5.0	Biotechnology and Bioprocess Engineering	5.0
	Water Chemistry	5.0	General Hydraulic	5.0
	Biochemistry (annual)	5.0	Biochemistry (annual)	5.0
	Total	30	Total	30
3rd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Probability and Statistics	5.0	Thermodynamics	5.0
	Transfer Phenomena	6.0	Water Resources	8.0
	Ecophysiology	6.0	Freshwater Ecology	5.0
	Waste Management (annual)	5.0	Phytogeography and Phytossocio-logy	5.0
	Environmental Chemistry	5.0	Environmental Economy	5.0
			Waste Management (annual)	5.0
	Total	27	Total	33
4th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Mineral and Energy Resources	4.5	Natural Resources conservation Faun and Flora	5.0
	Environmental Physics	6.0	Water and Wastewater Treatment	5.0
	Bioengineering in Rehabilitation of Sensitive Areas	4.5	Legislation and Environment Politics	5.0
	Environmental Modelling	4.5	Degradation and Soil Pollution	5.0
	Applied Hydraulic	6.0	Ecotoxicology	5.0
	Eco-management and Audit	4.5	Air Pollution Measurement and Control	5.0
	Total29	30	Total	30.0

	1st Semester	ECTS	2nd Semester	ECTS
5th Y E A R	Technical Drawing Environmental Impact Study and Forecasting Methodology Regional and Urban Planning Environment Quality Project (annual) 2 Options (Economic Analysis Projects; Environment Education; Protected Areas; Informatics Applied to the Environment;; Environmental Geology)	1.0 4.0 4.0 4.0 11.5 6.0	Landscape Planning Catchments Management Ecotechnology Project (annual) 2 Options (Agro-Environmental Protection; Noise Pollution; Remote Sensing; Evaluation and Maintenance of Genetic Resources)	4.0 4.0 4.0 11.5 6.0
	Total	30.5	Total	29.5

Total study credits: 300

1st year

1. Analysis Mathematics I - 0174.
2. Functions of one variable: implicit and inverse functions; some special functions. Limits of functions and continuity: classification of discontinuity. Derivatives: higher order derivatives; implicit differentiation. Antiderivatives: techniques of integration. Rolle's theorem, Lagrange's theorem and Cauchy's theorem. L'Hopital's rule. Taylor's formula. Integration: the definite integral.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st vol., Weberand Schmidt; Apostol, TM 1967 Calculus, 1st vol., Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito, Sílvia Reis, Pedro Vieira.
6. 6 h/week (3 theoretical + 3 theoretical/practical); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Two written assessments or final written exam - 100%.
9. No.
10. 6,5.

1. General Physics I - 0118.
2. Vector calculus. Complements of mathematics. Unities and dimensions. Statics. Kinematics. Particle and particle systems dynamics. Rigid body dynamics. Simple harmonic oscilations. Elasticity. Fluid mechanics.
3a) Mathematics.
3b) The students should be able to solve basic kinematical and mechanical problems.
3c) Keller, FJ et al. Physics: Classical and Modern, McGraw-Hill Book Company; Alonso, M & Finn, J Física um Curso Universitário, Edgard Blucher Lda.; Spiegel, M Análise Vectorial, McGraw-Hill Lda.; Feynman, RP et al. The Feynman Lectures on Physics, Addison-Wesley Publishing Company; Kittley, C et al. Berkeley Physics Course, McGraw-Hill Book Company; Dias de Deus, J et al. Introdução à Física, McGraw-Hill; Bueche, F Principles of Physics, McGraw-Hill Inc.; Almeida, JM et al. 2001 Física Geral (vols. I e II), Série Didáctica, UTAD Vila Real; Almeida, JM et al. 2001 Exercícios de Física Geral (vols. I e II), Série Didáctica, UTAD, Vila Real.
4. Compulsory.
5. José Manuel Marques Martins de Almeida, Luís Morgado, Francisco Marinho.
6. 4.5 h/week (3 theoretical + 1.5 theoretical/practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 5.

1. Geodynamic - 1304.
2. Seismicity and Earth's Interior. Gravity and Isostasy. Dynamics of the lithosphere. Energy and matter. Minerals. Igneous, sedimentary and metamorphic rocks. Struture of rock bodies. Geological time. Weathering. Mass movement River systems. Evolution of landforms. Groundwater. Glacial, Shoreline and Eolian systems. Cartography and topography concepts. Use of the compass-clinometer. Reading and interpretation of geological maps.
3a)
3b) We claim that the student understanding the constitution and dynamics of the planet Earth, how works and interacting their several dynamic systems ones to another. Geology and the geological processes in the genesis and evolution of soils and landforms are enhanced.
3c) Plummer, CC. & McGeary, D 1996 Physical geology. 7th ed., Wm. C. Brown Publishers, USA; Hamblin, KW 1992 Earth's dynamic systems. 6th ed., Maxwell Macmillan, NY, 6th ed.; Skinner, BJ & Porter, SC 1987 Physical Geology, Jonh Wiley & Sons, NY; Hamblin, KW & Howard, JD 1992 Exercises in physical geology, Maxwell Macmillan, NY, 8th ed.; Busch, RM (ed.) & Tasa, D (Ilust.) 1997 Laboratory manual in physical geology, 4th ed., Prentice-Hall, Inc. New Jersey; Bonte, A 1969 Introduction a la lecture des cartes geologiques. Masson et Cie. Éditeurs; . Serviço Cartográfico do Exército 1991 Manual de Leitura de Cartas.
4. Compulsory.
5. Carlos Coke.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam.
9. No
10. 4.5.

1. General Physics II - 0119.
2. Vector differential operators and coordinate systems. Electric charge and Coulomb's law. Electric field and potencial. Capacitors and dielectrics. Electric current. Electric circuits. Temperature and energy transfer.
3a) Mathematics and General Physics I.
3b) To provide students with the basic tools for electric circuit analysis.
3c) Keller, FJ et al. Physics: Classical and Modern, McGraw-Hill Book Company; Alonso, M & Finn, J Física um Curso Universitário, Edgard Blucher Lda.; Spiegel, M Análise Vectorial, McGraw-Hill Lda.; Feynman, RP et al. The Feynman Lectures on Physics, Addison-Wesley Publishing Company; Kittley, C et al. Berkeley Physics Course, McGraw-Hill Book Company; Dias de Deus, J et al. Introdução à Física, McGraw-Hill; Bueche, F Principles of Physics, McGraw-Hill Inc.; Almeida, JM et al. 2001 Física Geral (vols. I e II), Série Didáctica, UTAD Vila Real; Almeida, JM et al. 2001 Exercícios de Física Geral (vols. I e II), Série Didáctica, UTAD, Vila Real.
4. Compulsory.
5. Luís Morgado, Francisco Marinho, Jaime Viegas.
6. 4.5 h/week (3 theoretical + 1.5 theoretical/practical); 2nd semester; 1st year.
7. Lectures and theoretical/practical classes.
8. Final written exam.
9. No.
10. 5.

1. Pedology and Soil Conservation - 0814.
2.
3a) Good knowledge on General Chemistry.
3b)
3c) Costa, JB 1975 Caracterização e Constituição do Solo, Ed. Calouste Gulbenkian, Lisboa; Brady, NC 1990 The nature and properties of soils, Macmillan Publishing Company, NY; Schroeder, D 1984 Soils, Facts and Concepts, Int. Potash Institute, Bern, Switzerland; Wild, A 1993 Soils and the Environment. An Introduction, Cambridge University Press.
4. Compulsory.
5. Afonso Martins, Fernando Raimundo.
6. 3 h/week; 2nd semester; 1st year.
7. Lectures/practical classes, on field and laboratory.
8.
9. No.
10. 4.

1. Analysis Mathematics II - 0178.
2. Applications of Integration. Polar and Parametric Coordinates: area of plan figure, volume of solids, length of curve in Polar and Parametric Coordinates. Improper Integrals. Sequences of real numbers: bounded and monotonic sequences. Series: series with nonnegative terms : comparison tests, the integral test, the ratio and root tests; absolute convergence - alternating series. Power series: expansion of functions; differentiation and integration of power series; Taylor and Maclaurin series.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st vol., Weberand Schmidt; Apostol, TM 1967 Calculus, 1st vol., Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito, Helena Campos, Sandra Ricardo.
6. 6 h/week (3 theoretical + 3 theoretical/practical); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Two written assessments or final written exam - 100%.
9. No.
10. 6.5.

1. Zoology - 0238.
2. Slight knowledge of zoological systematic - classification criteria; Study of the more representative protozoa: Phyla Sarcomastigophora, Apicomplexa and Ciliophora; Study of the metazoans - origin, general characteristics, form and function, classification, phylogeny and adaptive radiation of the Phyla: Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca (Classes Gastropoda, Bivalvia and Cephalopoda); Annellida; Arthropoda (Classes Arachnida, Crustacea, Diplopoda, Chilopoda and Insecta); Echinodermata; Chordata - Subphylum Vertebrata - Superclasses Agnatha and Gnathostomata - Classes Chondrichthyes (cartilaginous fishes), Osteichthyes (bony fishes), Amphibia (amphibians), Reptilia (reptiles), Aves (birds) and Mammalia (mammals).
3a) Knowledge on Molecular Biology and Histology.
3b) To know the rules and criteria established for zoological systematic. Understand the diversity of the protozoa with similar characteristics to the animals - Protozoan Phyla. To identify characteristics and to interpret data related to the evolutionary history of the main animal groups. To relate structural and functional characteristics of the animals with the environment conditions where they live.
3c) Hickman, CP et al. 2001 Integrated Principles of Zoology, McGraw-Hill International Edition; Kukenthal, W et al. 1986. Guia de Trabalhos Práticos de Zoologia, Livraria Almedina, Coimbra.
4. Compulsory.
5. Jorge Ventura F. Cardoso, Sofia Santos.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Theorical written test (50%) + Practical written test (25%) + Teamwork - Bibliographic review (25%).
9. No.
10. 4.

2nd year

1. Biochemistry - 0007.
2. Theory. Introduction. Amino Acids. Proteins. Enzymes. Vitamins and Coenzymes. Carbohydrates. Lipids. Biological Membranes and Transport. Carbohydrates Metabolism: Glycolysis and the Catabolism of Hexoses and pentose phosphates. The Citric Acid Cycle. Oxidative Phosphorylation. Lipids Metabolism: Oxidation and Biosynthesis of Fatty Acids; Biosynthesis of Triacylglycerols and Glycerophospholipids; Biosynthesis of Sterols and Isoprenoids. Metabolism of Aminoacids. Nucleic Acids. Practice. Introduction Brief. Identification and Characterisation of Amino Acids. Quantification and Characterisation of Proteins. Enzymatic kinetics of alkaline phosphatase; Properties of polyphenoloxidase and enzyme immobilisation. Identification and Characterisation of Carbohydrates. Isolation, Identification and Characterisation of Lipids. Metabolism of Carbohydrates.
3 a) Good knowledge on chemistry.
b) To supply solid technical and scientific preparation in several areas, e.g. constituents of living matter, biocatalysis, general catabolic and biosynthetic pathways as well as biodegradation metabolisms which is essential for the accurate understanding of other courses in this undergraduate curriculum.
3c) Lehninger, AL et al. 1993 Principles of Biochemistry, 2nd ed., Worth Publishers, NY; Plummer, DT 1987 An Introduction to Pratical Biochemistry, 3rd ed., McGraw-Hill Book Company, London; Rawn, JD 1989 Bioquímica, vol. II, McGraw Hill - Interamericana de España, Madrid; Stryer, L 1990 Bioquímica. Tercera Edition, Editorial Reverté, SA, Barcelona; Voet, D & Voet, JG 1992 Bioquímica. Ediciones Omega, SA, Barcelona.
4. Compulsory.
5. Albino Alves Dias, Rosário Anjos.
6. 4 h/week (1 practical + 2 theoretical/practical); annual; 2nd year.
7. Lectures and theoretical/practical classes.
8. Mean of four written assessments 85%; Mean of practical works 15%.
9. No.
10. 10.

1. Microbiology - 0054.
2. Microorganisms. Structural and molecular organisation of the prokaryotic cell. Differences between prokaryotic and eukaryotic cells. Microorganisms nutrition and nutritional types. Culture media requirements. Control of microorganisms growth: physical and chemical agents. Major groups of bacteria, fungi and algae with environmental importance. Microbial metabolism: fermentation, and respiration. Biosynthetic processes: peptidoglican synthesis. Basic notions of microbial molecular genetics. The concept of viruses: morphology and organisation. Lytic and lisogenic cycles. Microbiology of the biogeochemical cycles. Symbiotic relations: mycorrhizae, lichens and Rhizobium and Bradyrhizobium - legume.
3a) We have the presuppose that the audience has prior knowledge of biology and chemistry.
3b) Acquire the fundamental knowledge of the ultrastructure, metabolism and diversity of the micoorganisms since they are involved on nearly every aspects of human existence, with both beneficial or detrimental effects. Realise their importance on biogeochemical cycles, the resolution of environmental problems, biomonitoring and on the production of valuable products.
3c) Prescott, LM et al. 1996 Microbiology, WCB ed.; Canas Ferreira, WF & De Sousa, JCF 1998 Microbiologia, vol. I, Editora Lidel; Brock, TD et al. 1994 Biology of Microorganisms, Prentice Hall, Inc..
4. Compulsory.
5. Ana Sampaio, João Carrola.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Written examinations, practical work.
9. No.
10. 5.

1. Population Genetics and Evolution - 0558.
2. Population genetics: Hardy-Weinberg equilibrium, extensions of Hardy-Weinberg equilibrium; nonrandom mating. Processes that change allelic frequencies: mutation, migration, small size population, natural selection. Quantitative inheritance. DNA: its mutation, repair and recombination. Molecular genetics; Genetics of the evolutionary process: darwinian evolution; genetic variation; sociobiology.
3a) Biology and biochemistry.
3b) To understand that evolution is a process that takes place in populations of organisms, the way in which allelic frequencies change in populations over time and that populations change, or evolve, through natural selection and other forces.
3c) Hartl, DL & Clark, AG 1989 Principles of population genetics, Sinauer Associates, Inc. Publishers, Sunderland; Wallace, B 1974 Génétique des populations, Masson et Cie ed., Paris; Metller, LE & Gregg, TG 1969 Populations genetics and evolution, Prentice-Hall Inc., Englewood Cliffs, New Jersey.
4. Compulsory.
5. Valdemar Carnide, Manuela Matos, Carlos Ribeiro de Carvalho.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 2nd year.
7. Lectures and practical classes,
8. Practical evaluation, written testes and final exam.
9. No.
10. 5.

1. Linear Algebra and Analytical Geometry - 0117.
2.. Algebric Structures. Vector Spaces: linear independence; spanning sets; basis and dimension; vectorial subspace. Linear Mappings: the algebra of linear mappings; kernel and image; linear mappings whose domain is a vector space of finite dimension. Matrices: matrix of a linear mapping relative to fixed basis; algebra of matrices; invertible matrices; rank of matrices. Systems of Linear Equations: matricial interpretation; a systematic method of solving systems of linear equations. Determinants: basic concepts; Laplace theorem; application to matrices and systems. Eigenvalues and Eigenvectors: basic concepts.
3a) Basic knowledge in logic, theory of sets, functions and secondary school level of algebra.
3b) To develop reasoning capacity of the student and to provide the basic concepts of Linear Algebra and Analytical Geometry.
3c) Giraldes, E et al. 1995 Curso de Álgebra Linear e Geometria Analítica, McGraw-Hill; Blyth, TS & Robertson, EF 1986 Matrices and Vector Spaces, Chapman and Hall; Blyth, TS & Robertson, EF 1994 Linear Algebra, Chapman and Hall.
4. Compulsory.
5. Elza Maria Alves de Sousa Amaral, Rosalina Reimão.
6. 5 h/week (2 theoretical + 3 theoretical/practical); 1st semester; 2nd year.
7. Lectures and theoretical/practical classes.
8. Written test (100%).
9. No.
10. 6.5.

1. Organic Chemistry - 0103.
2. Carbon compounds and chemical bond. Introduction to general organic reactions and their mechanisms. Conformational analysis. Stereochemistry. Sistematic study of the major functional groups: structure of organic compounds, nomenclature, physical properties and reactivity.
3a) General Chemistry.
3b) To provide the students a background in the fundamentals of Organic Chemistry in order to develop their ability to understand the behaviour of organic chemicals in the environment.
3c) Solomons, TWG & Fryhle, CB 2000 Organic Chemistry, 7th ed., John Wiley & Sons, Inc.; Brown, WH 1995 Organic Chemistry, International Edition, Saunders College Publishing; Schwarzenbach, RP et al. 1993 Environmental Organic Chemistry, John Wiley & Sons, Inc..
4. Compulsory.
5. Luís H. Melo de Carvalho, Ana Barros.
6. 4 h/week (2 theoretical + 2 practical).
7. Lectures, practical and laboratory classes.
8. Written exam (60%) and practical mark (40%).
9. No.
10. 5.

1. Numerical Methods - 0130.
2. Number systems and errors. Nonlinear equations. Eigenvalues and eigenvectors. Systems of linear equations. Systems of nonlinear equations. Polynomial interpolation. Least-squares approximation. Numerical differentiation. Numerical integration. Differential equations. Nonlinear unconstrained optimisation.
3a) Mathematical analysis and linear algebra.
3b) The students should be able to choose and use the right algorithms to solve different kind of problems, making a correct and precise analyse of error propagation. They must consider the required accuracy, estimate an approximated solution value, and provide verifications test and corrective actions in case of no convergence.
3c) Fernandes, Edite 1998 Computação Numérica, Serviços de Reprografia e Publicações da Universidade do Minho, Braga; Valença, MR 1983 Métodos Numéricos, Livraria Minho, Braga; Conte, SD & de Boor, C 1987 Elementary Numerical Analysis, McGraw-Hill Book Company. Dodes, IA 1978 Numerical Analysis for Computer Science, Elsevier North-Holland Inc., NY; Pina, H 1995 Métodos Numéricos, McGraw-Hill; Scheid, F 1991 Análise Numérica, McGraw-Hill; Santos, FC 2002 Fundamentos de Análise Numérica, Edições Sílabo, Lisboa.
4. Compulsory.
5. João Matias, Luísa Morgado, Laura Ribeiro, Sílvia Reis.
6. 5 h/week (2 theorectical + 3 theoretical/practical); 2nd semester; 2nd year.
7. Lectures and theoretical/practical classes.
8. Final written exam 100%.
9. No.
10. 5.

1. Hydraulics I - 1309.
2 Introduction. Properties of fluids. Hydrostatics. Motion of fluid particles and streams. The momentum equation and its applications. The energy equation and its applications. Dimensional analysis and theory of models. Flow in pipes. Fluid measurements. Hydrodynamic forces on submerged bodies. Introduction to hydraulic installations. Uniform and non uniform flow in open channels. Flow in porous means. Laboratory tests.
3a) Good knowledge on Physics.
3b) Introduction to basic concepts in fluid mechanics, special emphasis given to hydraulics. Description of the flow in terms of a global concept of the flow of liquids. Applications of the basic equations to solve problems in Environmental Engineering. Laboratory work illustrates real phenomena.
3c) Quintela, A 1981 Hidráulica Geral, F. C. Gulbenkian; Novais Barbosa, J Mecânica dos Fluidos e Hidráulica Geral, vols. I e II, Porto Editora; Lencastre, 1983 Hidráulica Geral, Hidroprojecto; White, F 1987 Fluid Mechanics, McGraw-Hill.
4. Compulsory.
5. Isabel Bentes, Amadeu Borges.
6. 4 h/week (2 theoretical + 2 theoretical/practical); 2nd semester; 2nd year.
7. Lectures and theoretical/practical classes.
8. Final exam.
9. No.
10. 5.

1. Cartography and Geographic Information Systems - 1307.
2. Systems of cartographic projection: objectives, characteristics, the most significant methods. Georeference systems: grid systems, transformation of coordinates, measurement of distances and azimuths. Maps: classification, main Portuguese maps, some foreign maps. Geographic Information Systems (GIS): origin, evolution of technology, the state of the art and future trends and perspectives. Applications of the GIS: categories and fields of application, costs and benefits. Components of a GIS database: graphic and non-graphic data and relation between them, development and maintenance of databases. Analytical functions in GIS: integrated analysis of spatial data and attributes.
3a) Notions of Mathematics and of how to use computer software for the Windows Operating System.
3b) To introduce students in the methods and techniques for a successful learning of Digital Cartography and of how to use Geographic Information Systems. To understand the methods leading to production of GIS databases with application in specific problems concerning the field of Environmental Engineering.
3c) Gaspar, JA 2000 Cartografia e projecções cartográficas, Liedel, Lisboa, 292 pp.; Matos, JL 2000 Fundamentos de informação geográfica, Liedel, Lisboa, 326 pp.; Antenucci, JC et al. 1991 Geographic Information Systems - A Guide to the Technology, Chapman & Hall; Neto, PL 1998 Sistemas de Informação Geográfica, FCA - Editora de Informática.
4. Compulsory.
5. Fernando A. L. Pacheco, João Carlos Baptista.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Exam
9. No.
10. 5.

3rd year

1. Waste Management - 1569.
2. Waste definition. Integrated Solid Waste Management. National and European Law. Waste composition and production. Collection, transport and transfer. Processing and Municipal Facilities. Separation, transformation and Recycling of waste. Industrial, hospital and Urban Wastes. Landfilling. Solid Waste Management and Planning.
3a) Soil, Chemistry, Physics, Thermodynamics and Microbiology.
3b) The students will be able to planning and management a Integrated Solid Waste Management Systems.
3c) Instituto Nacional de Resíduos 2002 Resíduos Sólidos Urbanos: Concepção, construção e exploração de Tecnossistemas, Ministério do Ambiente e Ordenamento do Território; Martinho, MG & Gonçalves, MG 2000 Gestão de Resíduos, Universidade Aberta; McBean, EA et al. 1995 Solid Waste Landfill Engineering and Design, Prentice Hall, USA; Qasim, SR & Chiang, W 1994 Sanitary Landfill Leachet: Generation, control and treatment, Technomic Publishing Company, USA; Serrão, PC 1998 Introdução à Gestão Ambiental: a avaliação do ciclo de vida dos produtos. IST - Press Instituto Superior Técnico; Tchobanouglous, G et al. 1993 Integrated Solid Waste Management: Engineering and management issues. McGraw-Hill USA.
4. Compulsory.
5. Carlos Afonso Teixeira.
6. 4 h/week (2 theoretical + 2 theoretical/practical); anual 3rd year.
7. Lectures and theoretical/practical classes.
8. One case study with presentation and discussion 50%; one written assessments (50%).
9. No.
10. 5.
10. 8.

1. Environmental Chemistry - 0560.
2. General concepts in Environmental Chemistry. Chemical reactions. Chemical reactors. Kinetics and stoichiometrie of simple reactions. Water pollution. Water and wastewater characterization: physical, chemical and biological parameters. Alkalinity. Hardness. Dissolved oxygen. Biochemical Oxygen Demand. Chemical Oxygen Demand. Nitrogen species. Solids. Sulphate. Phosphorous. Oil and grease. Trace contaminants. Air Pollution. The atmosphere of Earth. Primary and secondary pollutants. Air pollutants: carbon monoxide and carbon dioxide, nitrogen oxides (NOx), hydrocarbons, volatile organic compounds (VOC), photochemical oxidants, sulphur oxides, particulate matter, lead. Air pollution situations: greenhouse effect, changes in stratospheric ozone, photochemical smog, acid rain.
3a) Good knowledge on general chemistry.
3b) To provide students with an overview of anthropogenic activities impact in the Environment. The students should be able to interpret and identify water pollution and air pollution characteristics.
3c) Sawyer, CN, et al. 2003 Chemistry for Environmental Engineering, 5th ed., McGraw-Hill, NY; Baird, C 1999 Environmental Chemistry, 2nd ed., WH Freeman Pub., NY; Warnek, P 1988 Chemistry of the Natural Atmosphere, Academic Press, NY; APHA, 1998 Standard Methods for the Examination of Water and Wastewater, 19th ed..
4. Compulsory
5. José Alcides Peres, João Ribeiro Claro.
6. 7 h/week (2 theoretical + 1 theoretical/practical + 4 practical); 1st semester; 3rd year.
7. Lectures, practical classes and laboratories.
8. Final written exam (50%) and practical work (50%).
9. No.
10. 8.

1. Probability and Statistics - 0561.
2. Descritive Statistics and Statistical Inference. Introdution to Statistics and to data analysis. Introdution to Probability Theory. Introdution to Random Variables and to the Probability Laws. Mathematical Expectation and their Properties. Some Probability Laws Discrete and Continuous. Statistical Inference. Random Sampling. Data Description, and Some Fundamental Sampling Distributions. Bernoulli and Normal Populations. Estimation Methods. Point Estimation: Statistics and their Properties. Intervalar Estimation Cofidence Interval for the Single Mean, and for the Variance, and for the Difference Between Two means (Paired and Independent Samples), and for Two Sample Variances, and for the Proportions, and for the Difference Between Two Proportions. One and Two Sample Tests of Hypotheses. One and Two Tailed Tests. Use of p-Values in Decision Making
3a) Mathematics I.
3b) Students should be able to use the statistical methods in data analysis.
3c) Reis, E et al. 1997 Estatística Aplicada, Edições Sílabo, 2ª ed., vols. I e II; Walpole, RE & Myers, RH 1993 Probability and Statistics for Engineers and Scientists, Prentice Hall International Inc., 5th ed.; Zar, JH 1993 Biostatistical Analysis, Prentice Hall International Inc., 3rd ed..
4. Compulsory.
5. Maria Manuel da Silva Nascimento, Sónia Raposo.
6. 5 h/week (2 theoretical + 2 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. 100% Final Written Examination.
9. No.
10. 5.

1. Transfer Phenomena - 1570.
2. Vectors. Vector operators. Laws of conservation. Viscosity in fluids. Transfer equations. Energy transfer. Physics of radiation. Solar and terrestrial radiation in the atmosphere. Radiative transfer in the atmosphere. Atmospheric pollution.
3a) Good knowledge on Physics and Mathematics.
3b) The student must dominate the terminology and the physical principles associates to the subject, must know to identify the involved processes of transfer and computing its transfer rates. The knowledge of the laws of radiation is basic as well as its propagation in the atmosphere.
3c) Welty, JR et al. 2000 Fundamentals of Momentum, Heat, and Mass Transfer, John & Sons, Inc., 4ª ed., 759 pp; Peixoto JP & Oort, AH 1992 Physics of Climate, American Institute of Physics, NY, 2ª ed., 520 pp.; Kiely G 1996 Environmental Engineering, McGraw-Hill International Editions, 979 pp..
4. Compulsory.
5. Malik Amraoui, Eurico Vasco Ferreira Amorim.
6. 4.5h/week (3 theoretical + 1,5 theoretical/practical); 1st semester; 3rd year.
7. Lectures and theoretical/practical classes.
8. Final written exam.
9. No.
10. 6.

1. Ecophysiology - 1571.
2. Concept of ecophysiology. The water and plant physiology. Mineral nutrition and plant physiology. Photosynthesis. Stress physiology: concept, phases and recognise. Stress types (effects and defence mechanisms): water stress, flooding, salinity, heavy metals, visible and UV-B radiation, chilling, freezing, high temperature, atmospheric CO2, pollutants (ozone, SO2).
3a) Good knowledge on Biology and Biochemistry.
3b) Students should get a domain on the main aspects of structure and functions that interfere in the growth, differentiation and development of higher plants and on plant responses to environmental factors.
3c) Larcher, W 1995 Physiological Plant Ecology, 3rd ed., Springer-Verlag, Germany; Taíz, L & Zeiger, E 1998 Plant Physiology, 2nd ed., Bejamín/Cummings, Redwood, California, USA; Hopkins, WG 1999 Introduction to Plant Physiology, 2nd edition, John Wiley, New York, USA.
4. Compulsory.
5. Carlos M. Correia, Eunice Areal Bacelar.
6. 5 h/week (3 practical + 2 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Two written tests or a final exam - 100%.
9. No.
10. 6.

1. Freswhwater Ecology - 0812.
2. The relationship between the hydrobiology and forestry. Lotic and lentic ecosystems. Physico and chemical characterization of running waters. Patterns of longitudinal variation in lotic ecosystems and of vertical variation in lentic ones. Aquatic communities: micro-organisms, plankton, macrophytes, benthic invertebrates, fishes. Human impacts and bio-assessment.
3a) No prerequisites.
3b) Characterisation of the biotic and abiotic components of running waters establishing the relationship between those components and the watershed.
3c) Cortes, RMV et al. 1991 Caracterização Físico-Química das Águas Dulciaquícolas. Implicações Biológicas, UTAD, Vila Real, 131 pp.; Cortes, RMV & Ferreira, MT 1993 Metodologia para o Estudo da Estrutura das Populações de Ictiofauna em Águas Interiores, UTAD, Vila Real, 66 pp.; Wetzel, RG 1993 Limnologia, Edições da Fundação Callouste Gulbenkian, Lisboa, 898 pp..
4. Compulsory.
5. Rui Manuel Vitor Cortes, Simone Varandas de Oliveira, Daniel Gustavo de Oliveira.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 3rd year.
7. Lectures and practical classes looking for a complete integration between both types of classes.
8. Reports of the practical classes (or the presentation of a specific subject) together with written tests and a final examination.
9. No.
10. 5.5.

1. Environmental Economics - 1572.
2. Introduction to economics: resources scarcity and social choices for its allocation between alternative uses. Economic growth and Economic development. Human pressures over natural resources and Sustainable Development. Market mechanism and resources allocation. Governments role in market economy. Market mechanism and natural resources management: externalities, public goods and property rights issue. Social choice and property rights definition over environmental quality. Microeconomics concepts: Demand theory; Supply theory; Market equilibrium; Production function and marginal production; Production costs total and marginal; External costs total and marginal; Abatement costs total and marginal. Natural resources efficient allocation from economic perspective. Instruments for natural resources efficient allocation: legislative instruments and economic instruments, comparative advantages and disadvantages.
3a)
3b) To introduce concepts and tools for understating economic dimension of environmental problems and the need of environmental regulation in the market economies. Provide knowledge for economic analysis of natural resources management and to identify solutions for its efficient allocation. Supply information over environmental regulation instruments used by governments and provide knowledge for its analysis.
3c) Kolstad, C 2000 Environmental Economics, Oxford University Press, New York e Oxford; Neves, J 2000 Introdução à Economia, 5ª ed., Editorial Verbo, Lisboa; OCDE, 1994 La Fiscalidade y el Medio Ambiente, Versão espanhola de F. Pichot e J. Rapado, Co-edição da OCDE e Mundi-Prensa, Madrid; Pearce, D & Turner, R 1990 Economia de los Recursos Naturales y del Medio Ambiente (trad. Espanhola), Edições Celeste, Madrid; Samuelson, P & Nordhaus, W 1995 Economia, 14ª ed., McGraw-Hill de Portugal, Lisboa; Vários, 1995 Principles of Environmental and Resource Economics, Folmer, H., Gabel, H. e Opschoor, H. (org.). Edward Elgar Publishing Limited, Reino Unido.
4. Compulsory.
5. Lívia Madureira, António Pires.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Written essay with oral discussion (30%); written exam (70%).
9. No.
10. 5.

1. Phytogeography and Phytossociology - 1320.
2. Introduction to Phytossociology; Phytossociology and Typologism. The structure of the vegetation. The individualism and the chaotic organisation of the vegetation. The metapopulation approach of the populations. Typologism vs Individualism, the phytossociological approach. Phytostructuralism, structural characterisation of the behaviour tendencies, the structural parameters. Numerical analysis, multivariate methodology for the phytostructural analysis: numerical matrizes (the MEB and the MC), structural index, standardisation, variance analysis, clusters, multifactorial analysis (PCAs), tendencies characterisation, DCA, HEA. Structural dynamic, characterisation of the resistance and resilience. Prevision models.
3a) Knowledge of the taxonomy and systematic Portuguese vascular flora.
3b) The main goals of the discipline are involved in the knowledgement and characterization of the structure and dynamic of the vegetation.
3c) Blanquet, B 1977 Fitossociologia; Naveh, Z & Lieberman, AS 1987 Landscape Ecology. Theory and Application; Lorca, MP & Rivas-Martínez, S 1987 La Vegetación de España; Ludwig, JA & Reynolds, JF 1988 Statistical Ecology; Crawley , MJ 1989 Plant Ecology; Hair, JF et al. 1995 Multivariate data analysis with readings; Santos, VA & Luque, AP 1996 Métodos multivariados en bioestadística; Reis, E 1997 Estatística multivariada aplicada; Daniel, WW 1998 Biostatistics: a foundation for analysis in the health sciences; Collins, WW & Qualset, CO 1999 Biodiversity in agroecosystems; Hanski, W 1999 Metapopulation ecology; Pianka, ER 2000 Evolutionary ecology.
4. Compulsory.
5. António Maria Luís Crespí.
6. 3 h/week (2 theoretical + 1 practical); 2nd semester; 3rd year.
7. Lectures and practical classes. Transparents, articles, examples of projects already elaborated or in execution data-show presentation, elaboration of a project which will be exposed at the end of the semester.
8. Theoretical examination - 40%; practical examination - 50%.
9. No.
10. 5.

1. Thermodynamics - 0160.
2. The Language of Thermodynamics. Zero Law of Thermodynamics and Temperature. Simple Thermodynamic Systems. Work. Heat and the First Law of Thermodynamics. Ideal gas. The Second Law of Thermodynamics. The Carnot Cycle and the Thermodynamic Temperature Scale. Entropy. Thermodynamic potentials. Open systems. Pure substances. The Third Law of Thermodynamics. Elements of Statistical Mechanics.
3a) General Physics, Differential and integral calculus.
3b) To provide students with the theoretical basis in Thermodynamics and its fundamenta laws. The students should be able to apply their knowledge to several situations-problems relating diverse areas of Physics.
3c) Anacleto, JMS 2002 Termodinâmica e Mecânica Estatística, Série Didáctica 29, UTAD, Vila Real; Zemansky, MW & Dittman, RH 1997 Heat and Thermodynamics, 7th edition, McGraw-Hill; J. Güémez, J et al. 1998 Fundamentos de Termodinâmica do Equilíbrio, Fundação Calouste Gukbenkian, Lisboa; Callen, HB 1985 Thermodynamics and an Introduction to Thermostatics, 2nd ed., John Wiley; Fermi, E 1937 Termodinâmica, Almedina; Dias de Deus, J et al. 2000 Introdução à Física, 2a ed., McGraw-Hill.
4. Compulsory.
5. Joaquim Anacleto, Maria Adelaide Andrade.
6. 4.5h/week (3 theoretical + 1.5 theoretical/practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. One final written exam.
9. No.
10. 5.

1. Water Resources - 0355.
2. Water resources and uses; Distribution of surface and groundwater; Water cycle. The, P, I, R and ET components and their controlling factors; Water balances. Hydrological behaviour of the geologic units - aquifers to aquifugues - in porous and fractured media. The hydraulic parameters of the aquifers. Volume, configuration, location of the aquifers; natural groundwater discharge and spring wells and galleries. Groundwater runoff; well pumping and monitoring intended for computing hydraulic parameters and produtivities. Algorithms after the Darcy law. The quality of the water for human consumption, agriculture, industry. Rates of consumption; contamination. Protection of aquifers and recharge-discharge sites; Water resources in Portugal - surface and groundwater.
3a) Knowledge of General Geology, Chemistry and General Physics of Fluids.
3b) To give the students the scientific framework intended to enable their own progressive expertise and awareness for processes of the water cycle, water resources and their sustainable use. To introduce the concept, fundamental laws, principles and techniques necessary to understand monitor, prospect and uses surface and groundwater. Water resources and their management at different scales and consumption levels.
3c) Alencoão, Ana Maria et al. 2003 Componentes primárias do ciclo hidrológico, Série Didáctica das Ciências Aplicadas, 211, 60 pp. UTAD, Vila Real; Castany, G 1962 Tratado practico de las águas subterraneas, Barcelona: Editiones Omega; Lencastre, A & Franco, FM 1984 Lições de Hidrologia, Lisboa: Universidade Nova de Lisboa; Veiga da Cunha et al. 1980 A gestão da água. Princípios fundamentais e sua aplicação em Portugal, Lisboa: Fundação Calouste Gulbenkian.
4. Compulsory.
5. Ana Maria Pires Alencoão, Alcino Sousa Oliveira, Anabela Ribeiro dos Reis.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 5.

4th year

1. Applied Hydraulic - 1574.
2. Quantity of water and sewerage. Primary mains with and without pumping. Design of water supply systems, pipes, valves and appurtenances. Reservoirs, types and design. Design of sewer systems and storm sewer systems collectors. Design analysis.
3a) General Hydraulics knowledge.
3b) To provide the students with useful information for the design, construction and operation of water supply, sewerage and storm sewer systems.
3c) Bentes, I et al. 2002 Hidráulica Aplicada - Exercícios, Série Didáctica de Ciências Aplicadas, UTAD, Vila Real; Direcção Geral de Recursos Naturais 1988 Manual de Saneamento Básico. Legislação Portuguesa aplicada à matéria (DR 23/95); Novais Barbosa, J 1985/86 Apontamentos de Hidráulica Sanitária, FEUP.
4. Compulsory.
5. Luís Filipe Fernandes.
6. 5 h/week (2 theoretical + 3 theoretical/practical); 1st semester; 4th year.
7. Lectures and theoreticla/practical classes.
8. Final written exam 100%.
9. No.
10. 6.

1. Eco-management and Audit - 1575.
2. Environmental Management at organisations level: principles and challenges. Eco-management tools for organisations. Environmental performance evaluation. Environmental Management Systems (EMS). Implementation of EMS according ISO 14001 specifications. Proceedings for EMS certification. Audit concepts and principles. Audit standards for ISO 14001. Environmental audits preparation and conduction. Case studies. Eco-management tools for products: Life-Cycle Assessment; Products ecodesign; European Union Eco-label.
3a)
3b) Provide eco-management concepts and tools for environmental management at organisations level. Provide knowledge for Environmental Management Systems implementation and environmental audits conduction. To make evident the advantages of using eco-management tools for the organisations, namely for firms.
3c) APEMETA, 1999 Implementação de Sistemas de Gestão Ambiental, Actas do Seminário Implementação de Sistemas de Gestão Ambiental, Lisboa; Direcção Geral do Ambiente, 1999 Práticas de Sistemas de Gestão Ambiental, NPF Pesquisa e Formação Publicações; Fernández-Vítora, V 1997 Auditorías Medioambientales: Guia Metodológica. 2ª ed., Ediciones Mundi-Prensa, Madrid; Ferrão, P 1998 Introdução à Gestão Ambiental, Colecção Ensino da Ciência e da Tecnologia, Instituto Superior Técnico, Lisboa.
4. Compulsory.
5. Lívia Madureira, António Pires.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Practical work or case study with presentation and discussion (30%); written test (70%).
9. No.
10. 4,5.

1. Mineral and Energy Resources - 0360.
2. Genesis of fossil fuels and ore deposits. Elementary aspects of mineral economy. Abundance and availability of natural and mineral resources on Earth. Resources of abundant metals (Fe, Al, Mn, Cr, Ti, Mg), of scarce metals (Cu, Pb, Zn, Ni, Ag, Au, Pt, Sn, W) and of industrial minerals and rocks. Different kinds of energy. Global balance of energy. Energy demand. Potential energy and their types. Coal. Oil and other hydrocarbons. Nuclear energy. Alternative resources of energy. Geothermal energy. Surface energy resources. Solar energy, hydroelectric power, tidal power, wave energy. Their present and future significance. Fuels and environment: origin of their conflict. Problems with the nuclear energy and the energy of the water. The future of energy supply and demand. Reference to mineral and energy resources at Portugal.
3a) Elementary knowledge of Geology.
3b) To introduce students to the problem of geological occurrence, scarcity or abundance of several mineral substances, fuels and renewable energies, their significance for the Portuguese and world-wide economics and their respective exploration and utilisation conflicts on the environment and population.
3c) Skinner, BJ 1986 Recursos Minerais da Terra, Editora Edgar Blucker Ld.; Evans, AM 1995 Ore Geology and Industrial Minerals. An Introduction, Blackwell Science; Baumann, L 1976 Introduction to Ore Deposits, Scottish Academic Press, Edinburgh; Brown, GC & Skipsey, E 1986 Energy Resources. Geology, Supply and Demand, Open University Press. Philadelphia; Branco, SM 1995 Energia e Meio Ambiente, Editora Moderna, São Paulo.
4. Compulsory.
5. Manuel Leal Gomes.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 4th year.
7. Lectures, practical and field classes.
8.1 Written paper 20%, field class reports 5%, (practical 15% and theoretical 60%) final written exam.
9. No.
10. 4.5.

1. Water and Wastewater Treatment - 0818.
2. Wastewater characterisation. Wastewater treatment objectives, methods and implementation considerations. Introduction to wastewater treatment plant design. Physical Unit Operations: flow measurement, screening, flow equalisation, mixing, sedimentation, flotation, granular-medium filtration, gas transfer. Chemical Unit Processes: chemical coagulation/flocculation, adsorption, disinfection. Biological Unit Processes: aerobic suspended-growth treatment processes, aerobic attached-growth treatment processes, anaerobic treatment processes, combined treatment processes. Advanced wastewater treatment. Natural treatment systems. Treatment and disposal of sludge.
3a) Good knowledge on general chemistry and environmental chemistry.
3b) To provide students with the necessary background for design and assessment of water and wastewater treatment processes. The students should be able to interpret the basic concepts, theory and operation of most physical, chemical and biological processes in water and wastewater treatment operations.
3c) APHA, 199, Standard Methods for the Examination of Water and Wastewater, 19th ed.; Cheremisinoff, PN 1995 Handbook of Water and Wastewater Treatment Technology, Marcel Dekker, NY; Davis, ML & Cornwell, DA 1998 Introduction to Environmental Engineering, 3rd ed., McGraw-Hill; Eckenfelder WW 2000 Industrial Water Pollution Control, 3rd ed., McGraw-Hill.
4. Compulsory.
5. José Alcides Peres.
6. 4 h/week (2 theoretical + 2 theoretical/practical); 2nd semester; 4th year.
7. Lectures and theoretical/practical classes.
8. Final written exam (90%) and practical work (10%).
9. No.
10. 5.

1. Degradation and Soil Pollution - 0833.
2. General soil quality parameters and your relationship with environment, economic and social aspects; most important contaminant of soils, properties that influence your behaviour in soil, transports and transference phenomena's; description, analysis and quantification of risk associated to pollution; treatment technologies, type and local treatment classification; General aspects of Bioremediation, Phytoremediation, Soil Vapour Extraction, Air Sparging; Vacuum-Enhanced Recovery, Stabilization and Solidification methodologies, others methodologies of in situ Reactive Walls and Reactive Zones; procedures for selection and implementation remediation technology project.
3a) Good requiring knowledge on Soil, Chemistry, Hydrology, Hydraulics and Biology aspects.
3b) Provide the students with an overview of physical, chemical and biological aspects of soil pollution. The students should be able to develop a project for soil pollution analysis, integrating all issues referenced in the class, integrated the risks analysis, selection and implementation of methodology and monitorization procedures.
3c) Suthersen, SS 1996 Remediation Engineering: Design Concepts, Geraghty & Miller, Environmental Science and Engineering Series, 362 pp.; Eweis, JB et al. 1998 Bioremediation Principles. McGraw Hill Series in Water Resources and Environmental Engineering, 295 pp.; Harris, M & Herbert, S 1994 Contaminated land. Design and practice guides. Institution of Civil Engineers, Thomas Telford (eds.), 78 pp..
4. Compulsory.
5. João Ricardo Sousa.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 4th year.
7. Lectures and practical classes.
8. One case study with presentation and discussion (25%) and final written exam (75%).
9. No.
10. 5.

1. Air Pollution Measurement and Control - 1577.
2. Scales of the Air Pollution Problem, Emission Inventory, Measurement and Monitoring of Air Pollution, Acidic Deposition, Transport and Dispersion of Air Pollutants, Air Pollution Modelling, The Engineering Control of Air Pollution
3a) Good knowledge on Thermodynamics, Environmental Chemistry, Fluid Mechanics and Environmental Physics.
3b) To provide students with the theoretical and practical basis in air quality monitoring. The Students should be able to use and choose between different air pollution measurement techniques. Students should get an overview of air pollution control technologies.
3c) Boubel, WR et al. 1994 Fundamentals of Air Pollution, Academic Press, San Diego; Davis, ML & Cornwell, DA 1998 Introduction to Environmental Engineering, wcb/ McGraw Hill International, Boston; Monteith, JL & Unsworth, MH 1991 Principles of Environmental Physics, Edward Arnold. London; Nevers, N 2000 Air Pollution Control Engineering, McGraw Hill, Boston; Warneck, P 1988 Chemistry of the Natural Atmosphere, San Diego: Academic Press.
4. Compulsory.
5. Margarida Maria Correia Marques.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 4th year.
7. Lectures, practical classes and laboratories (70%); final written exam (30%).
8. Three case study and oral presentation with discussion.
9. No.
10. 5.

5th year

1. Environmental Quality - 0830.
2. The notion of natural and cultural integrity. Considerations of scale and hierarchy. Indicators of ecosystem integrity. Measuring biological integrity and monitoring for ecosystem integrity. Bioindicators of the quality of water, soil and air. Extreme environments and adaptation. Genetic variation and environmental stress. Environmental stress, selection, evolution and extinction. Air pollution. Toxic elements. Acidification. Forest decline. Fossil fuels. Eutrophication. Pesticides. Species richness. Radioactive pollution.
3a) Knowledge of General Ecology.
3b) To understand the fundamental concepts in evaluation, monitoring and rectification of environmental quality, such as environmental stress, ecological integrity, bioindicators, adaptation and evolution. To apply these concepts in the evaluation of the great and actual environmental issues.
3c) Andreasen, JK et al. 2001 Considerations for the development of a terrestrial index of ecological integrity. Ecological Indicators 1(1):21-36; Bijlsma, R & Loeschcke V 1997 Environmental Stress, Adaptation and Evolution, Birkhauser Verlag. 325 pp.; Dale, VH & Beyeler, SC 2001 Challenges in the development and use of ecological indicators. Ecological Indicators 1(1):3-10; Freedman, B 1989 Environmental Ecology, Academic Press, 424 pp.; Fowler, J & Cohen, L 1990 Statistics for Ornithologists, British Trust For Ornithology ,22:173; Jeffrey, DW & Madden, B (991)Bioindicators and Environmental Management, Academic Press, 224 pp.; Kurtz JC et al. 2001 Strategies for evaluating indicators based on guidelines from the environmental Protection Agency's office of research and development's. Ecological Indicators 1(1):49-60; Popp, J et al. 2001 Sustainability indices with multiple objectives. Ecological Indicators 1(1):37-48; Ribaudo, MO et al. 2001 Environmental indices and the politics of the conservation reserve program. Ecological Indicators 1(1):11-20; Soule, DF & Kleppel, GS 1988 Marine Organisms as Indicators, Springer-Verlag, 229 pp.; Woodley, S et al. 1993 Ecological Integrity and the Management of Ecosystems, St. Lucie Press, 210 pp..
4. Compulsory.
5. João Alexandre Cabral, Pedro Teiga.
6. 4 h/week (2 theoretical +2 practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. A written report 25% and two written tests and/or a final written exam 75%.
9. No.
10. 4.

1. Regional and Urban Planning - 0790.
2. Planning models; strategic planning; strategy elaboration; strategy assessment; land use planning; territorial planning; urban planning; prospective.
3a) Organizational capacity; systemic, critical, and creative thinking.
3b) The objective of the discipline is to familiarize the students with the theory and practice of planning in the public sector. In addition, the discipline offers the opportunity to the students to get involved in planning projects.
3c) Güell, JMF 1997 Planificación Estratégica de Ciudades, Barcelona: Editorial Gustavo Gili; Bryson, JM 1995 Strategic Planning for Public and Nonprofit Organizations: a Guide to Strengthening and Sustaining Organizational Achievement, San Francisco: Jossey-Bass; Bruton, M & Nicholson, D 1987 Local Planning in Practice, Leckhampton: Stanley Thornes (Publishers) Ltd.; Pujadas, R & Font, J 1988 Ordenación y Planificación Territorial, Madrid: Editorial Sintesis.
4. Compulsory.
5. Anastássios Perdicoúlis, Luís Ramos.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final exam (50%); project (50%).
9. No.
10. 4.

1. Informatics Applied to the Environment - 0827.
2. Digital Cartography using MicroStation SE: basic concepts, views of the drawings, elements in 2D, manipulation e modification of elements, cells, reference files, some advanced techniques in 2D (ex: multi-lines), annotations (texts), printing, data export. Manipulation of spatial data using Surfer V.8: Drawing of contou rand 3D surface maps, overlaying mapas, automatic calculus of slope and aspect maps, automatic clculus of areas and volumes, appklications to environmental problems. Manipulation of spatial data and attributes using Geomedia 4.0: drawing thematic maps using pré-existing GIS databases, performing queries by numeric and/or spatial attributes, production of simple GIS databases simples.
3a) Notions of Mathematics and of how to use computer software for the Windows Operating System.
3b. To introduce students in the methods and techniques for a successful learning of Digital Cartography and of how to use Geographic Information Systems. To understand the methods leading to production of GIS databases with application in specific problems concerning the field of Environmental Engeneering.
3c) Gaspar, JA 2000 Cartografia e projecções cartográficas, Liedel, Lisboa, 292 pp.; Matos, JL 2000 Fundamentos de informação geográfica, Liedel, Lisboa, 326 pp.; Antenucci, JC et al. 1991 Geographic Information Systems - A Guide to the Technology, Chapman & Hall; Neto, PL 1998 Sistemas de Informação Geográfica, FCA - Editora de Informática.
4. Optional.
5. Fernando A. L. Pacheco, João Carlos Baptista.
6. 5 h/week (1 theoretical + 2 practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Exam.
9. No.
10. 3.

1. Environmental Impact Study and Forecasting Methodology - 0829.
2. Introduction; legislation; impact typology; description and communication of impacts; impact analysis and forecasting; impact assessment; mitigation; public participation; decision-making; post-evaluation; monitoring
3a) Scientific knowledge from most of the other disciplines of the degree, to permit understanding the analysis, forecasting, and assessment of environmental impacts
3b) The objective of the discipline is to offer legal and scientific/ technical background, as well as to develop the capacity for the analysis, forecasting, and assessment of environmental impacts, so much for singular projects as for development strategies
3c) Canter, LW 1996 Environmental Impact Assessment, NY: McGraw Hill, Inc.; Morris, P & Thérivel, R 1995 Methods of Environmental Assessment, London: UCL Press; Wood, C 1995 Environmental Impact Assessment: A Comparative Review, Essex: Longman Scientific and Technical.
4. Compulsory.
5. Anastássios Perdicoúlis.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final exam; optional projects .
9. Não.
10. 4.

1. Landscape Planning - 0828.
2. Theoretical: Definition of terms and inherent concepts to Landscape Planning (LP). Presentation and discussion of themes relative to LP, with special meaning in Portugal (Zonation and regulations of PROTs and PDMs, politics and strategies of conservation of nature, agricultural and forest politics integrated in LP, LP of coastal areas, urban concentration, metropolitan areas, recreation and tourism, etc.). Practices: 1 - Analysis and comment of a LP instrument; 2 - analysis and prospective diagnosis of an area to elaborate an aptitude maps for the implementation of IP3; LP sketch for the same area according to conflicting logics, subsequent confrontation with the actual PDM.
3a) General Ecology, Edafology, Geology, Legislation, Cartography knowledge.
3b) To qualify the students to intervene in the process of Landscape Planning, with prominence for biophysical ambit, in a sustainability vision and at national, regional and local levels. To develop reasoning power in the logic of Landscape Planning, applying theoretical knowledge and using legal norms by the available information on the landscape and territory.
3c) Cancela d'Abreu, AO 1994 Significado do Ordenamento do Território numa Perspectiva Ambiental, Universidade de Évora; Fernandes, JPA 1991 Modelo de Caracterização e Avaliação Ambiental Aplicável ao Planeamento (ECOGIS/ECOSAD), Tese de Doutoramento, Universidade Nova de Lisboa; Fidélis, T 2001 Planeamento Territorial e Ambiente, Principia. Cascais; Partidário, MR 1999 Introdução ao Ordenamento do Território, Universidade Aberta. Lisboa.
4. Compulsory.
5. Edna Carla Janeiro Cabecinha.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final written test (40%) + Report (60%).
9. No.
10. 6.

1. Environmental Education - 1579.
2. Module I: perspectives and approaches; attitudes and values; sustainable development in a systemic perspective; human interventions; environmental awareness. Module II: methodology of environmental education; activities of environmental education; assessment in environmental education.
3a) Knowledge from most other disciplines of the degree, to furnish examples and applications.
3b) The objective of the discipline is to introduce fundaments of environmental education, so much at a philosophical level (Module I) as at a practical and applied level (Module II).
3c) Novo, M 1998 La educación ambiental: bases éticas, conceptuales y metodológicas, Paris: UNESCO, Madrid: Editorial Universitas; Díaz Pineda, F (ed.) 1996 Ecología y desarollo: escalas y problemas de la dialéctica Desarollo-Médio Ambiente, Madrid: Editorial Complutense; Goldsmith, E 1998 The Way: An Ecological World-View, Athens: University of Georgia Press.
4. Optional.
5. Anastássios Perdicoúlis, Aurora Monzon.
6. 3 h/week (3 theoretical + 2 practical); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final exam (40%); projects (60%).
9. No
10. 3.

1. Ecotechnology - 1578.
2. Introduction to Ecological Engineering. Principles, classification and examples of Ecological Engineering. Study cases (e.g. the role of wetlands in the control of nutrients; treatment and utilisation of wastewater; agriculture and Ecotechnology). Fundamentals of Ecological Modelling. Basic concepts of modelling. Submodels in ecological models. Conceptual models. Static models. Modelling population dynamics. Biogeochimical models. Application of ecological models in environmental management. The ecological importance of ecotones. The socio-economic value of ecotones. Ecological models and ecotones.
3a) Notions of General Mathematics and Ecology.
3b) To give the students basic knowledge in ecological engineering domain, specially for the development of ecological models and for its applicability in investigation and in environmental management. To employ and to apply the knowledge acquired in environment issues domain, namely by the construction of small models able to describe simple situations, involving biogeochimical and biological processes.
3c) Décamps, H & Naiman, RJ 1990 The ecology and management of aquatic-terrestrial ecotones, UNESCO; Jørgensen, SE 1988 Fundamentals of Ecological Modelling, Elsevier; Jørgensen SE 1991 Handbook of ecological parameters and ecotoxicology, Elsevier Science Publishers BV, Amsterdam, The Netherlands; Mitsch, WJ & Jorgensen, S E 1989)Ecological Engineering, John Wiley & Sons; Chistofoletti, A 1999 Modelagem Ambiental, 1ª ed., Editora Edgard Blecher Ltda, S. Paulo. Brasil.
4. Compulsory.
5. João Alexandre Cabral, Mário Santos.
6. 4 h/week (2 theoretical +2 practical); 2nd semester; 5th year.
7. Lectures and practical classes.
8. A written report 35% and two written tests and/or a final written exam 65%.
9. No.
10. 4.

1. Noise Pollution - 1583.
2. Sound creation and propagation. General sound characteristics. Kind of sound noises. Environmental noise: traffic noise and building acoustic. Labour noise. Noise measuring. Legislation and regulamentation. Sound noise effect on the human being. Sound noise control techniques. Noise maps elaboration.
3a)
3b) It is pretended that the students understand how sound is created and spred. Show the measuring techniques and control of noise as well application of sound/noise legislation.
3c) Halliday, D et al. 1996 Fundamentos de Física, vol. 2, 4ª ed., Livros técnicos e científicos editora, SA, Rio de Janeiro; Harris, CM 1979 Handbook of noise control, McGraw Hill Book Company, 2nd edition.
4. Optional.
5. Carmen Moreira, Carlos Teixeira.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester; 5th year.
7. Lectures and practical classes. It is compulsory to attend 2/3 of practical classes.
8. One written tests or final exam – 100%.
9. No.
10. 3.

1. Evaluation and Maintenance of Genetic Resources - 0811.
2. Biodiversity: aims and objectives. Magnitude and distribution of biodiversity. Generation, maintenance and loss of genetic resources. Genetic vulnerability and genetic erosion. Methods of conservation of genetic resources. The state of in situ and ex-situ management. Characterization, evaluation and documentation of genetic resources. Acess of genetic resources and sharing benefits derived from their use.
3a) Biology and Biochemistry.
3b) To understand how important are the genetic resources, which are the factors responsible for the erosion of the genetic resources, and how to preserve, characterize and evaluate them.
3c) 1995 Global Biodiversity Assessment, UNEP, Cambridge University Press; FAO, 1996 The state of the world's plant genetic resources for food and agriculture, FAO, Roma; 1991 Managing Global Genetic Resources, The US National Plant Germplasm System. National Academy Press Washington, DC.
4. Optional.
5. Valdemar Carnide, Ana Lúcia Pinto e Sintra.
6. 6 h/week (2 theoretical + 4 practical); 2nd semester; 5th year.
7. Lectures and practical classes.
8. Practical evaluation, written testes and final exam.
9. No.
10. 3.

1. Remote Sensing - 0474.
2. Application of remote sensing imagery in natural resources monitoring. Spectral reflectance and photography. Elements of Photogrammetry. Principles of Photointerpretation. Photo mosaics and orthophotomaps. Features of satellite imagery applications in natural resources monitoring
3a) Good knowledge on Botanics, Phytossociology and Phytogeography.
3b) Students should get an overview of: aerial survey tools and their application in natural resources monitoring; the requirements for aerial photography and principles of photo interpretation; application of satellite imagery in natural resources monitoring.
3c) Howard, JA 1991 Remote sensing of forest resources, Chapman & Hall; Lillesand, T & Kiefer, R 1994 Remote sensing and image interpretation, J.Wiley & Sons; Stellingwerf, DA & Hussin, YA 1997 Measurements and estimations of forest stand parameters using remote sensing, VSP.
4. Optional.
5. Carlos Pacheco Marques, Luís Roxo Almeida.
6. 5h/week (2 practical + 1 theoretical); 2nd semester; 5th year.
7. Lectures and practical classes.
8. Two tests during the semester and practical works or final written exam.
9. No
10. 3.

1. Agro-Environmental Protection - 1580.
2. I- Concepts and types of agroecosystems; agroecosystems and landscape; fundamental ecological interactions. II- Ambiental impacts on agroecosystems; pesticide residues; general concepts in integrated pest and disease management; biotechnology and environmental impacts. III- Integrated pest and disease management, integrated crop production, organic farming and sustained agroenvironment.
3a) Good knowledge on Ecology, Biochemistry, and general Plant Protection.
3b) To understand the concept of agroecosystems, positive and negative environmental impacts, mainly dose related to pests, infectious diseases and weeds.
3c) Paoletti, MG et al. 1992 Agriculture, Ecosystems and Environment, Elsevier Science Publishers, Amsterdam; Lowrance, R et al. 1984 Agricultural ecosystems: unifying concepts, John Wiley & Sons, NY; Amaro, P & Baggiolini, M (eds.) 1982 Introdução à Protecção Integrada, Edição FAO/DGPPA; Amaro, P 1999 Os efeitos secundários dos pesticidas, e a sua minimização através da protecção integrada. In Amaro, P (ed.) Para a optimização da protecção integrada e da produção integrada até 2006, ISA, Lisboa; Schumann, G 1991 Plant Diseases: their biology and social impact. Edição APS; Fry, J & Day, M 1992 Release of genetically engineered and other micro-organisms, Cambridge University Press.
4. Optional.
5. José Alves Ribeiro, Ana Maria Nazaré Pereira, Laura Torres.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester; 5th year.
7. Lectures and practical classes.
8. Written final exam and monographic reports.
9. No.
10. 3.

1. Project – 0166.
2. Environmental Project: Planning and Control Techniques. Cost-benefit analysis. How to write project reports (Sections of a report: Title Page, Abstract, Table of Contents, Introduction, Materials and Methods, Results, Discussion, Conclusion, Bibliography, Appendix); How to design effective tables; How to prepare effective Illustrations; Methods for planning and delivering oral presentations; Visuals aids; Verbal delivery and style. Technical and Scientific Sessions.
3a) Good knowledge on Environmental Chemistry, Environmental Physics, Pollution Measurement and Monitoring, SIG, Environmental Policy, Integrated Solid Waste Management and Engineering Control of Pollution.
3b) The students should be able to develop and implement an environmental project. Students should get an overview of environmental project planning and project financial estimating. Teamwork. The students should be able to write and present technical information.
3c) Abecassis, F & Cabral, N 1993 Análise Económica e Financeira de Projectos, Fundação Calouste Gulbenkian, Lisboa; Burke, R 1999 Project Management – Planning & Control Techniques, John Wiley & Sons, Chichester; Droste, RL 1997 Theory and Practice of Water and Wastewater Treatment, John Wiley & Sons, NY; Eckenfelder, WW 2000 Industrial Water Pollution Control, McGraw-Hill International, Boston; Goodstein, ES 2002 Economics and the Environment, John Wiley & Sons, NY; Kenny, M & Meadowcroft, J 1999 Planning Sustainability, Routledge, London; McDougall, FR et al. 2001 Integrated Solid Waste Management: a Life Cycle Inventory, Blackwell Science, Cornwall; Nevers, N 2000 Air Pollution Control Engineering, McGraw-Hill, Boston; Piasecki, BW et al. 1999 Environmental Management and Business Strategy, John Wiley & Sons, NY; Stern, R & Schiechtl, HM 2000 Water Bioengineering Techniques for Watercourse Bank and Shoreline Protection, Blackwell Science, Cornwall; Tchobanoglous, G et al. 1993 Integrated Solid Waste Management – Engineering Principles and Management Issues, McGraw-Hill International, NY; Williams, PT 2000 Waste Treatment and Disposal, John Wiley & Sons, Chichester.
4. Compulsory.
5. Margarida Maria Correia Marques + Lívia Madureira, Carmen Moreira, Carlos Pacheco Marques, Luis Carvalho.
6. 8h/week (2 theoretical + 6 practical); annual; 5th year.
7. Lectures, practical classes and laboratories.
8. 2 oral presentations with discussion; project report (70%); final oral presentation (30%).
9. No.
10. 11.5.

Biology Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	General Chemistry	6.0	Mineralogy and Petrology	6.0
	Biophysics	6.0	Organic Chemistry	6.0
	Biomathematics	6.0	Biostatistics	6.0
	Geral Ecology	6.0	No Vascular plants	6.0
	Cell Biology I	6.0	Cell Biology II	6.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Pedology and Soil Conservation	6.0	Genetics	6.0
	Experimental Design	6.0	Zoology	6.0
	Biochemistry and Metabolism I	6.0	Biochemistry and Metabolism II	6.0
	Electronics for Biologists	6.0	Bioenergetics	6.0
	Embryolology and Histology	6.0	Vascular Plants	6.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	General Ecology	6.0	Microbiology	6.0
	Elements of Palaeontology	6.0	Evolution and Biodiversity	6.0
	Compared Structure and Function in Vertebrates	6.0	Applied Ecology	6.0
	Genetic Engineering	6.0	Comparative Structure and Function of Vascular Plants	6.0
	Ethology	6.0	Bioethics and Biossecurity	6.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	(Animal Biology Area)		(Animal Biology Area)	
	Parasitology	6.0	Scientific Probation Period	30.0
	Biological Instrumentation	6.0		
	Biological Anthropology	6.0		
	Population Ecology	6.0		
	Environmental Adaptations in Vertebrates	6.0		
	Total	30.0	Total	30.0

Total of crédits: 240

Biology Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	General Chemistry	6.0	Mineralogy and Petrology	6.0
	Biophysics	6.0	Organic Chemistry	6.0
	Biomathematics	6.0	Biostatistics	6.0
	Geral Ecology	6.0	No Vascular plants	6.0
	Cell Biology I	6.0	Cell Biology II	6.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Pedology and Soil Conservation	6.0	Genetics	6.0
	Experimental Design	6.0	Zoology	6.0
	Biochemistry and Metabolism I	6.0	Biochemistry and Metabolism II	6.0
	Electronics for Biologists	6.0	Bioenergetics	6.0
	Embryolology and Histology	6.0	Vascular Plants	6.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	General Ecology	6.0	Microbiology	6.0
	Elements of Palaeontology	6.0	Evolution and Biodiversity	6.0
	Compared Structure and Function in Vertebrates	6.0	Applied Ecology	6.0
	Genetic Engineering	6.0	Comparative Structure and Function of Vascular Plants	6.0
	Ethology	6.0	Bioethics and Biossecurity	6.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	(Plant Biology Area)		(Plant Biology Area)	
	Biological Instrumentation	6.0	Scientific Probation Period	30.0
	Photosynthesis	6.0		
	Geobotany and Vegetal Sociology	6.0		
	Environmental Adaptations of Vascular Plants	6.0		
	Plant Morphologenesis	6.0		
	Total	30.0	Total	30.0

Total of crédits: 240

1st year

1. General Chemistry - 0176
2. Chemical equations, reactions in aqueous solution and mass relationships in a chemical reaction. Solutions. Chemical bonding. Chemical kinetics. Chemical equilibrium. Acids and bases. Acid-base equilibrium. Solubility equilibrium. Thermodynamics. Electrochemistry.
3a) No prerequisite.
3b) To provide the basic concepts in Chemistry and the main tools necessary for the study of quantitative relationships in chemical reactions. Once that basic knowledge has been acquired, different topics related to the physical and chemical properties of matter are examined thoroughly.
3c) Chang, R 1994 Química, 5ª Ed., McGraw-Hill; Brady, JE and Russell, JW and Holum, JR 200 Chemistry - Matter and Its Changes, 3ª Ed., John Wiley & Sons, New York; Reger, D, Goode, S and Mercer, E 1997Química: Princípios e Aplicações, Fundação Calouste Gulbenkian, Lisboa.
4. Compulsory.
5. Paulo Santos, José Sousa.
6. 4h/week (2T+ 2P); 1st semester; 1st year.
7. Lectures and practical classes.
8. Practical work 30%; final written exam 70%.
9. No.
10. 6.0.

1. Biophysics – 0239
2. Membrane biophysics: Mass transport. Transport of molecules and ions. Fick diffusion equation. Flux or rate of diffusion (J) of solutes (non-ionic and ionic) and of water through homogeneous and porous membranes. Osmosis, osmolarity and tonicity. Van't Hoff equation for electrolytes. Electrochemical equilibrium and Nernst equation. Resting membrane potential. Action potential along the axon. Goldman equation. General concepts os stimulus-secretion. II – Concepts about fluid biophysics: Hydrostatics: Stress in a fluid. Pressure in a fluid at rest. Pascal's principle. Archimedes' principle. Surface tension. Contact angle and capillarity. Hydrodynamics: Lines of flow. Laminar and turbulent flow. Continuity equation. Bernoulli's equation. Viscosity. Poiseuille's Law. Reynolds's number. Tension on blood vessel's fibres. Elastic fibres (collagene and elastin), application of Hook's and Laplace's equation. Poiseuille's Law and circulatory system. Starlling's phenomena and edema. III General concepts of nuclear physics and of radiation
3a) No prerequisite.
3b) To supply the basic knowledge to permit the application of ideas, concepts and techniques used in physics to biological phenomena.
3c) Sears, F, Zemansky, M and Young, U 1984 Física. Livros técnicos e científicos editora. Volume II, Cap. 12 e 13; Sears, F, Zemansky, M and Young, U 1984 Física. Livros técnicos e científicos editora. Volume IV, Cap. 47. Lídia Salgueiro & J Gomes Ferreira 1991 Introdução à Biofísica Ed. Fundação Calouste Gulbenkian. Cap.4 (pp 57-72); Cap. 5 (pp 73-87); Cap.17 (pp 293-317); Cap. 21 (p403-427); Cap. 23 (pp 445-461); Vincent, P Coletta 1995 Physics, College of Physics/Vincent Colleta. Ed. McGraw-Hill; Pedroso de Lima, JJ 1993 Conceitos gerais sobre biofísica de membranas Textos de apoio às aulas teóricas; Pedroso de Lima, JJ 1995 Conceitos gerais sobre biofísica dos líquidos. Textos de apoio às aulas teóricas; Pedroso de Lima, JJ 1993 Princípios básicos de física nuclear e das radiações. Textos de apoio às aulas teóricas; Silva, Amélia M 2002 Fichas de problemas de apoio às aulas práticas.
4. Compulsory.
5. Amélia Maria Lopes Dias da Silva.
6. 4 Hours/week (2 T + 2 T-P); 1st semester; 1st Year.
7. Theoretical and theorico-practical lectures.
8. Continuous evaluation (2 written test) or a final exam.
9. No.
10. 6.0.

1. Biomathematics – 0431
2. Introduction to complex numbers: definition of the complex numbers; properties of complex numbers. Functions of one real variable: implicit and inverse functions; the inverse trigonometric functions. Limits of functions and continuity; the Intermediate Value Theorem. Derivatives: the Chain Rule; higher order derivatives; implicit differentiation; the Mean Value Theorem; L' Hôpital' s Rule; Taylor's formula; Maximum-Minimum Problems. Antiderivatives: techniques of integration. Integration: the definite integral; the Fundamental Theorem of Calculus. Applications of integration: the area between two curves.
3a) High-school Mathematical Analysis.
3b) To provide students the basics concepts of Mathematical Analysis.
3c) Carvalho e Silva, Jaime 1994 Princípios de Análise Matemática Aplicada, Mc. Graw- Hill, Lisboa; Swokowski, Earl 1979 W, Calculus with Analytical Geometry, 1st vol, Weber and Schmidt; Apostol, TM 1967 Calculus (2nd edition), 1st vol, Wiley International Edition.
4. Compulsory.
5. Armando Figueiredo, Carlos Monteiro.
6. 4h/week (2 T + 2 TP); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. General Geology - 0452
2. The geological time : chronostratigraphic scale; methods of relative and radiometric dating. Structure and composition of the Earth; seismology. Global dynamics of the Earth: continental drift, deformation types, geologic structures. Mineralogy notions. The rock cycle: magmatism, metamorfism and sedimentary processes. Surface processes: mass movements, the water as a modelling agent (wild waters, rivers, waves and glaciers); wind as a modelling agent.
3a) Knowledge of general geology.
3b) To grant the students with the knowledge that enables an understanding of the Earth as a dynamic system, through a global perspective of the internal and external geodynamic processes. To study those same processes integrated in the rock cycle. To know the modelling agents and the forms of relief resulting from their actions on the terrestrial surface.
3c) Chernicoff, S & Venkatakrishnan, R 1995 Geology. An introduction to physical geology. Worth publishers, Inc., 593 pp.; Dercourt, J & Paquet, J 1981 Geologia. Objectos e Métodos. Livraria Almedina, 373 pp.; Hamblin, WK 1992 The earth's dynamics systems. Macmillan Publishing Company, 647 pp.;
Matos, AV & Peixoto, PA 1996 Contribuição para o estudo da geo-história. A evolução do conhecimento geológico: progressos e obstáculos. Serviços de Extensão e documentação, UTAD (extra série), 19 pp.; Matos, AV 1999 O tempo geológico. Serviços de Extensão e documentação, série didáctica, ciências aplicadas, nº 199, UTAD, 41 pp.; Press, F & Siever, R 1985 Earth. W. H. Freeman and Company, 656 pp.; Press, F & Siever, R 1994 Understanding earth. W. H. Freeman and Company, 593 pp.; Tarbuck, EJ & Lutgens, FK 1993 The earth. An introduction to physical geology. Macmillan Publishing Company, 654 pp.; Tarbuck, EJ & Lutgens, FK 1997 Earth science. Prentice-Hall, 638 pp.;
Wyllie, PJ 1976 A Terra. Nova Geologia Global. Fundação Calouste Gulbenkian, 384 pp..
4. Compulsory.
5. Ana Maria Pires Alencoão.
6. 4h/week (2 theoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 6.0.

1. Cell Biology I - 1815
2. I. Introduction: the logic of life. II. Cell chemical components: Chemical bonds – Covalent bond: polar molecules and non-polar molecules; Ionization; Non-covalent bonds: ionic bonds; electrostatic attraction and repulsion interactions; hidrogen bond; hydrofobic interactions and Van der Waals forces; Water: the Life-supporting properties of water; Acid, bases and buffers; Cell molecules: the nature of biological molecules: functional groups, a classification of biological molecules by function; carbohydrates; lipids, proteins, nucleic acids; the formation of complex macromeolecular structures; III. Bioenergetics, enzymes and metabolism.
3a) No prerequisite.
3b) To provide students basic knowledges, at atomic and molecular level, that avoid understanding advaced areas of Biology enhacing the biochemical and biophysical aspects.
3c) Alberts, A, Johson, A, Lewis, J, Raff, M, Roberts, K, and Walter, P 2002 Molecular Biology of the Cell. 4th edition, Garland Publishing, Inc., New York; Karp, G 2002. Cell and Molecular Biology. 3rd Edition, John Wiley & Sons, Inc., New York; McKee, T and McKee JR 2003. Biochemistry: An introduction. 3rd Edition, WCB McGraw-Hill, Boston; McMurry, JE and Castellion, ME 1999 Fundamentals of General, Organic, and Biological Chemistry. 3rd Edition, Prentice Hall, New Jersey; Nelson, DL and Cox, MM 2000 Lehninger´s Principles of Biochemistry. 3rd Edition, Worth Publishers, New York.
4. Compulsory.
5. Dario Loureiro dos Santos, Paula Lemos.
6. 4 h/week; (2T + 2P); 1st semester; 1st year.
7. Lectures, practical classes and laboratories.
8. Written assessment/exams (theoretical 75% and practical 25%).
9. No.
10. 6.0.

1. Mineralogy and Petrology - 0148
2. Mineral classification. Minerals- morphology, composition, physical and chemical properties, genesis and application. Minerals and life. Environmental mineralogy- practical interest of minerals and the effects of this in the human health and ecosystems. Rocks and processes igneous, sedimentary and metamorphic. Economic and social interest of geological materials.
3a) No prerequisiste.
3b) To introduce students, in a systematic way, into the understanding of the importance of geological materials (minerals and rocks) in the society daily and in the life and Earth sustainability.
3c) Battey, MH 1981 Mineralogy for students. Longman Scientific & Technical (2ª Ediction); Blatt, H & Tracy, R 1996 Petrology – Igneous, Sedimentary and Metamorphic. W.H.Freeman ans Company, New York; Cornelius, K, Cornelius, S and Hurlbut, CS 1985-Manual ol Mineralogy (after James D.Dana). John Wiley, New York (20ºEdição); Raymond, AL 1995 The Study of Igneous, Sedimentary and Metamorphic Rocks Wm. C. Brown Publishers. London; Nesse, WD 2000 Introduction to Mineralogy. New York: Oxford University Press.
4. Compulsory.
5. Elisa Preto Gomes, Anabela Ribeiro dos Reis.
6. 4h/week (2T, 2TP); 2 nd semester; 1st year.
7. Lectures and practical classes.
8. Final exam (60%T+40%TP).
9. No.
10. 6.0.

1. Organic Chemistry - 1179
2. Introduction to Organic Chemistry. Alkanes and cycloalkanes. Stereochemistry. Nucleophilic substitution reactions and elimination reactions in alkyl halides. Alkenes and alkines. Aromatic compounds. Alcohols and ethers. Aldehydes and ketones. Amines. Carboxylic acids and their derivatives. Radical reactions.
3a) No prerequisite.
3b) To provide a wide knowledge of functional groups. To explain the reactions of organic compounds based on the reactivity of functional groups and reaction mechanisms. To stimulate the interest of the students for this important and interesting subject, emphasising the biological, medicinal and environmental applications of Organic Chemistry.
3c) Solomons, TWG 1997 Fundamentals of Organic Chemistry, 5a Ed., John Wiley & Sons, New York; Solomons, TWG 1996 Química Orgânica, Vol. 1, 6a Ed., LTC Livros Técnicos e Científicos Editora S. A., Rio de Janeiro; Morrison, R and Boyd, R 1996 Química Orgânica, 13ª Ed., Fundação Calouste Gulbenkian, Lisboa; Carey, FA 2000 Organic Chemistry, 4a Ed., McGrawHill, Bóston.
4. Compulsory.
5. Paulo Santos.
6. 4h/week (2T+ 2P); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Practical work 30%; 2 written tests or a final written exam 70%.
9. No.
10. 6.0.

1. Biostatistics - 1816
2. Descriptive statistic: univariated and bivariated statistical variables. Theory of probability: probability, conditional probability e independence of events. Unvariated random variables: discrete and continuous. Expected value and order parameters. Special distributions. Central limit theorem. Point estimation. Methods of estimation.
3a) Knowledge on combinatory and calculus.
3b) To provide an introduction to probability and statistics.
3c) Reis, E, Melo, P, Andrade, R and Calapez, T 1996 Estatística aplicada Edições Sílabo, Lisboa; Guimarães, RC and Cabral, J 1998 Estatística McGraw-Hill de Portugal Lda, Lisboa; Pestana, DD and Velosa, SF 2002 Introdução à probabilidade e à estatística Fundação Calouste Gulbenkian, Lisboa; Murteira, BJ 1990 Probabilidades e estatística McGraw-Hill de Portugal Lda, Lisboa; Rohatgi, V 1976 An introduction to probability theory and mathematical statistics John Wiley & Sons, New York; Ross SM 1987 Introduction to probability and statistics for engineers and scientists John Wiley & Sons, New York.
4. Compulsory.
5. Sandra Dias.
6. 4h/week (2T + 2P); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 6

1. Non Vascular Plants - 1817
2. Origin of life. Chemical evolution. The atmospheric shield of ozone. Domain Archaea. Primitive organisms. Procariota and Eucariota: diferential. Endossimbiotic theory. Evolution of the Plant Kingdon. Steps of evolution. Trachaeophytes. Origin of vascular Plants. Classification systems. Thallophyta and Cormophyta. Subkingdom Thallophyta, Divison Schizophyta, Class Cyanophyceae. Divison Prochlorophyta. Divisions of Eucariotic Algae. Endosimbiosis and the origin of chloroplasts; origin and evolution of eucariotic Algae. Clorophyta: Classes Prainophyceae; Trebouxiophyceae; Chlorophyceae; Charophyceae; and Ulvophyceae. Heterokontophyta: Classes Phaeophyceae, Chrysophyceae; Parmophyceae; Sarcinochrysidophyceae; Xanthophyceae; Eustigmatophyceae; Bacillariophyceae; Raphidophyceae; and Dictyochophyceae. Divison Rhodophyta. Division Pyrrophyta. Division Euglenophyta. Division Glaucophyta. Division Haptophyta. Division Criptophyta. Fungi. Líquenes. Bryophyta vs. Tracheophyta: the common ancestor. Classes Anthocerotae, Hepaticae and Musci.
3a) No prerequisite.
3b) It is intended that the students know the non vascular plants in an evolutionary perspective.
3c)
Moore, R., Clark, W.D. e Vodopich, D.S. (1998) Botany. 2nd Edition. The McGraw-Hill Companies, Inc., Boston, 919 pp. Raven, P.H., Evert, R.F. e Eichhorn, S.E. (1999) Biology of Plants. 6th Edition. W.H. Freeman and Company/Worth Publishers, New York, 944 pp. Stern, K.R. (1997) Introductory Plant Biology. 7th Edition. Wm. C. Brown Publishers, Dubuque, IA, 570 pp. Texts supplied by the lecturers covering the full course (Book “Non vascular Plants”, in preparation).
4. Compulsory.
5. José M.G. Torres-Pereira, Victor M.F. Galhano.
6. 4h/week (2 Lectures+2 Practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. 2 practical tests and 2 theoretical tests or 1 final examination.
9. Yes.
10. 6.0.

1. Cell Biology II - 1818
2. Theory: Introduction to the study of cell biology. Levels of biological organization. Animal and plants cells: plasma membrane; cytoplasmic membrane systems; cell walls; nucleus; the cell cycle, m phase: mitoses and meiosis; mitochondrion and importing mitochondrial proteins; chloroplast and importing proteins into the chloroplast. Interactions between cells and their environment.
3a) No prerequisiste.
3b) To acquire knowledge about the structure-function duality at the cellular level, general vision of the inherent biological processes of the prokaryotic cells, eukaryotic cells and virus, as well as the morfo-functional interactions between the cells, the cellular organelles and their environment.
3c) Karp, G 2002 Cell and Molecular Biology. 3ª Edição. John, Wiley & Sons. New York; Paniagua, R et al 1993 Citologia y Histologia Vegetal y Animal- Biologia de las celulas y tejidos animales y vegetales. Interamericana -Mc Graw Hill. Madrid; Alberts, B et al 1989 Molecular Biology of the Cell. Garland Publishing, Inc. New York.
4. Compulsory.
5. Teresa Maria Pinto, Paula Lemos.
6. 4h/week (2 practical + 2 theoretical); 2nd semester; 1th year.
7. Lectures and practical classes.
8. According to University Regulations, 2 written tests or a final exam - 100%.
9. No.
10. 6.0.

2nd year

1. Pedology and Soil Conservation - 0814
2. Soil concepts, factors and processes responsible for soil formation; Soil functions on the terrestrial ecosystem, with emphasis for soil-environment relationships; Soil mineral components; Soil organic components; Soil chemistry properties – Exchange complex and soil reaction; Soil physical properties; Soil water; Soil classification.
3a) Good knowledge on general chemistry;
3b) Students should get a good knowledge of: (i) soil-environmental relationships and involved properties and components; (ii) soil components, its properties and functions and understand the soil behavior according its composition; (iii) to understand the way of soil management inside a sustainable frame.
3c) Costa, JB 1975 Caracterização e Constituição do Solo. Ed. Caloust Gulbenkian, Lisboa; Brady, NC 1990 The nature and properties of soils. Macmillan Publishing Company, New York; Schroeder, D 1984 Soils, Facts and Concepts. Int. Potash Institute. Bern, Switzerland; Wild, A 1993 Soils and the Environment. An Introduction. Cambridge University Press.
4. Obligatory.
5. Fernando Raimundo.
6. 4 h/week (2T + 2P), 1st semester, 2nd year.
7. Theoretical and practical classes.
8. Continuous evaluation, with tests, about practical works and application of theoretical concepts, as obligatory and a written classic test or examination.
9. No.
10. 6.0.

1. Experimental Design - 1185
2. Introduction to Descriptive Statistics and Statistical Inference in Data Analysis; to Probability Theory, to Random Variables and to Probability Laws. Mathematical Expectation and Properties. Probability Laws Discrete and Continuous. Random Sampling and Some Sampling Distributions. Point Estimation Methods: Statistics and Properties. Statistics for the Interval Confidence Interval and Tests of Hypotheses; The Use of p-Values in Decision Making; Nonparametric Statistics: Testing for Goodness of Fit and Independency; Association Measures; Tests for Multiple Comparisons for Dependent and Independent Samples; ANOVA Model I; Homogeneity of Variances Tests; Parametric and Nonparametric Tests for Multiple Comparisons; ANOVA Model II; Randomised Blocks; Simple Regression Analysis: Confidence Intervals and Hypothesis Testing in Simple Linear Regression and ANOVA; Correlation; Non-Linear Simple Regression: Simple Linear Regression and Data Transformations.
3a) Elements of Mathematics.
3b) Students should be able to use the statistical methods and experimental designs in data analysis.
3c) Reis, E, Melo, P, Andrade, R and Calapez, T 1997 Estatística Aplicada. Edições Sílabo, 2. Ed., Vols. I e II; Walpole, RE and. Myers, RH 1993 Probability and Statistics for Engineers and Scientists. Prentice Hall International Inc., 5.th Ed.; Montgomery, DC 1991 Design and Analysis of Experiments. John Wiley & Sons, Inc., Singapura, 3 Ed..
4. Compulsory.
5. Pedro Barroso.
6. 4h/week (2T;2TP); 1st Semester; 2nd Year.
7. Theoretical-Practical Classes.
8. 100% Final Written Examination.
9. No.
10. 6.0.

1. Biochemistry and Metabolism I - 1819
2. Enzymology. Basic principles, understanding mechanisms; vitamins and coenzymes: integration between vitamins and coenzymes. Biological membranes and transport. Oxidative phosphorilation: ATP-synthase; respiratory electron flow. Glycolysis and Gluconeogenesis: Reactions; enzymes; regulation and overall energetic balance, fermentation. Pentose phosphate pathway: importance and reactions. Citric acid cycle: reactions, enzymes, regulation and energetic balance.
3a) Good knowledge on Biology, Chemistry and Biophysics.
3b) To provide an introduction to the principles of metabolic pathways that gives the students a command of its concepts and language.
3c) Nelson, DL et al. 2000 Lehninger Principles of Biochemistry, 3th edition Worth Publishers.
4. Compulsory.
5. Rui Manuel Furtado Bezerra.
6. 4h/week (2 practical + 2 theoretical); 1st semester; 2th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Electronics for Biologists - 1820
2. Basic concepts: voltages and currents constant in time; voltages and currents variable in time; circuits for signal conditioning conductors, semiconductors and isolators; electronic properties of semiconductors and their uses. Structure of P-N junctions, junction diode; circuits with diodes. Topics of general interest in modern electronic circuits, with emphasis in the physical principles and their implementation in practice: physical basis for the functioning of devices with semiconductors; semiconductor devices with one or more junctions; active circuits; functional blocks of analogue circuits and their applications; functional blocks of digital circuits and their applications. Basic topics of electronic instrumentation: A-D and D-A conversion principles; transducers or sensors; feedback theory and its applications; frequency analysis; noise; principles of signal recovery.
3a) Course non subject to the precedence regimen.
3b) With the increasing complexity of modern electronic instrumentation, the Biologist faces difficulties, derived from the need of understanding equipment characteristics for experimental planning and adequate data gathering. The present course unit aims to give the Students basic concepts of electronic circuit theory, as well as the physical principles and the applications of semiconductor devices in the integrated circuits of analogue and digital Electronics.
3c) Ahmed, H and Spreadbury, PJ 1989 Analogue and Digital Electro-nics for Engineers – An Introduction. Electronics text for Engineers and Scientists. Cambridge University Press, Cambridge, UK.
Cook, NP 1999 Introductory DC/AC Electronics. Prentice-Hall, Upper Saddle River, N.J., USA. ISBN 0-13-896044-5; Grob, B 1997 Basic Electronics. McGraw-Hill, New York, N.Y., USA.
4. Mandatory course unit.
5. Luís Torres Pereira.
6. 4 hours/week (2 T+ 2 P);1st semester; 2nd year.
7. Lectures and practical classes.
8. 2 written Tests or Final examination covering both the theoretical and practical parts.
9. Yes.
10. 6.0.

1. Embryology and Histology - 1821
2. General Embryology – gametogenesis, hormonal regulation of sexual cycle; fertilization; general features of embryonic development on vertebrate. General Histology – epithelial tissue; connective tissue; nervous tissue; muscular tissue. General Embryology. Special Histology or Microscopic Anatomy – circulatory system; bone marrow and hematopoiesis; digestive system; respiratory system; excretory system; endocrine glands; male and female reproductive system; general structure of large bone - ossification processes; skin and appendages; central nervous system.
3a) Knowledge on Cell Biology.
3b) To acquire knowledge about embryonic development of vertebrates, structural, morphologic and functional aspects of animal tissues and its topography and interrelations in the diverse organs.
3c) Costa, AC & Morato, X 1984 Desenvolvimento Embrionário dos Vertebrados. Editora Verbo; Junqueira, LC & Carneiro, J 1990 Histologia Básica. Editora Guanabara; Burkitt, HG, Young, B & Heath, JW 1994 Wheater – Histologia Funcional. Editora Guanabara.
4. Compulsory.
5. Jorge Ventura F. Cardoso.
6. 4h/week; (2T+2P); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Theorical (50%): 2 written tests or final exam; Practical (50%): oral exam.
9. No.
10. 6.0.

1. Genetics - 0018
2. Mendelian Genetics: Mendel's principles, gene interaction, sex-linked inheritance. Sex determination, multiple alleles, variability of gene effect. Molecular Genetics: the genetic material, the genetic code, gene expression, mutations. Genetics of Bacteria and Bacteriophages: the bacteria chromosome, transformation, conjugation, sexduction, transduction. Linkage and mapping in prokaryotes and eukaryotes. Cytogenetics: chromosome number and structural variation. Population Genetics: the Hardy-Weinberg law, alleles frequencies of autossomal and sex linked characters, panmitic population and endogamy, parental coefficient (R), endogamy coefficient (F). Quantitative Genetics: polygenes, genotypic, phenotypic and environmental variance, heritability, heterosis versus endogamic depression. Evolution and especiation.
3a) Basic knowledge on citology, biochemistry and microbiology.
3b) Students should be sensitized for the importance of Genetics as a fundamental basic science for understanding and interpretation of the species diversity, evolution and genetic improvement.
3c) Tamarin, RH 2001 Principles of Genetics, International Edition. Ed. McGraw Hill; Griffiths, AJF, Miller, JH and Suzuki, DT 2000 An Introduction to Genetic Analysis, W H Freeman & Co; Hartl, DL and Jones, EW 2002 Essential Genetics, Ed. Jones and Bartlett; Klug, WS & Cummings, MR 2002 Concepts of Genetics. International Edition. Ed. Prentice Hall College Div; Kohler, RE 1994 Lords of the Fly Drosophila Genetics and the Experimental Life, University of Chicago Press; Russell, PJ 1998 Genetics, Ed. Addison Wesley Longman; Stansfield, WD 1985 Genética, Ed. McGraw-Hill.
4. Compulsory.
5. Henrique Guedes-Pinto, Raquel Chaves, Estela Bastos.
6. 4h/week (2P + 2 T); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Zoology
2. Slight knowledge of zoological systematic - classification criteria; Study of the more representative protozoa: Phyla Sarcomastigophora, Apicomplexa and Ciliophora; Study of the metazoans - origin, general characteristics, form and function, classification, phylogeny and adaptive radiation of the Phyla: Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca (Classes Gastropoda, Bivalvia and Cephalopoda); Annellida; Arthropoda (Classes Arachnida, Crustacea, Diplopoda, Chilopoda and Insecta); Echinodermata; Chordata - Subphylum Vertebrata - Superclasses Agnatha and Gnathostomata - Classes Chondrichthyes (cartilaginous fishes), Osteichthyes (bony fishes), Amphibia (amphibians), Reptilia (reptiles), Aves (birds) and Mammalia (mammals).
3a) Knowledge on Cell Biology and Embryology and Histology.
3b) To know the rules and criteria established for zoological systematic. Understand the diversity of the protozoa with similar characteristics to the animals - Protozoan Phyla. To identify characteristics and to interpret data related to the evolutionary history of the main animal groups. To relate structural and functional characteristics of the animals with the environment conditions where they live.
3c) Hickman, CP, Roberts, LS and Larson, A 2001 Integrated Principles of Zoology. McGraw-Hill International Edition; Kukenthal, W, Mathes, E and Renner, M 1986 Guia de Trabalhos Práticos de Zoologia. Livraria Almedina, Coimbra.
4. Compulsory.
5. Jorge Ventura F. Cardoso.
6. 4h/week (2T+2P); 2 nd semester; 2 nd year.
7. Lectures and practical classes.
8. Theorical written test (50%) + Practical written test (25%) + Teamwork - Bibliographic review (25%).
9. No.
10. 6.0.

1. Biochemistry and metabolism II - 1822
2. Lipid metabolism: Reactions, enzymes, regulation and energetic balance. Aminoacid metabolism: overview nitrogen metabolism. Photosynthesis: photosystems, electron carriers and ATP synthesis ; Calvin cycle. Metabolism overview. Information pathways: molecular genetic information and DNA technology. Biotransformation: xenobiotic compounds; biotransformation reactions.
3a) Good knowledge on Biology, Biophysics and Chemistry.
3b) To provide an introduction to the principles of metabolic pathways that gives the students a command of its concepts and language.
3c) Nelson, DL et al 2000 Lehninger Principles of Biochemistry, 3th edition Worth Publishers.
4. Compulsory.
5. Rui Manuel Furtado Bezerra.
6. 4h/week (2P + 2T); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Bioenergetics - 1823
2. Introduction. Quantitative bioenergetics. Morphology of energy-transducing membranes. Mitochondria: mitochondrial respiratory chain and proton pump; electric, chemical and electrochemical gradients; oxidative phosphorylation; chemiosmotic theory; ATPsintase and ATPase; inhibitors and uncouplers; uncoupler mechanisms; uncoupling proteins in animal and vegetal tissues. Photosynthesis: introduction; photochemical reaction centers. Metabolite and ion transport trough biological membranes. Alternative uses of the proton gradient. Alternative creation systems of proton gradient. Mitochondria in cell: mitochondria and oxidative stress, aptosis and necrosis; mitochondria and diseases. Thermodynamic and bioenergetic. Yeast respiration. Mitochondrial respiration. Photosynthesis. Active transport in biological membranes. Mitochondria: xenobiotics free radical; antioxidant protective effect. Analysis of Bioenergetic scientific publications.
3a) Good knowledges on Cell Biology, General Chemistry and Biochemistry.
3b) To provide students with chemical and cellular knowledges about the importance of energy on Living Systems.
3c) Harris, DA 1995 Bioenergetics at a Glance, Blackwell Science, Oxford; Karp, G 1999 Cell and Molecular Biology. 2nd Edition, John Wiley & Sons, Inc., New York; Nicholls, DG and Ferguson, SJ 2002 Bioenergetics3. 3rd edition, Academic Press, London; Wrigglesworth, J 1997 Energy and Life, Taylor and Francis Ltd., London.
4. Compulsory.
5. Dario Loureiro dos Santos.
6. 4 h/week (2T + 2P); 2nd semester; 2nd year.
7. Lectures, practical classes and laboratories.
8. Written assessment/exams (theoretical 75% and practical program 25%.
9. No.
10. 6.0.

1. Vascular Plants - 1824
2. The problematical concept of specie. The filogeny and the problem of the continuity. Typologism vs. individualism. The population and metapopulational approach. The autoecological analysis of the individuals: the phytogeography and the ecological factors; Methodology of the taxonomical analysis. The methodology of the evolutive analysis: Genecology and Morphoecology faced to the Evolutive Taxonomy; From Procariota to the Cormophyte Eucariotas. The importance of the cauologenic organs and their filogenetic implications. Organography of the vascular plants. Division Pteridophyta (Class Psilophytopsida, Class Lycopsida, Class Sphenopsida, Class Filicopsida), Division Spermatophyta, Sub-division Gymnospermae (Class Lyginopeteridatae, Class Coniferopsida), Sub-division Magnoliophytina: Class Magnoliopsida, Class Liliopsida.
3a) No prerequisite
3b) The knowledment of the systematic and taxonomy of the mos important vascular flora of Portugal and, at the same time, the diferentiation of the main biosistematic and taxonomic schools are the main goals of the discipline
3c) Coutinho, AXP 1939 Flora de Portugal. J. Cramer ed., Letershausen; Franco, JA 1971-84. Nova Flora de Portugal. Vol 1- 2, J. A. Franco ed.: 354-360 Lisboa; Sampaio, G 1988 Flora portuguesa. 3ª ed., INIC: 279-283. Lisboa; Talavera, S, Aedo, C, Castroviejo, S, Herrero, G, Romero Zarco, C, Salgueiro, FO and Velayos, M Flora Ibérica, vol.1-8, Real Jardín Botánico, CSIC: 741-775. Madrid.
4. Compulsory.
5. António Luis Crespí.
6. 4h/week ((2 practical + 2 theoretical); 2nd semester;2nd year.
7. Transparents, articles, data-show presentation, elaboration of a project.
8. Final classification = 50% theorical examination + 50% practical examination.
9. Yes.
10. 6.0.

3rd year.

1. General Ecology - 0026
2. Evolutionary Ecology and Conservation Biology. Behavioural Ecology. Population Ecology. Community Ecology. Ecosystems Ecology.
3a) Knowledge on biology, mathematics and statistics.
3b) Students should get an overview of the information and applications of the functioning and structure of the ecosystems.
3c) Stiling, P 99?Ecology, Theories and Applications, Prentice Hall; Molles, MC Jr, 1999 Ecology, Concepts and Applications, WCB/McGraw-Hill.
4. Compulsory.
5. João Alexandre Cabral, Mário Santos.
6. 4h/week (2T, 2P); 1st semester; 3rd year.
7. Lectures and practical classes.
8. 1 final work 20%; 2 written assessments or final written exam 80%.
9. No.
10. 6.0.

1. Elements of Palaeontology - 0348
2. The programme comprises the systematic and palaeontological taxonomy; palaeozoology and palaeobotany; theories of evolution and extinction.
3a) Non subject to the precedence regimen.
3b) Sistematic introdution of the students to the principles, concepts and methods of palaeontology and to the theories of evolution
3c) Clarkson, ENR 1996 Invertebrate Palaeontology and Evolution, 3rd Ed. Chapman & Hall. Cambridge; Black, RM 1988 The Elements of Palaeontology, 2nd Ed. Cambridge University Press. Cambridge.
4. Compulsory.
5. Anastássios Perdicoúlis.
6. 4h/week (2T + 4P), 1st semester, 3rd year.
7. Lectures and practical classes.
8. Required attendance: at least two thirds of all practical lessons; One poster and one essay (roughly 5 pages): 40%; Final exam: 60%.
9. No.
10. 6.0.

1. Compared Structure and Function in Vertebrates - 1825
2. The importance of studying Compared Structure and Function in Vertebrates. Survey of Vertebrate Animals. The Principal Structural Patterns. Revision of their Origin and Classification. Fishes. Tetrapods. Phylogeny and Ontogeny of Structure and Function. Evolution in relation to Time and Major Taxa of: Early Development; Integument and its Derivatives; Teeth; Head Skeleton and Body Skeleton; Muscles and Electric Organs; Coelom and Mesenteries; Digestive System; Respiratory System and Gas Bladder; Digestive System; Respiratory System and Gas Bladder; Circulatory System; Excretory System and Osmoregulation; Reproductive System and Urogenital Ducts; Central Nervous System and Peripheral Nervous System; Sense Organs; Endocrine Organs.
3a) Non subject to the precedence regimen.
3b) To convey an evolutionary perspective of Vertebrate Structure and Function. The Student studies the relation between structure and function comparing the nature of the different taxa, learning their evolutionary history and understanding that structural and functional changes result from environmental adaptations.
3c) Hildebrand, M and Goslow, G 2001 Analysis of Vertebrate Structure, 5th Edition. Jonh Wiley & Sons, New York, New York, EUA; Pough, FH, Janis, CM and Heiser, J 1999 Vertebrate Life, 5th Edition. Prentice-Hall, Inc., Upper Saddle River, New Jersey, EUA.
4. Compulsory Course.
5. Carla Maria Calçada Torres Pereira, Sofia Gabriel Garcia dos Santos.
6. 4 h/Week; (2 T+ 2P); 1st semester; 3rd year.
7. Lectures and Practical Sessions.
8. Course Evaluation is done trough a Written Examination and trough a Group Report.
9. Yes.
10. 6.0.

1. Genetic Engineering - 1826
2. The molecular basis of inheritance: the genetic material, DNA replication, in vitro synthesis of DNA – the PCR technique, molecular markers; Gene expression: transcription, translation, genetic code, control of gene expression, gene regulation, mutations, transposable genetic elements; Recombinant DNA technology: gene cloning, construction of DNA libraries, identification and analysis of cloned sequences; Biotechnology: genetic modified organisms (plants, animals and micro organisms), in vitro culture, Biotechnology applications to the human health, animal production, pharmaceutics industry, recombinant vaccines, serological testes, food industry. Gene therapy in humans. The Human Genome Project. Other genomes sequenced. Genomics and Proteomics.
3a) Basic knowledge on general genetics, cytology, biochemistry and microbiology.
3b) To interpretate the basic knowledge of Molecular Genetics in order to understand it importance and applicability in recombinant DNA technology, Biothechology and in new scientific areas like Genomics and Proteomics.
3c) Walker, JM and Rapley, R 2001 Molecular Biology and Biotechnology. 4th Ed. Royal Soc. Chem; Videira, A 2001 Engenharia Genética- Princípios e Aplicações. Ed. Lidel, Lisboa; Rojo, MI 1999 Ingeniería Genética y transferencia génica. Ediciones Pirámide, Madrid; Glick, BR and Pasternak, JJ 1994 Molecular Biotechnology – Principles and applications of recombinant DNA. Ed. ASM Press, Washington; Lewin, B 2000 Genes VII. Oxford University Press Inc.; Watson, JD, Gilman, M, Witkowski, ,J and Zoller, M 1992 Recombinant DNA. 2nd Edition; Pierik, RLM 1989 In vitro culture of higher plants. Matinos Nijhoff Pub. 2nd Ed.; Margara, J 1988 Multiplicación Vegetativa Y Cultivo in Vitro. Ediciones Mundi-Prensa, Madrid; Zryd, J-P 1988 Cultures de Cellules, Tissus et Organes Vegetaux- Fundements Théoriques et Utilisations pratiques. Ed. Press Polytech. Romandes.
4. Compulsory.
5. José Eduardo Lima Brito, Ana Lúcia Sintra and Paula Lopes.
6. 4h/week (2 practical + 2 theoretical); 1st semester, 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Ethology - 1827
2. Ethology. Historic Perspective. Evolutionary view of Animal Behaviour. Behavioural Development. Role of the Genetic Heritage. Role of the Environment. Behaviour Control. Nervous Regulation. Hormonal Regulation. Circadian and Circannual Rhythms. Instinct. Learning. Communication. Advantages and Disadvantages of Living Together. Adaptative Reactions to Predators. Searching for food. Habitat Choice. Male and Female Reproductive Strategies. Evolution of Mating Systems. Parental Strategies in the Protection of the Young. Introduction to the Evolution of Human Behaviour. Influence of Domestication in Behaviour. Behavioural Requirements of Captive Animals. Physical, Social, Nutritional and Sanitary Environments. Environmental Enrichment.
3a) Non subject to the precedence regimen.
3b) To look at Ethology as a bridge between the molecular and functional levels of Biology and the Environment. To understand the dynamics underlying genetic and physiological bases of behaviour and their critical role in biological adaptations. To understand the role of the Instinct-Learning dichotomy in the Ontogeny of Animal Behaviour. To recognize the complexity of Social Behaviour in its different manifestations. To apply acquired information in Animal Behaviour in critical areas of today's world e.g. Caring for Animals in Captivity, Preventing the Extinction of Animal Species, Understanding Human Societies.
3c) Alcock, John 1998 Animal Behavior - An Evolutionary Approach, Sixth Edition. Sinauer Associates, Inc., Sunderland, Massachusetts, EUA; Reinhardt, V and Reinhardt, A 2002 Animal Welfare Institute Comfortable Quarters for Laboratory Animals, 9th Edition. Eds. Animal Welfare Institute, Washington DC, Washington DC, EUA.
4. Compulsory Course.
5. Carla Maria Calçada Torres Pereira.
6. 4 h/week; (2 lectures + 2 practical);1st semester, 3rd year.
7. Lectures, Lab Sessions and Field Sessions.
8. Final Examination (80%) and a Report on a Behaviour or Welfare theme of practical relevance (20%).
9. No, at the present.
10. 6.0.

1. Microbiology - 0054
2. Theoretical Course. The study of microbial structure, characteristics and classification, diversity and ubiquity of the microbial word and their relation with others live organisms. Micro-organisms as components of the environment. Bacterial growth, nutrition and cultivation techniques. Microbial metabolism and cellular regulation. Microbial genetics and its applications. The diversity of the Prokaryotes world. The Viruses. Bacterial viruses. Viruses of eucaryotes. Micro-organisms and the environment. Water ecology environmental systems. Soil environmental microbiology. Air micro-organisms. Microbiology of several animal anatomic biocenosis. Sterilisation methods and their application. Microbiological culture media. Microbial ubiquity. The cultivation of virus. Isolation of bacteriophages.
3a) Good knowledge on biochemestry, citology, and genetics.
3b) To increase the student's sensibility to the microbial interaction and their relation with the other living organisms.
3c) Brock, TD and Madigan, TM 1997 Biology of Microrganisms. Prentice-Hall; Cruse, JM and Lewis, RE 1999 Atlas of immunology. CRC Press. Springer; Fenner, F, Bachman, PA; Gibbs, EPJ, Murphy, FA, Studdent, MJ and White, DO 1993 Veterinary virology. Academic Press, Inc. San Diego; Harley, JP and Prescott, LM 1993 Laboratory exercices in Micribiology. Wm. C. Brown Publishers. Pelczar, JM, Chan, ECS and Kieg, NR 1993 Microbiology concepts and applications. McGraw-Hill, Inc. New York.
4. Compulsory.
5. Jorge Rodrigues; António Almeida; Patrícia Poeta.
6. 4h/week; (2T + 2P); 2nd Semester; 3rd year
7. Lectures and practical classes.
8. One test; final written examination.
9. No.
10. 6.0.

1. Evolution and Biodiversity -1828
2. Theories about the Origin of Life on Earth. Endosymbiotic theory. Alternative types of Life on Earth. Theories of Evolution. The Bible, Cuvier, Agassiz , Lyell. Lamark. Darwin. Natural Selection: Darwin's theory and Modern synthesis. Role of Natural selection. Speciation. Anagenesis. Cladogenesis. Mayr's allopatric theory. Price's simpatric theory. Parapratic speciation. Adaptative radiation.
Global History of the Earth and Biological Evolution. Sistematic revision. Analogiste tradition. Convergent evolution. Monofilia. Taxonomy. Protista. Evolution of the eucariotic cell. Origin of Metazoa: colonial and sincicial theories. Autotrophic land invasion. Heterotrophic land invasion. Selection and coevolution. Evolution, competition and parasitism. "The Cambrian Explosion" and the Population growth.
3a) Non subject to the precedence regimen.
3b) Synthesis discipline, using the previous formation and introducing new knowledge, supplies an integrated treatment of the Evolution and Biodiversity, aiming to understand the meaning of the diverse standards of Life on Hearth in different periods of its History, the evolution of these standards and its degree of adaptative success.
3c) Margulis, Lynn 1993 Symbiosis in Cell Evolution: Microbial Communities in the Archean and Proterozoic Eons (2nd ed.). W. H. Freeman & Company. ISBN 0716770296; Doyle, JJ 2000 Plant Molecular Evolution. Kluwer. ISBN 0792360966; Cain, AJ 1993 Animal Species and Their Evolution. Princeton University Press. ISBN 0691020981; Price, PW 1997 Biological Evolution. Harcourt. ISBN 0030968437; Ratner, Vadim A 1996 Molecular Evolution. Springer Verlag NY Inc.. ISBN 3540570837.
4. Mandatory course unit.
5. José Torres Pereira.
6. 4 hours/week: (2 T + 2 P); 2nd semester; 3rd year.
7. Theoretical and practical classes.
8. Written test and a Group Monography.
9. Yes.
10. 6.0.

1. Applied Ecology - 1830
2. The notion of natural and cultural integrity. Considerations of scale and hierarchy. Indicators of ecosystem integrity. Measuring biological integrity and monitoring for ecosystem integrity. Bioindicators of the quality of water, soil and air. Extreme environments and adaptation. Genetic variation and environmental stress. Environmental stress, selection, evolution and extinction. Air pollution. Toxic elements. Acidification. Forest decline. Fossil fuels. Eutrophication. Pesticides. Species richness. Radioactive pollution.
3a) Notions of General Ecology.
3b) To understand the fundamental concepts in evaluation, monitoring and rectification of environmental quality, such as environmental stress, ecological integrity, bioindicators, adaptation and evolution. To apply these concepts in the evaluation of the great and actual environmental issues.
3c) Bijlsma, R and Loeschcke, V 1997 Environmental Stress, Adaptation and Evolution. Birkhauser Verlag. 325 p; Freedman, B 1989 Environmental Ecology. Academic Press. 424 p.; Jeffrey, DW and Madden, B 1991 Bioindicators and Environmental Management. Academic Press. 224 p.; Soule, DF and Kleppel, GS 1988 Marine Organisms as Indicators. Springer-Verlag. 229 p.; Woodley, S, Kay, J and Francis George 1993 Ecological Integrity and the Management of Ecosystems. St. Lucie Press. 210 p..
4. Compulory.
5. João Alexandre Cabral, Pedro Teiga.
6. 4h/week (2T+2P); 2nd semester, 3rd year.
7. Theorectical and Practical lectures.
8. A written report 25% and two written tests and/or a final written exam 75%.
9. No.
10. 6.0.

1. Comparative Structure and Function of Vascular Plants - 1831
2. Overview of vascular plants. Structure and function of plant cell and tissue. Morpho-functional characters of terrestrial plants. Architecture and diversity of vascular plants, including fossil plants. Comparative analysis of different types of stele. Plants and water: water potential; water movement in the soil and across the root; stomatal movements; survival during water shortage. Movement of water through the whole plant. Mineral nutrients: ion uptake by roots; metabolism of ions. Photosynthesis and photorespiration. Phloem transport: assimilate partitioning and control of translocation.
3a) Good knowledge on Plant cell and Biochemistry.
3b) The major objective is to provide plant science students with an overview of plant physiological and biochemical processes, and how they are influenced by environmental factors.
3c) Coll, JB, Rodrigo, GN, García, BS and Tamés, RS 2001 Fisiología Vegetal, Ediciones Pirámide, Madrid; Taíz, L and Zeiger, E 1998 Plant Physiology, 2nd edition, Bejamín/Cummings, Redwood, California, USA; Hopkins, WG 1999 Introduction to Plant Physiology, 2nd edition, John Wiley, New York, USA; Salisbury, FB and Ross, CW 1992 Plant Physiology, 4th edition, Wasdsworth Publishing Company, Belmont, Califórnia, USA.
4. Compulsory.
5. José Gomes Laranjo and José Moutinho Pereira.
6. 4h/week; (2 theoretical + 2 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Bioethics and Biossecurity - 1892
2. Interdisciplinar knowledge and the development of the principles of Bioethics and of Biossecurity. Environmental problems and scientific principles: environmental problems, their causes, and sustainability; critical thinking (science, models and systems); matter and energy resources (types and concepts). Human population, resources and sustainability: growth, demography, and reproductive capability; food resources; water; mineral and edaphic resources; non renewable energetic resources; energetic efficiency and renewable energetic resources. Environmental quality and pollution: risks, toxicology and human health; atmospheric pollution; global warming and ozone loss; water pollution; protection of feeding resources; solid residues; dangerous residues. Soil use, biodiversity, and conservation; sustainability. Sustainability of wild species. Sustainable cities. Environment and Society: economics and environment; politics and environment. Synthesis: present status of Bioethics and Biossecurity at the global level – principles that must govern the Global Society.
3a) Non subject to the precedence regimen.
3b) The objectives are to transmit the principles that must govern Mankind behaviour in relation to Nature and assure the security of the existing Biodiversity and of Mankind.
3c) Keller, DB and Botkin, EA 2000 Environmental Science – Earth as a Living Planet, 3ª ed.. John Wiley & Sons, New York, N. Y., USA. ISBN 0-471-32173-7; Masters, GM 1991 Introduction to Environmental Engineering and Science. Prentice Hall, Englewood Cliffs, N. J., USA. ISBN 0-13-483066-0; Ricklefs, RE 1996 A Economia da Natureza, 3ª ed.. Editora Guanabara Koogan, S.A., Rio de Janeiro, R. J., Brasil.
4. Mandatory course unit.
5. José Torres Pereira.
6. 4 hours/week; 2 T + 2 P, 2nd semester, 3rd year.
7. Theoretical and practical classes.
8. Written test or Final examination and a Monography about a theme of Bioethics and Biossecurity.
9. No, at the present.
10. 6.0.

4th year

1. Parasitology - 0253
2. Study of parasites from Kingdom Protista and Kingdom Animalia.
Taxonomic and morphological classifications. Parasites and their environment. Course with one academic year long. Two practical hours a week.
3a) Good knowledge on biochemestry, citology, zoology and ecology.
3b) To increase student's sensibility to the global importance of parasitology as a basic science essential for the further comprehension of the parasitism.
3c) Cox, FEG 1993 Modern Parasitology: a textbook of parasitology. 2nd ed. Oxford: Blackwell Scientific; Gállego-Berenguer, J 1989 Atlas de Parasitología. Barcelona: Ediciones Jover; Matthews, BE 1998 An Introduction to Parasitology. Cambridge University Press; Mehlhorn, H et al. 1992 Atlas de Parasitología Veterinaria. Barcelona: Grass Ediciones; Vilas, JMT 1973 Manual de Tecnicas de Parasitología Veterinária. Zaragoza: Laboratório Central Veterinário; "On-line" publications
4. Optional course unit.
5 . Manuela Rodrigues, Francisco Neto, Lucas Cardoso.
6. 4h/week; (2T+ 2P); 1stsemester, 4thyear.
7. Lectures and practical classes.
8. One test; final written examination theorectical.
9. No.
10. 6.0.

1. Biological Instrumentation - 1937
2. Light microscopy; Transmission electron microscopy; Scanning electron microscopy; Radioisotopes and Liquid scintillation counting; Preparing solutions; Cell culture; Isolation, purification and fractioning of proteins; Electrophoresis; Determination of protein structure by X-ray difraction; Centrifugation and ultracentrifugation; Fractioning of biological material; Isolation of cell organelles; Liquid phase chromaqtography; Gás phase chromatography; Spectrophotometry and determination of compound concentration; Infrared spectrometry; Electronic paramagnetic ressonance; Nuclear magnetic ressonance; Fluorometry.
3a) Subject to the precedence regimen to Electronics for Biologists (2nd year).
3b) The objectives are to present instrumentation used in differents areas of Biology, in order to prepare the Students for the exploitation, with sound knowledge, of biological research methodologies with different sophistication levels.
3c) Carr, JJ and Brown, JM 1998 Introduction to Biomedical Equip-ment Technology. Prentice-Hall, Upper Saddle River, N.J., USA. ISBN 0-13-849431-2; Fraden, J 1996 Handbook of Modern Sensors: Physics, Designs and Applications. Spriger-Verlag, New York, N.Y., USA. ISBN 1-56396-538-0; Togawa, T, Tamura, T and Öberg, PA 1997 Biomedical Transducers and Instruments. CRCPress, Boca Raton, N.Y., USA. ISBN 0-8493-7671-8.
4. Mandatory course unit.
5. Luís Torres Pereira.
6. 4 h/week; (2 T + 2 P); 1st semester; 4th year.
7. Lectures and practical classes.
8. 2 written Tests (50%+50%) or Final examination (100%) covering both the theoretical and practical parts.
9. No, the Degree begun in 2002/2003. However, the Lecturer has no problem in teaching in English the full Lecture and Practical Course.
10. 6.0.

1. Biological Anthropology - 1938
2. The evolution of humankind in the light of the new discoveries and findings. Primate evolution from early fossils to vestiges of the human species (from Purgatorius to Homo sapiens). Introduction to Primatology. The behavoir of the Primates. Humankind today.
3a) General knowledge of evolution.
3b) An Anthropological-biological approach to human origins. Introduction to Palaeo-Anthropology Primatology and Anthropological biology.
3c) Jurman, R, Harry, N, Lynn, K and Wenda, T 1997 Introduction to Physical Anthropology. 7º edition. 560p. Belmont, Ca. ITP; Vilar, CT (coordenação versão Portuguesa) 1998 Passo a passo a evolução humana. 84p. Lisboa. Ministério da Ciência e Tecnologia.
4. Optional Course. Compulsory Course for Students who choose the Animal Biology area in the 4th year.
5. M.E. Simões de Abreu.
6. 4h/week; (2 lecture + 2 theoretical-practical); 1st semester; 4th year.
7. Theoretical and practical - theoretical classes.
8. Continuous Assessment 30% + 1 essay 40% (50% oral + 50% writing) + test 30%.
9. No.
10. 6.0.

1. Population Ecology - 1939
2. Organisms and their environment; methodology and techniques; demography; intra-specific competition; inter-specific competition; predation; mutualism, symbiosis; parasitism, disease; controlled populations; exploited populations; community dynamics; conservation.
3a) Non subject to the precedence regimen.
3b) The discipline studies interactions within populations, and between populations and their environment; the discipline features qualitative and qualitative methods, including modeling methodology in the ecological/ environmental scope.
3c) Begon, M, Harper, JL and Townsend, CR 1996 cology: Individuals, Populations and Communities (3rd ed.).Oxford: Blackwell Science; Begon, M, Mortimer and Thompson, DJ 1996 Population Ecology – A Unified Study of Animals and Plants (3rd ed.). Oxford:ackwell Science; Krebs, CJ 1994 Ecology – The Experimental Analysis of Distribution and Abundance (4th ed.). New York: Harper Collins.
4. Optional Course. Compulsory Course for Students who choose the Animal Biology area in the 4th year.
5. Anastássios Perdicoúlis.
6. 4h/week (2T + 4P); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No
10. 6.0.

1. Environmental Adaptations in Vertebrates - 1940
2. Structural Elements of the Body. Mechanics of Support and Movement. Form, Function, and Body Size. Circulatory Systems and Internal Environments. Adaptations in Circulatory Systems to the aquatic, aerial and terrestrial environments. Gas Interchange and Transportation. Comparison between respiration in aquatic, aerial and terrestrial environment. Osmoregulation (aquatic environment) excretion and hydric balance (aerial environment). Adaptative Mechanisms of Locomotion (nature, advantages and general requirements) – Running and Jumping; Digging and Crawling; Climbing; Swimming and Diving; Flying and Gliding. Feeding Strategies – the capture of food. Metabolism and Thermoregulation. Types of Reproduction and reproductive strategies.
3a) Non subject to the precedence regimen.
3b) After acquiring basic knowledge of structural, functional and environmental aspects, the Student studies the interrelation animal-environment, through the awareness of Vertebrate Adaptations and their evolutionary aspects, in relation to Habits and Habitats.
3c) Hildebrand, M and Goslow, G 2001 Analysis of Vertebrate Structure, 5th Edition. Jonh Wiley & Sons, New York, New York, EUA; Pough, FH, Janis, CM and Heiser, J 1999 Vertebrate Life, 5th Edition. Prentice-Hall, Inc., Upper Saddle River, New Jersey, EUA.
4. Optional Course. Compulsory Course for Students who choose the Animal Biology area in the 4th year.
5. Lectures: Carla Maria Calçada Torres Pereira, DVM, Assistant with PAPCC (equivalent to M.Sc.). Practical Classes: Sofia, Animal Sciences Degree, Collaborator.
6. 4 h/ Week; (2Lectures + 2 Practical); 1st semester; 4th year.
7. Lectures and Practical Sessions.
8. Course Evaluation is done trough a Written Examination (80%), duration 60 minutes, covering both Lectures and Practical Sessions, and trough a Group Report on a Environmental Adaptations theme of practical relevance in Vertebrate Life (20%).
9. No, the Degree begun in 2002/2003. However, the Lecturer has no problem in teaching in English the full Lecture Course.
10. 6.0.

1. Biological Instrumentation - 1937
2. Light microscopy; Transmission electron microscopy; Scanning electron microscopy; Radioisotopes and Liquid scintillation counting; Preparing solutions; Cell culture; Isolation, purification and fractioning of proteins; Electrophoresis; Determination of protein structure by X-ray difraction; Centrifugation and ultracentrifugation; Fractioning of biological material; Isolation of cell organelles; Liquid phase chromaqtography; Gás phase chromatography; Spectrophotometry and determination of compound concentration; Infrared spectrometry; Electronic paramagnetic ressonance; Nuclear magnetic ressonance; Fluorometry.
3a) Subject to the precedence regimen to Electronics for Biologists (2nd year).
3b) The objectives are to present instrumentation used in differents areas of Biology, in order to prepare the Students for the exploitation, with sound knowledge, of biological research methodologies with different sophistication levels.
3c) Carr, JJ and Brown, JM 1998 Introduction to Biomedical Equip-ment Technology. Prentice-Hall, Upper Saddle River, N.J., USA. ISBN 0-13-849431-2; Fraden, J 1996 Handbook of Modern Sensors: Physics, Designs and Applications. Spriger-Verlag, New York, N.Y., USA. ISBN 1-56396-538-0; Togawa, T, Tamura, T and Öberg, PA 1997 Biomedical Transducers and Instruments. CRCPress, Boca Raton, N.Y., USA. ISBN 0-8493-7671-8.
4. Mandatory course unit.
5. Luís Torres Pereira.
6. 4 h/week; (2T + 2P); 1st semester; 4th year.
7. Lectures and practical classes.
8. 2 written Tests (50%+50%) or Final examination (100%) covering both the theoretical and practical parts.
9. No, the Degree begun in 2002/2003. However, the Lecturer has no problem in teaching in English the full Lecture and Practical Course.
10. 6.0.

1. Photosynthesis - 1941
2. Photosynthesis: Energetic transdution at different levels of structure/function. Photosynthesis in the past, present and to future. Chloroplasts- Evolutionary context, structure and organization. Grana formation. Sun and shady chloroplasts. Organizational dominie of thylakoid membranes. Lipids and their reflexes on biophysical properties of thylakoid membranes. Importance to photosynthesis. Type 18:3 and 16:3 plants. Photophysical photochemical aspects related to light absorbance. Photosynthetic unity. Electron transfer chain. Energetic transdution and generation of electrochemical potentials. Photophosphorylation. The energization of thylakoid membranes and generation of the surface negative charges. Inter-relations of chloroplast/cytoplasm. Photosynthetic CO2 fixation. C3, C4 and CAM plants. Bacterial photosynthesis. Photosynthesis in aquatic systems. Photorespiration.
3a) Good knowledge on Cell biology, Biochemistry, Bioenergetics and Plant Physiology.
3b) The objective is to give a set of knowledge enabling the students to understanding a integrated way the plant growth and development under environmental conditions.
3c) Gomes-Laranjo, J, Galhano, V, Moutinho Pereira, J and Torres-Pereira, J 2003 Fotossíntese bioenergética. Série Didática Ciências Aplicadas, nº 220, 95 pp. UTAD, Vila Real; Hall, DO and Rao, KK 1994 Photosynthesis. Studies in Biology. Cambridge University Press, 211 pp. Cambridge; Kirk, JTO 1994 Light & Photosynthesis in Aquatic Ecosystems, 2ª ed. Cambridge University Press, 509 pp.. Cambridge.
4. Optional Course. Compulsory Course for Students who choose the Plant Biology area in the 4th year
5. José Gomes Laranjo; Victor Galhano.
6. 4h/week (2T + 4P); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

1. Geobotany and Vegetal Sociology - 1942
2. Approach to the Biogeography, the Vegetal Kingdom of the World / Introduction to Phytossociology; Phytossociology and Typologism / The structure of the vegetation. The individualism and the chaotic organization of the vegetation. The metapopulation approach of the populations. Typologism vs. Individualism, the phytossociological approach / Numerical analysis, multivariate methodology for the phytostructural analysis: numerical matrizes (the MEB and the MC), structural index, standarization, variance analysis, clusters, multifactorial analysis (PCAs), tendencies characterization, DCA, HEA / Structural dynamic of the vegetal communities / Characterization of the resistance and resilience / / Prevision models.
3a) Knowledgment of the taxonomy and systematic portuguese vascular flora.
3b) The main goals of the discipline are involved in the knowledgement and characterization of the structure and dynamic of the vegetation.
3c) Braun-Blanquet, 1977 Fitossociologia; Naveh, Z and Lieberman, AS 1987 Landscape Ecology. Theory and Application; Peindado Lorca, M and Rivas-Martínez, S 1987 La Vegetación de España; Ludwig, JÁ and Reynolds, JF 1988 Statistical Ecology; Crawley, MJ 1989 Plant Ecology; Hair, JF et al. 1995 Multivariate data analysis with readings; Santos, VA and de Vargas Luque, AP 1996 Métodos multivariados en bioestadística; Reis, E 1997 Estatística multivariada aplicada; Daniel, WW 1998 Biostatistics: a foundation for analysis in the health sciences; Collins, WW and Qualset, CO 1999 Biodiversity in agroecosystems; Hanski, W 1999 Metapopulation ecology; Pianka, ER 2000 Evolutionary ecology.
4. Optional Course. Compulsory Course for Students who choose the Plant Biology area in the 4th year.
5. Antonio Luis Crespi.
6. 4h/week (2T + 2P); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam.
9. Yes.
10. 6.0.

1. Environmental Adaptations of Vascular Plants - 1943
2. The environment of plants. Environmental influences on growth and development. Adaptive strategies of vascular plants; C3 and C4 plants. Plants under stress: concept, phases and recognise. Stress types (effects and defence mechanisms): water stress, flooding, salinity, heavy metals, visible (high and low PAR) and UV-B radiation, chilling, freezing, high temperature, atmospheric CO2, atmospheric pollutants (ozone, SO2), global climate change.
3a) Good knowledge on molecular and cellular biology, structure and function of vascular plants and biochemistry.
3b) Students should get a domain on plant responses to environmental factors and on evolution aspects.
3c) Larcher, W 1995 Physiological Plant Ecology, 3th edition, Springer-Verlag, Germany; Taíz, L and Zeiger, E 1998 Plant Physiology, 2nd edition, Bejamín/Cummings, Redwood, California, USA; Hopkins, WG 1999 Introduction to Plant Physiology, 2nd edition, John Wiley, New York, USA.
4. Optional Course. Compulsory Course for Students who choose the Plant Biology area in the 4th year.
5. Carlos M. Correia, Eunice Areal Bacelar.
6. 4h/week (2 practical + 2 theoretical); 1st semester; 4th year.
7. Lectures and practical classes.
8. 2 written tests or a final exam - 100%.
9. No.
10. 6.0.

1. Plant Morphogenesis -1944
2. Growth, differentiation and plant development. Embryogenesis, morphogenesis, gene expression, polarity and totipotency. Hormones and growth regulators. Plant movements. Photo and gravitropism. Phytochrome and blue-light responses. Phoperiodism and thermoperiodism. Dormency. Seed formation and germination. Fruit development. Physiological and anatomical basis of plant propagation.
3a) Good knowledge on Comparative Structure and Function of Vascular Plants.
3b) Students should get a good domain of integration of the different levels of biological organization with effects on growth, differentiation and plant development.
3c) Larcher, W 1995 Physiological Plant Ecology, 3th edition, Springer-Verlag, Germany; Coll, JB, Rodrigo, GN, García, BS and Tamés, RS 2001 Fisiología Vegetal, Ediciones Pirámide, Madrid; Taíz, L and Zeiger, E 1998 Plant Physiology, 2nd edition, Bejamín/Cummings, Redwood, California, USA; Hopkins, WG 1999 Introduction to Plant Physiology, 2nd edition, John Wiley, New York, USA; Salisbury, FB and Ross, CW 1992 Plant Physiology, 4th edition, Wasdsworth Publishing Company, Belmont, Califórnia, USA.
4. Optional Course. Compulsory Course for Students who choose the Plant Biology area in the 4th year.
5. José Manuel Moutinho Pereira.
6. 4h/week; (2 theoretical + 2 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.0.

Chemistry Degree

Programme of Studies

1st YEAR	1st Semester	ECTS	2nd Semester	ECTS
	General Physics I	8.0	General Physics II	8.0
	Mathematics I	8.0	Mathematics II	8.0
	Laboratorial Physics I	3.0	Introduction to Informatics	3.0
	General Chemistry I	8.0	General Chemistry II	8.0
	Laboratorial Chemistry I	3.0	Laboratorial Chemistry II	3.0
	Total	30.0	Total	30.0
2nd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Analytical Chemistry	6.0	Biochemistry	4.0
	Inorganic Chemistry I	6.0	Inorganic Chemistry II	6.0
	Laboratorial Physics II	3.0	Mathematics IV	6.0
	Mathematics III	6.0	Electromagnetism	6.0
	Electronics and Instrumentation	6.0	Organic Chemistry I	5.0
	Laboratorial Chemistry III	3.0	Laboratorial Chemistry IV	3.0
	Total	30.0	Total	30.0
3rd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Physical-Chemistry	6.0	Complements of Physical Chemistry	6.0
	Environmental Chemistry	5.0	Electrochemistry	6.0
	Organic Chemistry II	6.0	Separation Processes	5.0
	Instrumental Analysis	5.0	Synthesis in Organic Chemistry	5.0
	Laboratorial Chemistry V	3.0	Spectroscopy	5.0
	Industrial Chemistry	5.0	Laboratorial Chemistry VI	3.0
	Total	30.0	Total	30.0
4th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Analytical Quality Control	7.0	Project (Annual)	30.0
	Option I	8.0		
	Option II	7.0		
	Option III	8.0		
	Total	30.0	Total	30.0

Total studies: 240

1st year

1. General Physics I - 0118.
2. Vector calculus. Complements of mathematics. Measurements, errors and experimental data graphical analysis. Unites and dimensions. Statics. Kinematics. Particle and particle systems dynamics. Rigid body dynamics. Simple harmonic oscillations. Elasticity. Fluid mechanics.
3a) Mathematics.
3b) The students should be able to solve basic kinematical and mechanical problems.
3c) Keller, FJ, et al. Physics: Classical and Modern, McGraw-Hill Book Company; Alonso M & Finn J, Física um Curso Universitário, Edgard Blucher Lda; Feynman RP et al. The Feynman Lectures on Physics, Addison-Wesley Publishing Company.
4. Compulsory.
5. José Manuel Marques Martins de Almeida, Luís Morgado and Francisco Marinho.
6. 5 h/week (3 theoretical + 1,5 lecture-practical); 1st semester; 1st year.
7. Lectures, practical and laboratory classes.
8. Laboratory 20% and final written exam 80%.
9. No.
10. 8.

1. Mathematics I - 0174.
2. Functions of one variable: implicit and inverse functions; some special functions. Limits of functions and continuity: classification of discontinuity. Derivatives: higher order derivatives; implicit differentiation. Antiderivatives: techniques of integration. Rolle's theorem, Lagrange's theorem and Cauchy's theorem. L'Hopital's rule.
3a. High-school Mathematical Analysis.
3b. To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st vol., Weberand Schmidt; Apostol, TM 1967 Calculus 1st vol., Wiley International Edition.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino and Carlos Jorge Pereira Monteiro.
6. 5 h/week (2 theoretical + 3 lecture-practical); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 8.

1. Laboratory Physics I - 0175.
2. Vector calculus. Complements of mathematics. Acquisition, error and graphical data analysis. Unities and dimensions. Experiments: 1- Specific mass of solids; 2- Determination of π; 3- Study of the simpl pendulum; 4- Determination of the force constant of a spring; 5- Statics of a body on na inclined plane without friction; 6- Paralel forces; 7- Decomposition of forces: inclined plane; 8- Determination of the static friction coeficient; 9- Composition of forces concurrent in a point; 10- Hydrodynamics: measurement of fluid flux.
3a) Mathematics.
3b) To provide students first contact with some methods of experimental physics concerning acquisition, treatment and interpretation of experimental data.
3c) Charles Kittley, C et al. Berkeley Physics Course, McGraw-Hill Book Company; Deus, JD & Pimenta, N Introdução à Física, McGraw-Hill. Sternheim and Kane General Physics, John Wiley & Sons; Halliday & Resnick Fundamentos de Física, Livros Técnicos e Científicos Editora.
5. José Manuel Marques Martins de Almeida, Luís Morgado and Francisco Marinho.
6. 4 h/week; 1st semester; 1st year.
7. Laboratory classes.
8. 50%Pactical work+50%Final written exam.
9. No.
10. 3.

1. General Chemistry I - 0708.
2. Atoms, molecules, and ions. Chemical reactions I: Chemical equations and reactions in aqueous solution. Chemical reactions II: Mass relationships. The gaseous state. Thermochemistry. Quantum Theory and the electronic structure of atoms. Periodic relationships among the elements. Chemical bonding I: Basic concepts. Chemical Bonding II: Molecular geometry and molecular orbitals.
3a) No prerequisites.
3b) Providing the students with a profound knowledge on the principles and concepts of Chemistry, and make them understand the vital role that Chemistry plays on our daily lives.
3c) Raymond C 1944 Química, 5ª ed., McGraw Hill, Lisboa; Daniel R et al. 1997 Química - Princípios e Aplicações, Saunders College Publishing/Fundação Calouste Gulbenkian (Edição em Português), Lisboa.
4. Compulsory.
5. Rui Ramos Vale and Ana Margarida Ferreira.
6. 4,5 h/week (3 theoretical + 1,5 lecture-practical); 1st semester; 1st year.
7. Lectures, problem solving tutorials and lab classes. Attendance in 2/3 of tutorials and lab classes is compulsory.
8. Two written assessments or final written exam (80%) + lab grade (20%).
9. No.
10. 8.

1. Laboratorial Chemistry I - 1721.
2. Safety in the Chemistry lab. Mass and volume measurements. Concentration units. Gravimetric analysis. Preparation of solutions, thermo chemistry, qualitative analysis.
3a) No prerequisites.
3b) Practice of basic unitary operation and techniques in preparative, analytical and inorganic chemistry.
3c) Not necessary.
4. Compulsory.
5. Ana Margarida Ferreira.
6. 3 h/week; 1st semester; 1st year.
7. Laboratory classes.
8. Final Test.
9. No.
10. 3.

1. General Physics II - 0119.
2. Vector differential operators and coordinate systems. Electric charge and Coulomb's law. Electric field and potential. Capacitors and dielectrics. Electric current. Electric circuits. Temperature and energy transfer.
3a) Mathematics and General Physics I.
3b) To provide students with the basic tools for electric circuit analysis.
3c) Keller, FJ, et al. Physics: Classical and Modern, McGraw-Hill Book Company; Sternheim and Kane General Physics, John Wiley & Sons; Halliday & Resnick Fundamentos de Física, Livros Técnicos e Científicos Editora; Freedman, Y University Physics, Addison-Wesley Publishing Company.
4. Compulsory.
5. Luís Morgado, Francisco Marinho and Jaime Viegas.
6. 5 h/week (3 theoretical + 2 lecture-practical); 2nd semester; 1st year.
7. Lectures, practical classes and laboratories.
8. Laboratory 20% and final written exam 80%.
9. No.
10. 8.

1. Mathematics II - 0178.
2. Taylor's formula . Integration: the definite integral. Applications of Integration. Improper Integrals. Sequences of real numbers: bounded and monotonic sequences. Series: series with nonnegative terms : comparison tests, the integral test, the ratio and root tests; absolute convergence - alternating series. Power series: expansion of functions; differentiation and integration of power series; Taylor and Maclaurin series.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Silva, JC 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st Vol., Weberand Schmidt; Apostol, TM 1967 Calculus 1st Vol., Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito and Fátima Ferreira.
6. 5 h/week (2 theoretical + 3lecture-practical); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 8.

1. Introduction to Informatics - 0342.
2. Hardware. Operating systems. Introduction to the Internet. Imaging treatment to Internet. HTML software (FrontPage and Netscape Composer). Adobe Acrobat (pdf maker). Chemistry programs demonstration (ACDLabs, Chemlab, Chemland, WinPerio, ChemDraw, Chem3D, Isisdraw, Vlab). Practical in ACDLabs (ChemSketch e Chem3D). Practical of Microsoft Word in writing scientific text. Practical of Microsoft Excel to solve common chemistry problems. The Solver of the Excel. Graphic representations in Excel and Microcal Origin.
3a) No prerequisites.
3b) Provide to students the basic tools of computer software and their applications, (Word, Excel)). Provide basic program language for resolution of Physic and chemistry problems.
3c) Colombain, J 1997 Internet, 1ª ed., Texto Editora; Kennedy, AJ 1997 Internet & World Wide Web, Guia de Navegação 2.0, Texto Editora; Biblioteca Exame Informática 1997 Guia Prático do Microsoft Office 97, Abril/Controljornal Editora; Biblioteca Exame Informática 1997 Como construir páginas Web com o Office 97, Controljornal Editora; Coelho, P 2001 HTML 4 & XHTML, FCA – Editora de Informática; Coelho, P 2002 FrontPage, FCA – Editora de Informática.
4. Compulsory.
5. Pedro Tavares.
6. 4 h/week (1 theoretical + 3 lecture-practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Students work presentation, and final exam with a strong practical component.
9. No.
10. 3.

1. General Chemistry II - 0709.
2. Intermolecular forces and liquids and solids. Physical properties of solutions. Chemical Kinetics. Chemical equilibrium. Acids and bases: general properties. Acid-base eqilibrium. Solubility equilibrium. Entropy, Free energia, and equilibrium. Electrochemistry.
3a) No prerequisites.
3b) Carry on providing the students with a profound knowledge on the principles and concepts of Chemistry, and make them understand the vital role that Chemistry plays on our daily lives.
3c) Raymond C 1944 Química, 5ª ed., McGraw Hill, Lisboa; Daniel Reger, S et al. 1997 Química - Princípios e Aplicações, Saunders College Publishing/Fundação Calouste Gulbenkian (Edição em Português), Lisboa.
4. Compulsory.
5. Rui Ramos Vale and Ana Margarida Ferreira.
6. 4,5 h/week (3 theoretical + 1,5 lecture-practical); 2nd semester; 1st year.
7. Lectures, problem solving tutorials and lab classes. Attendance in 2/3 of tutorials and lab classes is compulsory.
8. Two written assessments or final written exam (80%) + lab grade (20%).
9. No.
10. 8.

1. Laboratorial Chemistry II - 1722.
2. Distillation, Kinetics, Chemical Equilibrium, Chemical Reactions, Acid-base titration's, Oxidation-reduction reactions.
3a) No prerequisites.
3b) Practice of basic unitary operation and techniques in preparative, analytical and inorganic chemistry.
3c) Not necessary.
4. Compulsory.
5. Ana Margarida Ferreira.
6. 3 h/week; 2nd semester; 1st year.
7. Laboratory classes.
8. Final Test.
9. No.
10. 3.

2nd year

1. Analytical Chemistry - 0105.
2. Fundamentals of Analytical Chemistry. Errors in chemical analysis. Statistical evaluation of analytical data. Gravimetric methods of analysis. Titrimetric methods of analysis.
3a) General chemistry.
3b) To provide a rigorous background in both fundamental and practical aspects of the classical quantitative chemical analysis. To sensitise students to errors and uncertainties of analytical results. To introduce statistical methods for reliability evaluation of analytical data.
3c) Skoog, DA et al. 1996 Fundamentals of Analytical Chemistry, 7th ed., International Edition, Saunders College Publishing; Harris, DC 1999 Quantitative Chemical-Analysis 5th ed., W. H. Freeman and Company; Miller, JC & Miller, JN 1993 Statistics for Analytical Chemistry, 3rd ed., Ellis Horwood Limited.
4. Compulsory.
5. Luís H. Melo de Carvalho and João Claro.
6. 3 h/week (2theoretical + 1 lecture-practical); 1st semester; 2nd year.
7. Lectures and tutorial classes.
8. Written exam (100%).
9. No.
10. 6.

1. Inorganic Chemistry I - 0179.
2. Crystalline structure of solids. Energetic of solids. Solvents and solutions. Acid Base reactions. Redox reactions. Elemental studies and their compounds (H, O, P, B, S). Metallurgy and chemistry of metals. Metal complexes of d bloc.
3a) Good knowledge on general chemistry I.
3b) Provide the basic knowledge about chemicals elements, and establish the interactions between chemical properties of elements and their position in periodical table.
3c) Cavaleiro, A 1997 Química Inorgânica Básica, Universidade de Aveiro; Shriver, DF et al. 1990 Inorganic Chemistry, Oxford University Press; Chang, R 1994 Química, 5ª ed., McGraw-Hill de Portugal.
4. Compulsory.
5. Pedro Tavares.
6. 3 h/week; 1st semester; 2nd year.
7. Lectures classes.
8. Final written exam.
9. No.
10. 6.

1. Laboratory Physics II - 0461.
2. Complements of mathematics. Acquisition, error and analysis of experimental data. Unites and dimensions. Electric measures Instruments. Experiments: 1- Thévenin and Norton equivalent circuits; 2- Characteristic curve of a diode – “clipping” circuits; 3- Construction of a opt electronic transmitter/receptor (Led+fotodiode); 4- Characteristic curves of a transistor IC(VCE,IB); 5- Logic circuits with diodes and transistors; 6- Commutation circuit with a transistor – AC amplifier with a transistor; 7- Inverter and no inverter configurations of an operational amplifier; 8- Introduction to digital logic; 9- Implementation of functions based in “flip-flops”; 10- Monostable, multivibrator and astable circuits.
3a) Mathematics and knowledge of electricity (General Physics II).
3b) To observe and understand how some electronic components work as parts of simple circuits.
3c) Horowitz, P & Hill, W 1989 The Art of Electronics, 2ª ed., Cambridge Press; Martin, HJ 1977 A Practical Introduction to Electronic Circuits, Cambridge University Press.
4. Compulsory.
5. José Manuel Marques Martins de Almeida.
6. 4 h/week; 1st semester; 2nd year.
7. Laboratory classes.
8. 50%Pactical work+50%Final written exam.
9. No.
10. 3.

1. Mathematics III - 0663.
2. The topology of the Euclidean space Rn. Limits, continuity and differentiability of vector-valued functions of several variables. Differentiation. Extreme of real-valued functions: unconstrained extreme; constrained extreme and Lagrange multipliers. Double and triple integrals. Change of variables and applications.
3a) Differential and integral calculus of one variable as well as basic notions of linear algebra and analytic geometry.
3b) To give the basic theory of differential and integral calculus of functions of several variables and show the practical aspects of all these matters namely through applications in physics.
3c) Breda, A & Costa, JN 1996 Cálculo com Funções de Várias Variáveis, 1ª ed., McGraw-Hill International Editions; Marsden, JE & Tromba, AJ 1988 Vector Calculus, 3rd ed., W.H. Freeman and Company; Swokovski, E 1994 Cálculo com Geometria Analítica, Vol II, 1ª ed., Mc Graw-Hill Lda., S. Paulo.
4. Compulsory.
5. Anabela Borges and Carlos Rito.
6. 5 h/week (2 theoretical + 3 lecture-practical); 1st semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written examination – 100%.
9. No.
10. 6.

1. Electronics and Instrumentation - 1649.
2. Errors and measurements. Introduction to the study of electronics: passive and active components, Ohm's law, Kirchoff's law, Joule's law, Thévenin and Norton's equivalents circuits. Diodes: the pn junction, working principle, clipping and clamping circuits, rectifying and filtering. Altern current: fasors, reactance, generalized Ohm's law and power factor. Transistors: working principle, pnp and npn junctions, the transistor as an amplifier, the field effect transistor. Logical circuits using diodes: Boole's logics, basic logical functions, Morgan's laws and truth tables. Operational amplifiers: characteristics, DC and AC analysis, feed-back circuits, circuits using amplifiers, impedances.
3a) Basics knowledge on mathematics: vectors and vector operators.
3b) It is pretended to take the student to understand the working principles of various electronic components and it's function as part of a circuit.
3c) Horowitz, P & Hill, W 1989 The Art of Electronics, 2ª Edição, Cambridge Press; Martin, HJ 1977 A Practical Introduction to Electronic Circuits, Cambridge University Press; Senturia, SD Wedlock, BD Electronic Circuits and Applications, John Wiley.
4. Compulsory.
5. José Manuel Almeida.
6. 4,5 h/week (3 theoretical + 1,5 lecture-practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Laboratories reports 20% + Final exam 80%.
9. No
10. 6.

1. Laboratorial Chemistry III - 1723.
2. Systematic qualitative analysis. Quantitative analysis by gravimetric and titrimetric methods. Statistical evaluation of analytical data. Operations of Analytical Chemistry - reagents, preparation and conservation of standard solutions, use of gravimetric and volumetric equipment. Fundamental safety aspects.
3a) General chemistry.
3b) To provide a rigorous background in practical aspects of the classical qualitative and quantitative chemical analysis. To teach those laboratory skills that will give students confidence in their ability to design and conduct their experiments correctly in order to obtain reliable analytical data.
3c) Vogel, AI 1989 Vogel's Textbook of Quantitative Inorganic Analysis, 5th ed., by Longman Scientific & Technical, UK; Skoog, DA et al. 1996 Fundamentals of Analytical Chemistry, 7th ed. (1996), International Edition, Saunders College Publishing; Harris, DC 1999 Quantitative Chemical Analysis 5th ed., WH Freeman and Company.
4. Compulsory.
5. Luís H. Melo de Carvalho and João Claro.
6. 3 h/week; 1st semester; 2nd year.
7. Laboratory classes.
8. Written exam (60%) and practical mark (40%).
9. No.
10. 3.

1. Biochemistry - 0007.
2. Major chemical constituents of cells; Water and its properties; Carbohydrates, Lipids, Proteins; Thermodynamics applied to the biological systems; Enzymes; Nucleotides, nucleic acids and hereditariness; Genetic expression and protein synthesis; Bioenergetics; Catabolic pathways.
3a) General Chemistry.
3b) Application of he chemical knowledge's to the sociological systems.
3c) Stryer, L 1995 Biochemistry, 4ª ed., WH Freeman and Company, Inc., NY, USA; Seager SL & Slabaugh, MR 2000 Chemistry for Today General, Organic, and Biochemistry, Ed. Brooks/Cole, 4th ed., UK; Weil, JH Bioquímica Geral, 2ª ed., tradução de Maria Celeste Lechner, Fundação Caloust Gulbenkian, Lisboa.
4. Compulsory.
5. Francisco Manuel Pereira Peixoto.
6. 2 h/week; 2nd semester; 2nd year.
7. Lectures classes.
8. Final theoretical.
9. No.
10. 4.

1. Inorganic Chemistry II - 0196.
2. Coordination compounds. Structure and symmetry. Bonding and electronic structure. Ligand Field Theory. Crystal Field Theory. Properties of coordination compounds.
3a) The students should possess a reasonable background on chemistry.
3b) To cover currently important topics in the Chemistry of Coordination Compounds.
3c) Shriver, DE et al.1994 Inorganic Chemistry, Oxford University Press; Cotton, FA et al. 1995 Basic Inorganic Chemistry, John Wiley & Sons, Inc.; Douglas, B et al. 1994 Concepts and Models of Inorganic Chemistry, John Wiley & Sons, Inc.
4. Compulsory.
5. Verónica Cortés de Zea Bermudez.
6. 5 h/week; 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final theoretical and practical examinations.
9. No.
10. 6.

1. Mathematics IV - 0671.
2. First order differential equations. Differential equations of higher order: Method of the undetermined coeficients. Euler-Cauchy equations. Vector-valued functions in the plane and in the space. Velocity and acceleration. Arc length. Vector fields. Divergence and curl. Integrals over paths and surfaces. Theorems of Green, Gauss and Stokes.
3a) Differential and integral calculus of one variable as well as several variables and also basic notions of linear algebra and analytic geometry.
3b) Introduce the basic differential equations and give the basic theory of vector analysis showing the practical aspects of all these matters namely through applications in physics.
3c) Breda, A & Costa, JN da 1996 Cálculo com Funções de Várias Variáveis, 1ª ed., McGraw-Hill International Editions; Marsden, JE & Tromba, AJ 1988 Vector Calculus, 3rd ed., W.H. Freeman and Company; Swokovski, E 1994 Cálculo com Geometria Analítica, Vol II, 1ª ed., Mc Graw-Hill Lda., S. Paulo; Zill, D 1997 A First Course in Differential Equations with Modelling Appplications, 6ª ed. Brooks/Cole Publishing Company.
4. Compulsory.
5. Anabela Borges and Carlos Rito.
6. 4 h/week; 2nd semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8 Final written examination – 100%.
9. No.
10. 6.

1. Electromagnetism - 0721.
2. Electrostatics: charges and fields. The electric potential. Electric fields around conductors. Electric currents. The Magnetic field. Electromagnetic inductance. Displacement current. Maxwell's equations. Alternating current circuits. Electric fields in matter.
3a) College algebra and basic differential and integral calculus.
3b) To teach some fundamental concepts of electricity and magnetism to prospective secondary school teachers and provide them with the ability to apply these concepts to the solution of both familiar and unfamiliar problems.
3c) Purcell, E 1985 Electricity and Magnetism, McGraw-Hill, Singapore; Villate, JE 1999 Electromagnetismo, McGraw-Hill, Lisboa; Brito, L et al. 1999 Campo Electromagnético, Mc Graw-Hill, Lisboa; Fishbane, PM et al. 1996 Physics for Scientists and Engineers, Prentice-Hall, New Jersey.
4. Compulsory.
5. José Ferreira, Jaime Viegas and Daniel Alexandre.
6. 4,5 h/week (3 theoretical + 1,5 lecture-practical); 2nd semester; 2nd year.
7. Lectures, problem-solving tutorials.
8. Written exam.
9. No.
10. 6.

1. Organic Chemistry I - 1260.
2. Functional Groups, Alkenes and Cycloalkanes, Conformational Analysis, Stereochemistry, Spectroscopy, Nucleofilic substitution, Alkenes, Aromaticity, Alcohol's Aldeydes and Ketones, Carboxylic acids and derivatives, Radical reactions.
3a) General Chemistry.
3b) To show that the organic compounds properties are derivatively related with the functional groups present in the molecule.
3c) Solomons, G & Fryhle, C 2000 Organic Chemistry, 7th ed. 2000, John Wiley & Sons.
4. Compulsory.
5. Paulo Coelho and Maria Manuel Oliveira.
6. 3 h/week; 2nd semester; 2nd year.
7. Lectures classes.
8. Final written exam.
9. No.
10. 5.

1. Laboratorial Chemistry IV - 1724.
2. Experiments in Organic Chemistry: Separation techniques (Recrystallization, distillations, chromatography), Nucleophilic Substitution Reactions. Oxidations, Electrophilic additions, Nucleophilic additions.
3a) No prerequisites.
3b) Experiments in Organic Chemistry.
3c) Most, C 1988 Experimental Organic chemistry, J. Wiley & sons.
4. Compulsory.
5. Paulo Coelho and Francisco Peixoto.
6. 3 h/semana; 2nd semester; 2nd year.
7. Practical classes.
8. Final Test.
9. No.
10. 3.

3rd year

1. Physical Chemistry - 0185.
2. Behavior of gases. Thermodynamic laws. Chemical Thermodynamic. Chemical equilibrium. Phases and solutions. Chemical kinetics. Diffraction techniques.
3a) Good knowledge on general chemistry.
3c) Atkins, PW 1999 Físico-Química, 6th ed., vols 1, 2 e 3, LTC Livros Técnicos e Científicos; Laidler, K & Meiser , J 1999 Physical Chemistry, 3rd ed., Houghton Mifflin.
4. Compulsory.
5. Pedro Tavares and José Sousa.
6. 6 h/week (2 theoretical + 1 lecture-practical + 3 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.

1. Environmental Chemistry - 0560.
2. Water pollution. Water and wastewater characterization: physical, chemical and biological parameters. Alkalinity. Hardness. Dissolved oxygen. Biochemical Oxygen Demand. Chemical Oxygen Demand. Nitrogen species. Solids. Sulphate. Phosphorous. Oil and grease. Trace contaminants. Wastewater treatment: preliminary, primary, secondary and tertiary treatments. Disinfection. Pesticides. Insecticides. Herbicides. Solid Waste: landfill, incineration, dioxins and furans. Air Pollution. The atmosphere of Earth. Primary and secondary pollutants. Air pollutants: carbon monoxide and carbon dioxide, nitrogen oxides (NOx), hydrocarbons, volatile organic compounds (VOC), photochemical oxidants, sulphur oxides, particulate matter, lead. Air pollution situations: greenhouse effect, changes in stratospheric ozone, photochemical smog, acid rain.
3a) Good knowledge on general chemistry.
3b) To provide students with an overview of anthropogenic activities impact in the Environment. The students should be able to interpret and identify water pollution and air pollution characteristics.
3c) Sawyer, CN et al. 2003 Chemistry for Environmental Engineering, 5th ed., McGraw-Hill, NY; Baird, C, 1999 Environmental Chemistry, 2nd ed., W. H. Freeman Pub, NY; Warnek, P 1988 Chemistry of the Natural Atmosphere, Academic Press, NY; APHA, 1998 Standard Methods for the Examination of Water and Wastewater, 19th ed.; Metcalf & Eddy 2003 Wastewater Engineering. Treatment and Reuse, 4th Ed., McGraw-Hill, NY.
4. Compulsory.
5. José Alcides Peres.
6. 3 h/week (2 theoretical + 1 lecture-practical); 1st semester; 3rd year.
7. Lectures, practical classes.
8. Final written exam.
9. No.
10. 5.

1. Organic Chemistry II - 1261.
2. Electrophilic Aromatic Substitution, the carbonyl group, Nucleophilic addition reactions, Nucleophilic substitutions in the acyl group, Synthesis and reactions of dicarbonyl compounds.
3a) Knowledge of Organic Chemistry I.
3b) To show that the reactivity of the organic compounds can be understood on the basis of the reactions mechanism.
3c) Solomons, G & Fryhle, C 2000 Organic Chemistry, 7th ed., John Wiley & Sons.
4. Optional.
5. Paulo Coelho and Maria Manuel Oliveira
6. 6 h/week (2 theoretical + 1 lecture-practical + 3 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam (70%) and practical work (30%).
9. No.
10. 6.

1. Instrumental Analysis - 1725.
2. Characterization of the instrumental analysis techniques and methods. Their vantages and limitations. Uncertainties in instrumental measurements. Sensivity and detection limit for instruments. Introduction to electroanalytical chemistry. Potenciometric, coulometric and electro gravimetric methods. Introduction to absorption spectroscopy. Molecular ultraviolet and visible spectroscopy. Atomic spectroscopy based upon flame and electrochemical atomization.
3a) Knowledge on General Chemistry.
3b) To transmit the general principles and practical aspects of the various methods and techniques. To provide the understanding of the their strengths and limitations.
3c) Harris, DC 1999 Quantitative Chemical Analysis, 5th ed., by W. H. Freeman and Company; Skoog, DM et al. 1996 Fundamentals of Analytical Chemistry, 7th ed., by Saunders College Publishing.
4. Compulsory.
5. Maria Cristina F. Oliveira and Cristina Antunes.
6. 3 h/week (2 theoretical + 1lecture-practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam (80%) + oral presentation (20%).
9. No.
10. 5.

1. Laboratorial Chemistry V - 1726.
2. Experiments in Analytical chemistry, Quantitative analysis. Potentiometry, Visible spectrophotometry, Atomic absorption Spectroscopy.
3a) Laboratorial Chemistry III.
3b) Experiments of Instrumental chemical analysis.
3c) Harris, DC 1999 Quantitative Chemical Analysis, 5th ed. by W. H. Freeman and Company; Skoog, DA et al. 1996 Fundamentals of Analytical Chemistry, 7th ed. by Saunders College Publishing; Skoog, DA 1992 Principles of Instrumental Analysis, 4th ed. by Saunders College Publishing.
4. Compulsory.
5. Maria Cristina F. Oliveira.
6. 3 h/Week; 1st semester; 3rd year.
7. Practical classes.
8. Final written exam and practical work.
9. No.
10. 3.

1. Industrial Chemistry - 1727.
2. Chemical Principles of the industrial processes. Wastewater treatment and the environmental protection. Energy. Industrial gases. Ceramics and glass industries. Industrial Inorganic compounds. Agrochemical industries. Paper and plastics industry. European and Portuguese Chemical Industry. European Legislation.
3a) No prerequisites.
3b) To understand the scientific and economical aspects of industrial processes.
3c) Not necessary.
4. Compulsory.
5. Fernando Braga.
6. 2 h/week; 1st semester; 3rd year.
7. Lectures classes.
8. Final exam.
9. No.
10. 5.

1. Complements of Physical Chemistry - 1728.
2. Fundamental concepts in Quantum theory. The Schrödinger equation and its solution. Atomic structure. Molecular structure. The Molecular Orbital theory. The Valence-bond theory. The Hückel method. Pure rotation spectra. Vibration-rotation spectra. Group theory.
3a) The students should possess a good background on mathematics, chemistry and physics.
3b) This course intends to cover several advanced topics in Physical Chemistry, to extend fundamental Quantum theory knowledge and to provide the essentials of group theory and its application to vibrational spectroscopy.
3c) Atkins, PW 1994 Physical Chemistry, Oxford University Press; Davidson, G 1991 Group Theory for Chemists, MacMillan Physical Science Series.
4. Compulsory.
5. Verónica Cortés de Zea Bermudez.
6. 6 h/week (2 theoretical + 1 lecture-practical + 3 practical); 2nd semester; 3rd year.
7. Lectures, practices and lecture-practical classes.
8. Final theoretical and practical examinations.
9. No.
10. 6.

1. Electrochemistry - 1729.
2. Electrochemical cells: thermodynamic properties and electrode potentials. The interfacial region. Fundamentals of kinetics and mechanism of electrode reactions. Kinetics and transport in electrode reactions. Scanning and pulse potential techniques. Electrocatalyse. Corrosion.
3a) Knowledge of General Chemistry.
3b) To transmit the essence of electrochemistry and to show it's interdisciplinary. To provide the understanding of some techniques that allows studying electrode reactions.
3c) Pletcher, D & Walsh, F 1993 Industrial Electrochemistry, Blackie Academic & Professional; Brett, C & Brett, A 1993 Electrochemistry - Principles, Methods and Apllications, Oxford Science Publications; Southampton Electrochemistry group 1990 Instrumental methods in electrochemistry, Ellis Horwood.
4. Compulsory.
5. Maria Cristina F. Oliveira
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 3rd year.
7. Lectures, practical classes and laboratories.
8. Final written exam (70%) + laboratory reports (30%).
9. No.
10. 6.

1. Separation Processes - 1730.
2. Phase diagrams, distillation, Sublimation, Liquid-liquid Extraction, Nucleation, Crystallization. Chromatography: Basic Principles, Chromatographic Methods. Modern Methods of Chromatography: Separation Theory and Equipments. Liquid Chromatography: Gel Chromatography, Ion Exchange Chromatography; Chromatofocusing; Hydrophobic Interaction Chromatography; Affinity Chromatography; High Performance Liquid Chromatography (HPLC)- Development of Separation Methods. Liquid Chromatography-Mass Spectrometry (LC-MS). Gas-Liquid and Gas-Solid –Chromatography; Injection Methods (Split/Split less- On Column; TPV); Gas-Chromatography-Mass Spectrometry; Development of Separation Methods. Electrophoresis; High Resolution Capillary Electrophoresis. Equipment; Development of Analysis Methods.
3a) Instrumental Analysis.
3b) To develop the practical and theoretical aspects of several separation techniques.
3c) Henley, ES & Seader, JD Equilibrium Stage Separation; Foust, WC & Anderson,M Princípios das Operações Unitárias, Guanabara Dois; Hubschmann HJ Verlag, W 2000 Fundamentals and Applications, Handbook of GC/MS; Sorensen, H et al.Chromatography and Capillary Electrophoresis in Food Analysis, RSC Food Analysis Monographs.
4. Compulsory.
5. Fernando Nunes and Pedro Tavares.
6. 2 h/week; 2nd semester; 3rd year.
7. Lectures classes.
8. Final Test.
9. No.
10. 5.

1. Synthesis in Organic Chemistry - 1731.
2. Functional group Interconversion. Retrosynthesis. Convergent and linear Synthesis. Disconnection with two functional groups. Total and partial synthesis. Quimioselectivity, regioselectivity, diastereoselectivity, enatioselectivity, estereoselectivity. Functional group protection. Additions to Multiple C-C bonds. Carbanions and Organomettalics. Quirality induction. Enatioselective Synthesis, Racemic synthesis and resolution techniques. Asymmetric Synthesis or Synthesis from natural products.
3a) Knowledge or Organic Chemistry I.
3b) To develop the previous knowledge of organic reactions and applied them to the synthesis of complex molecules.
3c) March, J 1985 Advanced Organic Chemistry, 3rd ed., Wiley-Interscience, NY; Warren, S 1982 Organic Synthesis. The Disconnection Approach, Wiley, NY; Corey, EJ Cheng, XM The Logic of Chemical Synthesis, Wiley, NY.
4. Compulsory.
5. Lucinda Vaz Reis.
6. 2 h/week; 2nd semester; 3rd year.
7. Theoretical lectures.
8. Final exam.
9. No.
10. 5.

1. Spectroscopy - 1232.
2. Pure rotation spectra. Vibrational spectra. Vibration-rotation spectra. Group theory.
3a) No prerequisites.
3b) This course intends to cover several advanced topics in vibrational and rotacional spectroscopies and to provide the essentials of group theory and its application to vibrational spectroscopy.
3c) Colthup, NB et al. 1990 Introduction to Infrared and Raman Spectroscopy, Academic Press; Davidson, G et al. 1991 Spectroscopic Methods in Organic Chemistry, Thieme.
4. Compulsory.
5. Verónica Cortés de Zea Bermudez.
6. 5 h/week (2 theoretical + 3 lecture-practical; 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final theoretical examination.
9. No.
10. 5.

1. Laboratorial chemistry VI - 1733.
2. Experiments of separation techniques and Organic Chemistry.
3a) No prerequisites.
3b) Experiments of separation techniques and Organic Chemistry..
3c) Furniss, B et al. 1989 Vogel's Practical Organic Chemistry, Longman Scientific & Technical.
4. Compulsory
5. Lucinda Vaz Reis and Pedro Tavares.
6. 3 h/week; 2nd semester; 3rd year.
7. Practical classes.
8. Final written exam (70%) and practical work (30%).
9. No.
10. 3.

4th year

1. Analytical Quality Control - 1734.
2. Precision and Accuracy; Evaluation of Precision and Accuracy; Evaluation of the sources of variation on data – ANOVA; Calibration; Sensitivity and Detection Limit; Selectivity and Specificity. EURACHEM procedures. Validation of Analytical Methods. Interlaboratory studies – Reproducibility and Repetability of Analytical Methods. Optimization of Analytical Methods. Signal Processing. Multivariate Methods – Principal Component Analysis; Cluster Analysis; Principal Component Regression; Partial Least Squares Regression.
3a) Analytical Chemistry or Instrumental Methods of Analysis.
3b) This course intends to cover several advanced topics in statistical analysis and experimental data treatment.
3c) Massart, DL et al. (eds) 1988 Chemometrics:a text book, Amesterdam.
4.Compulsory.
5. Fernando Nunes.
6. 5 h/week (3 theoretical + 2 lectures-practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final theoretical exam.
9. No.
10. 7.

1. Food Chemistry - 1738.
2. Water: structure and properties; Water Activity in food and food stability; Lipids: chemical composition and properties; lipid autoxidation; thermal degradation of oils and fats; Aminoacids: structure and properties, nutritional value; Proteins: structure and properties, thermal processing; Enzymes: importance in the food industry; Carbohydrates: structure and properties; Maillard reaction, Caramelization; dietary fiber; Phenolic compounds: structure and properties; anti-oxidant activity; enzymatic browning.
3a) Organic Chemistry, Biochemistry
3b) To give general concepts about the main food components and their functionality. Introduction to the mechanisms of food processing and spoilage.
3c) Belitz, HD & Grosch, W (eds) 1999 Food Chemistry, 2nd ed., Springer-Verlag, Berlin; Alais, C & Linden, G 1991 Food Biochemistry, Ellis Horwood, NY.
4.Optional.
5. Fernando Nunes.
6. 5 h/week (2 theoretical + 3 lecture-practical); 1st semester; 4th year.
7. Lecture and Practice classes.
8. Final test.
9. No.
10. 8.

1. Electroanalytic - 1739.
2. Theoretical bases of electro analytical methods. Study of electrode reactions: Cyclic voltammetry. Controlled-potential techniques: chronoamperometry, polarography, pulde voltammetry, stripping analysis. Potenciometry: ion-selective electrodes, liquid-membrane electrode, solid-state electrode. Electrochemical sensors: chemical and biosensors.
3a) Good knowledge on Analytical Chemistry and Instrumental Analysis.
3b) The objective of this course is to provide the principles and applications of modern electro analytical. techniques and devices. Emphasis is placed on utility and actual application of each method, namely in quantitative analysis.
3c) Wang, J 2000 Analytical Electrochemistry, Wiley-VCH; Skoog, DA et al. 1998 Principles of Instrumental Analysis, Saunders College Pub.
4. Optional.
5. Cristina Antunes.
6. 5 h/week (3 practical + 2 theoretical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 8.

1. Materials characterization techniques - 1740.
2. Crystallography; X-ray Diffraction; Scanning electronic microscopy, Transmission electronic microscopy; Atomic force microscopy; Moss Bauer Spectroscopy; Resistvities and magnetization measurements; Hall effect.
3a) Good knowledge of Inorganic Chemistry.
3b) To provide some modern methods of Materials characterization
3c) Robert, E & Lifshin E Concise Encyclopedia of Materials Characterization, X-Ray Characterization of Materials; Lifshin, E Structural and chemical analysis of Materials.
4. Optional.
5. Pedro Tavares.
6. 4 h/week (2 theoretical + 2 lecture-practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final exam.
9. No.
10. 7.

1. Solid State Chemistry - 1741.
2. Preparation and characterization Methods. Solid solution. Microstructures. Interpretation of phase diagrams. Phase transitions. Electrical, magnetic and optical properties, Glasses. New materials with technological interest. Superconductors.
3a) Good knowledge of Inorganic Chemistry.
3b) To provide the preparation and characterization methods of solids
3c) West, AR Solid State Chemistry and its Applications, Wiley & Sons; Interrante, L & Hampden-Smith M (Eds.), Chemistry of Advanced Materials, Wiley & Sons; Ellipt, S The Physics and Chemistry of Solids, Wiley & Sons.
4. Optional.
5. Pedro Tavares.
6. 4 h/week (2 theoretical + 2 lecture-practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final exam.
9. No.
10. 7.

1. Chemistry of Natural Products - 1242.
2. Introduction to the main families of Natural Products. Structural elucidation of Natural Products. It will be presented the biosynthetic mechanisms, since they become a good guide to an organic chemist interested in the synthesis of a new drug. It will be discussed the relationship structure/biological activity of the families studied.
3a) Knowledge Organic Chemistry I.
3b) To provide to the students information concerning biosynthesis, which will allow them to chose within several possible chemical structures for an newly found compound, those more plausible biological point of view.
3c) Lobo AM 1976 Biossíntese de Produtos Naturais, UNL; Mann J 1987 Secondary Metabolism, 2ª ed., Clarendon Press; Mann, J et al. 1996 Natural Products, their Chemistry and Biological Significance, ed. Longman Group, UK Limited.
4. Optional.
5. Lucinda Reis.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam or 2 written tests (70%), written test about the laboratory experiences (20%) and practical laboratory work (10%).
9. No.
10. 8.

1. Advanced Organic Chemistry - 1743.
2. The chemistry of Heterocycles: Pirrole, indole, pyridine, quinoline and isoquinoline. Electrophilic substitution, reactivity. Chemical reactivity of carbonyl derivatives: enolic esteres, enolic ethers and ketals. Catalytic reactions (Oxidations, hydrogenations, coupling). Frontier molecular orbitals theory. Cycloadditions reactions, Peryciclic reactions, sigmatropic rearrangements, Diels-Alder reaction, Cope and Claisen rearrangements, Photochemical synthesis of organic molecules.
3a) Knowledge of Organic Chemistry.
3b) to provide advanced methods of organic synthesis.
3c) March, J 1985 Advanced Organic Chemistry, 3rd ed., Wiley-Interscience, NY; Volhardt, KPC & Schore, NE 1998 Organic Chemistry, 3rd ed., W. H. Freeman and Company, NY; Fleming, I 1999 Pericyclic Reactions, Oxford Science Publications.
4. Optional.
5. Paulo Santos.
6. 5 h/week (2 theoretical+ 3 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 8.

Civil Engineering Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Linear Algebra and Analitic Geometry	5.5	General Physics II	5.0
	General Physics I	4.5	Geology	6.0
	Material Science	5.5	Mathematical Analysis II	7.0
	Mathematical Analysis I	7.0	Drawing II	3.0
	Drawing I	3.0	Descriptive Geometry II	5.0
	Descriptive Geometry I	4.5	Computer programming	4.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Complements of Mathematical Analysis	7.0	Land Surveying	4.5
	Technical Drawing	3.0	Numerical Methods	6.0
	Statistics	6.0	Mechanics II	6.0
	Electronics	4.0	Computer Aided Design II	4.0
	Mechanics I	6.0	History of Architecture	5.0
	Computer Aided Design I	4.0	Hydraulics I	4.5
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	Mechanicsa I	5.0	Operational Research	5.0
	Strength of Materials I	6.5	Electrotecnics	4.5
	Building Materials I	4.5	Strength of Materials II	6.5
	Soil Mechanics I	5.0	Building Materials II	5.0
	Hydraulics II	5.0	Soil Mechanics II	5.0
	Architecture I	4.0	Architecture II	4.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	Urban and Regional Planning	4.0	Theory of Structures II	7.0
	Theory of Structures I	7.0	Physics of Buildings II	6.0
	Physics of Buildings I	6.0	Measure Techniques and Construction Budget	4.0
	General Construction Procedures	5.0	Computer Aided Design and Cinstrution	5.0
	Means of Communication	4.0	Urbanism I	4.0
	Environmental Hydraulics	4.0	Environment Impact	4.0
	Total	30.0	Total	30.0

5th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Reinforced and prestressed Concrete I	6.0	Reinforced and Prestressed Concrete II	6.0
	Building Site Organization	5.5	Construction Project Management	5.5
	Uurbanism II	4.0	Steel and wood Strutures	5.5
	Construction's Economical/Financial	5.5	Building Installations	3.0
	Engineering	7.0	Project	6.0
	2 Electives		2 Electives	6.0
	Total	28.0	Total	32.0
	1st Semester	ECTS	2nd Semester	ECTS
	ELECTIVES		ELECTIVES	
	Geotechenics	3.5	Special Structures	3.0
	Conservation and Rehabilitation of Buildings	3.5	Seminary of Building Construction	3.0
			Urban Management	3.0
			Special Works	3.0

Total crédits: 300

1st year

1. Linear Algebra and Analytic Geometry - 0117
2. Matrices and Systems of Linear Equations. Determinants and Systems of Linear Equations. General Vector Spaces. Linear Transformations and Matrices.
3a) Vector calculus. Basic notions about functions. Systems of two linear equations.
3b) To provide a set of mathematical tools used to solve a widespread engineering problems.
3c) Willams, G 2001 Linear Algebra with Applications, 4ª ed., Boston, Jones and Bartlett Publishers, Inc.; Vitória, J and Lima, T P 1998 Álgebra Linear, Lisboa, Universidade Aberta.
4. Compulsory.
5. Cecília Costa, Ana Paula Teixeira.
6. 5h/week (2T + 3TP); 1st semester; 1st year.
7. Lectures and practical classes.
8. According to University Regulations, final exam 100%.
9. No.
10. 5.5.

1. General Physics I - 0118
2. Vectors. Kinematics for one and two dimensions. Dynamics. Newton's laws of motion. Gravitation. Work and kinetic energy. Potential energy and conservation of energy. Systems of particles. Collisions. Torque. Rotation. Fluids. Oscillations. Temperature, Heat and First and Second laws of Thermodynamics.
3a) No prerequisites.
3b) Give to students some elements of Physics that can be applied and developed in more specific areas.
3c) Keller: General Physics; Halliday, Resnick, Walker Fundamentals of Physics Extended. Wiley & Sons; Alonso e Finn Física: um curso Universitário.
4. Compulsory.
5. Carlos Manuel M. Matias; Pedro Serra; Malik Amaouri.
6. 4 h / week (2T + 2 TP); 1st semester; 1st year.
7. Lectures and tutorials classes.
8. Two-middle semester written asseeement; Exam.
9. No.
10. 4.5.

1. Materials Science - 0150
2. Introduction to Materials Science. Metallic materials. Crystal structure. Crystalline imperfections. Diffusion. Mechanical properties. Engineering alloys. Phase diagrams. Electrochemistry. Corrosion. Ceramic materials. Glasses. Polymeric materials.
3a) The students should possess a modest background on mathematics, chemistry and physics.
3b) This course intends to provide the basic fundamentals of Materials Science
3c) Smith, W 1993 Foundations of Materials Science and Engineering, McGraw Hill Int. Edition, NY; Callister Jr., W. D., 1994 Materials Science and Engineering - An Introduction, John Wiley & Sons, Inc., NY.
4. Compulsory.
5. Verónica Cortés de Zea Bermudez.
6. 5h/week; 1st semester; 1st year.
7. 2 hours lectures, 1 hour tutorial + 2 hours practical/week.
8. Final theoretical and practical examinations.
9. No.
10. 5.5.

1. Mathematical Analysis I - 0174
2. Functions of one variable: implicit and inverse functions; some special functions. Limits of functions and continuity: classification of discontinuity. Derivatives: higher order derivatives;implicit differentiation. Antiderivatives: techniques of integration. Rolle's theorem, Lagrange's theorem and Cauchy's theorem. L'Hopital's rule. Taylor's formula. Integration: the definite integral.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to civil Engineers.
3c) Carvalho e Silva, J Princípios de Análise Matemática Aplicada 1994, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry. 1st Vol., Weberand Schmidt; Apostol, Tom M. 1967 Calculus. 1st Vol., Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito; Maria Luis Vasco; Luis Magalhães.
6. 6h/week (3T+ 3TP); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 7.0.

1. Drawing I - 0664
2. Basic design principals. Graphical expression discovery through creation of an abstract tridimensional space. The rigor and its graphic representation. Scales. Plans, sections, elevations. Axonometric perspective and conic perspective.
3a) Basic knowledge of drawing.
3b) Contribute to the knowledge of the basic Design tools related to the Civil Engineering area. The student must acquire and develop the following skills: to conceive and represent the visible reality through drown graphical register; to conceive and represent the visible reality above tridimensional basis; to explore the drawing abilities of design as conception and communication tool of architectural design; to read and recognise architectural design through its different graphical components/representations bi/tridimensional.
3c) Benevolo, L 1982 Diseño de la Ciudad, la descripción del ambiente editorial Gustavo Gili SA, Barcelona; Cullen, G 1977 El Paisage Urbano, tratado de estética urbanística editorial Blume, Barcelona; Cunha, LV 1995 Desenho Técnico, Fundação Calouste Gulbenkian, Lisboa; Massironi, M 1982 Ver pelo Desenho edições 70, Lisboa; Munari, B 1982 Designe Comunicação Visual edições 70, Lisboa; Munari, B 1981 Fantasia, Invenção, Criatividade e Imaginação na Comunicação Visual editorial Presença, Lisboa; Schaarwachter, G 1991 Perspectiva para Arquitectos editorial Gustavo Gili SA, México.
4. Compulsory.
5. Marta de Moura Vilar.
6. 4h/week (2TP + 2P); 1st semester; 1st year.
7. Tutorial and pratical classes.
8. Case studies (80%) + 1 written assessment (20%), or a final written exam.
9. No.
10. 3.0.

1. Descriptive Geometry I - 0666
2. Gaspar Monge Method. Fundaments. Union and Intersection. Parallelism. Perpendicularity.
3a) Basic knowledge of drawing.
3b) Develop the capacity of mental representation of imaginary or real forma connected to civil Engineering. Acquire graphic rigor basis. Acquire specific technical vocabulary for Descriptive Drawing and Descriptive Geometry.
3c) Ricca, G 1992 Geometria Descritiva Método de Monge Fundação Calouste Gulbenkian, Lisboa.
4. Compulsory.
5. Marta de Moura Vilar.
6. 4h/week (2T + 2TP); 1st semester; 1st year.
7. Lectures and practical classes.
8. 2 written assessment (50%+50%), or a final written exam.
9. No.
10. 4.5.

1. General Physics II - 0119
2. Coulomb's law and electrical field. Gauss law. Electrical potential. Capacitors. Electrical current and circuits. Magnetism. Magnetic fields. Induction and indutance. Waves. Sound. Optical images. Special theory of relativity.
3a) No prerequisites.
3b) Give to students some elements of Physics that can be applied and developed in more specific areas.
3c) Keller: General Physics; Halliday, Resnick, Walker Fundamentals of Physics Extended. Wiley & Sons; Alonso e Finn Física: um curso Universitário.
4. Compulsory.
5. Carlos Manuel M. Matias (responsible); Pedro Serra; Malik Amaouri.
6. 4 h /week (2 T + 2 TP); 2nd semester; 1st year.
7. Lectures and tutorials classes.
8. Two-middle semester written assessment; Exam.
9. No.
10. 5.0.

1. Geology - 0144
2. Elementary principles on Crystalography (symmetry). Essential principles on Mineralogy. Essential principles on Petrology. Magmatic rocks, sedimentary rocks and metamorphic rocks. Essential principles on Geodynamics. Essential principles of geological sciences.
Geological time. Main kind of geological structures. Essential principles on Geomorphology. Introduction to Engineering Geology.The fundamental properties of engineering of terrains (soils and rocks). Soil and rock classifications. Rock mass discontinuities. Prospecting of terrains. Mechanical and geophysical prospecting. Sampling. Rock and soil treatments by injections and by bolts. Several geotechnical problems analysed by Engineering Geology. Earthquakes. Slopes.Underground excavations.
3a) Previous elementary notions on Physics, Chemestry and preferably on Geology.
3b) To provide students with essential principles on Geology and the necessary Knowledge of Geology to understand the Geological-Geotechnical problems of civil works.
3c) Carvalho, LHB 1987 Apontamentos de Geologia aplicada à Engenharia Civil, UTAD, Vila Real; Costa, JB 1967 Estudo e classificação das rochas por exame macroscópico, Fundação Calouste Gulbenkian, Lisboa; Derruaux, M 1972 Les formes du relief terrestre, Masson e Cie Editeurs, Paris; Hurlbut, CS 1974 Manual de Mineralogia de Dana, Editorial Reverté S.A., Barcelona;.Oliveira, R 1979 Introdução à Geologia de Engenharia, UNL, Lisboa; Plummer, CC and McGeary, D 1996 Physical Geology, Wm. C. Brown Publishers, Dubuque.
4. Compulsory.
5. Manuel Leal Gomes, Luís Sousa, José Leitão.
6. 5h/week (3T + 2TP); 2nd semester; 1st year.
7. Lectures, practical classes and laboratories.
8. Practical 40% and theoretical 60% final written exam.
9. No.
10. 6.0.

1. Mathematical Analysis II - 0178
2. Applications of Integration. Polar and Parametric Coordinates: area of plan figure, volume of solids, length of curve in Polar and Parametric Coordinates.Improper Integrals. Sequences of real numbers: bounded and monotonic sequences. Series series with nonnegative terms comparison tests, the integral test, the ratio and root tests; absolute convergence alternating series. Power series expansion of functions; differentiation and integration of power series; Taylor and Maclaurin series.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to civil Engineers.
3c) Carvalho e Silva, J Princípios de Análise Matemática Aplicada 1994, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry. 1st Vol., Weberand Schmidt; Apostol, Tom M. 1967 Calculus. 1st Vol., Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito; Sandra Dias; Sandra Ricardo.
6. 6h/week (3T, 3TP); 2nd semester; 1st year.
7. Lectures and practical classes.Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 7.0.

1. Drawing II - 0665
2. Quota systems. Point, straight line and plan, fundaments and representation of plan, representation of a straight line, representation of aplan. Union and intersection. Intersection of plans, intersection of a straight line with a plan, straight lines of union, plans' union. Perpendicularity. Straight lines perpendicular to plans, perpendicular straight lines. Roofs. Type of roofs classification, structure, form, raw material, roofs design. Shapes. Shapes in solids on parallel light. Topographic surfaces. Definition, representation, topographic curves, design of topographic curves, scale and halfway, intersection problems, profiles, major slope lines and equal slope lines.
3a) Good knowledge on fundamental concepts of drawing.
3b) The students should be able to represent through quota system plans and straight lines, and they should also be able to solve problems of union, intersection and perpendicularity. The students should be able to use these concepts to solve slopes, shapes and topographic surfaces.
3c) Ricca, G 1997 Método cotado, FEUP; Cunha, LV 1994 Desenho técnico, Fundação Calouste Gulbenkian, Lisboa; Silva, O 1995 Projecções cotadas / Superfícies topográficas, FEUP; Schaarwachter, G 1991 Perspectiva para arquitectos, Edições G. Gili, México.
4. Compulsory.
5. Solange Almeida, Ricardo Bento, Terêncio Carriço.
6. 4h/week (2TP + 2Pl); 2nd semester;1st year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 3.0.

1. Descriptive Geometry II - 0667
2. Gaspar Monge Method. Auxiliary Methods. Metric Problems. Substitution of projection plans. Rotations. Reductions.
3a) Basic knowledge of drawing.
3b) Develop the capacity of mental representation of imaginary or real forma connected to Civil Engineering. Develop the capacity for space visualization of the forms and their relative positions.
3c) Ricca, G 1992 Geometria Descritiva – Método de Monge Fundação Calouste Gulbenkian, Lisboa.
4. Compulsory.
5. Marta de Moura Vilar.
6. 4h/week (2T + 2TP); 2nd semester; 1st year.
7. Lectures and practical classes.
8. 2 written assessment (50%+50%), or a final written exam.
9. No.
10. 5.0.

1. Computer Programming - 0679
2. Introduction: a computer system, components of a typical computer. Imperative languages: presentation of the paradigm and matching with other paradigms.
Systems of numeration: conversion of a base b to a base b ', conversion of a base b to the decimal base (base 10), conversion of a decimal number for another base and conversion among bases 2, 4, 8 and 16.
Algorithms: notion of algorithm, algorithmic language, methodology, data types, variables, expressions and basic operations. Decomposition of a problem.
Decision structures: the selection from alternative actions (If-then-else, nested If's). A multiple selection structure - Case.
Loops: conditional loops – Repeat ... until, loop-controlled input, counted loops - For... to... do, nested loops.
Sub-algorithms: functions and procedures, argument-parameter correspondence.
Vectors: of one, two and higher dimensions.
3a) No prerequisites.
3b) The aim of the course is to provide the necessary framework concerning the formalisation of solution of problems of reduced complexity. The solutions (sequences of commands) should be expressed in an algorithmic description and implemented in a structured programming language (Pascal has been adopted for this course).
3c) Tremblay, JP, DeDourek, JM and Blunt, RB Introduction to Computer Science McGraw Hill, Byron S. Gottfried, Programação em Pascal (2ª edição), McGraw Hill.
4. Compulsory.
5. João Manuel Pereira Barroso.
6. 4h/week (2T, 2P); 2nd semester; 1st year.
7. Lectures and laboratories.
8. Written assessment 100%.
9. No.
10. 4.0.

2nd year.

1. Complements of Mathematical Analysis - 0121
2. First order differential equations. Differential equations of higher order: Method of the undetermined coeficients. Vector-valued functions. Differentiation. Extrema of real-valued functions. Double integrals. Triple integrals, the change of variables and applications. Integrals over paths and surfaces. Theorems of Green, Gauss and Stokes.
3a) Differential and integral calculus of one variable as well as basic notions of linear algebra and analytic geometry.
3b)To give the basic theory of differential and integral calculus of functions of several variables, to introduce the basic differential equations and show the practical aspects of all these matters namely through applications in physics.
3c) Breda, A. and Costa, JN 1996 Cálculo com Funções de Várias Variáveis, 1ª edição McGraw-Hill International Editions; Marsden, JE and Tromba, AJ 1988 Vector Calculus, 3rd edition W.H. Freeman and Company; Swokovski, E 1994 Cálculo com Geometria Analítica, Vol II, 1ª edição Mc Graw-Hill Lda., S. Paulo; Zill, DG 1997 A First Course in Differential Equations with Modelling Appplications, 6ª edição Brooks/Cole Publishing Company.
4. Compulsory.
5. Anabela Borges, Argentina Leite.
6. 6h/week (3T + 3TP); 1st semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments 50%+50% or final written examination – 100%.
9. No.
10. 7.0.

1. Technical drawing - 0143
2. Normalisation and drawing conventions; Drawing in scale; Dimensioning.
3a) No prerequisites.
3.b) To introduce the students to the presentation and representation through technical drawing and construction drawing; Draw normalisation; orthographic views.
3c) Cunha, LV 1994 Desenho Técnico - Fundação Calouste Gulbenkian, Lisboa.
4. Compulsory .
5. Terêncio Carriço.
6. 3 hours; 1st semester; 2nd year.
7. Practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessment (50% each) or Final written exam (100%).
9. No.
10. 3.0.

1. Statistics -0168
2. Introduction to the theory of probabilities. Random variables. Bi-dimensional random variables. Random distributions. Fundamental theorems. Mathematical statistics.
3a) High-School Mathematics.
3b) To provide the basic concepts of probability and statistics useful to engineers.
3c) Walpole, RE and Raymond HM1993 Probability Statistics for Engineers and Scientists. Prentice Hall International Inc., 5th Edition, 766 p. BN:0024242012; Zar, JH 1993 Biostatistical Analsis. Prentice all International Inc., 3th Edition, ISBN:0130845426 ; Dagnelis, P 1973 Théorie et Métodes Satistiques. Les Presses Agronomiques de Gemblous, 2éme Edition, Vols. I et II.
4. Compulsory.
5. Carlos Mendonça e Moura; Irene Cristina S. Oliveira; Maria de Fátima M. Ferreira and Eva Virgínia Morais.
6. 5h/week (2T, 3TP); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. Electronics - 0192
2. Electrical conduction in Semiconductor Materials. Diodes. Half–wave and Full–wave rectifiers circuits with diodes. Bipolar Junction Transistor. Operational amplifiers. Power supplies. Controlled rectifier devices. Transducers. A/D and D/A converters. Microprocessors
3a) No prerequisites.
3b) The main objective of this course is to provide the students with a new area of knowledge and supply the tools that can be used, for instance, to interact with others professionals. So, this course consists of a general study of electronic components and circuits.
3c) Boylestad, N1992 Electronic Devices and Circuit Theory, Prentice–Hall Internacional; Bogart, Linear Electronics, Merril; Millman, H Electrónica Vol I & Vol II, McGraw-Hill; O'Malley, J Análise de circuitos, Schaum McGraw-Hill.
4. Compulsory.
5. Salviano Filipe S. P. Soares.
6. 3h/week (2T +1TP);1st semester, 2nd year.
7. Lectures, practical classes.
8. Written exam 100%.
9. No.
10. 4.0.

1. Mechanics I - 0681
2. Calculus of vectors. Centre of mass calculation. Moments of inertia definition and calculation. Products of inertia definition and calculation. Statics basic notions.
3a) Good knowledge of physics.
3b) To provide students withe instruments of structures behaviour comprehension through basic parameters of characterisation.
3c) Fonseca, Adhemar 1976 “Curso de Mecânica”, Livros Técnicos e Científicos Editora, S.A., Rio de Janeiro; Meriam, James L 1985 “Estática”, Livros Técnicos e Científicos Editora, S.A., Rio de Janeiro; Beer, Ferdinand P and Johnston, ER 1977 “Mecânica Vectorial para Engenheiros”, McGraw Hill, São Paulo.
4. Compulsory.
5. Jorge Machado, Nuno Cristelo.
6. 5h/week (2T + 3TP); 1st semester; 2nd year.
7. Lectures and tutorial classes.
8. Final written exam.
9.No.
10. 6.0.

1. Computer Aided Design I - 0918
2. General Characteristics of AutoCAD related to the bidimensionality :Introduction to Autocad Commands. Drawing Control And Manipulation. Drawing Editing Commands. Grouping Entities In Autocad . Advanced Topics : Prototype Drawings, Effective Use of Layers and Text Styles, Advanced Editing Features, 2D Polylines, Points, Blocks with Attributes, Dimensioning.
3a) No prerequisites.
3b) General characteristics of the PC-based drafting system known as AutoCAD. The purpose is to give a new user a broad conceptual understanding of the operation of this system concerning bidimensionality.
3c) Santos, J 2000i –AutoCad, ed. FCA; Autodesk - AutoCad " User´s Guide" e “ Command Reference"; Fernández ,JL - AutoCad, ed. Mc Graw Hill; Miura ,G Mastering AutoCad, ed. Sybex.
4. Compulsory.
5. Domingos José Moreira Guimarães ; Sandra Cristina A. P. da Silva Cunha; Solange M Soares Almeida.
6. 4h/week (4TP); 1st semester; 2nd year.
7. Theorical practical classes.
8. Final exam.
9. No.
10. 4.0.

1. Land Surveying. - 0013
2. This one-semester course covers: Surveying and mapping. Direct leveling. Angle, direction and distance measurement. Problems with distances, directions and coordinates. Types of Topographic Surveys. Topographic map construction. Working on maps. Traverse. Intersection and resection. Rigorous angle measurement. Digital Terrain Models-Applications. Land Surveying and Computer Aided Design.
3a) Mathematical analysis, especially plain trigonometry.
3b) To provide students with both surveying theory and real-world practice in mapping and engeneering surveys. To give also the ability of using topographic instruments and bringing them up to date on the technological advances that are changing the field.
3c) Apontamentos Teóricos de Topografia. Departamento de Matemática – UTAD; Gaspar, J Alves Cartas e Projecções Cartográficas. Lidel; Elfick, M, Fryer, J, Brinker, R and Wolf, P Elementary Surveying. Harper Collins Publishers; Modelos Digitais de Terreno. Departamento de Matemática – UTAD; Bannister, A and Raymond, S Baker Surveying. Longman Scientific & Technical; Alves, J, Cruz, J and Norte, C Topografia. Academia Militar; Casaca, J, Matos, J and Baio, M Topografia Geral. Lidel; Xerez Topografia Geral.
4. Compulsory.
5. João Sousa.
6. 5h/week (3P + 2T); 2nd semester; 2nd year.
7. Theoretical lessons, practical classes.
8. A final written exam or a final written exam + a presented practical work.
9. No.
10. 4.5.

1. Numerical Methods - 0130
2. Numerical systems and errors. Nonlinear equations. Eigenvalues and eigenvectors. Systems of linear equations. Systems of nonlinear equations. Polynomial interpolation. Least-squares approximation. Numerical differentiation. Numerical integration. Differential equations. Nonlinear unconstrained optimization.
3a) Mathematical analysis and linear algebra.
3b) The students should be able to choose and use the right algorithms to solve different kind of problems, making a correct and precise analysis of error propagation. They must consider the required accuracy, estimate an approximated solution value, and provide verifications test and corrective actions in case of no convergence.
3c) Fernandes, Edite MGP 1998 Computação Numérica Serviços de Reprografia e Publicações da Universidade do Minho, Braga; Valença, MR 1983 Métodos Numéricos Livraria Minho, Braga; Conte, SD and de Boor, C 1987 Elementary Numerical Analysis McGraw-Hill Book Company; Dodes, IA 1978 Numerical Analysis for Computer Science Elsevier North-Holland Inc., New York; Pina, H 1995 Métodos Numéricos Mc Graw-Hill; Scheid, F 1991 Análise Numérica Mc Graw-Hill; Santos, FC. 2002 Fundamentos de Análise Numérica Edições Sílabo, Lisboa.
4. Compulsory.
5. João Matias, Luísa Morgado, Laura Ribeiro and Sílvia Reis.
6. 5h/week (2T + 3TP); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. Mechanics II - 0672
2. Statics. Stress/strain materials behaviour during traction and compression. Elasticity of elongation and elasticity of bulk. Strain work. Elastic potential energy. Weighted structures. Strain diagrams in isostatic structures.
3a) Good knowledge of physics.
3b) To provide students with methods and calculation elements for basic and properly characterised structures based on their behaviour under loading and applied stresses.
3c) Meriam, James L 1985 “Estática”, Livros Técnicos e Científicos Editora, S.A., Rio de Janeiro; Nash, William A 1986 “Resistência dos Materiais”, Livro Técnico, S. A., Rio de Janeiro.
4. Compulsory.
5. Jorge Machado, Nuno Cristelo.
6. 5h /week (2T + 3TP); 2nd semester; 2nd year.
7. Lectures and tutorial classes.
8. Final written exam.
9. No.
10. 6.0.

1. Computer Aided Design II - 0919
2. General Characteristics of AutoCAD related to the tridimensionality : Editing Features, 3D Polylines, Points, Blocks with Attributes, Dimensioning, 3D Construction Commands, UCS (user coordinate system), Point Filters,Variable Settings, External References and File Management, Paper Space, Viewports, Plotting.
3a) No prerequisites.
3b)General characteristics of the PC-based drafting system known as AutoCAD related to the tridimensionality. The purpose is to give a new user a broad conceptual understanding of the operation of this system.
3c) João Santos-AutoCad 2000i, ed. FCA; Autodesk - AutoCad " User´s Guide" e “ Command Reference"; Fernández, JL AutoCad, ed. Mc Graw Hill; Miura,G Mastering AutoCad, ed. Sybex.
4. Compulsory.
5. Domingos José Moreira Guimarães ; Sandra Cristina A P da Silva Cunha.
6. 4h/week (4TP); 2nd semester; 2nd year.
7. Theorical practical classes.
8. Final exam.
9. No.
10. 4.0.

1. History of Architecture - 0920
2. The origin of urban settlements; Architectural construction of Mesopotamia, Ancient Egypt, Aegean and Southwest Asia, Ancient Greece, republican Rome and Roman Empire; Urban design and architectural construction of Western Europe, from the pre and proto-history, medieval, renascent, baroque, neoclassic, industrial revolution periods, to the modern movements.
3a) No prerequisites.
3b) Analysis of phenomena connected with urban design; analysis of construction techniques and materials, architectural typologies and physic and cultural context; comparative reflections between the old and contemporaneous constructive typologies, important to understand how the human groups adapted to the environment and to the production and social systems changes; investigation basis of the construction evolution, appropriate to the restoration interventions of monuments or historical buildings and to the rehabilitation of historical or traditional urban centres.
3c) Benévolo, L 1994 História de la Arquitectura Moderna, Ed. Gustavo Gili, S.A., Barcelona;
Goitia, FC 1982 Breve História do Urbanismo, Editorial Presença, Lisboa; Kostof, S 1997 História de la Arquitectura, 3 vol., Alianza Editorial, Madrid; Villalva, AC 1996 Historia de la Construcción Arquitectónica; Universidad Politécnica de Catalunya, Barcelona; Alarcão, J, Almeida, CAF and Dias, P História da Arte em Portugal, 4 vol., Publicações Alfa.
4. Compulsory.
5. Maria Eunice da Costa Salavessa.
6. 4 h (4T) / week; 2nd semester; 2nd year.
7. Lecture classes.
8. 1 case study with presentation and discussion 50%; final written examination 50%.
9. No.
10. 5.0.

1. Hydraulics I - 0930
2. Introduction. Properties of fluids. Hydrostatics. Motion of fluid particles and streams. The momentum equation and its applications. The energy equation and its applications. Dimensional analysis and theory of models. Flow in pipes. Fluid measurements. Hydrodynamic forces on submerged bodies. Introduction to hydraulic installations. Laboratory tests.
3a) Good knowledge of Physics.
3b) Introduction to basic concepts in fluid mechanics, special emphasis given to hydraulics. Description of the flow in terms of a global concept of the flow of liquids. Applications of the basic equations to solve problems in Civil Engineering. Introduction to the basic concepts of turbomachinery and pipe works. Laboratory work illustrates real phenomena.
3c) Quintela, A 1981 Hidráulica Geral, F. C. Gulbenkian; Novais Barbosa, J Mecânica dos Fluidos e Hidráulica Geral; Vol. I e II; Porto Editora; Lencastre, 1983 Hidráulica Geral, Hidroprojecto; White, F 1987 Fluid Mechanics, McGraw-Hill.
4. Compulsory.
5. Isabel Bentes, Cristina Matos.
6. 4h/week (2T + 2TP); 2nd semester; 2nd year.
7. Lectures, practical classes and laboratories.
8. Final exam.
9. No.
10. 4.5.

3rd year.

1. Mechanics III - 0673
2. Theory of stress state. Deformation of continuous media. The theory of elasticity. Introduction to constitutive relations.
3a) Linear Algebra, Mathematical Analysis and Statics.
3b) To provide a basic introduction to the mechanics of deformable solids.
3c) Timoshenko SP and Goodier JN 1970 “The Theory of Elasticity”. Mc Graw Hill; Shames,IH and Cozzarelli, AC 1992 “Elastic and Inelastic Stress Analysis”. Prentice-Hall International Editions.
4. Compulsory.
5. José Lopes Morais, Nuno Dourado .
6. 4h/week (2T + 2TP); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final examination.
9. No.
10. 5.0.

1. Strength of materials I - 0921
2. Fundaments. General safety criteria. Tension and pure compression. Flexion.
3a) No prerequisites.
3b) To study deformable solid bodies, specially linear pieces in static equilibrium under the action of external forces.
3c) Espasa Colpe, T “Resistência de Materiais I”.; Féodossiev, Mir “Résistance des Matériaux”; Theodore, G “Structural Members and Frames”. Prentice-Hall.
4. Compulsory
5. José Barbosa Vieira; Terêncio Carriço.
6. 6 hours; 1st semester; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam.
9. No.
10. 6.5.

1. Building Materials I - 0922
2. Natural Stones, Binders, Mortars, Artificial Stones, Steel, Wood, Cork and Glass.
3a) No prerequisites.
3b) To allow the students to acquire a solid knowledge on the properties, fabrication processes, applications, advantages and disadvantages of specific applications of materials used in Civil Engineering. At the same time it is intended to develop a strong spirit of analysis and criticism on a full scale respect for the Art of Construction.
3c) Especificações do LNEC, Documentação Normativa, Laboratório Nacional de Engenharia Civil; Normas Portuguesas. Instituto Português da Qualidade; Neil Jackson, and Ravindra K Dhir 1988 Civil Engineering Materials, Macmillan Education Lt., 4th edition; Materiais de Construção I – Documentos de Apoio do Instituto Superior Técnico.
4. Compulsory.
5. Amândio Teixeira Pinto, Paulo Osório.
6. 4h/week (2T +1P + 1TP); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.5.

1. Soil Mechanics I - 0923
2. Basic characteristics of soil, soil description and classification. Effective stress. Seepage. Soil compaction. Consolidation theory.
3a) Good knowledge on Geology and Mechanics.
3b) To convey the students to the fundamental principles of soil mechanics and to sensitise them to some aspects, such as Soil / Structures interaction, Soil as a resisting element or pressure resultant from Soil action.
3c) Craig, RF 1992 “Soil Mechanics”. ELBS edition of fifth edition; Matos, F 1994 “Mecânica dos Solos”. Porto, Faculdade de Engenharia da Universidade do Porto, Porto; Folque, J1996 “Introdução à Mecânica dos Solos”. Laboratório Nacional de Engenharia Civil, Lisboa; Lambe, WT 1969 “Soil Mechanics”. John Wiley & Sons, Nova Iorque.
4. Compulsory.
5. Amândio Teixeira Pinto, Nuno Cristelo.
6. 4h/week (2T + 2TP); 1st semester; 3rd year.
7. Lectures and tutorials classes.
8. Final written exam and practical work.
9. No.
10. 5.0.

1. Hydraulics II - 0924
2. Hydrology: watershed; precipitation; interception; evaporation and transpiration; infiltration, percolation and drainage; surface runoff; flood flows. Open channel flows: application of Bernoulli equation; application of Euler momentum equation; flow control; uniform flow in open channels; steady gradually varied flow in open channels; steady rapidly varied flow in open channels. Hydraulic works: portuguese dam safety regulation; dams; safety and exploitation of hydraulic works; flood routing in a reservoir; hydroelectric power plants; transient regimes.
3a) Basic knowledge in fluid mechanics and hydraulics.
3b) Provide technical knowledge in applied hydraulics and water resources, including environmentally sound and efficient management of water as a scarce resource with the goals of satisfaction of basic needs and of social and economic progress.
3c) Barbosa, JN 1985 Mecânica dos Fluidos e Hidráulica Geral. Vol I e II; Quintela, AC 1981 Hidráulica. Fundação Calouste Gulbenkian; Ribeiro, AÁ 1987 Hidrologia, UP; Franco, FM and Lencastre, A 1984 Lições de Hidrologia, UNL.
5. Vítor Ribeiro and Solange Almeida.
6. 4h/week (2 T + 2 TP); 1st semester; 3rd year.
7. Theoretical lectures and tutorial classes and site study visit.
8. Final theoretical and practical written exam.
9. No.
10. 5.0.

1. Architecture I -0925
2. Analysis and discussion of the modern movements in Architecture. The structure, the building components and the construction materials and technologies. The several phases of a design. Geographic, climatic and topographic conditionings. The functional program, the dimensions for housing and the required spaces of a dwelling. Internal circulation. External facilities. Houses planning and design.
3a) Basic knowledge of drawing.
3b) This discipline aims to draw the attention of the future engineers to the preservation of the quality of the urban spaces as well as to the execution of building design, in a interdisciplinary view of the urban aspects.
3c) Schmitt, H 1980 Tratado de Construção Editorial Gustavo Gili, S.A., Barcelona; Le Corbusier 1973 Hacia una Arquitectura Ed. Poseidon, Buenos Aires; Tutt, P and Adler, D 1985 New Metric Handbook The Architectural Press, London; Neufert, E 1991 Arte de Projectar em Arquitectura Editorial Gustavo Gili S.A., Barcelona; Regulamento Geral das Edificações Urbanas Imprensa Nacional Casa da Moeda, Lisboa.
4. Compulsory.
5. Ricardo Santelmo Gomes, Marta de Moura Vilar.
6. 5h/week (1T + 4P); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Case studies (70%) and a final written exam (30%).
9. No.
10. 4.0.

1. Operational Research - 0386
2. Introduction to Operational Research. Linear Programming (LP): General formulation of LP model. Graphic representation and interpretation of a PL problem. Linear Álgebra revision and basic notions of Convex Analysis. Fundamental PL theorems. (Primal) Simplex algorithm. 2-phase method, and the method of penalties. Duality. Sensitivity Analysis. Particular problems in LP.
3a) Good knowledge of Linear Algebra.
3b) To model accurately real problems as a LP model; many are the applications in the field of engineering suitable to be model as LP problem. The Simplex method as a systematic procedure to find the solution of a LP problem. To be able to evaluate a pós-optimal analysis: duality theory and sensitivity analysis. To be able use current software in Operational Research .
3c) Bazaraa, MS et al. 1990 Linear programming and network flows, 2nd Edition. John Wiley & Sons, New York; Valadares, TL et al. 1996 Investigação Operacional. McGraw-Hill, Lisboa.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis, Eva Morais, Pedro Barroso.
6. 4 hours/week (2T+ 2TP); 2st semester; 3rd year.
7. Lectures and tutorials.
8. Final exame.
9. Course not offered in any other language other than Portuguese.
10. 5.0.

1. Electrotecnics - 0917
2. Electrical energy systems. Electrical energy chain. A.C. circuits(mono and three phases circuits). Lighting techniques. Electrical networks. Basic notions about the electrical equipment.
3a) Complex number. Basic knowledge of electricity.
3b) To give the students an overview of the electrical energy chain. To make the students understand the technical language of the Electrical Engineers in the design and implementation in the following subjects:Transformation power plant, Transformers, a.c. generators, etc., Lighting projects
3c) Cordeiro, M 1996 Segurança de Pessoas e Bens em Instalações Eléctricas, Série Didáctica - Ciências Aplicadas, 93; Cordeiro, M 1996 Cadeia de Energia e Sistema Tarifário, Série Didáctica - Ciências Aplicadas, 94; Vale, AA and Moura, AM 1994 Sistemas Eléctricos de Energia – FEUP; Brandão, DP 1980 Electrotecnia Geral , Fundação Calouste Gulbenkian; EDP - Relatórios Técnicos de Exploração e Construção; Guide de l'ingénierie électrique des réseux internes d'usines - Téchnique & Documentation; Regulamento de segurança de subestações e postos de transformação - Imprensa Nacional; Regulamento de instalações eléctricas - Imprensa Nacional.
4. Compulsory.
5. Manuel Ressurreição Cordeiro; Sérgio Augusto Pires Leitão.
6. 4h/week; 2nd semester; 3rd year.
7. Lectures, Pratical classes.
8. Final examination 100%.
9. No.
10. 4.5.

1. Strength of materials II - 0926
2. Shear; Torsion; Combination of strains; Elastic instability
3a) No prerequisites
3b) To study linear pieces under shear torsion and compound bending strain. Analysis of elastic instability problems.
3c) Samuelson, PA et al 1993 “Economia”. XIV edição, McGraw Hill; Brealey, RA 1992” Princípios de Finanças Empresariais”. McGrawHill; Ruegg, R and Marshall H 1990 “Building Economics”. VNR, New York.
4. Compulsory .
5. José Barbosa Vieira; Terêncio Carriço.
6. 6 hours; 2nd semester; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam.
9. No.
10. 6.5.

1. Building Materials II - 0927
2. Concrete, its properties, methods of design and technologies of fabrication and handling. Ceramic materials, Paints and varnishes, Aluminium, Polymers, Asphaltic materials.
3a) No prerequisites.
3b) To allow the students to acquire a solid knowledge of the properties, the fabrication processes, the applications, advantages and disadvantages of different applications of materials used in Civil Engineering.
3c) Coutinho, AS 1988 e 1994 Fabrico e Propriedades do Betão. Volumes I, II e III, LNEC; Especificações do LNEC, Documentação Normativa, Laboratório Nacional de Engenharia Civil; Neil Jackson, and Ravindra K Dhir 1988 Civil Engineering Materials, Macmillan Education Lt., 4th Lt.; Materiais de construção II – Documentos de apoio do Instituto Superior Técnico.
4. Compulsory.
5. Amândio Teixeira Pinto, Paulo Osório.
6. 4h /week (2T + 2TP); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 5.0.

1. Soil Mechanics II - 0928
2. Shear strength, stresses and displacements. Lateral earth pressure and retaining walls design. Stability of slopes. Ground investigation and sampling. Shallow foundations. Piling and deep foundations. Introduction to earth dams.
3a) Good knowledge on Geology and Mechanics.
3b) To convey to the students the fundamental principles of soil mechanics and to sensitize them to some aspects, such as Soil / Structures interaction, soil as a resisting element or pressure resultant from soil action.
3c) Craig, RF 1992 “Soil Mechanics”. ELBS edition of fifth edition; Matos, F 1994 “Mecânica dos Solos”. Porto, Faculdade de Engenharia da Universidade do Porto, Porto; Folque, J1996 “Introdução à Mecânica dos Solos”. Laboratório Nacional de Engenharia Civil, Lisboa; Lambe, WT 1969 “Soil Mechanics”. John Wiley & Sons, Nova Iorque.
4. Compulsory.
5. Amândio Teixeira Pinto, Nuno Cristelo.
6. 4h/week (2T + 2TP); 2nd semester; 3rd year.
7. Lectures and tutorial classes.
8. Final written exam and practical work.
9. No.
10. 5.0.

1. Architecture II -0929
2. Introduction to studies of architectural integration in the urban context. Local authority housing. The planning standards and technical specifications of the building design. Construction details. The planning of a commercial and residential building. Roads and footpaths.
3a) Basic knowledge of drawing.
3b) To provide students with strong training in design and planning, based on a clear understanding of environmental and cultural factors. To educate professionals which can solve interdisciplinary problems, namely in architectural design.
3c) Neufert, E 1991 Arte de Projectar em Arquitectura Editorial Gustavo Gili S.A., Barcelona; Reis Cabrita, AM 1974 Regras para Elaboração de Projectos de Arquitectura MOP/LNEC, Lisboa; Griffini, EA Constucción Racional de la Casa - Ediciones Hoepli, S. L., Barcelona; Rodrigues, MJ, Sousa, P, Bonifácio, HMP Vocabulário Técnico e Crítico de Arquitectura Quimera Editores, Lisboa;
Regulamento Geral das Edificações Urbanas Imprensa Nacional Casa da Moeda, Lisboa; Instruções para o Cálculo dos Honorários em Projectos de Obras Públicas Imprensa Nacional Casa da Moeda, Lisboa; Licenciamento de Obras Particulares; Regulamento de Segurança Contra Incêndio Imprensa Nacional Casa da Moeda, Lisboa.
4. Compulsory.
5. Ricardo Santelmo, Marta de Moura Vilar.
6. 5h/week (1T + 4P); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Case studies (70%) and a final written exam (30%).
9. No.
10. 4.0.

4th year

1. Urban and Regional Planning - 0831
2. 1. Introduction to urban and regional planning; 2. Land planning; 3. Urban planning; 4. Strategic planning; 5. Aims and instruments of the regional policies; 6. The European regional policy; 7. The Portuguese regional policy.
3a) No prerequisites
3b) To sensitise the students to the basic notions, theoretical aspects and practical methodologies of urban and regional planning.
3c) Pujadas, Romà e Font, Jaume, Ordenación y Planificación Territorial,Editorial Sintesis, Madrid 1998; Lobo, Manuel Costa e outros; Normas Urbanísticas; Lisboa; DGOT/UTL; 1990; Lacaze, Jean Paul, O ordenamento do território, Inst. Piaget, Lisboa 1998.
4. Compulsory.
5. Luís Ramos.
6. 4 hours/week (2T + 2P); 1st semester; 4th year.
7. Lectures and tutorials.
8. Essay and Final exame.
9. Course not offered in any other language than Portuguese.
10. 4.0.

1. Theory of structures I - 0931
2. Equilibrium of solids under elastic behaviour. Virtual work principles applied to the structural analysis of framed structures: axial forces and flexural moments in beam type elements. The “Force method” and the “Displacement method” in the linear elastic structural analysis; application to plane framed structures. Main energetic principles. Influence lines.
3a) Mechanics.
3b) Provide tools for the structural analysis of plane framed structures and trusses.
3c) Coelho, AG Teoria das Estruturas. F.E.U.P; Martins, B Apontamentos de Estruturas. U.M; Mota Freitas, Apontamentos de Estruturas. F.E.U.P; Ghali, A & Neville, AM Structural Analysis – A Unified Classical and Matrix Approach, E & FN SPON.
4. Compulsory.
5. João Miranda Guedes, Francisco Bernardo.
6. 6h/week (3T + 2TP + 1P); 1st semester, 4th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 7.0.

1. Physics of Buildings I - 0932
2. Quality of buildings. Methods to evaluate the quality of dwellings. Thermal behaviour of buildings. Application of the building thermal regulations. Dampness in buildings. Non-structural pathologies.
3a) Fundamentals of heat and humidity transfer.
3b) To draw the attention of the students to the relevance of improving the quality of building construction and to introduce the necessary concepts to design buildings with better thermal behaviour, without problems of dampness and other non-structural pathologies.
3c) Ferry Borges, J 1988 A Qualidade na Construção. LNEC. Lisboa. Portugal; Henriques, F 1995 “Humidade em paredes”. LNEC. Lisboa. Portugal; RCCTE 1990 Regulamento das Características do Comportamento Térmico dos Edifício .1º Encontro sobre Conservação e Reabilitação de Edifícios. Tema 3 - Patologia da Construção, (1985) LNEC. Lisboa.
4. Compulsory.
5. Anabela Paiva, Sandra Pereira.
6. 5h/week (2T, 3TP), 1st semester, 4th. year.
7. Lectures, practical classes.
8. 1 case study 20%; final written exam 80%.
9. No.
10. 6.0.

1. General construction procedures - 0933
2. Construction industrialization. Construction quality and control. Quantification and combination of loading cases. Shallow foundations. Deep Foundations. Semi-shallow foundations. Retaining structures. Demolitions and excavations. Lowering of water level in soils. Basement drainage and impermeability. Concrete structures execution. Non traditional concrete solutions. Roofs. Walls. Prefabricated systems and connection problems to other elements. Wall and floor covering. Building components and other building elements. Casting moulds and supports. General construction machinery and soil movements. Visits to several construction sites.
3a) Strength material and construction materials knowledge.
3b) It’is intended that the student recognize the several constructive systems furthermore identify and solve some of the most current problems in the building construction industry. The student must be able to identify the loading cases distribution by the several structural elements and design precasted slabs as well as foundation bases.
3c) Lambe & Whitman Soil Mechanics; Fang; Foundation Enginneering Handbook; Cardoso, A Introdução ao Projecto de Estacas e Grupos de Estacas solicitadas axialmente. F.E.U.P.; Brazão Farinha, JS Tabelas Técnicas; Correia dos Reis, A 1993 Fundações 547-552 pp. Edição revista; I.S.T., 1988/89 Organização de Estaleiros; Clemente, JS 1988 Cofragens Tradicionais de Madeira (Tabelas). LNEC; Tijolos para Alvenaria - Características e Ensaio. Norma Portuguesa NP-80, 1964; Coberturas de Grande Vão. LNEC.1985; Classificação funcional dos revestimentos de piso e dos locais. Classificações UPEC e GWS, LNEC. 1991.
4. Compulsory.
5. José Barbosa Vieira. António Manuel da Cunha Monteiro.
6. 4h/week (2T + 2TP); 1st semester; 4th year.
7. Lectures, joined theoretical and practical classes.
8. In accordance with pedagogic rules 2 written assessments or final exam 100%.
9. No.
10. 5.0.

1. Means of Communication - 0935
2. Study of the stress, calculation of the tensile stress. Roads ground plan restrictions, circular bends and transition bends. Roads profile, restrictions and study. Traffic, profile of the roads. Earth working, volume calculation. Drainage, study of the roads drainage system. Pavement, definitions and design. Traffic signs, vertical and horizontal. Safety elements.
3a) No prerequisites.
3b) To provide the students with knowledge in the means of communication area namely the design and construction of roads.
3c) Sohen, S Engenièrie du Trafic Routier; Jorges, J and Raymond Fauterey École Nacional de Ponts et Chaussé, cour de route; Couche de roulement, dimensionement des chaussé; Peixoto, JÁ Notas sobre Drenagem Rodoviária; Normas de Traçado–Instituto de Estradas de Portugal (I.E.P.); Normas de Intersecções – Instituto de Estradas de Portugal (I.E.P.); Manual de drenagem superficial em vias de comunicação – Instituto de Estradas de Portugal (I.E.P.); Estudo e Concepção de Estradas. Livraria Almedina, Coimbra; Roundabouts: An Informational Guide, U.S. Departmente of Transportation, Federal Highway Administration Publication No. FHWA-RD-00-067.
4. Compulsory.
5. José Peixoto, José Cardão.
6. 4h/week (2T + 2P); 1th semester; 4th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 4.0.

1. Environmental Hydraulics - 1280
2. Quantity of water and sewerage. Primary mains with and without pumping. Reservoirs, types and design. Design of water supply systems, pipes, valves and appurtenances. Design of sewer systems, materials and appurtenances. Design of storm sewer systems, materials and appurtenances.
3a) Good knowledge on General Hydraulics.
3b) To provide the students with useful information for the design, construction and operation of water supply, sewerage and storm sewer systems.
3c) Ministério do Ambiente e dos Recursos Naturais 1991 Manual de Saneamento Básico, Volumes 1 e 2, Direcção Geral dos Recursos Naturais, Lisboa, ISBN 972-9412-04-9; McGhee and Terence, J 1991 Water Supply and Sewerage Engineering. 6th Edition, McGraw-Hill, ISBN 0-07-100823-3;
Regulamento Geral dos Sistemas Públicos e de Drenagem de Águas Residuais e Prediais de Distribuição de Água, Decreto Regulamentar nº 23/95 de 23 de Agosto.
4. Compulsory.
5. Isabel Bentes, Cristina Matos.
6. 4h/week (2T + 2P); 1stsemester; 4th year.
7. Lectures, practical classes.
8. Final written exam .
9. No.
10. 4.0.

1. Theory of structures II - 0937
2. The “Displacement method” in the linear elastic structural analysis; application to grid and three-dimensional framed structures with and without axial deformation. The “Cross method”; application to plane framed structures. Plastic structural analysis of plane framed structures; simplified analysis considering elastic-plastic materials. General overview on the “Finite element method”; its potential to the structural analysis.
3a) Mechanics.
3b) Provide tools for the structural analysis of plane and three-dimensional framed structures and trusses. Give an overview on the plastic structural analysis of plane framed structures and the finite element method.
3c) Coelho, AG Teoria das Estruturas. F.E.U.P; Martins, B Apontamentos de Estruturas. U.M; Mota Freitas, Apontamentos de Estruturas. F.E.U.P; Ghali, A & Neville, AM Structural Analysis – A Unified Classical and Matrix Approach, E & FN SPON; Onate, E 1995 Cálculo de estructuras por el metodo de elementos finitos. Análisis estático lineal. Centro Internacional de Métodos Numéricos en Ingeniería, 2ª Edic.
4. Compulsory.
5. João Miranda Guedes, Francisco Bernardo.
6. 6h/week (3T + 2TP +1P); 2nd semester, 4th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 7.0.

1. Physics of Buildings II - 0938
2. Natural ventilation in buildings. Acoustics behaviour of buildings. Application of the acoustics regulations. Daylighting and insolation. Fire safety design concepts and regulations.
3a) Fundamentals of sound transmission.
3b) To draw the attention of the students to the relevance of improving the quality of building construction and to introduce the necessary concepts to design buildings with better acoustics behaviour, better ventilation, daylighting, insolation and fire safety.
3c) Viegas, JC 1995 Ventilação Natural em Edifícios de Habitação. LNEC. Lisboa; Hopkinson, RG et al.1975 Iluminação Natural. Fundação Calouste Gulbenkian. Lisboa; Martins da Silva, P 1978 Acústica de Edifícios. ITE 8. LNEC. Lisboa; Regulamento dos Requisitos Acústicos de Edifícios.
Regulamento de Segurança Contra Incêndio.
4. Compulsory.
5. Anabela Paiva, Sandra Pereira.
6. 5h/week (2T + 3TP), 2nd semester, 4th. year.
7. Lectures, practical classes.
8. Final written exam.
9. No.
10. 6.0.

1. Measure Techniques and Construction Budget - 0940
2. Measure Techniques in building industry; Cost budget in building industry; Construction cost control; Owning and operating cost construction equipment; Earthwork cost; Owner and contractor responsibilities; Government contracts; Portuguese public laws; Price revision.
3a) No prerequisites.
3b) With the course program, we aim to endow the future civil engineers with the capability to present, define and debate, at least, the following aspects:
·Measure and budget rules' definition, based on standards as demanding as possible, to be in the same level of the rules applied in other countries;
·Systematic approach to the most important legislation in the public building contract legal regime dominion and enfolding.
3c) Faria, J 1986 Noções elementares sobre orçamentos de obras de construção civil. Porto.; Paz Branco, J 1998 Rendimentos de mão-de-obra, materiais e equipamentos em edificações e obras públicas. Texto Editora, Lda.; Fonseca, MS 1997 Curso sobre Regras de Medição na Construção LNEC
4. Compulsory
5. Eduardo Paiva Rodrigues; Sandra Pereira
6. 4 hours; 2nd Semester; 4th year
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Written essay and exam (30% + 70%) or Final exam (100%)
9. No.
10. 4.0.

1. Computer Aided Design and Construction - 0941
2. Evaluation of buildings thermal and acoustic behaviour. Condensation risk analysis in the building envelope elements. Water supply and sewerage design. Dynamic analysis of structural systems.
3a) Good knowledge in the areas of the computer programs to be used.
3b) To sensitise the students to handle computer programs of different civil engineering areas.
3c) Reference manuals of the software programs, Handouts.
4. Compulsory.
5. Anabela Paiva, Jorge Pereira Faustino, Solange Almeida, Ilídio Faria.
6. 5h/week; 2nd semester; 4th year.
7. Lectures and practical classes.
8. Final exam.
9. No.
10. 5.0.

1. Urbanism I - 0942
2. 1. Cities and the urban development; 2. The European system of cities; 3. Urban policy; 4. The urban planning at the municipalities; 5. The urban planning process; 6. Geographical Information System (GIS)
3a) No prerequisites.
3b) To sensitise the students to the basic notions, theoretical aspects and practical methodologies of urban planning.
3c) Lacaze, JP 1995 Introduction à la Planification Urbaine. Paris, Presses de l'école des Ponts et Chaussées; Ledo, AP 1996 Ciudad y Desarrollo Urbano Editorial Sintesis, Madrid ; Lobo, MC et al. 1990 Normas Urbanísticas. Lisboa; DGOT/UTL.
4. Compulsory.
5. Luís Ramos,José Carlos Fernandes.
6. 4 hours/week (2T + 2P); 2nd semester; 4th year.
7. Lectures and tutorials.
8. Essay and Final exam.
9. Course not offered in any other language than Portuguese.
10. 4.0.

1. Environmental Impact 1279
2. Sustainable development. Multi-objective planning. Decision with GIS. Assessment methods of Environmental Impact. Water bacteriological, quimical and physical characteristics. Environmental conditionants map. Waters and swearage's treatment.
3a) Hydraulics knowledge.
3b) To sensitise students to the relevance of environmental problems. To give them elements and toolsable to interfere direct or indirectly in actions about environment.
3c) Canter, LW 1996 Environmental Impact Assessmen. McGraw-Hill, Inc.; Bear, J and Verruijt, A 1987 Modeling Groundwater Flow and Pollution. Dordrecht, D., Reidel; Legislação Portuguesa sobre Ambiente; Mc Allister, DM 1991 Evaluation in Environmental Planning, Social, economic and Political Trade-offs. MIT Press; Vieira, JMP 1995 Tratamento de Águas Residuais Universidade do Minho.
4. Compulsory.
5. Luís Filipe Fernandes, Solange Almeida.
6. 4h/week (2T + 2P); 2nd semester; 4th year.
7. Lectures and practical classes.
8. 1 Final written exam 100%.
9. No.
10. 4.0.

5th year.

1. Reinforced and Prestressed Concrete I - 0943
2. Design of reinforced concrete structures and prestressed concrete structures under different kind of stresses.
3a) Good Knowledge on Strength of Materials and Structural Theory.
3b) Transmit the basic concepts of Reinforced and Prestressed Concrete. Establish a firm understanding of thebehaviour of Reinforced and Prestressed Concrete structures. Present and analyse the principles and requirements for safety of the structures. Design concrete structures including detailing of reinforcement.
3c) Traité de Génie Civi.l de l'Ecole Polytechnique Fédérale de Lausanne - Volumes 7 e 8; Hurst,M.K Prestressed Concrete Design. CEB-FIP - MODEL CODE 1990; Eurocódigos 1 e 2; Beeby, A. W and Narayanan, RS Designer's Handbook to Eurocode 2, Thomas Telford Services Ltd; Design of concrete structures, Arthur H. Nilson, McGRAW-HILL.
4. Compulsory.
5. Ilídio Faria.
6. 5h/week (3T + 2TP); 1st semester; 5th year.
7. Lectures and practical classes.
8. Written essays and Final exam.
9. No.
10. 6.0.

1. Building site Organization - 0944
2. The industrial engineering perspective to maximise productivity and to reduce costs at the work site. The layout of the temporary facilities in relation to the work. Planning and control problems associated with "one-time through" programs, as opposed to continues production operations. The construction management environment. Construction contracting. Client-contractor relations. Project control. The control process. Cost-control. The project cash-flow plan. Organisational design. Construction scheduling. The arrow and the precedence diagramming methods. Advantages and disadvantages of CPM, Pert and Bar-chart methods. Safety and security plan. Case-studies/themes: Preparation of a construction schedule for a highway project; Operation analysis - applying motion and time studies to building houses; Ventilation of tunnels. Production of crushed-stone aggregate. Forms for concrete structures.
3a) Knowledge in the area of operational research (PERT e CPM), and in the areas of building construction and structures.
3b) To assist the students of Civil Engineering to more fully understand the construction industry and illustrate how the application of engineering fundamentals to construction activities may reveal methods to improve the quality reducing the costs of construction.
3c) Peurifoy, RL 1979 Construction Planning, Equipment, and Methods (3rd edition McGraw-Hill;
Miller, RW 1963 Schedule, Cost, and Profit Control with PERT McGraw-Hill; Krajewski, Lee J and Ritzman, LP 1990 Operations Management - Strategy and Analyses (2nd edition) Addison-Wesley Publishing Company, Inc.; Ritz, GJ 1994 Total construction project management McGraw-Hill
4. Compulsory.
5. Elói Ribeiro.
6. 4h/week; 1st semester; 5th year.
7. Lectures, Pratical classes.
8. Final examination 100%.
9. No.
10. 5.5.

1. Urbanism II - 0946
2. 1. Modern Urbanism history; 2. Urban Policies - modern challenges; 3. Urban policy in Portugal - today situation.
3a) No prerequisites.
3b) To carry to the students scientific knowledge about urbanism and urban policies, special as a form of civil engineers intervention in urban spaces, and provide the future professional with a global vision about urbanism, in a way they can execute or coordinate works in this area; Conception of practical works, with the use of some analysis and elaboration methodologies of plans and projects, and providing the students have contact with real cases, stimulating they synthesis and presentation capability.
3c) Relph, Edward 1990 A Paisagem Urbana Moderna. ed. Edições 70, Lisboa; Benevolo, Leonardo 1994 As Origens da Urbanística Moderna. ed. Editorial Presença, Lisboa; Salgueiro, Teresa Barata 1999 A Cidade em Portugal, uma geografia urbana. ed. Edições Afrontamento, Porto; Lacaze, Jean-Paul 1999 A Cidade e o Urbanismo. ed. Instituto Piaget; Lôbo, Margarida Souza 1995 Planos de Urbanização. A Época de Duarte Pacheco, DGOTDU e FAUP publicações, Porto; Coelho, António Baptista and Cabrita, António Reis 1999 Espaços Exteriores em Novas Áreas Residenciais. LNEC, Lisboa; Lobo, Manuel Costa et al. 1990/91 and 1993 Normas Urbanísticas. vol. 1, 2 e 3, DGOT/UTL Lisboa; Balsas, Carlos José Lopes 1999 Urbanismo Comercial em Portugal e a revitalização do Centro das Cidades. GEPE / Ministério da Economia Lisboa.
4. Compulsory.
5. José Carlos Fernandes.
6. 3 hours/week (1T + 2TP); 1st semester; 5th year.
7. Lectures and tutorials.
8. Presentation of individual essays and Final examination (theoretical).
9. Course not offered in any other language than Portuguese.
10. 4.0.

1. Conservation and Rehabilitation of Buildings - 0955
2. Characterization of architectural heritage. The main pathologies of building. Repair and prevention. Conservation interventions. Conservation politics of buildings. The rehabilitation of buildings: materials, technologies, legal and financial framing and decision criterions about the nature and depth of the interventions. Conservation and restoration of monuments and historical sites. The History of Construction in the monumental restoration. Traditional structures behaviour. Possible combinations between traditional materials and constructive techniques with contemporaneous ones.
3a) Physics of Buildings; General Construction Procedures.
3b) To provide the following specific competences: knowledge of inspection and experimental techniques, pathologies survey, characterization, diagnosis; knowledge of traditional materials and constructive techniques and their compatibility with contemporaneous ones; conservation and restoration theories; non-destructive and rather intrusive techniques; to interpret the aims of architectural project and to contribute to a less impact intervention on the authenticity of the constructions with historical or aesthetics value.
3c) Le Moniteur 1993 Réhabiliter et entretenir un immeuble ancien point par point, Paris; Ministério da Cultura / IPPAR Legislação Nacional; Cartas e Convenções Internacionais, Lisboa; LNEC 1983 1º Encontro sobre Conservação e Reabilitação de Edifícios de Habitação, 3 vol., Lisboa; LNEC 2000 Encontro Nacional sobre Conservação e Reabilitação de Estruturas Lisboa; Departamento de Construcción y Tecnologia Arquitectónicas, U. P. M. 1998 Tratado de Rehabilitación, Editorial Munilla-Léria, Madrid.
4. Optional.
5. Maria Eunice da Costa Salavessa; José Barbosa Vieira.
6. 3h (3TP) / week; 1st semester; 5th Year.
7. Lecture and practical classes.
8. 1 case study with presentation and discussion 50%; final written examination 50%.
9. No.
10. 3.5.

1.Geotechnics - 0958
2. Short revision of basic concepts of Soil Mechanics. Earth Retention Walls. Direct Foundations and Pile Foundations. Slope Stability. Soil Improving Techniques (temporary and permanents), Diaphragm Walls. Geotextiles.
3a) Good knowledge of Soil Mechanics.
3b) To sensitise students for geotechnical problems. To develop the capacity of work together with all related disciplines, which normally are connected to Geotechnics. Study of practical cases.
3c) Coelho, S Tecnologia de Fundações. ed. EPGE Escola profissional Gustave Eiffel; Geotechnical Applications In Civil Engineering, R.N.P. Arogyaswamy, Ed. A.A. Balkema/ Rotterdam; Fondations Speciales Et Reprises En Sous-Œuvre. Marcel Forni, Editions Eyrolles;Technologie de la Construction Des Bâtiment. Fondations – Soutènements, Jacques Putatti, Editions Eyrolles; Guido Guidicini and Carlos M.Nieble Estabilidade de Taludes Naturais e De Escavação., Editora Edgard Bluecher Lda; Soil Improvement Techniques And Their Evolution. W.E.Impe, Ed. A.A. Balkema/Rotterdam; T.William Lambe and Robert Whitman Mecánica de Suelos. Editorial Limusa; Handouts.
4. Optional.
5. Amândio Teixeira Pinto.
6. 3h/week (3TP); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 3.5.

1. Special Structures - 0959
2. Special foundations (piles, foundation wells, mat foundation). Retaining walls. Reinforced concrete reservoirs. Re-stressed beams. Bridges.
3a) Structures, reinforced concrete.
3b) To introduce students to unsual structures. To explain the design proceedings and to give guidence related to the aspects of the construction of these type of structures.
3c) Guerrin, A Traité de Béton Arme. Dunod; Jimenez Salas, JA 1993 Geotécnia y Cimientos. Editorial Rueda, Madrid; Paredes Moldadas. LNEC, 1993; Timoshenko, SP and Woinowsky-Krieger, S Theory of Plates and Shells, McGraw-Hill.
4. Optional course unit.
5. Jorge Tiago Pinto.
6. 3h/week; 2nd semester; 5th year.
7. The students are required to develop a design project/topic under the supervision of the lecture.
8. Based upon the classification of the different projects.
9. No.
10. 3.5.

1. Construction's Economical/ Financial Engineering - 1266
2. Construction industry; Economical basic notions; Financial engineering; Construction cost; Building conservation and rehabilitation in economical engineering; Real state valuation method; Technical economical methods in buildings plan's elaboration.
3a) No prerequisites.
3b) With this course, we aim to present the economical science basic structure, with the premise that economical questions affect the citizens and the companies and decisions must be taken every day. In that decision taken, we aim that can be applied the principles accumulated by the economical science over the years, as for economical basic notions are elementary, logical, rational and balanced to anyone to achieve. In the other hand, we verify in all the companies, in any nature and dimension, emerge management problems to resolve who claim financial situation exact knowledge, in way to allow resolutions to clear them up. After the "point of view's acquisition" to look to the reality - through basic notions seized in the program – will be developed and applied to achieved concepts, referring to the decision marking in construction, specially in buildings conservation and rehabilitation, real state valuation method and technical-economical methods in buildings plan's elaboration.
3c) Samuelson, PA et al 1993 Economia. XIV edição, McGraw Hill; Brealey, RA.,1992 Princípios de Finanças Empresariais, McGrawHill; Ruegg, R and Marshall H 1990 Building Economics, VNR, New York.
4. Compulsory .
5. Paiva Rodrigues; Sandra Pereira.
6. 4 h/week; 1st semester; 5th year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Written essay and examination (20% + 80%) or Final examination (100%).
9. No.
10. 5.5.

1. Reinforced and Prestressed Concrete II - 0949
2. Design of reinforced concrete structures and prestressed concrete structures under different kind of stresses.
3a) Good Knowledge on Strength of Materials and Structural Theory.
3b) Present and analyse the principles and requirements for the usability of the structures. Design concrete structures including detailing of reinforcement.
3c) Traité de Génie Civil. de l'Ecole Polytechnique Fédérale de Lausanne, Volumes 7 e 8; Hurst,MK Prestressed Concrete Design. CEB-FIP - MODEL CODE 1990; Eurocódigos 1 e 2; Beeby, A. W and Narayanan, RS Designer's Handbook to Eurocode 2, Thomas Telford Services Ltd; Design of concrete structures, Arthur H. Nilson, McGRAW-HILL.
4. Compulsory.
5. Ilídio Faria.
6. 5h/week (2T + 3TP); 2nd semester; 5th year.
7. Lectures and practical classes.
8. Written essays and Final exam.
9. No.
10. 6.0.

1. Construction Project Management - 0950
2. Concepts and typical project life-cycle curve. The Owner, Constructor and Designer interfaces. Management themes: Changing goals; Quality; Cost; Human Resources; Contracts; Communications, Subcontracts; Risk. Concepts of Project Management. Computers in Construction Management. Owner/client goals. Contractor goals. The major points in the proposal and contracting environment, as seen from the construction manager´s viewpoint. Case Studies.
3a) No prrequisites.
3b) To assist the students of Civil Engineering in more fully understanding the highly competitive environment normally encountered in filling a construction contract. Thus the course adopts a multidisciplinary approach derived from production engineering and management, technology policy, financial management, industrial relations and organizational behaviour.
3c) Brand, Jaime Pereña, Direcção e Gestão de Projectos; Courtis, A, Martins C and Pillet, M Gestão da Produção; Barros, C Gestão de Projectos; Barros, C Pestana Decisões de Investimento e Financiamento de Projectos; Bezelga, A and Rodrigues, P Metodologia para financiamento de empreendimentos imobiliários considerando factores de risco e qualidade ponto de vista da entidade financiadora, FEUP - Construções Civis, Financiamento da Construção; Ritz, GJ.1994 Total construction project management; McGraw-Hill, PMBOK – Project Management Body of Knowledge – (Project Management Institute) – versão em Português tradução livre, não oficial – Antônio José Soares e Márcio Tibo – Brasil Maio de 2000.
4. Compulsory.
5. José Manuel Cardão.
6. 4h/week (2T + 2TP); 2nd semester; 5th year.
7. Lectures and practical classes.
8. Final exam (50%) and case studies (50%).
9. No.
10. 5.5.

1. Steel and Wood Structures - 0951
2. Design of steel structures and wood structures under different kind of stresses
3a) Theory of structures, strength of materials
3b) To introduce instability problems (i.e. buckling, lateral buckling and warping). To design steel structural elements (i.e. roof trusses, purlins, bracing, columns, beams) under different load combinations, according to Portuguese`s codes (RSA and REAE) and the Eurocode 3. To design wood (i.e. compact wood, veneers and chip-board) structural elements following the Eurocode 5
3c) Steel Designers`s Manual, The Steel Construction Institute, GrahamW. Owens and Peter R. Knowles, Blackwell Science, 2000; Manfred Hirt, Rolf Bez, Construction Métallique, L'Ecole Polytechnique de Lausanne, Volume 10, Lausanne, 1996; Edwin H. Gaylord, Jr., Charles N. Gaylord, James E. Stallmeyer, Steel Structures, McGraw-Hill International Editions, 1992; Walter Pfeil, Estruturas de Madeira, Livros Técnicos e Científicos Editora S.A., Rio de Janeiro, 1994.
4. Compulsory.
5. Jorge Tiago Pinto, António Monteiro.
6. 4h/week (2T + 2TP); 2nd semester; 5th year.
7. Lectures and tutorials (project of an industrial store building).
8. Written essays and final written exam.
9. No.
10. 5.5.

1. Building Installations - 0952
2. Building water supplies. Building sewer drainage. Building storm sewer drainage. Building gas supplies. Ventilation. Building suction pump. Building fire protection water system. Pipes and accessories. Design analysis.
3a) Hydraulics knowledge.
3b) To sensitise students to the aspects related to building hydraulics as well as the analysis of other design specialities (mechanics and electrothecnics).
3c) Delebecque, R and Roux, C.1979 Le Formulaire des Installations Sanitaires - Tome 3, Paris Librairie Delagrave; Direcção Geral de Recursos Naturais 1988 Manual de Saneamento Básico; Legislação Portuguesa aplicada à matéria (Dr.23/95); LNEC 1996 Curso sobre Dimensionamento de Redes de Distribuição e Drenagem de Águas em Edifícios.
4. Compulsory.
5. Luís Filipe Fernandes.
6. 3h/week (3TP); 2nd semester; 5th year.
7. Lectures practical classes.
8. Written essays and oral discussions 30%. Final written exam 70%.
9. No.
10. 3.5.

1. Seminary of Building Construction -1351
2. Building industry, Intervenients and relationships; Concurs organization (Public, Private); Construction Planning; Site building organization; Construction hygiene and security; Security plans; Quality; Building ventilation; Fire protection; Building installation; Acoustic water supply and sewrage system. Construction details; Site work visits.
3a) No prerequisites
3b) Reunion and practical application in design and in site of the knowledge obtained in the different courses in the civil engineering degree.
3c) Decreto Lei nº 59/99 Regime jurídico das empreitadas de obras públicas; Decreto Lei nº 61/99 Tratado de Edificación. Frick Knoll Neumann; Tratado de Construcción Heinrich Schmitt; Borges, J Ferry 1997 Qualidade na construção LNEC, Curso 167; IPQ Certificação de produtos no SPQ; Regulamento Geral das Edificações Urbanas. Normas ISO 9000; Segurança Higiene e Saúde no Trabalho 1994; Código Civil (anotado) 1999.
4. Optional.
5. José Barbosa Vieira.
6. 3 hours; 2nd Semester; 5th year.
7. Lectures and practical classes.
8. Written essay and examination (50% + 50%) or Final examination (100%).
9. No.
10. 3.5.

1. Urban Management - 1355
2. Management and control of private urban interventions; Expropriations; Legal mechanisms to the distribution of coasts and benefits in urban interventions; Elaboration of a Urban Management Regulation (based in the new portuguese legislation).
3a) No prerequisites.
3b) Provide students the scientific knowledge about urban management, in a general perspective, as a plan development tool, and as a strong area of civil engineers intervention; sensitize the students to application and coordination tasks in this domain; Conception of practical works, with the use of some analysis and elaboration methodologies of projects and urban management, and providing the students have contact with real cases, stimulating their synthesis and presentation capability.
3c) Lectures notes; Portuguese legislation; Correia, Fernando Alves 1998 Curso do Ambiente, Urbanismo e do Ordenamento do Território, Coimbra; Rey, Henrique Porto: Las determinaciones del plan general para la equidistribución - las áreas de reparto y los aprovechamientos tipo; Escuela Gallega de Administración Pública - V Curso Superior de Urbanismo 2001; Santiago de Compostela - 2001.
4. Optional.
5. José Carlos Fernandes.
6. 3h/week (3TP); 2nd semester, 5th year.
7. Lectures + tutorials.
8. Exam + theoretical essay + essay.
9. Course not offered in any other language other than portuguese.
10. 3.5.

1. Special Works -1860
2. Study of Explosives and its use in dismantling rocks. Anchorages, design and field tests. Introduction to the Study of Underground Works, approach to design methods and escavation techniques. General Introduction to Dams. Earth Dams in particular.
3a) Good knowledge on Soil Mechanics.
3b) To make the students familiar with the real problems of Geotechnics. Some specific project problems are studied in order to finalise the global comprehension of soil behaviour.
3c) Denver 1990 Design of Small Dams. US Bureau of Reclamation; Gomez Navarro 1964 Saltos e Presas de Embalse. Madrid; IGM, 2001 Desmonte de Rochas com Uso de Explosivos; Handouts.
4. Optional.
5. Amândio Teixeira Pinto.
6. 3h/week (3TP); 2nd semester; 5th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 3.5.

1. Project - 0166
2. During the 1st semester, each group (two or three students) is required to develop a research project on one of the following areas: regional and urban planning, structures, infra-structures and means of communication, building construction, geotechnics and hydraulics. During the 2nd semester, all the groups have to design a building, taking the following aspects into account: the urban planning, the interaction between architectural and structural design and infra-structural design, the design of reinforced concrete and steel structures in a systematic and professional way, the water supplies, sewer drainage and pluvial waters drainage
3a) Requires that the students had finished successfully the subjects of the previous years of the degree.
3b) To give the students practical knowledge on the most important aspects of the design and research activities that concern the civil engineering domains: regional and urban planning, means of communication, infra-structures, architecture, hydraulics, structures, building construction and geotechnics.
3c) Ramon Arguelles Alvarez La Estrutura Metalica. Hoy I, 11 e III - Escuela Tecnica Superior de Ingenieros de Montes, Madrid; Leonhardt, F and Monnig, E - Construções de Concreto, I a 6 - Editora Interciência, Rio de Janeiro, Brasil; Joseph, E Bowles -Foundation Analysis and Design - Mc Graw Hill; Manual de Saneamento Básico, Direcção Geral de Recursos Naturais, Lisboa, 1988; Pedroso, Victor M. Ramos Regras de Dimensionamento das Redes Prediais de Distribuição de Água e Drenagem de Águas Residuais, Domésticas e Pluviais, LNEC, 1991.
4. Compulsory.
5. Anabela Paiva, Luís Ramos, Isabel Bentes, Luís Filipe, Eunice Salavessa, Jorge Tiago Pinto, Barbosa Vieira, Francisco Bernardo, Ilídio Faria, António Monteiro, Ricardo Santelmo Gomes, Sandra Pereira, José Manuel Cordão, José Carlos Fernandes.
6. 9h/week; annual, 5th year.
7. Research project under the supervision of a lecture.
8. Project and viva.
9. No.
10. 6.0.

Electronics Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Mathematical Analysis I	8.0	Mathematical Analysis II	8.5
	Linear Algebra and Analytic Geometry	8.0	Physics II	8.5
	Physics I	8.0	Laboratories II	6.0
	Laboratories I	6.0	Introduction to Computer Programming	7.0
	Total	30	Total	30
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Complements of Mathematical Analysis	7.0	Applied Mathematics	5.5
	Statistics	6.0	Circuit Analysis	6.5
	Electricity and Magnetism	6.0	Data Structures	6.0
	Algorithms	6.0	Electronics I	7.0
	Cost Analysis in Industry	5.0	Operation Research	5.0
	Total	30	Total	30
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	Numerical Analysis	6.0	Control Systems	6.5
	System and Signal Analysis	5.5	Microprocessors and Microcomputers	5.5
	Digital Circuits	6.0	Operating Systems	6.0
	Electronics II	6.5	Electronics III	6.0
	Computer Architecture	6.0	Digital Electronics I	6.0
	Total	30	Total	30
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	Automation	6.5	Telecommunications	6.5
	Data Transmission	5.0	Electrical Machines	5.5
	Electronics IV	6.0	Digital Signal Processing	6.5
	Measuring and Systems	6.5	Computer Networks	5.5
	Digital Electronics II	6.0	Advanced Computer Programming	6.0
	Total	30	Total	30
	1st Semester	ECTS	2nd Semester	ECTS
5th YEAR	Optional	7.5	Optional	7.5
	Optional	7.5	Optional	7.5
	Project	15	Project	15
	Optional disciplines: Electrical Energy Systems I Digital Control Systems Digital Image Processing Architectures and Algorithms of Digital Signal Processing Intelligent Systems and Robotic Computer Graphics Electrical Energy Systems II Mobile Communication and Wireless Networks			
	Total	30	Total	30

Total credits: 300

1st year

1. Mathematical Analysis I – 0174.
2. Functions of one variable: implicit and inverse functions; some special functions. Limits of functions and continuity: classification of discontinuity. Derivatives: higher order derivatives; implicit differentiation. Antiderivatives: techniques of integration. Rolle's theorem, Lagrange's theorem and Cauchy's theorem. L'Hopital's rule. Taylor's formula. Integration: the definite integral.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, Jaime 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, Earl W 1979 Calculus with Analytic Geometry, 1st Vol. Weberand Schmidt Apostol; Tom M 1967 Calculus, 1st Vol, Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito; Maria Luís Vasco; Félix Póvoa; Irene Oliveira
6. 6 h/week (3T, 3TP); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 8.0.

1. Linear Algebra and analytic Geometry - 0117.
2. Binary relations, binary operations. Vector Spaces: Linear independence. Spanning sets. Basis and dimension. Vectorial subspace. Linear Mappings: the algebra of linear mappings. Kernel and image. Linear mappings whose domain is a vector space of finite dimension. Matrices: Matrix of a linear mapping relative to fixed basis Algebra of matrices. Invertible matrices. Rank of matrices. Systems of linear equations: matricial interpretation. A systematic method of solving systems of linear equations. Determinants: Basic concepts. Laplace theorem. Application to matrices and systems. Eigenvalues and Eigenvectors: Basic concepts. Inner product. External product.
3a) High-school Algebra.
3b) To provide the basic concepts of linear algebra useful to engineers.
3c) Giraldes, Emília e Fernandes, Vítor Hugo e Smith, Maria Paula, 1995 Curso de Álgebra Linear e Geometria Analítica, McGraw-Hill; Blyth, TS and Robertson, EF 1986 Matrices and Vector Spaces, Chapman and Hall, London, New York; Blyth, TS and Robertson, EF 1994 Linear Algebra, Chapman and Hall, London, New York.
4. Compulsory.
5. Emília Giraldes, Paulo Vasco.
6. 5 h/week (3 lectures, 2 practical); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Three written tests or final exam 100%.
9. No.
10. 8.0.

1. General Physics I – 0118.
2. Vectors. Kinematics for one and two dimensions. Dynamics. Newton's laws of motion. Gravitation. Work and kinetic energy. Potential energy and conservation of energy. Systems of particles. Collisions. Torque. Rotation. Fluids. Oscillations. Temperature, Heat and First and Second laws of Thermodynamics.
3a) No.
3b) Give to students some elements of Physics that can be applied and developed in more specific areas.
3c) Keller General Physics. Halliday; Resnick, Walker Fundamentals of Physics Extended. Wiley & Sons; Alonso e Finn Física: um curso Universitário.
4. Compulsory.
5. Carlos Manuel M. Matias; Pedro Serra.
6. 6 h/week (3T + 1,5 TP+ 1,5 P) 1st semester; 1st year.
7. Lectures and practical classes.
8. Two-middle semester tests; Exam.
9. No.
10. 8.0.

1. Laboratories I – 0719.
2. Elementary Circuit Analysis. Experimental Data and Errors. Analogue Measurement Instruments. The Oscilloscope. Resistors and Resistors Measurement. RC Circuits.
3a) No.
3b) Give students practical information and technical support for laboratory classes through the course. Provide fundamental concepts on circuit analysis and be able to work with several instruments in the laboratory.
3c) Boylestad, Robert L 1994 Introductory Circuit Analysis, Prentice Hall, Inc.
4. Compulsory.
5. Salviano Filipe S. P. Soares.
6. 6 h/week (2T, 4P) 1st semester; 1st year.
7. Lectures and laboratories.
8. Assessment Final test 70%; Laboratory 30%.
9. No.
10. 6.0.

1. Mathematical Analysis II – 0178.
2. Applications of Integration. Polar and Parametric Coordinates: area of plan figure, volume of solids, length of curve in Polar and Parametric Coordinates. Improper Integrals. Sequences of real numbers: bounded and monotonic sequences. Series: series with nonnegative terms : comparison tests, the integral test, the ratio and root tests; absolute convergence - alternating series. Power series: expansion of functions; differentiation and integration of power series; Taylor and Maclaurin series.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, Jaime 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, Earl W 1979 Calculus with Analytic Geometry, 1st Vol. Weberand Schmidt Apostol; Tom M 1967 Calculus, 1st Vol, Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito; Helena Campos.
6. 6h/week (3T, 3TP); 2nd semester; 1st year.
7. Lectures and practical classes.Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 8.5.

1. General Physics II – 0119.
2. Coulomb's law and electrical field. Gauss law. Electrical potential. Capacitors. Electrical current and circuits. Magnetism. Magnetic fields. Induction and indutance. Waves. Sound. Optical images. Special theory of relativity.
3a) No.
3b) Give to students some elements of Physics that can be applied and developed in more specific areas.
3c) Keller General Physics. Halliday; Resnick, Walker Fundamentals of Physics Extended. Wiley & Sons; Alonso e Finn Física: um curso Universitário.
4. Compulsory.
5. Carlos Manuel M. Matias; Pedro Serra.
6. 6 h/week (3 T + 1,5 TP+ 1,5 P); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Two-middle semester tests; Exam.
9. No.
10. 8.5.

1. Laboratories II – 0720.
2. Introduction to SPICE. AC signals. Capacitors Charge and Discharge Phase. Filters. Semiconductor Diode. Rectifiers.
3a) No.
3b) Give students a global understanding about a simulation tool SPICE. Give concepts about sinusoidal alternating waveforms, phasors, capacitors charge and discharge phase. Low-Pass and High-Pass filters are discussed with graphical hint analysis. Semiconductor diode with some applications is presented.
3c) SPICE Reference Manual; Richard C Dorf 1997 The Electrical Engineering Handbook, 2nd Edition, CRC Press & IEEE Press; Boylestad, Robert L 1994 Introductory Circuit Analysis, Prentice Hall, Inc; Boylestad, Robert L Louis, Nashelsky 1999 Electronic Devices and Circuit Theory, Prentice Hall, Inc.
4. Compulsory.
5. Salviano Filipe S. P. Soares.
6. 6 h/week (2T, 4P); 2nd semester; 1st year.
7. Lectures and laboratories.
8. Assessment Final test 70%; Laboratory 30%.
9. No.
10. 6.0.

1. Introduction to Computer Programming – 0487.
2. Introduction: a computer system, components of a typical computer. Imperative languages: presentation of the paradigm and matching with other paradigms. Systems of numeration: conversion of a base b to a base b '; conversion of a base b to the decimal base (base 10); conversion of a decimal number for another base and conversion among bases 2, 4, 8 and 16. Algorithms: notion of algorithm; algorithmic language; methodology; data types; variables; expressions and basic operations. Decomposition of a problem. Decision structures: the selection from alternative actions (If-then-else, nested If's). A multiple selection structure - Case. Loops: conditional loops (Repeat ... until, while … do); loop-controlled input; counted loops (For... to... do); nested loops. Sub-algorithms: functions and procedures; argument/ parameter correspondence. Arrays of one, two and higher dimensions. Records and arrays of records.
3a) No.
3b) The aim of the course is to provide the necessary framework concerning the formalisation of solution of problems of reduced complexity. The solutions (sequences of commands) should be expressed in an algorithmic description and implemented in a structured programming language (Pascal has been adopted for this course).
3c) Tremblay, JP DeDourek, JM Blunt, RB Introduction to Computer Science McGraw Hill; Byron S Gottfried, Programação em Pascal (2ª edição), McGraw Hill.
4. Compulsory.
5. Manuel Cabral Reis; António Jorge Gouveia; António Coelho; Renato Madureira.
6. 6h/week (2T, 4P), 2nd semester, 1st year.
7. Lectures and laboratories.
8. Written test 100%.
9. No.
10. 7.0.

2nd year

1. Complements of Mathematical Analysis – 0121.
2. First order differential equations. Differential equations of higher order: Method of the undetermined coeficients. Vector-valued functions. Differentiation. Extrema of real-valued functions. Double integrals. Triple integrals, the change of variables and applications. Integrals over paths and surfaces. Theorems of Green, Gauss and Stokes.
3a) Differential and integral calculus of one variable as well as basic notions of linear algebra and analytic geometry.
3b) To give the basic theory of differential and integral calculus of functions of several variables, to introduce the basic differential equations and show the practical aspects of all these matters namely through applications in physics.
3c) Breda, A e Costa, JN da 1996 Cálculo com Funções de Várias Variáveis, 1ª edição McGraw-Hill International Editions; Marsden, JE and Tromba, AJ 1988 Vector Calculus, 3rd edition WH Freeman and Company; Swokovski, E 1994 Cálculo com Geometria Analítica, Vol II, 1ª edição Mc Graw-Hill Lda; Paulo, S. Zill, DG 1997 A First Course in Differential Equations with Modelling Appplications, 6ª edição Brooks/Cole Publishing Company.
4. Compulsory.
5. Anabela Borges; Argentina Leite; Helena Campos.
6. 6h/week (3T, 3TP); 1st semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments 50%+50% or final written examination – 100%.
9. No.
10. 7.0.

1. Statistics – 0168.
2. Introduction to the theory of probabilities. Random variables. Bi-dimensional random variables. Random distributions. Fundamental theorems. Mathematical statistics.
3a) High-School Mathematics.
3b) To provide the basic concepts of probability and statistics useful to engineers.
3c) Walpole, Ronald E e Raymond, H Myers 1993 Probability and Statistics for Engineers and Scientists. Prentice Hall International Inc., 5th Edition, 766 p. ISBN:0024242012; Zar, Jerrold H 1993 Biostatistical Analysis. Prentice Hall International Inc., 3th Edition. ISBN:0130845426. Dagnelis, P 1973 Théorie et Métodes Statistiques. 2éme Edition, Vols. I et II, Les Presses Agronomiques de Gembloux.
4. Compulsory.
5. Carlos Mendonça e Moura; Irene Cristina S. Oliveira; Helder Fernando Pedrosa e Sousa.
6. 5h/week (2T, 3TP); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. Electromagnetism – 0721.
2. Electrostatics: charges and fields. The electric potential. Electric fields around conductors. Electric currents. The Magnetic field. Electromagnetic inductance. Displacement current. Maxwell's equations. Alternating current circuits. Electric fields in matter.
3a) College algebra and basic differential and integral calculus.
3b) To teach some fundamental concepts of electricity and magnetism to prospective electrical engineers and provide them with the ability to apply these concepts to the solution of both familiar and unfamiliar problems.
3c) Purcell, E 1985 Electricity and Magnetism McGraw-Hill, Singapore; Villate JE 1999 Electromagnetismo McGraw-Hill, Lisboa; Brito, L Fiolhais, M Providencia, C 1999 Campo Electromagnético Mc Graw-Hill, Lisboa; Fishbane, PM Gasiorowicz, S Thornton, ST 1996 Physics for Scientists and Engineers Prentice-Hall, New Jersey.
4. Compulsory.
5. Jose Ferreira; Jaime Viegas; Daniel Alexandre.
6. 6h/week (3 theoretical, 3 tutorials); 2nd semester; 2nd year.
7. Lectures, problem solving tutorials.
8. Written exam.
9. No.
10. 6.0.

1. Algorithms – 0722.
2. Decision structures (overview). Computer memory addressing. Composite data structures: vectors, arrays, structures and structures arrays. Sorting and searching. Recursion. Sequential files. String manipulation. Introduction to linear data structures: list, stack and queue. Introduction to algorithm analysis. The engineering of computer software: design, implementation, testing and debugging. All the implementation is done using C language.
3a) Basic computer programming.
3b) To provide students with the necessary framework concerning the formalisation of an algorithmic language for the correct development of problems in the computer science area. To introduce students to software development issues and methodologies. Implementation is done using a general purpose well known programming language, that will be necessary throughout the licentiateship.
3c) Cormen, Leiserson Rivest, Stein 2001 Introduction to Algorithms, MIT Press-McGraw Hill; Kelley, Pohl 1998 A Book on C; Benjamin Cummings, Knuth, D 1973 The Art of Computer Programming – (vols. 1 e 2) Addison Wesley; Sedgewick, R 2002 Algorithms in C Parts 1-5 (2 volumes) Addison Wesley; Tremblay, Bunt 1984 Introduction to Computer Science – An algorithmic approach, 2nd Ed., McGraw-Hill.
4. Compulsory.
5. Pedro Melo Pinto; Paulo Martins.
6. 6h/week (2T, 2TP, 2P); 1st semesterr; 2nd year.
7. Lectures, practical classes and laboratories
8. 1 case study with presentation and discussion 30%; 2 written assessments 5%+5%; final written exam 60%.
9. No.
10. 6.0.

1. Cost Analysis in Industry – 0979.
2. Selection of economic alternative, economic evaluation of projects and effects of the variable conditions on the cost and profits.
3a) No.
3b) To introduce the fundamental concepts of finance economy, as monetary flows, interest, values of the money in the time, effective and nominal rates, depreciation and amortisation.
3c) Humphreys, KK 1983 Jelen's Cost and Optimisation Engineering, McGrawHill.
4. Compulsory.
5. Caroline Dominguez.
6. 4h/week (2T, 2TP) 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final exam and oral discussion.
9. No.
10. 5.0.

1. Applied Mathematics – 0124.
2. Linear Differential Equations: Complex functions of a real variable; Linear differential equations with discontinuous inputs; Impulse function and other generalized functions; Application of generalized functions to linear differential equations. Basic Concepts of Systems Analysis: Operators; Operators associated with linear differential equations; Duhamel's integral; Weighting function, impulse response and convolution. Analytic Functions of a Complex Variable: Functions of a complex variable; Limits and continuity; Derivatives and differentials; Integrals; Analytic functions: Cauchy-Riemann equations; Integrals of analytic functions; Cauchy integral theorem; Cauchy's integral formula; Power series as analytic functions; Power series expansion of general analytic functions; Power series in positive and negative powers, Laurent expansion; Isolated singularities of an analytic function; Zeros and Poles; Residues. The Laplace Transform: Introduction of the Laplace Transform; Properties of the Laplace Transform; Inverse transform; Initial- and final-value theorems.
3a) For students already possessing a background in Mathematical Analysis.
3b) To provide the mathematical tools employed in the design and analysis of linear systems, that is, physical systems whose behavior is described by linear differential equations. The basic approach to the problems considered arose in modern engineering in the design of complicated control systems.
3c) Churchill, Ruel V Brown, James W 1990 Complex Variables and Applic., McGraw-Hill, New York; Marsden, Jerrold E Hoffman, Michael J 1987 Basic Complex Analysis, Freeman, New York; Ahlfors, Lars V 1979 Complex Analysis, McGraw-Hill, New York.
4. Compulsory.
5. Carlos Mendonça e Moura; João Luís Honório Matias; Argentina Soeima Leite.
6. 5h/week (2T, 3TP); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 5.5.

1. Circuit Analysis – 0126.
2. DC linear circuits. DC non-linear circuits. AC circuits. Polifasic systems. Asymmetric systems. Difasic system. Hexafasic symmetric system. 1st order circuits. 2nd order circuits.
3a) Mathematical Analysis, Algebra, Physics and Electricity, Magnetism and Laboratories
3b) Give students an introduction to electric circuits basic analysis techniques. The subjects are expose in a sequential way that students can easily understand. The first part is dedicated to DC circuits analysis with the propose to give students material that they will need to understand the second part that includes AC circuits. A third part consist of study several polifasic systems, either symmetric or asymmetric. In the end, is made an analysis to 1st and 2nd order circuits, in time domain, using differential equations.
3c) William, H Hayt Jr, Jack, E Kemmerly Circuit Analysis, McGraw-Hill; John O'Malley Basic Circuit Analysis, McGraw-Hill; Milton Gussow, Basic Electricity, McGraw-Hill.
4. Compulsory.
5. Paula Cristina R. C. Oliveira.
6. 6 h/week (3T, 3TP) 2nd semester; 2nd year.
7. Lectures, practical classes and laboratories
8. Final exam.
9. No.
10. 6.5.

1. Data Structures – 0737.
2. Memory allocation. Abstract data types. Linear data structures: lists - stacks, queues; linked lists; circular lists; doubly-linked lists. Non linear data structures: trees. Algorithm analysis. Searching and sorting. Non linear data structures: graphs(introduction to). All the implementation is done using C language.
3a) Computer programming. Algorithms.
3b) To provide students with the theoretical basis in data structures. The students should be able to develop and use programs that implement such data structures in a programming language, and they should also be able to choose between different search and ordering algorithms, according with their efficiency.
3c) Cormen, Leiserson Rivest, Stein 2001 Introduction to Algorithms, MIT Press-McGraw Hill; Esakov J Weiss T 1989 Data Structures, an advanced approach using C, Prentice Hall; Kerninghan, B Ritchie, D 1988 The C Programming Language, Prentice Hall; Kingston, JH 1998 Algorithms and Data Structures, Addison Wesley; Pinto, Pedro Melo 2003 A Utilização de Memória em Listas Ligadas – uma abordagem visual, Série Didáctica, Nº 192, UTAD; Sedgewick, R 2002 Algorithms in C Parts 1-5 (2 volumes), Addison Wesley; Weiss, MA 1997 Data Structures and Algorithm Analysis in C, Addison Wesley.
4. Compulsory.
5. Pedro Melo Pinto; Paulo Martins.
6. 6h/week (2T, 2TP, 2P) 2nd semester; 2nd year.
7. Lectures, practical classes and laboratories
8. 1 case study with presentation and discussion 40%; 2 written assessments 5%+5%¸final written exam 50%.
9. No.
10. 6.0.

1. Electronics I – 0127.
2. Electrical Conduction in Solids. Conservation and Motion of Charge. PN Junction Diode. Circuits with Diodes. Theory of Junction Transistor. DC Biasing of Transistor and Bias Stabilisation. BJT Transistor Modelling. BJT Small Signal Analysis. FET Amplifier. Compound Configurations.
3a) Students should have a good knowledge on Physics about basic electrical laws as well as knowledge about the generation of electromagnetic fields and related effects.
3b) Outline the properties of semiconductors and explain the physical operation and circuit characteristics of junction diodes, bipolar transistors (BJTs), and field-effect transistors (FETs).
3c) Jacob Millman, Arvin Grabel, 1987 Microelectronics 2.Ed., McGraw-Hill International Editions; GN Garud, LC Jain, 1983 Electronic Devices and Linear Circuits, Tata McGraw-Hill Publishing Company Limited.
4. Compulsory.
5. João Pavão.
6. 7h/wek (3T, 2TP, 2P) 2nd semester; 2nd year.
7. Lectures, practical classes and laboratories.
8. Assessment Final test 70%; Laboratory 30%.
9. No.
10. 7.0.

1. Operational Research – 0386.
2. Introduction to Operational Research. Linear Programming (LP): General formulation of LP model. Graphic representation and interpretation of a PL problem. Álgebra Linear revision and basic notions of Convex Analysis. Fundamental PL theorems. (Primal) Simplex algorithm. 2-phase method, and the method of penalties. Duality. Sensitivity Analysis. Particular problems in LP.
3a) Good knowledge of Linear Algebra.
3b) To model accurately real problems as a LP model; many are the applications in the field of engineering suitable to be model as LP problem. The Simplex method as a systematic procedure to find the solution of a LP problem. To be able to evaluate a pós-optimal analysis: duality theory and sensitivity analysis. To be able use current software in Operational Research .
3c) Bazaraa, MS et al 1990 Linear programming and network flows. 2nd Edition. John Wiley & Sons, New York; Valadares Tavares, L et al 1996 Investigação Operacional. McGraw-Hill, Lisboa.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis, Eva Morais, Pedro Barroso
6. 4 h/week (2L + 2T); 2nd semester; 2nd year.
7. Lectures and tutorials.
8. Final exam.
9. Course not offered in any other language other than Portuguese.
10. 5.0.

3rd year

1. Numerical Methods – 0130.
2. Number systems and errors. Nonlinear equations. Eigenvalues and eigenvectors. Systems of linear equations. Systems of nonlinear equations. Polynomial interpolation. Least-squares approximation. Numerical differentiation. Numerical integration. Differential equations. Nonlinear unconstrained optimization.
3a) Mathematical analysis and linear algebra.
3b) The students should be able to choose and use the right algorithms to solve different kind of problems, making a correct and precise analyze of error propagation. They must consider the required accuracy, estimate an approximated solution value, and provide verifications test and corrective actions in case of no convergence.
3c) Fernandes, Edite MGP 1998 Computação Numérica, Serviços de Reprografia e Publicações da Universidade do Minho, Braga; Valença, MR 1983 Métodos Numéricos, Livraria Minho, Braga; Conte, SD e de Boor, C 1987 Elementary Numerical Analysis McGraw-Hill Book Company; Dodes, IA 1978 Numerical Analysis for Computer Science, Elsevier North-Holland Inc., New York; Pina, Heitor 1995 Métodos Numéricos, Mc Graw-Hill; Scheid, Francis 1991 Análise Numérica Mc Graw-Hill. Santos, FC 2002 Fundamentos de Análise Numérica Edições Sílabo, Lisboa.
4. Compulsory.
5. João Matias.
6. 6h/week (3T, 3TP); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. System and Signal Analysis – 0128.
2. Nodal Matrix Analysis. Fluency Graphics. Fourier Series. Response of Linear and Time Invariant Systems. The Fourier Transform.
3a) Mathematical Analysis, Algebra and Circuit Analysis.
3b) To form students in a way to apply “mathematycal tools” for the analysis of systems and signals.
3c) Donald, E Scott An Introduction to Circuit Analysis - McGraw-Hill; Mason, SJ and HJ Zimmernan, Electronic Circuits, Signals and Systems - John Wiley & Sons, New York; Papoulis, A The Fourier Integral and its Applications - McGraw-Hill.
4. Compulsory.
5. Paula Cristina R. C. Oliveira.
6. 6h/week (2T, 2TP); 1st semester; 3rd year.
7. Lectures and practical classes.
8. 1 case study with presentation and discussion 40%; 2 written assessments 5%+5%; final written exam 50%.
9. No.
10. 5.5.

1. Digital Systems – 0131.
2. Numeric systems and arithmetic. Boolean Algebra. Karnaugh Maps. Digital integrated circuits and logic families. Combinational circuits. Programmable devices. Synchronous and asynchronous sequential circuits. Memory devices.
3a) Basic Electronics, Álgebra.
3b) To introduce students to the digital systems, their principles and applications.
3c) Wakerly, JF 2002 Digital Design: Principles and Practices and Xilinx 4.2i Student Package (3rd Edition), Prentice Hall; Sandige, RS 2001 Digital Design Essentials and Xilinx 4.2i Package, Prentice Hall; Leach, DP Malvino, A 1994 Digital Principles and Applications McGraw-Hill; Mano, M 2000 Logic and Computer Design Fundamentals and Xilinx 4.2i Prentice Hall.
4. Compulsory.
5. Luís José Calçada Torres Pereira.
6. 6 h/week (2T, 2TP, 2P); 1st semester; 3rd year.
7. Lectures, practical classes and laboratories.
8. Final exam 70 %; Two written individual papers each 11.25 %; Laboratory classes evaluation 7.5 %.
9. No.
10. 6.0.

1. Electronics II – 0129.
2. Bode Diagram. Frequency Response of Amplifiers. Feedback Amplifiers. Stability and Response of Feedback Amplifiers. Sinusoidal Oscillators.
3a) Students should have a good knowledge on basic electronic devices, such as diodes, BJT, and FET. At the mathematical level they should be aware about imaginary arithmetic.
3b) Give students the understanding about frequency response of amplifiers, with and without feedback, stability of amplifiers and sinusoidal oscillators.
3c) Jacob Millman, Arvin Grabel, 1987 Microelectronics 2.Ed., McGraw-Hill International Editions; GN Garud, LC Jain, 1983 Electronic Devices and Linear Circuits, Tata McGraw-Hill Publishing Company Limited.
4. Compulsory.
5. João Pavão.
6. 6 h/week (2T, 2TP, 2P) 1st semester; 3rd year.
7. Lectures, practical classes and laboratories.
8. Assessment Final test 70%; Laboratory 30%.
9. No.
10. 6.5.

1. Computer Architecture – 0988.
2. Introduce the Computers basics organization, assembly language programming, as well as focusing topics like Addressing, Operations, Subroutines and parameters, Input/Output and Basic interrupt system.
3a) Boolean algebra, binary representation.
3b) To learn the fundamental concepts related with the functioning of the computer, such as: Microprocessor structure and organization; Processor interface and I/O devices; Assembly language methodology.
3c) Greg, W Scragg 1992 Computer Organization: A Top-Down Approach, McGraw Hill; John F Wakerly, Microcomputer Architecture and Programming - The 68000 Family, John Wiley & Sons, Inc.; Andrew S Tanenbaum, Structured Computer Organisation – 3rd Edition, Prentice Hall International Editions; Lance A Leventhal, Z80 1980 Assembly Language Programming, Osborne/McGraw-Hill.
4. Compulsory.
5. José Carlos Silva Cardoso; António Manuel Marques; Francisco Godinho.
6. 5h (2T, 3TP) | 1st semester | 3rd year
7. Lectures and practical classes
8. Final exame
9. No.
10. 6.0.

1. Control Systems – 0972.
2. System, measurement and control definitions. Linear system representation: differential equations, Laplace Transform, block diagrams and transfer functions. Time and frequency responses. Stability and feedback. Steady state error. Linear system analysis: Root locus; Bode, Nichols and Nyquist diagrams. Feedback control systems and basic control actions: lead, lag and lead-lag compensation. The PID controller. State space representation and state control design.
3a) Knowledge of Physics and Electronics.
3b) Provide the students some knowledge of feedback control systems for linear time invariant systems.
3c) D'Azzo & Houpis, 1988 Linear Control Systems Analysis & Design, 3rd Ed, Mc.Graw-Hill; Katsuhiko Ogata, 1970 Modern Control Engineering. Prentice-Hall; Joseph Distefano, 1982 Sistemas de Retroação e Controle. Col. Schaum da McGraw-Hill. Lecture notes.
4. Compulsory.
5. José Boaventura Cunha.
6. 5 h/week (3T, 2TP) 1st semester; 3rd year.
7. Lectures and practical classes.
8. Written test 100%.
9. No.
10. 6.5.

1. Microprocessors and Microcomputers – 0961.
2. Microcomputer organization; microprocessor organization; addressing; Intel 8086/88 microprocessor features; Assembly programming; Assembly programming for the Intel 8086/88 microprocessors family; peripherals; interrupts; evolution of processors and microcomputer architectures; microcontrollers.
3a) Skills in programming and computer architecture.
3b) Understanding of the overall operation of today's computers and abbility to build Assembly programs.
3c) Malone, M 1995 The Microprocessor: a biography, Telos Springer-Verlag; Bartee T, Computer Architecture and Logic Design, McGraw-Hill; Gilmore, 1989 Microprocessors: Principles and Applications, McGraw-Hill; Rafiquzzaman, M 1992 Microprocessors – Theory and Applications (Intel/Motorola), Prentice-Hall; Junior, E Santos, J 1989 Programando em Assembler 8086/8088 – IBM PC, Makron Books McGraw-Hill.
4. Compulsory.
5. Benjamim Fonseca; António Marques.
6. 5 h/week (2 T+1TP+2P)| 2nd semester; 3rd year.
7. Oral theoretical explanation, in theoretical classes; "paper" implementation of practical exercises, in theoretical-practical classes; computer implementation of the exercises that were made in the theoretical-practical classes, in the practical classes.
8. Final examination, with a theoretical component and a theoretical-practical component (50% each one).
9. No.
10. 5.5.

1. Operating Systems – 0137.
2. Introduction to computer science evolution and features; operating systems concepts; operating system structure.
3a) The student should possess basic hardware knowledge and be acquainted with programming in C.
3b) Present to students the issues behind management of computer systems. The student should also acquire the basic notions on the design of a simple operating system, and its expansion and modification. Several algorithms and techniques are presented, as solutions for general issues found on operating systems.
3c) Tanenbaum, Andrew S 2001 Modern Operating Systems, Prentice-Hall; Veeraraghavan, Sriranga Sams 2002 Teach Yourself Shell Programming in 24 Hours, Sams; Robbins, Kay A e Robbins, Steven 1996 Practical UNIX Programming: A Guide to Concurrency, Prentice Hall.
4. Compulsory.
5. Leonel Morgado; Hugo Paredes.
6. 5 h/week (2 lectures, 3 laboratory); 2nd semester; 3rd year.
7. Lectures and laboratories.
8. Final test and programming mini-tests.
9. No.
10. 6.0.

1. Electronics III – 0132.
2. Operational amplifiers, active filters, non – linear operational amplifier, logarithmic amplifier, Analogue multiplication and division. Negative resistance devices and circuits, tunnel diode, unijunction transistor. Introduction to telecommunication circuits, AM and FM modulation, radio frequency amplification, frequency multiplication, phased lock loop.
3a) Students must have knowledge about basic electronic devices (diodes, BJT, FET); they must know about the frequency response of electronic circuits and electromagnetism. At the mathematical level they should be comfortable about Laplace and Fourier analisys.
3b) The main objectives of this course is to enable the student to learn about signal operational amplifiers, namely, non - linear operational amplifiers and active filters design. Negative resistance devices and telecommunications circuits made up the final part of this course.
3c) John V Wait, Lawrence P Huelsman, Granino A Korn Introduction to Operational Amplifiers Theory and applications, McGraw-Hill International Editions; Tobey Graeme, Huelsman, Operational Amplifiers, Mac Graw – Hill, int. Editions; Millman e Taub, Pulse, digital and Switching Waveforms, Mac Graw – Hill, int. Student Editions.
4. Compulsory.
5. João Pavão.
6. 5 h/week (2T, 1TP, 2P); 2nd semester; 3rd year.
7. Lectures, practical classes and laboratories.
8. Assessment Final test 70%; Laboratory 30%.
9. No.
10. 6.0.

1. Digital Electronics I – 0724.
2. Dispositivos lógicos programáveis. Circuitos temporizadores,. Phase-looked Loops, Conversão Digital para Analógica digital e Conversão Analógica para Digital. Memórias integrados memórias e suas aplicações. Microcontroladores. Sistemas de aquisição de dados.
3a) Digital Systems.
3b) Analysis and design of digital electronics using digital integrated circuits.
3c) Taub, H e Schilling, D 1982 Electrônica Digital. McGraw-Hill, São Paulo, Brasil; Coughlin, RF e Villanucci, RS 1990 Introductory Operational Amplifiers - Theory and Experimentation. Prentice-Hall, Englewood Cliffs, NJ EUA; Wakerly, John 1999 Design: Principles and Practices, Prentice Hall Series in Computer Engineering; Sedra, A e Smith, KC 1991 Laboratory Manual for Microelectronic Circuits, 3ª ed. Harcourt Brace Jovanovich, Orlando, Fa, EUA; Torres-Pereira, L 1995 Conversão A/D, Relatório de Uma Aula Prática de Electrónica Digital. Provas de Aptidão Pedagógica e Capacidade Científica, Setembro, Vila Real, Portugal; Sheingold, DH ed. 1986 Analog-digital Conversion Handbook. Prentice-Hall, Englewood Cliffs.
4. Compulsory.
5. Luís José Calçada Torres Pereira.
6. 4 h/week (2T, 2TP); 2nd semester; 3rd year.
7. Lectures and practical classes
8. Final Exam.
9. No.
10. 6.0.

4th year

1. Automation – 0725.
2. Programable Logic Controllers (PLCs), PLCs Programming Languages, Ladder Logic Diagrams, Manufacturing Systems Modelling using Sequential Flow Charts (GRAFCET), Industrial Process Control.
3a) Feeddback Control Systems, Boolean Logic Diagrams.
3b) To provide students with knowledge about: basic working principles of programmable logic controllers, how to program a PLC by using Ladder Logic Diagrams, how to use sequential flow charts in the context of modelling manufacturing systems, as well as notions on industrial process control systems.
3c) René David e Hassane Alla 1992 Petri Nets & Grafcet, Prentice Hall; ADEPA/AFCET 1995 Le GRAFCET, Cépadues Editions; Proth JM e Xie X Petri Nets 1997 A Tool for Design and Management of Manufacturing Systems, John Wiley & Sons; Shinskey FG Process Control Systems: Application Design and Tuning. McGraw Hill International; Dale E Seborg, Thomas F Edgar and Duncan F Mellichamp Process Dynamics and Control, Jonh Wiley & Sons Inc; Thomas E Marlin Process Control: Designing Processes and Control Systems for Dymanic Performance, McGraw Hill.
4. Compulsory.
5. Paulo Moura Oliveira; Eduardo Pires.
6. 6 h/week (2T, 2TP, 2P); 1t semester; 4th year.
7. Lectures, practical classes and laboratories.
8. 4 case studies with discussion 30%; final written exam 70%.
9. No.
10. 6.5.

1. Data Transmission – 0726.
2. Waiting lists. Data transmission networks. Reference models: OSI and TCP/IP. Physic and data layers. LAN and MAN protocols. Examples.
3a) No.
3b) Provide the students the understanding of data transmission in computer networks.
3c) William Stallings, Data and Computer Communications, MacMillan (2ª edição); Andrew S Tanenbaum, Computer Networks, Prentice – Hall (2ª edição); Gerad E Kaiser, Local Area Networks, MacGraw – Hill.
4. Compulsory.
5. Eurico Carrapatoso.
6. 4 h/week (2T, 2TP); 1st semester; 4th year.
7. Lectures, practical classes and laboratories.
8. Final exam.
9. No.
10. 5.0.

1. Electronics IV – 0136.
2. Linear power supplies (linear and integrated). Linear power supplies protection. DC-DC converters analysis: step-down or buck, step-up or boost, flyback and forward topologies. Study of the thermal behavior of power devices and heatsink design. Analysis of the characteristics of the power rectifiers: 4-layer diode, diacs, tyristors and triacs. Controlled rectification.
3a) No.
3b) Give students the understanding of power electronics, namely linear power supplies, discrete and integrated, power DC-DC converters, power semiconductor thermal behaviour and power controlled devices. Practice of linear power supplies projects (discrete and integrated) and implementation of DC-DC converters.
3c) Mohan, Undeland Robins 1995 Power Electronic - Converters, Applications and Design, Wiley; Millman, J Halkias CC Electronica – Dispositivos & Circuitos, Vol.2. – Ed. McGrawHill; Kilgenstey, Switched Mode Power Supplies in Pratice, Wiley.
4. Compulsory.
5. Carlos Manuel José Alves Serôdio; Pedro Miguel Mestre Alves da Silva.
6. 5h (2T, 1TP, 2P); 1st semester; 4th year.
7. Lectures, practical classes and laboratories.
8. Assessment Final test 70%; Laboratory 30%.
9. No.
10. 6.0.

1. Measuring Systems – 0142.
2. Introduction to measurement systems. Resistive sensors; Signal conditioning for resistive sensors. Reactance variation and electromagnetic sensors; Signal conditioning for reactance variation sensors. Generating sensors. Signal conditioning for generating sensors. Digital sensors. Other sensing methods: Sensors based on semiconductor junctions, sensors based on MOSFET transistors, Ultrasonic-based sensors and fibber optic sensors. Telemetry and data acquisition. Signal and noise in the measurement systems. Instruments of electric measurement.
3a) No.
3b) Give students the understanding of the principle of operation of the most common sensors, analyze of the electronic signal-conditioning circuits and the designing and implementing measuring systems (data acquisition system).
3c) Paulo Salgado, 2001 Electrónica e Instrumentação, Série didáctica, UTAD; Geoges Asch, Les capteurs en instrumentation industrielle, 4ª Edição, DUNOD; Pallás-Areny, Ramon, W John G 1991 Sensors and Signal Conditioning, John Wiley & Sons, Inc.
4. Compulsory.
5. Paulo Alexandre Cardoso Salgado.
6. 6 h/week (2T, 2TP, 2P); 1st semester; 4th year.
7. Lectures, practical classes and laboratories.
8. Final exam 70%; Laboratory 30%.
9. No.
10. 6.5.

1. Digital Electronics II – 0727.
2. Properties and Definitions of Digital ICS. Diodes. Bipolar Junction Transistors. Diode-Transistor Logic (DTL). Schottky Transistor-Transistor (STTL). Other TTL Gates. Basic Emitter-Coupled Logic (ECL). MECL III and ECL 10K. Other ECL Gates. Introduction to MOS Digital Circuits. Resistor Loaded NMOS Inverter. Enhancement-Depletion Loaded NMOS Inverter. NMOS Gates. CMOS Inverter. CMOS Tri-State Gates. CMOS Drivers. Dynamic CMOS. BiCMOS. Latches and Flip-Flops. Semiconductor Read-Only Memories.
3a) Digital Design, Electronics I, Digital Electronics I.
3b) Extensive coverage of digital integrated circuits. Provides complete qualitative descriptions of circuit operation followed by in-depth analytical analyses and spice simulations. The circuit families described in detail are transistor-transistor logic (TTL, STTL, and ASTTL), emitter-coupled logic (ECL), NMOS logic, CMOS logic, dynamicCMOS, BiCMOS structures.
3c) Demassa, Thomas e Ciccone, Z 1996 Digital Integrated Circuits, John Wiley &Sons; Rabaey, JM Chandrakasan, A Nikolic, B 2002 Digital Integrated Circuits, Prentice Hall; Howe, RT e Sodini, CG 1997 Microelectronics an Integrated Aproach Prentice Hall.
4. Compulsory.
5. Luís José Calçada Torres Pereira.
6. 6 h/week (2T, 2TP, 2P); 1st semester; 4th year.
7. Lectures, practical classes and laboratories.
8. 70 %Final Exam + 15 % Lab Reports + 15 % Lab test.
9. No.
10. 6.0.

1. Telecommunications – 0738.
2. Signal classification and communication systems (Fourier Transform and time domain analysis), amplitude modulation (AM-DSB, AM-DSB-SC, AM-SSB), phase modulation, frequency modulation, frequency domain modulation (FDM), digital modulation (continuous signal sampling, reconstruction end filtering), time domain multiplexing (TDM), pulsed systems (PAM, PWM, PPM), pulse code modulation (PCM) and data communication. Analysis of noise in communication systems.
3a) No.
3b) Give students the understanding of communication systems. Give students the understanding of the analogic and digital modulation concepts, and antennas. Practice of the different kinds of analogic and digital modulation
3c) Haykin, S Communications Systems – Ed. Wiley & Sun; Carlson, AB Communications Systems – Ed.MacGrawHill; Stallings, William 1988 Data and Computer Communications, 2nd Edition, Macmillan Publishing Company; Schwartz, M Information, Modulation & Noise, Ed. McGrawHill.
4. Compulsory.
5. Carlos Manuel José Alves Serôdio; Pedro Miguel Mestre Alves da Silva.
6. 6 h/week (2T, 2TP, 2P); 2nd semester; 4th year.
7. Lectures, practical classes and laboratories.
8. Assessment Final test 60%; Laboratory 40%.
9. No.
10. 6.5.

1. Electrical Machines – 0141.
2. General aspects of electric machines (functional characterisation and technical terms; e.m.f and torque production; rating; losses, efficiency, heating process and cooling methods; standards). Power electric transformers (single and three-phase). Conventional electric motors (AC single and three-phase induction and synchronous types; DC types). Special electric transformers (measuring and signal types). Special electric motors (permanent magnets, linear and stepping types).
3a) No.
3b) Fundamental types of electric machines. Functioning theoretical principles. Fundamental rules for rational uses.
3c) Carvalho, CC 1983 Transformadores, Editorial Engenharia FEUP; Chapman, SJ 1991 Electric Machinery Fundamentals, Mc-GrawHill International Edition.
4. Compulsory
5. Manuel Cordeiro; Sérgio Leitão.
6. 5 h/week (2T, 1TP, 2P); 2nd semester; 4th year.
7. Lectures, practical classes and laboratories.
8. Assessment Final test 70%; Laboratory 30%.
9. No
10. 5.5.

1. Digital Signal Processing – 0140.
2. Discrete signals and systems. Discreet Fourier Transform. Z-Transform. Realisations structures. Project of IIR and FIR filters.
3a) Algebra, Complex number functions.
3b) To introduce students to the importance of digital signal processing and its applications. Implementation of digital filters.
3c) Oppenheim, A Schaffer, R – Digital Signal Processing, Prentice-Hall; Roman Kuc – Introduction to Digital Signal Processing, McGraw-Hill.
4. Compulsory.
5. José Carlos Silva Cardoso; Salviano Soares Pinto.
6. 6 h/week (2T, 2TP, 2P) 2nd semester; 4th year.
7. Lectures, practical classes and laboratories.
8. Final assessment test 80%; Laboratory 20%.
9. No.
10. 6.5.

1. Computer Networks – 0728.
2. Protocols and protocol stacks; internetworking; transport protocols; client-server model; Internet apllications.
3a) Skills in the utilisation of computer networks, related protocols, Linux operating system and C programming language.
3b) Understanding the operation of computer networks and how to develop network applications.
3c) Tanembaum, 1996 Computer Networks, Prentice-Hall; W Stallings, 1999 Data and Computer Communications, MacMillan; Eduardo Monteiro, Fernando Boavida, 2000 Engenharia de Redes Informáticas FCA.
4. Compulsory.
5. Eurico Carrapatoso; Benjamim Fonseca.
6. 4 hr/week (2T+2TP); 2nd semester; 4th year.
7. Oral theoretical explanation, in theoretical classes; oral explanation of the methodology used in the project of computer networks and implementation of practical exercises concerning the programming of distributed applications, in theoretical-practical classes.
8. Final examination, with a theoretical component (50%) and 2 practical works (50%).
9. No.
10. 5.5.

1. Advanced Computer Programming – 0729.
2. Introduction to databases. Solutions in database areas. Structured Implementations of Applications. Implementation examples using Visual Basic.Introduction to SQL. Crystal Reports. A real project.
3a) No.
3b) To provide the students with the knowledge to specify, design and implement a complete software engineering project, focusing on the area of databases.
3c) Tom DeMarco, 1985 Structured Analysis and Specification CAMPOS, Luis, & Vilar; Sandro 1999 Programação de Bases de Dados com Visual Basic 6.0. Lisboa: FCA-Editora de Informática; NINA, Nuno 1998 Aplicações de Gestão em Visual Basic. Lisboa: FCA- Editora de Informática; NINA, Nuno 1999 Visual Basic 6 Curso Completo. Lisboa: FCA- Editora de Informática; SUSVIELA, Carlos Alberto Nunes (s.d.). Visual Basic Curso Básico. Brasil; PAIVA, Lionardo Fonseca 1996 Visual Basic 5.0 Passo a Passo – 1ª Edição Brasil http://vbbrasil.com/vb/tutoriais.html.
4. Compulsory.
5. António Paulo Teixeira Costa.
6. 6 h/week (2T, 2TP, 2P); 2nd semester; 4th year.
7. Lectures, practical classes and laboratories.
8. Final project developed by groups of two students.
9. No.
10. 6.0.

5th year

1. Digital Image Processing – 0275.
2. Digital images. Basic concepts. Pre-processing operation. Filters in the spatial and in the frequency domain. Segmentation. Region-based methods. Texture. Mathematical morphology. Computer vision as an extension of image processing.
3a) No.
3b) To prepare the students for the development of applications in the area of Digital Image Processing and Computer Vision, with a moderate degree of complexity.
3c) Wayne Niblack, 1986 An Introduction to Digital Image Processing, Prentice-Hall; Rafael Gonzalez & Richard Woods, 1992 Digital Image Processing, Addison-Wesley.
4. Optional.
5. João Barroso; João Paulo Moura.
6. 6 h/week(2T, 2TP, 2P); 1st semester; 5th year.
7. Lectures, practical classes and laboratories.
8. Final test 70%; Practical Works 30%.
9. No.
10. 7.5.

1. Electric Energy Systems I – 0840.
2. Electrical energy systems. Electrical energy chain. Electrical ground grids. Electrical energy supply grids in Low Voltage. Lighting. Electrical networks. Basic notions about the electrical equipment. Lighting techniques
3a) No.
3b) Give to the students one overview about the electrical energy chain and the electrical system production. Enhance the importance of the security in the electrical installations. Calculate the value of the section of the electrical conductors in the electrical grid of supply. Prepare the students to the design and implementation in the following subjects: Transformation power plant; Energy electrical grid supply
Lighting.
3c) Manuel Cordeiro, 1996 Segurança de Pessoas e Bens em Instalações Eléctricas, Cadeia de Energia e Sistema Tarifário, Dimensionamento de Redes de Terra de Instalações Eléctricas de B.T., n.ºs 93,94, 99, Série Didática – Ciências Aplicadas; Vale, AA Moura, AM 1994 Sistemas Eléctricos de Energia, FEUP,; Diogo P Brandão, 1980 Electrotecnia Geral, Fundação Calouste Gulbenkian; Guide de l'ingéniere électrique des réseux internes d'usines - Téchnique & Documentation.
4. Optional.
5. Manuel Cordeiro.
6. 6 h/week (2T, 2TP, 2P); 1st semester; 5th year.
7. Lectures, practical classes and laboratories.
8. Final exam.
9. No.
10. 7.5.

1. Architectures and Algorithms of Digital Signal Processing – 0841.
2. Introduction to DSP processors, DSP architectures, DSP applications, parametric and time-frequency methods for spectral estimation, Filter Banks, Wavelets , Adaptive signal processing.
3a) No.
3b) To deepen already study digital signal processing concepts. Fundamentals of real-time signal digital signal processing using Digital Signal Processors. DSP systems architectures. DSP programming to solve proposed problems.
3c) Lapsley, P 1998 DSP Processor Fundamentals: Architectures and Features, IEEE Press; Diniz, P Adaptive Filtering - Algorithms and Practical Implementation, Kluwer Academic Publisher; Antoniou, A 1997 Digital Filters Analysis, Design, and Aplications, MCGraw Hill; TMS320C5x DSK 1997 Aplications Guide. Texas Instruments; DSP 1996 Teaching Kit. Texas Instruments; 1996 Signal Processing Toolbox Manual Mathworks, Matlab.
4. Optional.
5. José Carlos Silva Cardoso.
6. 6 h/week (2T, 2TP, 2P); 1st semester, 5th year.
7. Lectures, practical classes and laboratories.
8. Final assessment test 50%; Laboratory 50%.
9. No.
10. 7.5.

1. Digital Control Systems – 0837.
2. Need for advanced feedback control systems. Basic notions of control systems: time and frequency response. Basic control actions and PID industrial controllers. Modelling and state space representation. Discrete-time systems. The Z transform. System identification. Implementation of real-time control systems. Digital PID controllers. Adaptive control. Emerging methodologies in control systems.
3a) Knowledge of Control Systems and Applied Mathematics.
3b) Prepare the students to apply digital controllers in industrial processes.
3c) Astrom, Karl J e Wittenmark Bjorn, 1990 Computer-Controlled Systems – Theory and Design, Prentice-Hall International; Kuo, 1992 Digital Control Systems – Theory, Hardware, Software, Sanders College Publishing; Constantine, H Houpis e Gary, B Lamont 1987 Digital Control Systems , 2nd Edition, McGRAW – HILL; Wellstead PE e Zarrop, MP 1991 Self-Tuning Systems, Control and Signal Processing, Wiley. Lecture notes.
4. Optional.
5. José Boaventura Cunha.
6. 6 h/week (2T, 2TP, 2P); 1st semester; 5th year.
7. Lectures, practical classes and laboratories.
8. Final lab work 30%; 4 Practical lab works 70% (17,5% for each).
9. No.
10. 7.5.

1. Computer Graphics – 0845.
2. Computer Graphics Systems. User interface and interaction techniques. Basic raster graphics algorithms for drawing primitives. Geometrical transformations. Viewing in 3D. Geometrical modelling. Image synthesis with high level of detail. Virtual reality.
3a) Knowledge in programming, algorithms, data structures, algebra, matrix calculus, differential calculus and physics.
3b) Prepare students for the development of graphical applications in the fields of image synthesis, virtual reality and CAD. Give the students the knowledge to improve the user interaction.
3c) James Foley, Andries van Dam, John Hughes, Richard Phillips, 1994 Introduction to Computer Graphics, Addison-Wesley.
4. Optional.
5. António Coelho, João Paulo Moura.
6. 6h (2T, 2TP, 2P); 2nd semester; 5th year.
7. Lectures, practical classes and laboratories.
8. Final exam 50%; Practical Works 50%.
9. No.
10. 7.5.

1. Electric Energy Systems II – 0838.
2. The p.u. system. Electrical devices for cut and protection. Outdoor lighting. UPS - Uninterruptible Power Supply. Study and fight of the harmonic pollution.
3a) No.
3b) The use of p.u. system. Design and supervision of low power electrical networks. To get know the electrical devices to cut and protect electrical circuits. Design outdoor lighting. To study UPS – Uninterruptible Power Supply and interference among electrical devices.
3c) Manuel Cordeiro, 1996 Segurança de Pessoas e Bens em Instalações Eléctricas, Cadeia de Energia e Sistema Tarifário, Dimensionamento de Redes de Terra de Instalações Eléctricas de B.T., n.ºs 93,94, 99, Série Didática – Ciências Aplicadas; Vale, AA Moura, AM 1994 Sistemas Eléctricos de Energia, FEUP,; Diogo P Brandão, 1980 Electrotecnia Geral, Fundação Calouste Gulbenkian; Guide de l'ingéniere électrique des réseux internes d'usines - Téchnique & Documentation.
4. Optional.
5. Manuel Cordeiro.
6. 6 h/week (2T, 2TP, 2P); 2nd semester; 5th year.
7. Lectures, practical classes and laboratories.
8. Final exam.
9. No.
10. 7.5.

1. Mobile Communication and Wireless Networks – 2134.
2. This course has as main objective focus the following contents: architectures, protocols, modulation methods and propagation models in mobile and wireless technologies (GSM, GPRS, EDGE, HSCSD, 3G, 802.11 e Bluetooth).
3a) Fundamental concepts of telecommunication and data transmission.
3b) the main objectives of this syllabus are offer to student with the base knowledge and critical analysis capabilities in the following points: overview of mobile communications systems and their evolution; the growing up between generations; architecture and topology of mobile and wireless networks; protocols, medium access methods and modulation process; context aware development tools (WAP, Java Servlets).
3c) Dunlop, J Girma, D Irvine, J 1999 Digital Mobile Communications and the TETRA System, John Wiley and Sons; Regis, J Bates, "Bud" 2002 GPRS – General Packet Radio Service, McGraw Hill; Bray, J Sturman, CF 2001 Bluetooh – Connect without Cables, Prentice Hall PTR.
4. Optional.
5. Carlos Manuel Alves Serôdio; Pedro Miguel Alves da Silva.
6. 6 h/week (2T, 2TP, 2P); 2nd semester; 5th year.
7. Lectures, practical classes and laboratories.
8. Final exam (60%); laboratory reports (40%).
9. No.
10. 7.5.

1. Intelligent Systems and Robotic – 0843.
2. Introduction to Robotics Concepts and Problems; Kinematics (Translation, Rotation, Rigid body motion. Manipulator kinematics. Inversion Problem); Dynamic (some needed theorems and facts about the momenta; Euler's Laws of motion); Trajectory planning and control. Intelligence Systems (Learning. Genetic Algorithms and Genetic programming. Fuzzy logic. Neural networks).
3a) No.
3b) Given to the student's one overview about the Intelligent Systems and the Robotic Systems. To prepare the students for the development of applications in theses areas.
3c) Paulo Salgado, 2002 Robótica e Sistemas Inteligentes, Serie Didáctica, Nº 154, 2001, UTAD, ISBN: 972-669-436-1; Stadler, Wolfram, 1995 Analytical Robotics and Mechatronics, McGraw-Hill International Editions.
4. Opcional.
5. Paulo Alexandre Cardoso Salgado.
6. 6 h/week (2T, 2TP, 2P); 1st semester; 5th year.
7. Lectures, practical classes and laboratories.
8. Final exam 65%; Practical Works 35%.
9. No.
10. 7.5.

1. Final Project – 0166.
2. Projects fit in these areas: Digital Control, Telecommunications, Electronics and Instrumentation, Digital Signal Processing, Energy Systems, Computation, Databases, Computer Vision, Internet, Industrial Management.
3a) Basic Sciences (e.g. Mathematics). Engineering Sciences (depending on the type of project).
3b) Prepare students for the development of projects in the Electrical Engineering area.
3c) Varies according to each project.
4. Compulsory.
5. Educational staff of Electrical Engineering.
6. 15 h/week (6TP, 9P); full year; 5th year
7. Practical classes and laboratories.
8. Assessment = Preliminary assessment 10%; Final assessment 90%; Preliminary assessment Co-ordination Team 90%; Presentation Commission 10%; Final assessment Co-ordination Team 70%; Technical Commission 15%; Presentation Commission 15%.
9. No.

Informatics Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Analysis Mathematics I	7.0	Digital Systems	6.0
	Introduction to Informatics	6.0	Analysis Mathematics II	7.0
	Computing Logic	7.0	Computer Architecture	6.0
	Linear Algebra	6.0	Programming Methodologies I	7.0
	Portuguese Language and Communication	4.0	Portuguese Language and Communication I	4.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Statistical Methods	6.0	Numeric Methods	6.0
	Methodologies of Programming II	7.0	Data Transmission	7.0
	Operative Systems	7.0	Methodologies of Programming III	7.0
	Discrete Mathematics	7.0	Information Systems	7.0
	English and Techniques of Communication II	3.0	English and Techniques of Communication III	3.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	Methodologies of Programming IV	6.0	Analysis of Industrial Costs	3.0
	Data Base	7.0	Methodologies of Programming V	6.0
	Computer Networks I	7.0	Data Bases Advanced Techniques	7.0
	Human-computer Interface	7.0	Computer Networks II	7.0
	History and Sociology of the Computation	3.0	Software Engineering	7.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	Sign Digital Processing	7.0	Project II	8.0
	Computer Graphics	7.0	Digital Image Processing	7.0
	Project I	8.0	Intelligent Systems	7.0
	Applied Computation to Network I	8.0	Applied Computation to Network II	8.0
	Total29	30.0	Total	30.0
5th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Period of Training	24.0	Period of Training	24.0
	Optional I	6.0	Optional II	6.0
	Total	30.0	Total	30.0

Total study credits: 300

1st year

1. Introduction to Informatics - 1787.
2. Introduction: to Computational Systems. Identification of the physical components of a computer. Basic concepts of Operating Systems. Basic concepts of the management of work environments. Interaction with Grafic interfaces. Most usual applications (such as. “browser”, text processor, work sheet). Algorithms and problem solving. Introduction to Computer Programming. Examples using several languages.
3a) No prerequisites.
3b) The aim of the course is to provide the necessary knowledge to work with computer in a user logic.
3c) Azul, AA 2002 Introdução às Tecnologias de Informação, (Bloco 1) Porto Editora; Azul, AA 2002 Introdução às Tecnologias de Informação, (Bloco 2) Porto Editora; Stuart, R 1998 Microsoft Windows 98, Interactive Learning, Microsoft Press.
4. Compulsory.
5. João Barroso, Pedro Couto.
6. 4 h/week; 1st semester; 1st year.
7. Lectures and laboratories classes.
8. Practical Works 75%; Written test 25%
9. No.
10. 6.

1. Computing Logic - 1788.
2. Introduction: computing systems. Logic: history context, fundamentals, propositional logic, logic operations, logic operations proprieties, syllogism, paralogism and paradox. Algorithms: notion of algorithm, algorithmic language, methodology, data types, variables, expressions and basic operations. Decomposition of a problem. Global principles of structured programming, pseudo-code, flow chart and data dictionary. Decision structures: the selection from alternative actions (If-then-else), nested If's. A multiple selection structure - Case. Loops: conditional loops – Repeat ... until, loop-controlled input.
3a) No prerequisites.
3b) Give the student with problems analysis capability based in propositional logic principles. The solutions (sequences of commands) should be expressed in an algorithmic language.
3c) Tremblay JP et al. 1989 Introduction to Computer Science, McGraw Hill; Gottfried, BS 1984 Programação em Pascal, 2ª ed., McGraw Hill; Lloyd, JW Foundations of a Logic Programming, Springer-Verlag; Gallier, J 1986 Logic for Computer Science, John Wiley & Sons.
4. Compulsory.
5. Ramiro Manuel Gonçalves.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 1st year.
7. Lectures and laboratories.
8. Written test - 100%.
9. No.
10. 7.

1. Linear Algebra - 1789.
2. Binary relations, binary operations. Vector Spaces: Linear independence. Spanning sets. Basis and dimension. Vectorial subspace. Linear Mappings: the algebra of linear mappings. Kernel and image. Linear mappings whose domain is a vector space of finite dimension. Matrices: Matrix of a linear mapping relative to fixed basis Algebra of matrices. Invertible matrices. Rank of matrices. Systems of linear equations: matricial interpretation. A systematic method of solving systems of linear equations. Determinants: Basic concepts. Laplace theorem. Application to matrices and systems. Eigenvalues and Eigenvectors: Basic concepts. Inner product. External product.
3a) High-school Algebra.
3b) To provide the basic concepts of linear algebra useful for Informatics.
3c) Giraldes, Emília et al. 1995 Curso de Álgebra Linear e Geometria Analítica, McGraw-Hill; Blyth, TS & Robertson, EF 1986 Matrices and Vector Spaces, Chapman and Hall, London, NY; Blyth, TS & Robertson, EF 1994 Linear Algebra, Chapman and Hall, London, NY.
4. Compulsory.
5. Emília Giraldes, Paulo Vasco.
6. 5 h/week (3 theoretical + 2 theoretical/practical); 1st semester; 1st year.
7. Lectures and theoretical/practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Three written tests or final exam 100%.
9. No.
10. 6.

1. Analysis Mathematics I - 0174.
2. Functions of one variable: implicit and inverse functions; some special functions. Limits of functions and continuity: classification of discontinuity. Derivatives: higher order derivatives; implicit differentiation. Antiderivatives: techniques of integration. Rolle's theorem, Lagrange's theorem and Cauchy's theorem. L'Hopital's rule.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st vol., Weberand Schmidt; Apostol, TM 1967 Calculus, Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito, Maria Luís Vasco.
6. 5 h/week (2 theoretical + 3 theoretical/practical); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Two written assessments or final written exam - 100%.
9. No.
10. 7.

1. Portuguese Language and Communication I - 1790.
2. Language and communication – concepts and theories; The linguistic system – the codes of the written language and techniques of oral communication and argumentative expression; delivering dynamic presentations.
3a) No prerequisites.
3b) This course aims at the study of the expressive-communication process as a theoretical reflexon and a creative and interpretative textual pratice: 1) Developing the metalinguistic awareness; 2) Improving the performance of the mother-tongue.
3c) Rei, JE 1975 Curso de Redacção I A Frase e II O Texto, Porto, Porto Editora; Archand, R & Bourbeau, N 1998 La Communication Éficace. De l'intention aaux moyens d'expression, Bruxelles, De Boeck Université; Weston, A 1996 A Arte de Argumentar, Lisboa, Gradiva.
4. Compulsory.
5. J. Esteves Rei.
6. 4 h/week; 1st semester; 1st year.
7. Lectures and practical classes.
8. Reports produced during the classes; final examination.
9. No.
10. 4.

1. Computer Architecture - 0988.
2. Introduction: key-words; microprocessor general description; CPU architecture; computer architecture; instructions format and processing; Z80 architecture. Assembly programming: programming structure; pseudo-instructions; assembly programming; assembler; loaders; macros. Assembly instructions set: symbolic instructions format; flags; addressing modes; instructions; stack; subroutines; parameter passing. Input/ output: addressing maps; interfaces; type of interfaces. Interrupts: general considerations; Z80 interrupts.
3a) No prerequisites.
3b) To learn the fundamental concepts related with the functioning of the computer, such as: Microprocessor structure and organisation; Processor interface and I/O devices; Assembly language methodology.
3c) Wakerly, JF 1989 Microcomputer Architecture and Programming - The 68000 Family, John Wiley & Sons, Inc.; Tanenbaum, AS 1989 Structured Computer Organization, 3rd ed., Prentice Hall International Editions.
4. Compulsory.
5. Manuel Cabral Reis, António Soares.
6. 4 h/week (2 theoretical + 2 theoretical/practical), 2nd semester, 1st year.
7. Lectures and theoretical/practical classes.
8. Final exam.
9. No.
10. 6.

1. Programming Methodologies I - 1791.
2. Introduction: software engineering. Algorithms: notion of algorithm, algorithmic language, methodology, data types, variables, expressions and basic operations. Decomposition of a problem. Decision structures: the selection from alternative actions (If-then-else, nested If's). A multiple selection structure - Case. Loops: conditional loops – Repeat ... until, loop-controlled input, counted loops - For... to... do, nested loops. Sub-algorithms: functions and procedures, argument-parameter correspondence. Arrays: of one, two and higher dimensions. Sort and search using arrays. Recursive algorithms.
3a) No prerequisites.
3b) The aim of the course is to provide the necessary framework concerning the formalisation of solution of problems of reduced complexity. The solutions (sequences of commands) should be expressed in an algorithmic description and implemented in a structured programming language (Pascal has been adopted for this course).
3c) Tremblay JP et al. 1989 Introduction to Computer Science, McGraw Hill; Gottfried, BS 1994 Programação em Pascal, 2ª ed., McGraw Hill; Guerreiro, P 2002 Pascal - Técnicas de Programação, FCA; Wirth, N 1989 Algoritmos e Estruturas de Dados, Prentice-Hall, Brasil.
4. Compulsory.
5. Ramiro Manuel Gonçalves.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 1st year.
7. Lectures and laboratories.
8. Written test - 100%.
9. No.
10. 7.

1. Digital Systems - 0131.
2. Numeric systems and arithmetic. Boolean Algebra. Karnaugh Maps. Digital integrated circuits and logic families. Combinational circuits. Programmable devices. Synchronous and asynchronous sequential circuits. Memory devices
3a) Algebra.
3b) To introduce students to the digital systems, their principles and applications.
3c) Wakerly, JF 2002 Digital Design: Principles and Practices and Xilinx 4.2i Student Package, 3rd ed., Prentice Hall; Sandige, RS 2001 Digital Design Essentials and Xilinx 4.2i Package, Prentice Hall; Leach, DP & Malvino, A 1994 Digital Principles and Applications, McGraw-Hill; Mano, M 2000 Logic and Computer Design Fundamentals and Xilinx 4.2i, Prentice Hall.
4. Compulsory.
5. Luís José Calçada Torres Pereira.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures, practical classes and laboratories.
8. Final exam - 70%. Two written individual papers each - 11.25%. Laboratory classes evaluation - 7.5%.
9. No.
10. 6.

1. Analysis Mathematics II - 0178.
2. Taylor's formula . Integration: the definite integral. Applications of Integration. Improper Integrals. Sequences of real numbers: bounded and monotonic sequences. Series: series with nonnegative terms : comparison tests, the integral test, the ratio and root tests; absolute convergence - alternating series. Power series: expansion of functions; differentiation and integration of power series; Taylor and Maclaurin series.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st vol., Weberand Schmidt; Apostol, TM 1967 Calculus, Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito, Maria Luís Vasco.
6. 5 h/week (2 theoretical + 3 theoretical/practical); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Two written assessments or final written exam - 100%.
9. No.
10. 7.

1. English and Communication techniques I - 1792.
2. Exchanging technical information, describing a process, technical vocabulary, reading comprehension, Sequencing instructions, extracting meaning from context.
3a) Pre-intermediate knowledge of English grammar, sentence structure and vocabulary
3b) This course is designed to meet the language needs of students studying I.T. by providing them with the necessary language framework needed to understand technical texts as well as communicate with a functional level of English.
3c) Glendinninng, E & McEwan, J 2002 Oxford English for Information Technology, Oxford University Press; Esteras, R 2003 Infotech English for computer users, Cambridge, 3rd ed.; Hall, N & Shepheard, J 1995 The Anti-Grammar Grammar Book, Longman 5th ed.; Murphy, R 1987 English Grammar In Use, Cambridge University Press. Como fontes adicionais de material, a Internet e vários jornais e revistas.
5. Paul Driver.
6. 3 h/week ; 2nd semester ,1st year.
7. Lectures, communication activities, reading/listening comprehensions.
8. Final exam (80%) plus Interview (20%).
9.Yes, English.
10. 4.

2nd year

1. Methodologies of Programming II - 1793.
2. Recursivity. Types of abstracts data. Lists. Stacks. Queue. Symbolic tables. Trees and graphs. Application examples.
3a) No prerequisites.
3b) To endow the student with basic knowledge of programming.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 2nd year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 6.

1. Operative Systems - 1794.
2. Basic beginnings of operative systems. Competition of processes. Stagger of processes. Virtual memory. Administration of the devices. Safety and protection. Administration of file systems. Systems in real time. Application examples.
3a) No prerequisites.
3b) Approach the organisations, components and characteristics of an operative system. Administration of resources and processes, storage systems and transmission of information. Safety and fiability of the systems. Configuration and administration of systems of small, average and great dimension.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 2nd year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 6.

1. Discrete Mathematics - 1795.
2. Set theory: definitions, notation, operations and properties, Venn diagrams, duality, set family, power set. Counting: basic counting techniques, elementary probability, inclusion-exclusion principle and binomial methods, counting and partitions, pigeon hole principle. Elementary logic: informal introduction, prepositional calculus, methods of proof, duality. Relations: relations, diagraphs and graphs, matrix representation, equivalence relations and partitions, The division algorithm and Z(p). Induction and recursion: loop invariants, mathematical induction, recursive definitions, recurrence relations, the Euclidean algorithm. Graph theory: terminology and examples, particular cases, connectivity, matrix representation and properties, graph isomorphism, Euler graphs, Hamilton graphs, plan graphs, Kuratowski theorem, Euler formula for plan graphs. Trees: characterisation, trees spanned by graphs, binary trees and crossing types, tree isomorphism, weighted graphs, flow networks.
3a) Knowledge of Linear Algebra.
3b) Rigorous and formal approach of the program topics in view to develop on the students a mathematical way of thinking, and equip the same students with the capacity to read, understand and construct mathematical arguments, which occur namely in the proofs of propositions. A second objective of the course is to develop capacities to deal and represent discrete data and its relations using abstract data types.
3c) Ross, KA & Wright, CRB 1992 Discrete Mathematics, 3rd ed., Prentice Hall, London; Garnier, R & J Taylor, J Discrete Mathematics for new technology, 2nd ed., IOP (Institute of Physics), London (não disponível); Balakrishan, VK Introductory Discrete Mathematics, Dover Publications, Inc., NY (não disponível); Johnsonbaugh, R. Discrete Mathematics, 5th ed., Prentice Hall, London (não disponível).
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis.
6. 5 h/week (2 theoretical + 3 theoretical/practical); 1st semester; 2nd year.
7. Lectures and theoretical/practical classes.
8. Final exam.
9. No.
10. 6.

1. Statistical Methods - 0008.
2. Theory of the probabilities. Real random variables. Theoretical distributions. Statistical inference. Estimate of parameters. Application examples.
3a) No prerequisites.
3b) To endow the competence student in the use of statistical techniques, with emphasis in discreet probabilities.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 2nd year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 5.

1. English and Techniques of Communication II -1796.
2. Practice of the composition in English language. Structure of documents. Subjects of translation English/Portuguese. Syntax, semantics and pragmatic of English. The documentation conception in English.
3a) No prerequisites.
3b) To increase in the student the domain of the English language, with emphasis in the written language.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 2 h/week; 1st semester; 2nd year.
7. Theoretical-practical classes.
8. Not defined.
9. No.
10. 2.

1. Methodologies of Programming III - 1797.
2. Paradigm of the guided programming the objects. Classes and instances. Inheritance. Polimorfism. Analysis, drawing and implementation of guided objects systems. Design patterns. Programming based on events (event-driven programming). The interface with the user.
3a) No prerequisites.
3b) To endow the students of competencies in programming object oriented.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 2nd year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 6.

1. Information Systems - 1798.
2. Information systems and Informatics. History of the systems of bases of data. Components of a system of base of data. Functions of a system of administration of base of data (DBMS). Architecture of a system of base of data. Independence of the data. Recent developments (hypertext, hypermedia and multimedia). application examples.
3a) No prerequisites.
3b) To endow the student with the understanding of the fundamental concepts of systems of information and of his/her relationship with the informatics systems. To touch the student for recent developments and their applications.
3c) Not defined.
4. Compulsory
5. Staff Department.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 2nd year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 6.

1. Data Transmission - 0726.
2. Waiting lists. Nets of computers. Models OSI and TCP/IP. Transmission Models. Codes. Logical connection. I control of mistake, I control of flow, HDLC. Local nets. Area nets more enlarged. Transport protocols. Programming using sockets.
3a) No prerequisites.
3b) To present the constituent elements of a system of communication of data, familiarising the student with models and standard. To endow the competence student in the sockets use.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 2nd year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 6.

1. Numeric Methods - 0130.
2. Mistakes. Numeric solutions of equations with a lineal variable. Systems and own values. No-lineal systems. Interpolation polynomial. Differentiation and numeric integration. Numeric resolution of differential equations.
3a) No prerequisites.
3b) To endow the sensibility student and competencies in the numeric resolution of problems.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 2nd year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 5.

1. English and Techniques of Communication III - 1799.
2. Practice of oral communication in English language. Structure of support documents for the orality. Translation subjects and interpretation English /Portuguese. The conception of oral communications in English language (glimpsed, report). The semiotics while communication space.
3a) No prerequisites.
3b) To increase in the student the domain of the English language, with emphasis in the oral communication. Development of capacities of symbolic communication, as vehicle of support of the ideas (multimedia).
3c)
4. Compulsory.
5. Staff Department.
6. 2 h/week; 2nd semester; 2nd year.
7. Theoretical/practical classes.
8.
9. No.
10. 2.

3rd year

1. Methodologies of Programming IV - 1800.
2. History and analysis of the programming languages. Virtual machines. Introduction to the translation of languages. Systems of translation of languages. Types and tipped systems. Models of I control of execution. Declarations, modularity and administration of memory. Semantics of the programming languages. Paradigms of functional programming. The programming paradigm guided for objects. The parallelism in the programming languages.
3a) No prerequisites.
3b) To endow the student with knowledge and competencies enlarged in the area of programming languages.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Not defined.
9. No.
10. 6.

1. Data Bases -1801.
2. Systems of data bases. Data modelling. The relational model. Query languages. I draw and implementation of bases of data relates.
3a) No prerequisites.
3b) To endow the student with competence in the analysis, drawing and implementation of systems of bases of data.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 6 h/week (2 theoretical + 4 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Not defined.
9. No.
10. 7.

1. Computer Networks I - 1802.
2. Typology of nets. Planning and project of nets. Communication of nets. Analysis of acting of nets. Simulation. Distributed applications.
3a) No prerequisites.
3b) To endow the student with knowledge and basic competencies in the project area and analysis of acting of nets of computers.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 6 h/week (2 theoretical + 4 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Not defined.
9. No.
10. 7.

1. Human-Computer Interface - 1803.
2. Beginnings of interaction Human/computer. The modelling of the user. Interaction. Systems managers of windows. Systems of help. Evaluation techniques. The ergonomics of the interfaces with the user. The people's problem with special needs.
Computational supports to the collaborative work.
3a) No prerequisites.
3b) To endow the student of a solid and including formation in the area of interface Human/computer, with emphasis in the drawing and implementation of interfaces.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Not defined.
9. No.
10. 7.

1. History and Sociology of the Computation - 1804.
2. History of the computation. Social context. Ethical and professional responsibility. Risks and professional responsibility. Intellectual property. Privacy and legislation. Social implications of the Internet. Informatics crime. Economics subjects. Philosophical beginnings of the ethics.
3a) No prerequisites.
3b) To touch the student for social and ethical aspects of the profession.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 2 h/week; 1st semester; 3rd year.
7. Lectures classes.
8. Not defined.
9. No.
10. 3.

1. Methodologies of Programming V -1805.
2. Beginnings of analysis of algorithms. Algorithmic strategies. Algorithms. Fundamental of computation. Distributed algorithms. Theory of the computability. Cryptography. Application examples.
3a) No prerequisites.
3b) To endow the student of fundamental theoretical knowledge in sciences of the computation.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Not defined.
9. No.
10. 6.

1. Data Bases Advanced Techniques - 1806.
2. Data bases distributed. Advanced drawing of data bases relates. Systems of geographical information (SIG). Data warehouses. Data mining. Analysis multidimensional of data (OLAP). Applications.
3a) No prerequisites.
3b) To endow the student with knowledge and competencies in advanced themes of data bases, namely SIG, data warehouse, data mining, analysis multidimensional of data (OLAP).
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 6 h/week (2 theoretical + 4 practical); 2nd semester; 3rd year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 7.

1. Computer Networks II - 1807.
2. Users administration and resources (hardware and software). Data center. Safety and fiability.
3a) No prerequisites.
3b) To endow the student with knowledge and competencies in the area of integrated administration of nets of computers.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 5 h/week (2 theoretical + 3 practical); 2nd semester; 3rd year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 7.

1. Software Engineering - 1808.
2. Processes and metric of software. Specifications and requirements. Conception and implementation. Verification and validation. Tools and atmospheres. Methodologies of software project. Application examples.
3a) No prerequisites.
3b) To endow the student with knowledge and competencies in the area of software engineering.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 6 h/week (2 theoretical + 4 practical); 2nd semester; 3rd year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 7.

1. Analysis of Industrial Costs - 0979.
2. Economic selection of alternatives. Economic evaluation of projects. Effect of variable conditions in the costs and profits. Application examples.
3a) No prerequisites.
3b) To endow the student with sensibility for the area of analysis of industrial costs, namely focusing the analysis of costs in computer science projects.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 2 h/week; 2nd semester; 3rd year.
7. Lectures classes.
8. Not defined.
9. No.
10. 3.

4th year

1. Apprenticeship.
2. The apprenticeship should include the approach of a problem real, whenever possible framed in a business atmosphere.
3a) No prerequisites.
3b) To provide to the student a vocational experience, developing his/her capacity to relate with other professionals, preferentially in business atmosphere.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 16 h/week; annual; 5th year.
7. Lectures/practical classes.
8. Not defined.
9. No.
10. 24.

1. Option I - 1813.
2.
3a) No prerequisites.
3b) To endow the student with advanced knowledge and competencies in a specific area.
3c) Not defined.
4. Optional.
5. Staff Department.
6. 6 h/week (2 theoretical + 4 practical); 1st semester; 5th year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 8.

1. Option II -1814.
2.
3a) No prerequisites.
3b) To endow the student with advanced knowledge and competencies in a specific area.
3c) Not defined.
4. Optional.
5. Staff Department.
6. 6 h/week (2 theoretical + 4 practical); 2nd semester; 5th year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 8.

5th year

1. Apprenticeship.
2. The apprenticeship should include the approach of a problem real, whenever possible framed in a business atmosphere.
3a) No prerequisites.
3b) To provide to the student a vocational experience, developing his/her capacity to relate with other professionals, preferentially in business atmosphere.
3c) Not defined.
4. Compulsory.
5. Staff Department.
6. 16 h/week; annual; 5th year.
7. Lectures/practical classes.
8. Not defined.
9. No.
10. 24.

1. Option I - 1813.
2.
3a) No prerequisites.
3b) To endow the student with advanced knowledge and competencies in a specific area.
3c) Not defined.
4. Optional.
5. Staff Department.
6. 6 h/week (2 theoretical + 4 practical); 1st semester; 5th year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 8.

1. Option II -1814.
2.
3a) No prerequisites.
3b) To endow the student with advanced knowledge and competencies in a specific area.
3c) Not defined.
4. Optional.
5. Staff Department.
6. 6 h/week (2 theoretical + 4 practical); 2nd semester; 5th year.
7. Lectures and practical (laboratories) classes.
8. Not defined.
9. No.
10. 8.

Financial Mathematics

Programme of Studies

1st	1st Semester	ECTS	2nd Semester	ECTS
Y	Infinitesimal Analysis I	8.0	Infinitesimal Analysis II	8.0
E	Fundamental Aspects of Mathematics	6.0	Geometry	6.0
A	Introduction to Computing	6.0	Programming Methods	6.0
R	Linear Algebra	8.0	Linear Algebra	8.0
	English as a Foreign Language	3.0		
	Total	31.0	Total	28.0
2nd	1st Semester	ECTS	2nd Semester	ECTS
Y	Numerical Analysis	8.0	Differential Equations	5.0
E	Infinitesimal Analysis III	8.0	Infinitesimal Analysis IV	8.0
A	Algebra I	8.0	Algebra II	8.0
R	Linear Programming	5.0	Probability	8.0
	Total	29.0	Total	29.0
3rd	1st Semester	ECTS	2nd Semester	ECTS
Y	Introductory Economics	6.0	Operational Research	5.0
E	Advanced Analysis	8.0	Financial calculus	6.0
A	Applied Statistics	8.0	Actuarial Mathematics I	7.0
R	Accounting I	6.0	Accounting II	6.0
	Business Organisation I	6.0	Business Organisation II	6.0
	Total	34.0	Total	30.0
4th	1st Semester	ECTS	2nd Semester	ECTS
Y	Actuarial Mathematics II	7.0	Applied Econometrics	7.0
E	Stochastic Processes	7.0	Investment Analysis	7.0
A	Risk Theory	7.0	Investments Fund Management	7.0
R	Capital Markets	7.0	Management Information System	5.0
	Data Base	5.0	Seminar/Professional Placement	
	Total	33.0	Total	26

Total of credits: 240

1st year.

1. Infinitesimal Analysis I - 0423
2. Topological notions of the real line. Sequences of real numbers: monotic sequences, bounded sequences, sequences of Cauchy. Series: series with nonnegative terms, comparison test, test of Cauchy, test of d'Alembert and test of Raabe. Alternating series: test of Leibnitz. Absolute converge and simple converge. Functions of one variable: implicit and inverse functions; some special functions and its inverses. Limits and continuity of functions: classification of discontinuity; uniformly continuity.
3a) High-school Mathematical Analysis.
3b) To provide the elementary theory of calculus. To lead mathematics students to think about mathematical theorems, its proofs and criticise them.
3c) Carvalho e Silva, J 1994 " Princípios de Análise Matemática Aplicada ",McGraw Hill, Lisboa; Swokowski, EW 1979 " Calculus with Analytic Geometry ", 1st Vol.,Weberand Schmidt; Apostol, TM 1967 " Calculus ", 1st Vol.,Wiley International Edition.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino, Isabel Alexandra da Silva Vaz Nicolau.
6. 6h/week; (3T + 3TP); 1st semester; 1st year.
7. Lectures and practical classes.Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 8 0.

1. Aspects Fundamental of Mathematics - 1665.
2. Logic (propositional calculus and predicate calculus); Methods of mathematical proof; Sets and Functions; Finite sets; Countable infinite sets and uncountable sets.
3a) High-school Mathematics.
3b) Introduction to abstract mathematics, furnishing the mathematical tools which shell be needed to future studies with abstract axiomatic orientation.
3c) Lima, EL 1976 Curso de Análise (Vol 1), Instituto da Matemática Pura e Aplicada, CNPq, Rio de Janeiro; Kenneth, AR 1992 Discrete Mathematics, Prentice Hall, Englewood Cliffs, New Jersey, 07632; Morash, RP 1991 Bridge to Abstract Mathematics: Mathematical Proof and Structures, 2nd edition, McGraw-Hill, New York.
4. Compulsory.
5. Emília Giraldes, Paulo Vasco.
6. 4,5h/week; (3T + 1,5P); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Three written tests or final exam 100%.
9. No.
10. 6.0.

1. Introduction to Computing - 1666
2. History of computers, and its industry. Security of computing systems. Type of computers (size, utility, and analogic/digital). Internal functioning of the computers. Initialisation and terminus. Communicating with the computer. Storage. Communicating the results. Software. Codification and number systems. Networks and communications. Problem solving. Operating system Windows. The wordprocessor Word. The spreadsheet Excel. Powerpoint. Email tool and internet browser. Elaboration of web pages: design, HTML programming, and Frontpage.
3a) No prerequesites.
3b) To acquaint students with the information technology language. To be able to use everyday software, such as wordprocessors, spreadsheets, presentation software, networking software. To introduce students to problem solving.
3c) Azevedo Perdicoúlis T-P 2002 Introdução às tecnologias da informação. Série Didáctica, Ciências Aplicadas, UTAD, Vila Real.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis, Luis Magalhães.
6. 5 hours/week; (2L, 3T); 1st semester; 1st year.
7. Lectures and tutorials.
8. Final exame 85% + project 15%.
9. Not offered in any other languages.
10. 6.0.

1. Linear Algebra I - 1667
2. Operations and algebraic structures. Vectorial spaces: Linear dependence and independence. Basis and dimension. Vectorial subspaces. Linear applications: Kernel and image subspaces of a linear application. Matrices: Matrix of a linear application between vectorial spaces of finite dimension. Invertible matrices. Characteristic of a matrix. Change of basis matrix. Sistems of linear equations: Discussion and resolution of systems of linear equations. Matrices inversions, using matrix resolution of a system of linear equations. Determinants: Laplace theorem. Aplications
3a) No prerequisite.
3b) Students should get concepts, technics and reasonings fundamentals in the Linear Algebra, according to the syllabus
3c) Giraldes, E, Fernandes, V and Smith, P 1995 Curso de Álgebra Linear e Geometria Analítica, Lisboa, McGraw-Hill; Agudo, F 1992 Introdução à Álgebra Linear e Geometria Analítica, Livraria Escola Editora; Cohn, P 1994 Elements of Linear Algebra, Londres, Chapman and Hall.
4. Compulsory.
5. Luís Roçadas.
6. 6h/week; (3T + 3TP); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam (100%) .
9. No.
10. 8.0.

1. English as a Foreign Language - 1668
2. Exchanging personal information, sentence structure (positve/negative/interrogative, basic tenses, vocabulary, reading comprehension, prepositions, extracting meaning from context.
3a) Pre-intermediate knowledge of English grammar, sentence structure and vocabulary
3b) This course is designed to meet the needs of students by providing them with the language framework needed to understand and communicate in written and spoken English of a functional level.
3c) Blackie, D 1982 English for Basic Maths (Nelson); Remacha E 2003 Infotech English for computer users (Cambridge, 3rd edition); Hall, N and Shepheard, J 1995 The Anti-Grammar Grammar Book (Longman 5th Edition); Murphy, R 1987 English Grammar In Use (Cambridge University Press).In addition the internet, various journals and newspapers will be used as sources of material.
4. Compulsory.
5. Paul Driver.
6. 2h/week; 1st year, 1st semester.
7. Lectures, communication activities, reading/listening comprehension, grammar exercises, oral presentations.
8. Final exam .
9. Yes, English.
10. 3.0.

1. Infinitesimal Analysis II - 0488
2. Derivatives: higher order derivatives; implicit differentiation. Rolle's theorem, Lagrange's theorem and Cauchy's theorem for differentials functions. L'Hopital's rule. Taylor's formula. Antiderivatives: techniques of integration. Integration: the definite integral; applications of integration: the area between two curves, the volume of a solid of revolution and length of a curve. Polar and parametric coordinates. Improper integrals. Power series: expansion of function; differentiation and integration of power series; Taylor and MacLaurin series.
3a) High-school Mathematical Analysis.
3b) To provide the elementary theory of calculus. To lead mathematics students to think about mathematical theorems, its proofs and criticise them.
3c) Carvalho e Silva, J 1994 " Princípios de Análise Matemática Aplicada ", McGraw Hill, Lisboa; Swokowski, EW 1979 " Calculus with Analytic Geometry ", 1st Vol., Weberand Schmidt. Apostol, TM 1967 " Calculus ", 1st Vol.,Wiley International Edition.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino, Isabel Alexandra da Silva Vaz Nicolau.
6. 6h/week; (3T + 3TP); 2 nd semester; 1st year.
7. Lectures and practical classes.Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 8.0.

1. Geometry - 0494
2. Affine Spaces: basic concepts. Vectorial equations of affine subspaces with finite dimension. Paralelism of affine subspaces. Metric geometry. Euclidean Spaces with dimension 3: external product. Homomorphism from Euclidean Space to itself.
3a) High-school algebra.
3b) To provide fundamental concepts about affine spaces and euclidean affine spaces.
3c) Agudo, FRD 1992 " Introdução à Álgebra Linear e Geometria Analítica ", Livraria Escolar Editora, Lisboa; Giraldes, E, Fernandes, VH and Smith, MP 1995 " Curso de Álgebra Linear e Geometria Analítica ", McGraw-Hill; Monteiro, A 2001 " Álgebra Linear e Geometria Analítica ", McGraw-Hill.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino, Paulo José Martins Vasco.
6. 4,5h/week; (3T + 1,5TP); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam-100%.
9. No.
10. 6.0.

1. Programming Methods - 1669
2. Problem solving. Introduction to Pascal. The programming environment Turbo Pascal. Structures of selection. Structures of repetition. Simple data types. Functions, procedures, and graphics. Arrays.
3a) Basic notions of Linear Algebra, and punctually would be desirable some knowledge of discrete mathematics.
3b) To develop the capacity of problem solving and algorithm construction. To reinforce an adequate decision on data structures. To be able to distinguish concepts such as semantic and sintaxe. To develop programs in Pascal.
3c) Koffman, EB 1998 Turbo Pascal — 5th edition. Addison Wesley Longman, Inc. ISBN 0-201-35086-6.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis, Luis Magalhães.
6. 5h/week; (2L + 3T); 2nd semester;1st year.
7.Lectures and tutorials.
8 . Final exame 75% + project 25%.
9. Not offered in any other languages.
10. 6.0.

1. Linear Algebra II - 1670
2. Eigenvalues and Eigenvectors. Dual Space. Bilinear mappings. Bilinear forms. Quadratic forms. Sesquilinears mappings. Sesquilineares forms. Inner product. Euclidean Spaces. Unitary Spaces. Analytic Geometry. Quadrics.
3a) High-school algebra.
3b) To provide fundamental concepts about euclidean spaces and unitary spaces and background in geometric problems related with bidimensinal space and also tridimensional space.
3c) Agudo, FRD 1992 " Introdução à Álgebra Linear e Geometria Analítica ", Livraria Escolar Editora, Lisboa; Giraldes, E, Fernandes, VH and Smith, MP 1995 " Curso de Álgebra Linear e Geometria Analítica ", McGraw-Hill; Monteiro, A 2001 " Álgebra Linear e Geometria Analítica ", McGraw-Hill.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino, André Gama Oliveira.
6. 6h/week (3T + 3TP); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam-100%.
9. No.
10. 8 0.

2nd year

1. Numerical Analysis - 0163
2. Error theory. Conditioning of a mathematical problem. Stability of a numerical method. Numerical solution of nonlinear equations. Numerical solution of a system of linear equations. Polinomial interpolation. Least squares approximation. Numerical differentiation and integration. Numerical methods for ordinary differential equations with initial condition.
3a) Basic knowledge of Calculus, and preferably some programming knowledge in a high level language. Useful would also be some knowledge in matrices algebra and differential equations, however this background will be provided to the students during the course.
3b) To introduce students to approximation techniques, explaining when and why they are expected to work. To supply the students with good background which will enable them to further studies in the field of Numerical Analysis. To learn how to identify standard problems which require a numerical solution. To observe some examples of error propagation as a consequence of the application of numerical techniques. To determine, with good precision, a numerical solutions of problems whose solution cannot be obtained otherwise.
3c) Burden, RL and Faires, JD 1993 Numerical Analysis—5th edition. PWS Publishing Co, Boston. ISBN 0-534-93219-3; Ferreira, JA and Patrício, MF 1998/1999 Análise Numérica—Textos de Apoio. FCTUC, Dep. Matemática.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis, Luisa Morgado.
6. 6h/week (3L + 3T); 1st semester; 2nd year.
7. Lectures and tutorials.
8. Final exam.
9. Course not offered in any other language other than Portuguese.
10. 8.0.

1. Infinitesimal Analysis III - 0490
2. Some of the classical material of a first course in differential calculus of functions of several variables: topology of the euclidian space R^n; sequences in R^n; compactness; limits, continuity and differentiation of functions $f : D \subset R^n \to R^m$.
3a) A good knowledge in differential calculus and basic properties of functions of a single real variable and a basic course in linear algebra and analytic geometry.
3b) To provide a solid background in the differential calculus of functions of several variables and to develop the students' ability to prove results using rigorous reasoning as well as the capability to make use of the theorems in the solution of concrete problems (examples).
3c) Dias Agudo, FR 1989 Análise Real, vol. I, Escolar Editora (Lisboa); Lima, EL 1981 Curso de Análise, vol. 2, Projecto Euclides, Instituto de Matemática Pura e Aplicada, Rio de Janeiro; Marsden, JE and Hofman, MJ 1974 Elementary Classical Analysis, Freedman and Company, New York.
4. Compulsory
5. José Luis S. Cardoso.
6. 3h/Week; (3T + 3TP); 1st semester; 2nd year.
7. Theoretical and Practical Classes.
8. Final exam.
9. No.
10. 8.0.

1. Algebra I - 0492.
2. Generalities in groupoids. Groups: Generalities. Integers modulo n. Congruences in groups. Normal subgroups. Quotient groups. Morphism. The fundamental homomorphism theorem and isomorphism theorems. Cyclic groups. Finite Symmetric group. Cayley's theorem. Rings: Generalities. Divisors of zero. Integral Domains. Invertible elements. Fields. Characteristic. Congruences on rings. Ideals. Quotient ring Morphisms. The fundamental homomorphism theorem and isomorphism theorems.
3a) High-school Algebra.
3b) To provide some basic concepts of groups and rings.
3c) Durbin, JC 1985 Modern Algebra. An Introduction. Jonh Wyley and Sons, New York; Allenby, R and Rings, BJT. 1983 Fields and Groups. An Introdution to Abstract Algebra. Eduard Arnold; Monteiro, AJ and Matos, IT 1995 Álgebra – Um Primeiro Curso.
4. Compulsory.
5. Emília Giraldes, Luís Roçadas.
6. 6h/week (3T + 3P); 1st semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Three written tests or final exam 100%.
9. No.
10. 8.0.

1. Linear Programming – 1671
2. The role and the objectives of the Operations Research (OR) and the Introdution to Linear Programming (LP) Formulating LP Problems (LPP). Geometrically Solving LPP. Introdution to Convex Linear Algebra Fundamental Properties of LPP. Solving LPP: The Simplex Method. Solving LP Problems with Other Model Forms: The Big-M Method and the Penalty Method. Compatibility and Redundancy in LPP. Degeneracy LPP. Introdution to Duality in LP. Fundamental Properties of Dual LPP. Sensitivity Analysis in LP Problems.
3a) Linear Algebra I.
3b) Students should be able to identify PL Models and to use correct algoritms to solve those models. Learn the basic rules of a Written Work.
3c) Bazaraa, MS, Jarvis, JJ and. Sherali, HD 1990 Linear Programming and Network Flows. Jonh Wiley & Sons, EUA, 2. Ed.; Murty, KG 1983 Linear Programming. John Wiley & Sons., E.U.A., 2. Ed.; Ramalhete, M, Guerreiro, J and Magalhães, A 1984 Programação Linear. McGraw-Hill de Portugal, Lda., Vol. I.
4. Compulsory.
5. Maria Manuel da Silva Nascimento.
6. 4,5h/week (1,5T, 3TP); 1st semester; 2nd year.
7. Theoretical and Theoretical-Practical Classes.
8. 25% Written Work, Presentation, Oral Discution + 75% Final Written Examination.
9. No.
10. 5.0.

1. Differential Equations - 0326
2. Definitions and terminology. Classification of differential equations; initial value problems and boundary-value problems. Existence of a unique solution. First-order differential equations: separable variables; exact equations and integrating factors; linear equations and Bernoulli equations; solutions by substitutions. Applications of first-order equations: orthogonal and oblique trajectories; differential equations as mathematical models. Explicit methods of solving higher-order linear differential equations: homogeneous and nonhomogeneous equations; reduction of order; the homogeneous equations with constant coefficients; the method of undetermined coefficients; variation of parameters. Applications of second-order linear differential equations with constant coefficients.
3a) Familiarity with the basic definitions of Linear Algebra and calculus.
3b) To provide the basics methods for solving differential equations and to describe in mathematical terms the behavior of some real-life system or phenomenon, whether physical, sociological or economic.
3c) Braun, M 1984 Differential Equations and their Applications, 3ª edição, Springer-Verlag, New York; Bronson, R 1976 Moderna Introdução às Equações Diferenciais, Colecção Schaum, McGraw-Hill, Lisboa; Ferreira, MF 1995 Equações Diferenciais Ordinárias, Um primeiro curso com aplicações, McGraw-Hill, Lisboa; Ross, SH 1980 Introduction to Ordinary Differential Equations, 3ªedição; John Wiley & Sons, New-York; Zill, DG 1989 A First Course in Differential Equations with Applications, PWS-Kent Publishing Company, Boston.
4. Compulsory.
5. Sandra Isabel Ventura Ricardo
6. 5h/week (2T + 3TP); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 5.0.

1. Infinitesimal Analysis IV - 0491
2. Taylor's formula of a function of several variables. Extrema of real functions of several variables. Constrained extrema an Lagrange multipliers. Multiple integrals. The change of variables theorem and applications. Line integrals and surface integrals. Theorems of Green, Gauss and Stokes.
3a) A good knowledge in differential and integral calculus of one variable as well as those topics related to functions of several variables treated in Infinitesimal Analysis III.
3b) To give the students a solid background in the differential and integral calculus of functions of several variables.
3c) Dias Agudo, FR 1974 Análise Real, vol. I,II, 2ª edição, Escolar Editora ,Lisboa; Breda, A and Costa, JN 1996 Cálculo com Funções de Várias Variáveis, 1ª edição, McGraw-Hill International Editions; Lima, EL 1995 Curso de Análise, vol. 2, 4ª edição, Projecto Euclides, Instituto de Matemática Pura e Aplicada, Rio de Janeiro; Marsden, JE 1975 Elementary Classical Analysis, 2ª edição, Freedman and Company, New York; Marsden, JE and Tromba, AJ 1988 Vector Calculus, 3rd edition , W.H. Freeman and Company.
4. Compulsory.
5. Anabela Borges, Carlos Rito.
6. 6h/week; (3T + 3TP); 2nd semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written examination – 100%.
9. No.
10. 8.0.

1. Algebra II - 0493.
2. Integers:The Euclidean Algorithm. The Fundamental theorem of Arithmetic. Polynomials: The division Algorithm. Greatest common divisor. Factorization of Polynomials. Unique Factorization Domains. Quotient rings of F[x] (F corpo). Factorization and ideals. Field extensions. Polynomial equations: Roots of a polynomial. An Introdution to Galois Theory.An introduction to Lattices and Boolean Algebras.
3a)Good knowledge of Algebra I.
3b)To provide fundamental concepts about factorization in integral domains, Galois Theory and some basic concepts about lattices
3c) Durbin, JC 1985 Modern Algebra. An Introduction. Jonh Wyley and Sons, New York; Lang, S 1965 Algebra. Reading Manchets. Adition-Wyley; Monteiro, AJ and Matos, IT 1995 Álgebra – Um Primeiro Curso.
4. Compulsory.
5. Emília Giraldes, Paulo Vasco.
6. 6h/week; (3T + 3P); 2nd semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Three written tests or final exam 100%.
9. No.
10. 8.0.

1. Probability - 0496
2. An introduction to probability theory. Real random variables and probability laws. Real random vectors. Independence of real random variables.
3a) Infinitesimal Analysis (in \R and \Rn).
3b) The general target is to introduce the mathematics of randomness and to develop methods for calculating probabilities in practical situations.
3c) Gonçalves, E and Mendes Lopes N 2000 Probabilidades - Princípios Teóricos, Escolar Editora; Murteira, B 1990 Probabilidades e Estatística, vol. I, 2a edição revista, McGraw-Hill; Ross, SM 1987 Introduction to Probability and Statistics for Engineers and Scientists, Wiley, New York; Rohatgi, VK 1976 An Introduction to Probability Theory and Mathematical Statistics, Wiley, New York..
4. Compulsory.
5. Cristina Maria Tavares Martins, Maria de Fátima Monteiro Ferreira
6. 4,5h/week; (3T + 1,5TP); 2nd semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam.
9. No.
10. 8.0.

3rd year

1. Introductory Economics - 0364
2. Introduction to Market Economics (Supply and Demand Theories). Consumer Theory and Demand. Neo-classical Theory of the Firm. Market Structures (Perfect Competition; monopoly). The role of government in market economies.
3a) No pre-requisites
3b) To teach basic micro theory related with supply and demand, consumer and firm behaviour, and market structures.
3c) Neves, JLC 2001 Introdução à Economia. 6ª edição, Verbo, Lisboa; Mata, J 2000 Economia da Empresa. Fundação Calouste Gulbenkien, Lisboa. Ucha, I 2000 Introdução à Economia – Guia de Apoio à «Introdução à Economia» de João César das Neves - Sínteses, Exercícios e Soluções. 3ª edição, Verbo, Lisboa; Samuelson, PA. and Nordhaus, WD 1999 Economia. 16ª edição, McGraw-Hill de Portugal, Lisboa; Recommended books
4. Compulsory.
5. José Vaz Caldas.
6. 4.5h/week; 1st semester; 3rd year.
7. Theoretical and practical classes (3T + 1.5P).
8. Two midterms (or alternatively a final comprehensive exam).
9. No.
10. 6.0.

1. Advanced Analysis - 1672

2. Metric Spaces. Hölder and Minkowski's Inequalities. Some important examples: l^p, l ,s (sequences space), C[a,b] (space of continuous functions on [a,b]), B[a,b] (space of bounded functions on [a,b]), d (discrete metric space).

Topology in a metric space. Separable set. Separability of l^p e non-separability of l .

Sequences. Completeness of a metric space. Completeness of ^{n}, C^n, l , l^p, C[a,b] and of c (convergent squences space). Examples of incomplete metric spaces. Completion of a metric space.
Normed Spaces. Banach Spaces. Metric Induced by the norm. Further properties of metric spaces. Completion of a normed space. Finit dimensional normed spaces and subspaces. Compacteness and finite dimension. F. Riesz's lemma. Linear Operators. Bounded linear operators and continuous linear operators. Extension of a bounded linear operator. Linear Functionals. Algebraic dual. Linear operators and functionals on finite dimensional spaces. Normed space of operators. Dual Space. Dual spaces of ^{n}, C^n, l^1, l^p (1<p<∝).

Inner Product Spaces (pre-Hilbert) and Hilbert Spaces. Examples: ^{n}, C^n, L^2 [a,b], l^2. Examples of non pre-Hilbert spaces: C[a,b] e l^p (p 2). Parallelogram and Polarization Identities. Schwarz Inequality. Norm induced by a inner product. Completion of a inner product space.
3a) Some concepts of Linear Algebra are required.
3b) The purpuse of the book is to give some prepation in Functional Analysis important for applications.
3c) Erwin Kreyszig, Introductory Functional Analysis with Applications, John Wiley & Sons, 1989.
V.S. Sunder, Functional Analysis, Spectral Theory, Birkhäuser, Advanced Texts, 1997.
4. Compulsory
5. José Luis S. Cardoso.
6. 3h/Week; (3T + 3P); 1° Semester; 3th year.
7. Theoretical and Practical Classes.
8. Final exam.
9. No.
10. 8.0.

1. Applied Statistics - 1673
2. I - Descriptive and mathematical statistics - an introduction. II - Descriptive statistics: univariated and bivariated frequency distributions. III - Introduction to statistical inference: sample statistics and sampling distributions. IV - Parametric estimation: estimators and estimatives, confidence intervals. V - Tests of hypotheses: Neyman-Pearson tests, likelihood-ratio tests.
3a) Good knowledge on probability theory.
3b) To introduce the basic ideas and procedures of statistical analysis.
3c) Mood, AM, Graybill, F and. Boes, DC 1974 An Introduction to the Theory of Statistics, 3a ed., McGraw-Hill; Murteira, B 1990 Probabilidades e Estatística I, Vol. I, II, 2a edição revista, Mc Graw-Hill; Rohatgi, VK 1976 An Introduction to Probability Theory and Mathematical Statistics, Wiley; Saporta, G 1990 Probabilités, Analyse des Données et Statistique, Éd. Technip; Tassi, Ph. 1992 Méthodes Statistiques, Economica, Paris.
4. Compulsory.
5 Maria Emília de Mesquita Nogueira, Maria de Fátima Monteiro Ferreira.
6. 4,5h/week (3T + 1,5TP); 1st semester; 3thyear.
7. Lectures and practical classes.
8. final written exam 100%
9. No.
10. 8.0.

1. Accounting I - 1674
2. Introduction to the theory and practice of company accounting: assets and liabilities, wealth transactions, income statements, result determination, value added tax, tax benefits; revenue cycle. Detailed study of a general accounting plan: Portuguese accounting standardization, accounting principles the POC. The international normalization process: IASB and FASB context
3a) No prerequisite are required.
3b) At the end of semester students will be able to achieve gain a general understanding of financial and tax accounting according to national standards and law.
3c) Bento, J et al 1997 Plano Oficial de Contabilidade Explicado, Porto Editora; Borges, A and Ferrão, M 1995 Manual de Casos Práticos de Contabilidade, Rei dos Livros, Lisboa; Borges, A et al 1999 Elementos de Contabilidade Geral, Rei dos Livros, Lisboa; Costa, C and Alves, CG 1996 Contabilidade Financeira, Rei dos Livros, Lisboa.
4. Compulsory.
5. Prof. Carlos Machado Santos, Dra. Carmem Leal
6. 4,5H/week; 1st semester; 3thyear;
7. Lectures.
8. Written examination.
9. The answer will be given in face of each particular case.
10. 6.0.

1. Business Organisation I - 1675
2. Evolution of the Thought in Administration. The company and its atmosphere. Functions of Administration: Planeament, Organization, Leadership and Control. Innovation and Administration of the Change.
3a) Without prérequirement.
3b) The discipline intends to supply a solid base of knowledge, fundamental notions of the Administration, he wants through the theoretical concepts, he/she wants through illustrative practical cases of the subjects
3c) Teixeira, Sebastião (1998), Gestão das Organizações, McGrawHill, Lisboa
Stoner, J. A e Freeman, R.E. (1995), Admistração. Rio de Janeiro. Prentice Hall do Brasil.
Hampton, David R. (1992), Administração : Processos administrativos. São Paulo (Brasil), McGrawHill.
4. Compulsory.
5. Júlia Fragoso da Fonseca.
6. 4,5H/week; (3T + 1,5P); 1st Semester; 3rd year.
7. Lectures and practical classes. Adance in 2/3 of practical classes in compulsory.
8. Final Exam; Work; Reading records and presence in the classes.
9. No.
10. 6.0.

1. Operational Research - 0386
2. Introduction to Operational Research. Game theory: brief history. Game theory in Economics. Mathematical formulation of differential games. Continuous and discrete games. Optimal control theory: Pontrjagin´s principle. Open-loop and feedback Nash equilibria. Hierarquical differential games. Open-loop Stackelberg games. Linear quadratic games. Many examples of application to Economy.
3a) Good knowledge of Linear Algebra, Optimisation, Differential Equations, and Calculus III.
3b) To familiarise the students with optimisation problems with more than one optimisation agent, as well as with different optimality concepts. To acquaint the students with elementary control theory. To introduce the students to the formulation of classical problems in Economics in terms of differential games.
3c) Bagchi, A (Não disponível) Stackelberg Differential Games in Economic Models, Lecture Notes In Control and Information Sciences, Springer Verlag, 64; Başar, T and Olsder, GJ 1995 Dynamic Noncooperative Games Theory. Academic Press, London; Docker, E et al. 2000 Differential Games in Economics and Management Science. Cambridge University Press, Cambridge; Jank, G 2001 Introduction to non-cooperative dynamical game theory. Lecture notes. Dep. Matemática, FCTUC, Coimbra.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis, Manuela Rodrigues.
6. 4H/week; (2L + 2T); 2nd semester; 3rd year.
7. Lectures and tutorials.
8. Final exam.
9. Course not offered in any other language other than Portuguese.
10. 5.0.

1. Financial Calculus - 0641
2. Introductory concepts. Processes of capitalization and discount. Interest rates. Financial instruments of debt. loans amortization methods.
3a) Students are required to have a background on mathematics.
3b) The purpose of the discipline is to make students aware of the basic financial frameworks and techniques, which are crucial to understand the general evaluation of financial assets.
3c) Cadilhe, M 1993 “Matemática Financeira Aplicada”, 2ª Edição, Edições Asa, Porto; Nogueira, M and Santos, P 1993 “Cálculo Financeiro”, 7ª Edição, Lisboa, Texto Editora; Silva, AN 1993 “Matemática das Finanças I”, McGraw-Hill, Lisboa.
4. Compulsory.
5. Carlos Machado Santos.
6. 4,5H/week; 2nd semester; 3rd year
7. Lectures.
8. Written examination.
9. The answer will be given in face of each particular case.
10. 6.0.

1. Actuarial Mathematics I - 1676
2. Elementary notions of Financial Mathematics. Financial annuities. Actuarial Demography. Life annuities and Temporary annuities. Life Insurances. Life Insurances with returnable premiums. Mathematical Reserves. Ransom Value.
3a) Concepts of Probabilities and Mathematical Analysis.
3b) To form the student in a way to make him able to be an Actuary in Life Branch. The student should know several Life Insurances and he has to use the technical basis to compute the Premiums, Mathematical Reserves and Ransom Values.
3c) Bowers, NL, Gerber, HU, Hickman, JC, Jones, DA and Nesbitt, CJ 1986 “Actuarial Mathematics”. Itasca, Illinois: The Society of Actuaries; Gerber, HU 1997 “Life Insuranse Mathematics”. Springer Verlag; Neil, A 1992 “Life Contingencies”. London: Heineman.
4. Compulsory
5. Maria Manuela Reis, Pedro Barroso Magalhães.
6. 4,5h/week; (3 T + 1,5 TP); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. 2 written tests 80% and 1 practical work with discussion or a final written exam 100%.
9. No.
10. 7.0.

1. Accounting II - 1677
2. Review of Accounting I. Depreciations, stock evaluation, inventory, investments. Annual financial statements. Balance sheet and income statement: further elements of financial reporting.
3a) No pre-requisites are required.
3b) At the end of semester students will be able to prepare, read and understand the basic elements of financial statements.
3c) Bento, J et al 1997 Plano Oficial de Contabilidade Explicado, Porto Editora; Borges, A and Ferrão, M 1995 Manual de Casos Práticos de Contabilidade, Rei dos Livros, Lisboa; Borges, A et al 1999 Elementos de Contabilidade Geral, Rei dos Livros, Lisboa; Costa, C and Alves, CG 1996 Contabilidade Financeira, Rei dos Livros, Lisboa.
4. Compulsory.
5. Prof. Carlos Machado Santos; Dra. Carmem Leal.
6. 4,5h/week; 2nd semester; 3rd year.
7. Lectures.
8. Written examination.
9.The answer will be given in face of each particular case.
10. 6.0.

1. Business Organisation II - 1678
2. To provide the fundamental principles and basic notions of management and a perspective of the diverse management areas
3a) Sem pré-requisitos
3b) Information system, financial resources management, material resources management, Marketing; Human resources management
3c) Sousa, A 1990 Introdução à Gestão, Uma abordagem sistémica, Edições Verbo: Lisboa
4. Compulsory.
5. Ana Paula Rodrigues.
6. 4,5h/week; (3T + 1,5P); 2nd semester; 3rd year.
7. Lecture/Discussion/Exercises.
8. Written reports, participation in class, exam.
9. No.
10. 6.0.

4th year

1. Actuarial Mathematics II - 1679
2. The Social Security; Pensions Plans and Funds; Constitution of a Pensions Fund; Actuarial Evaluation of Responsibilities and Contributions; Financial Actuarial Methods; Defined Contribution Schemes; Pensions Funds Administration.
3a) Concepts of Probabilities and Mathematical Analysis.
3b) To complement the student's formation in a way to make him able to be an Actuary in Life Branch, initiated in Actuarial Mathematics I. The student should know several Life Insurances and he has to use the technical basis to compute the Premiums, Mathematical Reserves and Ransom Values.
3c) Bowers, NL, Gerber, HU, Hickman, JC, Jones, DA and Nesbitt, CJ 1986 "Actuarial Mathematics". Itasca, Illinois: The Society of Actuaries; Gerber, HU 1997 "Life Insuranse Mathematics". Springer Verlag; Neil, A 1992 "Life Contingencies". London: Heineman.
4. Compulsory
5. Maria Manuela Reis, Pedro Barroso Magalhães.
6. 4,5h/week (3 T + 1,5 TP); 1st semester; 4th year.
7. Lectures and practical classes.
8. 2 written tests 80% and 1 practical work with discussion or a final written exam 100%.
9. No
10 . 7

1. Stochastic Processes - 1680
2. General Notions About Stochastic Processes. Classification of Stochastic Processes: independent and stationary increments, stationarity, martingales, Markov processes, renewal and point processes, Wiener process. Birth and Death Processes. Introduction to Queuing Theory. Poisson Processes. Discreet Time Markov Chains. Renewal Processes.
3a) Good knowledge in integration and Calculus and Probability and Statistics.
3b) The aim of the course is to provide students with the basic knowledge on stochastic processes. Emphasis is made on the existence of many types of processes with very different properties which make them particular useful to model phenomena coming from a wide variety of applied fields.
3c) Heyman, DP and Sobel, M.J. 1982 Stochastic Models in Operations Research. (Vol. I). McGraw-Hill, ; Grimmett, GR and Stirzaker, DR, 1992 Probability and Random Processes. Oxford Science Publications; Karlin, S and Taylor, HM. 1972 A First Course in Stochastic Processes. Academic Press; Parzen, E 1972 Stochastic Processes. Holden-Day.
4. Compulsory.
5. Irene Oliveira.
6. 4,5h/week; (1,5T + 3L); 1st semester; 4th year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, final exam.
9. No.
10. 7.0.

1. Risk Theory - 1681
2. Some Concepts in Insurance under a Utility perspective. Individual Risk Models for a Short Term. Collective Risk Models for a single Period. The Compound Poisson Distribution and the Compound Negative Binomial Distribution as models for the aggregate claims. Collective Risk Models Over an Extended Period. Notion of Ruin. Claim Processes. The adjustment coefficient and its relation to the Probability of Ruin. Applications of Risk Theory to problems in Insurance. Claim Amount Distributions. Approximating the Individual Model. The effect of Reinsurance on the Probability of Ruin.
3a) Good knowledge in a first course of-Probability and statistics.
3b) To provide students an introduction to some basic notations in Actuarial field, using basical methodology in Utility Theory and Risk Theory.
3c) Beard, RE, Pentikainen, T & Pesinen, E 1977 Risk Theory; The Stochastic Basis of Insurance, London, Methuen; Bowers, NL Jr, Gerber, HU, Hickman, JC, Jones, D & Nesbitt, CJ 1986 Actuarial Mathematics, Chicago, The Society of Actuaries; Gerber, HU 1979 An Introduction to Mathematical Risk Theory, Huebner Foundation Monograph 8, distributed by Richard D. Irwn, Homewood.
4. Compulsory.
5. Irene Oliveira.
6. 4,5h/week (1,5T+ 3L); 4th year; 1st semester.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, final exam.
9. No.
10. 7.0.

1. Capital Markets - 1682
2. Financial Markets. Stocks, Bonds, Mutual funds and Performance evaluation. Futures, Options and Other Derivatives.
3a) Students are required to have a good background on Financial Mathematics.
3b) This course intends to expose students to modern financial methods and techniques which, within the respective theoretical frameworks, are used to evaluate a broad range of financial assets.
3c) Neves da Silva, A 1994 Mercado de Capitais e Derivados. McGraw-Hill; Elton, E and Gruber, M 1995 Modern Portfolio Theory and Investment Analysis, 5.ª Ed.; Hull, J 1997 Introduction to Futures and Options. Prentice-Hall.
4. Compulsory.
5. Carlos Machado Santos.
6. 4,5h/week; 1st semester; 4th year;
7. Lectures.
8. Written examination and course-work.
9. The answer will be given in face of each particular case.
10. 7.0.

1. Data Base - 1683
2. Data base systems. Data modeling. Relational model. Query languages. Relational data base design and implementation.
3a) No prerequisite.
3b) The aim of the course is to provide the necessary knowledge about concepts and methodologies of information arrangement. Understand the different data base models, as well as data base management systems.
3c) Pereira, JL 1998 Tecnologias de Bases de Dados. 2ª Ed., FCA; Silberschatz, A and Korth, HF 1998 Database System Concepts. 3ª ed., McGraw Hill.
4. Compulsory.
5. To define.
6. 4.5h/week; (1.5T + 3P); 1st semester; 4th year;
7. Lectures and laboratories.
8. Written test 100%.
9. No.
10. 5.0.

1. Applied Econometrics - 0587
2. Regression models and instrumental variables. Panel data models. Limited dependent variable models (logit and probit). Simultaneous equation models. Time series model. Carrying out an empirical project.
3a) No prerequisite.
3b) Estimation and analyses the results of micro and macroeconomics models.
3c) Johnston J and DiNardo, J 1997 Econometric Methods, McGraw-Hill, 4th Edition; Wooldridge, JM 2003 Introductory Econometrics – A Modern Approach, 2E, Thomson South-Western.
4. Compulsory.
5. João Rebelo.
6. 4,5 h/week; 2nd semester; 4th year.
7. Theoretical- practical classes.
8. Written essays with oral discussion (50%) and test (50%) or exam at the end of the semester .
9. No.
10. 7.0.

1. Investment Analysis - 1684
2. Financial analysis and Theory of the Risk and Value. Politics of Formation of Wallets. Decisions of Investment. Decisions of Financing.
3a) Without pré – requirements.
3b) The objectiv of the discipline is that the students possess the fundamental theoretical concepts to analyze and to study the managerial projects, as well as the risk analysis.
3c) Barros, C 1990 Decisões de Investimento e financiamento de projectos. Edições Sílabo; Cebola, A 2000 Elaboração e análise de Projectos de investimento. 1ª Edição. Edições Sílabo.
4. Compulsory
5. Júlia Fragoso da Fonseca.
6. 4,5h/week; (3T + 1,5P); 2nd semester; 4th year.
7.Lectures and practical classes. Adance in 2/3 of practical classes in compulsory.
8. Final Exam; Work; Reading records and presence in the classes.
9. No.
10. 7.0.

1. Investment Fund Management - 1685
2. Investment Funds: concepts, definitions, types of investment; Portfolio theory: Efficient Diversification and Portfolio selection. Performance Analysis of Portfolio investment. Capital Asset Pricing Model. Investment Funds Including Options.
3a) Without Prerequisites.
3b) The objective of the unit is to give students contact with financial products that are negotiated in the market, using the Portfolio theory.
3c) Elton, E and Gruber, M 1995 Moderns Portfolio theory and Investment Analysis", John Wiley; Sharpe, WF and Alexander, GJ 1990 "Investments", Fourth Edition, Prentice-Hall. Quintart, A and Zirswiller, R 1994 "Teoria Financeira" Editora Caminho.
4. Compulsory.
5. José Maria Andrade.
6. 6h/week; (3T + 3P); 2nd semester; 4th year.
7. Lectures and practical classes. Presence in 2/3 of the practical classes is compulsory.
8. Final Exam; work, Reading records and presence in classes.
9. No.
10. 7.0.

1. Management Information System - 1686
2. Information systems: Basics notions. Case studies analysis. Application projects development to familiarize the students with programming languages utilization.
3a) No prerequisite.
3b) Integrate knowledge from informatics and management. Understand the system definition and conceptualize the organization as one system. Sensitize the students to importance of information systems in organizations.
3c) Laudon, K and Laudon, J 1995 Information Systems. Dryden Press; Davis, G and Olson, M 1984 Management Information Systems. McGraw-Hill.
4. Compulsory.
5. To define.
6. 4,5h/week; (1.5T + 3P) 2nd semester; 4th year.
7. Lectures and laboratories.
8. Written test 100%.
9. No.
10. 5.0.

Mechanics Degree

Programme of Studies

	1st semester	ECTS	2nd semester	ECTS
1st YEAR	Analysis Mathematics I	6.0	Applied Mechanics I	6.0
	Linear Álgebra and Analytic Geometry	6.0	Analysis Mathematics II	7.0
	General Mechanics	6.0	Introduction to Computer Programming	5.0
	Chemistry	6.0	Electricity and Magnetism	6.0
	Computer Aided Drawing	6.0	Technical Drawing	6.0
	Total	30	Total	30
	1st semester	ECTS	2nd semester	ECTS
2nd YEAR	Complements of Mathematical Analysis	7.0	Applied Mathematics	6.0
	Statistics	6.0	Numerical Methods	6.0
	Mechanical Design	5.0	Electrical	6.0
	Thermodynamics	6.0	Materials Engineering I	6.0
	Applied Mechanics II	6.0	Applied Thermodynamics	6.0
	Total	30		30
	1st semester	ECTS	2nd semester	ECTS
3rd YEAR	Solids Mechanics I	6.0	Solids Mechanics II	5.0
	Materials Engineering II	5.0	Operation Research	5.0
	Fluid Machanics I	6.0	Mechanical Engineering Design I	5.0
	General Electronics I	5.0	General Electronics II	5.0
	Electrical Machines	6.0	Fluid Mechanics II	5.0
	Basic Economics	3.0	Mechanical Technology I	5.0
	Total	30		30
	1st semester	ECTS	2nd semester	ECTS
4th YEAR	Microprocessors and Microcomputers	5.0	Measuring System	5.0
	Heat Transfer	5.0	Power Electronics	5.0
	Mechanical Engineering Design II	5.0	Automation II	5.0
	Thermal Machines	5.0	Mechanical Technology II	5.0
	Automation I	5.0	Finite Element Method	5.0
	Structural Mechanics	5.0	Hydraulic Machines	5.0
	Total	30	Total	30
	1st semester	ECTS	2nd semester	ECTS
5th YEAR	Business Management	4.0	Industrial Costs	4.0
	Industrial Informatics	5.0	Production Management	4.0
	Materials Engineering III	4.0	Mechanical Vibrations	5.0
	Project	7.0	Project	7.0
	Climatization	5.0	Energy Management	5.0
	Combustion	5.0	Industrial Refrigeration	5.0
	Total	30	Total	30

Total credits: 300

1st Year

1. Analysis Mathematics I – 0174.
2. Functions of one variable: implicit and inverse functions; some special functions. Limits of functions and continuity: classification of discontinuity. Derivatives: higher order derivatives; implicit differentiation. Antiderivatives: techniques of integration. Rolle's theorem, Lagrange's theorem and Cauchy's theorem. L'Hopital's rule. Taylor's formula. Integration: the definite integral.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, Jaime 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, Earl. W 1979 Calculus with Analytic Geometry, 1st Vol., Weberand Schmidt; Apostol, Tom M 1967 Calculus, 1st Vol., Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito; Carlos Monteiro; Manuela Rodrigues.
6. 6h/week (3T, 3TP); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 6.0.

1. Linear Algebra and Analytic Geometry – 0117.
2. Matrices and Systems of Linear Equations. Determinants and Systems of Linear Equations. General Vector Spaces. Linear Transformations and Matrices.
3a) Vector calculus. Basic notions about functions. Systems of two linear equations.
3b) To provide a set of mathematical tools used to solve a widespread engineering problems.
3c) Williams G 2001 Linear Algebra with Applications 4ª ed., Boston, Jones and Bartlett Publishers, Inc..; Vitória J e Lima T Pedroso 1998 Álgebra Linear Lisboa Universidade Aberta.
4. Compulsory.
5. Cecília Costa; Luís Roçadas.
6. 5h/week (3T, 2TP); 1st semester; 1st year.
7. Lectures and practical classes.
8. According to University Regulations, final exam - 100%.
9. No.
10. 6.0.

1. Computer Aided Drawing – 0906.
2. General Characteristics of AutoCAD. Introduction to Autocad Commands. Drawing Control And Manipulation. Drawing Editing Commands. Grouping Entities In Autocad . Advanced Topics : Prototype Drawings, Effective Use of Layers and Text Styles, Advanced Editing Features, 2D and 3D Polylines, Points, Blocks with Attributes, Dimensioning, 3D Construction Commands, UCS (user coordinate system), Point Filters,Variable Settings, External References and File Management, Paper Space, Viewports, Plotting.
3a) No prerequisites.
3b) General characteristics of the PC-based drafting system known as AutoCAD. The purpose is to give a new user a broad conceptual understanding of the operation of this system.
3c) João Santos AutoCad 2000i, ed. FCA, Autodesk AutoCad, User´s Guide, Command Reference; Fernández J Lopez AutoCad, ed. Mc Graw Hill; Miura George Mastering AutoCad, ed. Sybex.
4. Compulsory.
5. Domingos José Moreira Guimarães; Licínio Azenha Jorge.
6. 6h/week (2TP); 1st semester; 1st year.
7. Theorical practical classes.
8. Final exam.
9. No.
10. 6.0.

1. Chemistry – 0003.
2. Fundamental tools in chemistry. Atoms, molecules and ions. Chemical reactions I: chemical equations and the types of chemical reactions. Chemical reactions II: quantitative relations. Electrochemistry. Metal coatings. Corrosion. Chemical bonds I: ionic, covalent e metallic. Chemical bonds II: molecular geometry. Intermolecular forces. Solids: cubic and hexagonal structure. Chemical and physics properties of the solids. Organic chemistry.
3a) No prerequisites.
3b) To provide the essence of chemistry and the main tools to study quantitatively the chemical reactions, the structure and properties of the chemical compounds. To relationship the physical and chemical matter properties with the intermolecular forces and chemical bonds.
3c) R Chang, 1994 Química 5ª Ed., McGraw-Hill; W Smith, 1998 Princípios de Ciência e Engenharia dos Materiais, 3ª Ed., McGraw-Hill.
4. Compulsory.
5. Maria Cristina F. Oliveira; Rosa Rego.
6. 5h/week (2 P + 1TP+ 2T); 1st semester; 1st year.
7. Lectures, practical classes and laboratories.
8. Final written exam (80%) + laboratory exam (10%) + laboratory reports (10%).
9. Não.
10. 6.0.

1. Electricity and Magnetism – 0903.
2. Electrostatic: electric charge, Coulomb´s interaction, principal of charge conservation, principal of superposition, electric field, graphic representation – field lines, electric field flux, Gauss law, electric potential energy, electric potential, equipotential surfaces, conductors and conductors systems, capacitance, dielectrics, electrical polarisation vector, electrical displacement vector. Steady currents: electrical current density; continuity equation, Ohm's law, resistivity. Electrical circuits I: Kirchhoff's laws and superposition principal. Magnetism: magnetic interaction, magnetic induction field, Bio-Savart's law, Laplace force, Ampère's law, Lorentz interaction, electromotive induction interaction, Faraday's law, Lenz principle, inductance, inductors, magnetic materials. Electric Circuits II: Transient phenomena.
3a) Elementary vector calculus.
3b) The students should be able to identify electrical and magnetic phenomena and analyse through the physical quantities which describes the phenomena according to the integral forms of electrical and magnetic laws.
3c) Villate, JE 2001 Electromagnetismo, McGraw-Hill; Mendiratta, SK 1995 Introdução ao electromagnetismo, Fundação Calouste Gulbenkian, 2ª Edição; Kip, AF 1969 Fundamentals of Electricity and Magnetism, McGraw-Hill, 2ª Edição; Purcell EM 1985 Electricity and Magnetism, McGraw-Hill, 2ª Edição.
4. Compulsory.
5. Norberto Jorge Gonçalves; Malik Amraoui.
6. 5h/week (2T, 1TP, 2P); 2nd semester; 1st year.
7. Lectures, practical classes and laboratories.
8. 1 laboratory work 33%; final written exam 67%.
9. No.
10. 6.0.

1. General Mechanics – 0146.
2. Units and dimensions. Kinematics: position, velocity and acceleration vectors. Particle dynamics: Newton's laws, momentum, work, power, kinetic energy, impulse, potencial energy, mechanical energy, velocity-dependent forces, fluid resistance, terminal velocity. Harmonic motion: motion equation, energy, damped oscillations, forced oscillations, resonance, forced and damped oscillator. Dynamics of a particle system: centre of mass motion, momentum, angular momentum and kinetic energy, momentum conservation, elastic and inelastic collisions. Dynamics of the rigid solid: angular momentum, moment of inertia, gyration radius, Steiner's theorem, equations of the rotational motion, kinetic energy, potencial energy and mechanical energy, work. Static: resultant force and resultant torque of a system of forces, static equilibrium conditions. Elasticity: stress and strain in solids, traction, compression, torsion e flexure, shearing stress and strain.
3a) High school calculus.
3b) To provide students with the theoretical basis in classical mechanics. They should be able to express mechanical behaviour in analytical form.
3c) Fowles, Cassiday 1999 Analytical Mechanics, 6th edition, Saunders College Publishing; Halliday, Resnick Fundamentos de Física Livros Técnicos e Científicos Editora; Tipler, P 1997 Física (volume 1) Livros Técnicos e científicos Editora; Alonso Finn. Física – um curso universitário, Edgar Blutcher Ltd.
Almeida, JMM Marinho, F Morgado L 2001 Sebenta de Física Geral UTAD.
4. Compulsory
5. Jaime Pinto Ribeiro Viegas.
6. 5h/week (2T, 3TP); 1st semester; 1st year.
7. Lectures and practical classes.
8. Two written tests during the semester or final exam.
9. No.
10. 6.0.

1. Applied Mechanics I – 0669.
2. System of forces: force concept; momentum of a force; momentum of a couple forces; total force. Static equilibrium: equilibrium equations, free body diagrams. Diagrams of normal and shear forces and momentum diagrams. Structures; method of joints, frames, method of members. Dry friction and its aplications. Power screws. Geometry of mass; inertia momentum and products of inertia.
3a) Basic Knowledge on Mathematics and Physics.
3b) To provide students with the theoretical basis statics and geometry of mass to should be able to develop knowledge to use in Strenth of Materials and in the Mechanical Engineering Design I and II.
3c) James L Meriam 1997 Estática; Editorial Reverte SA; Ferdinand Beer, Russel Johnston Jr, 2000 Vector Mechanics for Engineers Statics and Dynamics, McGraw-Hill; Alfredo da Silva Ribeiro 1995 Estática e Geometria das Massas, UTAD.
4. Compulsory.
5. Alfredo da Silva Ribeiro; António Vasconcelos Lima.
6. 5h/week (2T, 3TP); 2nd semester; 1st year.
7. Lectures, practical classes.
8. Test or final exam.
9. No.
10. 6.0.

1. Introduction to Computer Programming – 0487.
2. Algorithms and Programming in Pascal.
3a) Work with Computers.
3b) To provide students with the knowledge to solve problems of reduce complexity in Algorithms terms (Pascal has been adopted for this course).
3c) Niklaus Wirth 1973 Systematic Programming: an Introduction, Prentice-Hall; Niklaus Wirth, 1976 Algorithms+Data Structures=Programs, Prentice-Hall.
4. Compulsory.
5. Paulo Costa; Jorge Gouveia.
6. 4h/week (2T, 2P); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Written test 100%.
9. No.
10. 5.0.

1. Analysis Mathematics II – 0178.
2. Applications of Integration. Polar and Parametric Coordinates: area of plan figure, volume of solids, length of curve in Polar and Parametric Coordinates. Improper Integrals. Sequences of real numbers: bounded and monotonic sequences. Series: series with nonnegative terms : comparison tests, the integral test, the ratio and root tests; absolute convergence - alternating series. Power series: expansion of functions; differentiation and integration of power series; Taylor and Maclaurin series.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, Jaime 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa.; Swokowski, Earl. W 1979 Calculus with Analytic Geometry, 1st Vol., Weberand Schmidt.; Apostol, Tom M 1967 Calculus, 1st Vol., Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito; Luisa Morgado.
6. 6h/week (3T, 3TP); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam-100%.
9. No.
10. 7.0.

1. Technical Drawing – 0143.
2. Standards in drawing; types of projections; cuts and views. Dimensioning.
3a) No prerequisites.
3b. Basic course giving a general view of drawing techniques and their uses to enable students to interpret technical drawings
3c) A Bachman R Forberg 1970 Desenho Técnico Editora Globo; L Veiga da Cunha 1999 Desenho Técnico Fundação Calouste Gulbenkian; Simões Morais 1984 Desenho Construções Mecânicas Porto Editora; Normas Portuguesas Direcção Geral de Qualidade.
4. Compulsory.
5. Domingos José Moreira Guimarães.
6. 5h/week (2T, 3P); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Final exam.
9. No.
10. 6.0.

2nd Year

1. Complements of Mathematical Analysis – 0121.
2. First order differential equations. Differential equations of higher order: Method of the undetermined coeficients. Vector-valued functions. Differentiation. Extrema of real-valued functions. Double integrals. Triple integrals, the change of variables and applications. Integrals over paths and surfaces. Theorems of Green, Gauss and Stokes.
3a) Differential and integral calculus of one variable as well as basic notions of linear algebra and analytic geometry.
3b) To give the basic theory of differential and integral calculus of functions of several variables, to introduce the basic differential equations and show the practical aspects of all these matters namely through applications in physics.
3c) Breda A e Costa, JN da 1996 Cálculo com Funções de Várias Variáveis 1ª edição McGraw-Hill International Editions; Marsden, JE and Tromba AJ 1988 Vector Calculus, 3rd edition WH Freeman and Company; Swokovski, E 1994 Cálculo com Geometria Analític, Vol II 1ª edição Mc Graw-Hill Lda. S. Paulo; Zill D G 1997 A First Course in Differential Equations with Modelling Appplications, 6ª edição Brooks/Cole Publishing Company.
4. Compulsory.
5. Anabela Borges, Helena Campos.
6. 6h/week (3T, 3TP); 1st semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments 50%+50% or final written examination – 100%.
9. No.
10. 7.0.

1. Thermodynamics – 0160.
2. Concepts and definitions. Work and heat in Thermodynamics. First Law of Thermodynamics. Internal energy and enthalpy. Application to closed and open systems. Second Law of Thermodynamics. Entropy. Application to closed and open systems. Carnot cycle. Thermal engines and refrigerators. Thermal efficiency.
3a) No prerequisites.
3b) To provide to introduce the students to the study of energy processes, using property tables and other equations.
3c) Gordon J Van Wylem Richard E Sonntag Borgnakke C 1994 Fundamentals of Classical Thermodynamics Wiley; José A Manrique Rafael S Cardenas 1978 Termodinâmica, HARLA SA; GFC Rogers YR Maylew 1983 Engineering Thermodynamics Work and Heat Transfert, Longam.
4. Compulsory.
5. Manuel Carlos Pires.
6. 5 h/week (3T, 2TP); 1st semester; 2nd year.
7. Lectures, practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. Applied Thermodynamics – 0907.
2. Concepts and definitions. Work and heat in Thermodynamics. First Law of Thermodynamics. Internal energy and enthalpy. Application to closed and open systems. Second Law of Thermodynamics. Entropy. Application to closed and open systems. Carnot cycle. Thermal engines and refrigerators. Thermal efficiency.
3a) No prerequisites.
3b. To provide to introduce the students to the application of the thermodynamic studies to power and refrigeration cycles, gas mixtures and psicrometry.
3c) Gordon J Van Wylem Richard E Sonntag Borgnakke C 1994 Fundamentals of Classical Thermodynamics Wiley; José A Manrique Rafael S Cardenas 1978 Termodinâmica, HARLA SA; GFC Rogers YR Maylew 1983 Engineering Thermodynamics Work and Heat Transfert, Longam.
4. Compulsory.
5. Manuel Carlos Pires.
6. 5 h/week (2T, 3TP); 2nd semester; 2nd year.
7. Lectures, practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. Mechanical Design – 0162.
2. Normalization. Mechanical components representation.
3a) Technical design knowledge.
3b) Identify any mechanical component.
3c) Simões Morais, Desenho Construções Mecânicas Porto Editora; Arlindo Silva, João Dias, Luis Sousa, 2000 Desenho Técnico Moderno Ed. Lidel; L Veiga da Cunha 1999 Desenho Técnico Fundação Calouste Gulbenkian 11ª Ed.; Normas Portuguesas, Direcção Geral de Qualidade; Dessins Techniques Recueil de Normes ISSO.
4. Compulsory.
5. Licínio Dias A. Jorge.
6. 5 h/week (2T+3P), 2nd semester, 2th year.
7. Lectures, practical classes.
8. Final written exam.
9. No.
10. 5.0.

1. Numerical Methods – 0130.
2. Number systems and errors. Nonlinear equations. Eigenvalues and eigenvectors. Systems of linear equations. Systems of nonlinear equations. Polynomial interpolation. Least-squares approximation. Numerical differentiation. Numerical integration. Differential equations. Nonlinear unconstrained optimization.
3a) Mathematical analysis and linear algebra.
3b) The students should be able to choose and use the right algorithms to solve different kind of problems, making a correct and precise analyze of error propagation. They must consider the required accuracy, estimate an approximated solution value, and provide verifications test and corrective actions in case of no convergence.
3c) Fernandes, Edite MGP 1998 Computação Numérica, Serviços de Reprografia e Publicações da Universidade do Minho, Braga; Valença, MR 1983 Métodos Numéricos, Livraria Minho, Braga; Conte, S D e de Boor C 1987 Elementary Numerical Analysis, McGraw-Hill Book Company; Dodes IA 1978 Numerical Analysis for Computer Science, Elsevier North-Holland Inc., New York; Pina Heitor 1995 Métodos Numéricos, Mc Graw-Hill; Scheid Francis 1991 Análise Numérica, Mc Graw-Hill; Santos, FC 2002 Fundamentos de Análise Numérica, Edições Sílabo, Lisboa.
4. Compulsory.
5. João Matias; Luísa Morgado; Laura Ribeiro; Sílvia Reis.
6. 5h/week (2T, 3TP); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. Applied Mechanics II – 0904.
2. Relative motion. Kinematics of a rigid body. Newton-Euler formulation of rigid body dynamics. Kinetic energy theorem of a rigid body. Systems of rigid bodies.
3a) Particle Mechanics, Linear Algebra and Differential and Integral Calculus.
3b) To provide the basic analytical tools for the kinematical and dynamical analysis of rigid bodies and mechanisms.
3c) Ginsberg, JH 1995 Advanced Engineering Dynamics, Cambridge University Press; Baruh H 1999 Analytical Dynamics, McGraw-Hill.
4. Compulsory.
5. José Lopes Morais; Nuno Dourado.
6. 5h/week (2T, 3TP); 1st semester; 2nd year.
7. Lectures and practical classes.
8. 2 written assessments 50%+50% or final written exam 100%.
9. No.
10. 6.0.

1. Electrical – 0917.
2. Electrical Circuits Analysis: Electrical charge, voltages;Ohm Law;Kirchhoff laws; Duality principle;Independent loop law; Superposition principle; Thevenin Theorem;Norton Theorem. Measurement of Electrical Quantities: Amperímeter; Voltammeter;Ohmmeter. Transient Phenomenon in Circuits RL, RC and C.C. Magnetic Circuits: Magnetic Means of transmission;Iron magnetization. Iron Saturation. Hysteresis. Magnetic circuit Theory. Hopkinson formula. Kirchhof laws applied to magnetic circuits. Electromagnetic Induction. Lenz laws. Foucault currents. Alternating Current Circuits: Basic units; Analysis of ac circuits; Ohm Law in complex notation; Single-phase circuits; Single-phase circuit analysis and power consumption, Tri-phase circuits: Star and triangular connections;Electrical Power in tri-phase and single-phase circuits.
3a) Physics Knowledge.
3b) The global aim is to provide the students with basic concepts of Electrical Engineering, namely concerning the fundamental electrical measures and units necessary to understand electromechanical systems. The basic concepts of alternated current and analysis and project of general electric circuits.
3c) L Bessonov, 1977 Electricidade Aplicada para Engenheiros, Lopes da Silva Editora 2ª Edição; Berta Baptista, 1992 Sebenta de Electricidade Aplicada, (1º Volume) UTAD; Gussow Milton, 1985 Electricidade Básica, MacGraw-Hill; R Bartkowiak 1985 Electric Circuit Analysis; John Wiley & Sons. Lecturer notes.
4. Compulsory.
5. José Boaventura Cunha; Sérgio Leitão.
6. 5h/week (2T, 3TP); 2nd semester; 2nd year.
7. Lectures, practical classes
8. Final written exam 100%.
9. No.
10. 6.0.

1. Statistics – 0168.
2. Introduction to the theory of probabilities. Random variables. Bi-dimensional random variables. Random distributions. Fundamental theorems. Mathematical statistics.
3a) High-School Mathematics.
3b) To provide the basic concepts of probability and statistics useful to engineers.
3c) Walpole, Ronald E e Raymond H Myers, 1993 Probability and Statistics for Engineers and Scientists, Prentice Hall International Inc., 5th Edition, 766 p. ISBN:0024242012; Zar, Jerrold H 1993 Biostatistical Analysis, Prentice Hall International Inc., 3th Edition, ISBN:0130845426; Dagnelis, P 1973 Théorie et Métodes Statistiques, Les Presses Agronomiques de Gemblous, 2éme Edition, Vols. I et II.
4. Compulsory.
5. Carlos Mendonça e Moura; Maria de Fátima M. Ferreira; Eva Virgínia A. Morais.
6. 5h/week (2T, 3TP); 1st semester; 2nd year.
7. Lectures and practical classes.
8. final written exam 100%.
9. No.
10. 6.0.

1. Applied Mathematics -0124.
2. Linear Differential Equations: Complex functions of a real variable; Linear differential equations with discontinuous inputs; Impulse function and other generalized functions; Application of generalized functions to linear differential equations. Basic Concepts of Systems Analysis: Operators; Operators associated with linear differential equations; Duhamel's integral; Weighting function, impulse response and convolution. Analytic Functions of a Complex Variable: Functions of a complex variable; Limits and continuity; Derivatives and differentials; Integrals; Analytic functions: Cauchy-Riemann equations; Integrals of analytic functions; Cauchy integral theorem; Cauchy's integral formula; Power series as analytic functions; Power series expansion of general analytic functions; Power series in positive and negative powers, Laurent expansion; Isolated singularities of an analytic function; Zeros and Poles; Residues. The Laplace Transform: Introduction of the Laplace Transform; Properties of the Laplace Transform; Inverse transform; Initial- and final-value theorems.
3a) For students already possessing a background in Mathematical Analysis.
3b) To provide the mathematical tools employed in the design and analysis of linear systems, that is, physical systems whose behavior is described by linear differential equations. The basic approach to the problems considered arose in modern engineering in the design of complicated control systems.
3c) Churchill, Ruel V Brown, James W 1990 Complex Variables and Applications, McGraw-Hill, New York; Marsden, Jerrold E Hoffman, Michael J 1987 Basic Complex Analysis, Freeman New York; Ahlfors, Lars V 1979 Complex Analysis, McGraw-Hill, New York.
4. Compulsory
5. Carlos Mendonça e Moura; João Luís Honório Matias.
6. 5h/week (2T, 3TP); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam 100%.
9. No.
10. 6.0.

1. Materials Engineering I – 0905.
2. Introduction to Materials Engineering; Crystalline Structure; Crystalline Imperfections; Solidification; Dislocation Theory; Schmid Law; Diffusion; Strengthening Mechanisms – By Precipitation, Grain Size, Plastic Deformation and Phase Transformation; Solid State Transformations – Recovery, Recristalization and Grain Growth, Precipitation, Eutectoid Transformation, Martensitic Transformation; Fragile and Ductile Rupture. Miller and Miller-Bravais Indices for planes and directions; Diffusion Exercises – Arrhenious Law, First and Second Ficks Law; Binary Phase Diagrams; Mechanical Tests – Hardness, Traction and Compression;Introduction to Samples Metalographic Preparation.
3a) Chemistry and Physics 12th year.
3b) Basic knowledge of Materials Science, metalographic preparation of samples for microscopy observation and traditional mechanical essays.
3c) Soares, P 1987 Aços, Tratamentos e Características, Ed. Livro Luz, 4ªEd.; Seabra, AV 1981 Metalurgia Geral, LNEC; Smith, DR 1986 Principles of Materials Engineering, McGraw Hill; Askeland, D R 1990 The Science and Engineering of Materials, Chapman & Hall; Cottrell, AH Metalurgia Física: Introdução ás Teorias da Estrutura dos Metais e Ligas, Ed. Calouste Gulbenkien; Davim, JP Magalhães, AG 1992 Ensaios Mecânicos e Tecnológicos, Ed. Estante; Castro, FP Soares, DF Princípios de Metalografia, CETEM, Cadernos de Metalurgia, nº2; Silva, PL 2000 Textos de Apoio à Disciplina de Materiais de Engenharia I, UTAD.
4. Compulsory.
5. Paula Luisa Nunes Braga da Silva.
6. 6h/week (2T+4TP); 2nd semester; 2nd year.
7. Use of transparencies, films and practical exercises in Theoretical classes. For practical classes the students use the Metalographic and Mechanical Testing laboratories.
8. Test or Final Exam.
9. No.
10. 6.0.

3rd Year

1. Basic Economics – 0269.
2. Introduction to Market Economics. Producer Theory. Market Structures (competition. Monopoly and market power). National Accounting.
3a) No pre-requisites.
3b) To teach basic micro theory related with supply and demand, firm and market structures; and finally, macro concepts related with national accounting and relation with Portuguese economy.
3c) João Luís César das Neves, 2001 Introdução à Economia, 6ª edição, Verbo, Lisboa; José Mata 2000 Economia da Empresa, Fundação Calouste Gulbenkien, Lisboa; Isabel Ucha 2000 Introdução à Economia – Guia de Apoio à Introdução à Economia de João César das Neves - Sínteses, Exercícios e Soluções. 3ª edição, Verbo, Lisboa; Jorge Santos et al. 1994 Macroeconomia: Exercícios e Teoria. McGraw-Hill, Lisboa.
4. Compulsory.
5. José Vaz Caldas.
6. 4 hours/week; (2T; 2P) 1st semester; 3rd year.
7. Theoretical and practical classes.
8. Final exam.
9. No.
10. 3.0.

1. Solids Mechanics I – 0908.
2. Analysis of stress and strain. Constitutive equations of a linear elastic solid. Torsion of bars. Shear-force and bending-moment diagrams.
3a) Theory of Elasticity and Statics.
3b) Introduction to the fundamental principles of mechanics of deformable and elastic solids.
3c) Gomes, JFS Teoria da Elasticidade. Fundamentos e Aplicações, FEUP Porto; Branco, CM 1985 Mecânica dos Materiais, Fundação Calouste Gulbenkian; Timoshenko SP Goodier JN 1970 The Theory of Elasticity, Mc Graw Hill, New York; Den Hartog, JP 1952 Advanced Strenght of Materials, Mc Graw Hill, New York.
4. Compulsory.
5. António M. Vasconcelos Lima.
6. 5h/week (2T, 2TP); 2nd semester; 3rd year.
7. Lectures, practical classes.
8. 2 written assessments 50%+50% or final written exam 100%.
9. No.
10. 6.0.

1. Solids Mechanics II – 0913.
2. Criteria for material failure.Bending of elastic beams. Elastic stability.
3a) Theory of Elasticity and Statics.
3b) To provide students with the theoretical basis for design isostatic structures and machine elements.
3c) Lima, AV 2003 Apontamentos de Mecânica dos Sólidos II, – não editados; Branco, CM Mecânica dos Materiais, Fundação Calouste Gulbenkian, 1985; Beer, FP Johnston, ER 1982 Resistência dos Materiais MacGraw-Hill; Timoshenko, SP Gere, Mechanics of Materials Chapman & Hall; Den Hartog, JP 1952 Advanced Strenght of Materials, Mc Graw Hill, New York.
4. Compulsory.
5. António M. Vasconcelos Lima.
6. 5h/week (2T, 2TP); 2nd semester; 3nd year.
7. Lectures, practical classes.
8. 2 written assessments 50%+50% or final written exam 100%.
9. No.
10. 5.0.

1. General Electronics I – 0912.
2. Charge transport in semiconductors. Junction diodes. Zener diodes. Circuits using diodes: limiting circuits, half and full wave rectifiers. Junction transistors npn and pnp. Transistor polarization and transistor amplifiers. Field Effect Transistors.
3a) Physics Knowledge.
3b) The global aim is to provide the students with basic concepts of Electronics by studying the most common electronic devices: diodes, transistor, as well circuits using these devices.
3c) Robert L Boylestad, Louis Nashelsky, 1999 Electronic Devices and Circuit Theory, 7th Edition, Prentice Hall; Millman-Halkias 1981 Electrónica Vol I e II, McGraw-Hill; Jacob Millman, Arvin Grabel, 1998 Microelectronics, McGraw-Hill International Editions; Lecturer notes.
4. Compulsory.
5. José Boaventura Cunha; Margarida Seixas.
6. 5h/week (2T, 3TP); 1st semester; 3rd year.
7. Lectures, practical classes and laboratory classes.
8. lab work (25%) and final written exam 75%-
9. No.
10. 5.0.

1. Materials Engineering II – 0910.
2. General Criterions for Materials Selection; Fe-C Alloys Phase Diagram; TTT Curves ; Termic Treatments, Isotermic Treatments, Termochemical Treatments; Superficial Treatments; Mechanical Treatments; Steels – Tools, Stainless, Construction and Maraging; Corrosion – Aqueous Corrosion, Forms of Corrosion, Protection; Cast Irons – Grey, White, Ductile and Malleable; Non-ferrous alloys – Light and heavy alloys. Analysis Techniques for Structural Observation – Optic and electronic microscopy; Practical work on Termic and Termochemical Treatments- bibliographic research, experimental work, report and oral presentation.
3a) Acquired knowledge from Materials Engineering I.
3c) Soares, P 1987 Aços, Tratamentos e Características, Ed. Livro Luz, 4ªEd.; Seabra, AV 1981 Metalurgia Geral, LNEC; Smith, DR 1986 Principles of Materials Engineering, McGraw Hill; Askeland, DR 1990 The Science and Engineering of Materials, Chapman & Hall; Cottrell, AH Metalurgia Física: Introdução ás Teorias da Estrutura dos Metais e Ligas, Ed. Calouste Gulbenkien; Davim, JP Magalhães, AG 1992 Ensaios Mecânicos e Tecnológicos, Ed. Estante; Castro, FP Soares, DF Princípios de Metalografia, CETEM, Cadernos de Metalurgia, nº2; Silva, PL 2000 Textos de Apoio á Disciplina de Materiais de Engenharia II, UTAD; Apraiz, 1987 Tratamientos Térmicos de los Aceros; Chiaverini, V 1989 Tecnologia Mecânica; Monteiro, FJ 1994 Tratamentos de Superfície, Mestrado em Engenharia dos Materiais; Dieter, Mechanical Metallurgy, McGraw-Hill.
4. Compulsory.
5. Paula Luisa Nunes Braga da Silva.
6. 5h/week (2T+1TP+2P); 1st semester; 3rd year.
7. Use of transparencies, films and practical exercises in Theoretical classes. For practical classes the students use the Metalographic and Mechanical Testing laboratories.
8. Test (70%)+Experimental work (30%) or Final Exam.
9. No.
10. 5.0.

1. Mechanical Technology I – 0157.
2. Manufactoring Processes. Casting, Plastic Deformation and Welding
3a) Materials Science knowledge.
3b) Identification of diferents Manufactoring.
3c) JMG Carvalho Ferreira 1999 Tecnologia da fundição, Fundação Calouste Gulbenkian; ASM Handbook, ASM International, 1990 The Materials Information Society, Vol. 6, 14 e 15; António A Fernandes 1981 Materiais e Processos Tecnológicos II, FEUP DEMEC; Alvaro Morais 1984 Tecnologia Mecânica, FEUP; Vicente Chiaverini 1986 Tecnologia Mecânica, MC Graw-Hill; Oliveira Santos 1982 Soldadura Eléctrica por Arco, ISQ; Soldadura por Arco Submerso, ISQ; Processo TIG; ISQ; Processo MIG, ISQ; Processo MAG, ISQ.
4. Compulsory.
5. Licínio Dias A. Jorge.
6. 5h/week (2T+1TP+2P); 2nd semester, 3rd year.
7. Lectures, practical classes and laboratories.
8. One case study with presentation and discussion + two practical work + one written test; final written exam.
9. No.
10. 5.0.

1. Fluid Mechanics I – 0911.
2. History introduction, liquid and gas, Extern forces, pecific mass. Density compressibility, Viscosity. Hydrostatic pressure law, absolute pressure, relative pressure, how to take a measurement of pressure. Fluid flow, laminar flow, turbulent flow, Reynolds experience, continuity of flow. General case of continuity equation. Properties variations during a flow. Bernoulli equations, measurement in flow, Pitot. Energy equation in permanent state during stream lines throughout the flow. Energy equation for tube flow. Momentum conservation equations for permanent state. Loss mass in conduct flow, localized or distributed loss mass.
3a) Fundamental state equations for mechanics, differential equations.
3b) To give knowledge of fluid flow in one dimensional state and how to determine a pressure forces for mechanical engineering students. Fluid behavior in viscous or non viscous can be described by linear equations: Bernoulli and generalized Bernoulli.
3c) A Rouboa, 2003 Mecânica dos Fluidos I (Apontamentos da aula), Universidade de Trás-os-Montes e Alto Douro; JF Douglas, Problemas resueltos de Mecanica de Fluidos, Volume 1, Edt Belisco ISBN :84-85198-50-6; JF Douglas, Problemas resueltos de Mecanica de Fluidos, Volume 2, Edt Belisco ISBN :84-85199-50-6; Francisco de Assis A Bastos, Problemas de Mecânica dos Fluidos, Edt Guanabara Kougan ISBN :85-7030-010-7.
4. Compulsory.
5. Abel Rouboa; Eliseu Monteiro.
6. 4h/week (2T, 2TP and 1P); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. 1 case study with presentation and discussion 20% and final written exam 80%.
9. No.
10. 6.0.

1. General Electronics II – 0915.
2. Introduction. Operational Amplifiers, Silicon Controlled Rectifiers.
3a) Basic electrical networks and electronics circuits concepts.
3b) To provide students with the theoretical basis in data structures. The students should be able to develop and use programs that implement such data structures in a programming language, and they should also be able to choose between different search and ordering algorithms, according to their efficiency. To provide knowledge about: the operational amplifier and its main applications, power supplies and voltages regulators as well as the fundamental principles about silicon controlled rectifiers. Most of the theoretical concepts are followed by laboratory circuits assignments.
3c) Robert L Boylestad e Louis Nashelsky 1999 Electronic Devices and Circuit Theory, Prentice Hall; Sergio Franco, 1988 Design with Operational Amplifiers and Analogue Integrated Circuits, McGraw-Hill; Jacob Millman e Arvin Grabel, 1987 Microelectronics, McGraw-Hill International Editions; Millman-Halkias, 1982 Electrónica Vol I e II, McGraw-Hill.
4. Compulsory.
5. Paulo Moura Oliveira; Francisco Esteves.
6. 5h/week (2T, 1TP, 2P); 2nd semester; 3rd year.
7. Lectures, practical classes and laboratories.
8. 5 case studies with discussion 20%; final written exam 80%.
9. No.
10. 5.0.

1. Operational Research – 0386.
2. Introduction to Operational Research. Linear Programming (LP): General formulation of LP model. Graphic representation and interpretation of a PL problem. Álgebra Linear revision and basic notions of Convex Analysis. Fundamental PL theorems. (Primal) Simplex algorithm. 2-phase method, and the method of penalties. Duality. Sensitivity Analysis. Particular problems in LP.
3a) Good knowledge of Linear Algebra.
3b) To model accurately real problems as a LP model; many are the applications in the field of engineering suitable to be model as LP problem. The Simplex method as a systematic procedure to find the solution of a LP problem. To be able to evaluate a pós-optimal analysis: duality theory and sensitivity analysis. To be able use current software in Operational Research .
3c) Bazaraa, MS et al. 1990 Linear programming and network flows, 2nd Edition. John Wiley & Sons, New York; Valadares Tavares, L et al. 1996 Investigação Operacional. McGraw-Hill, Lisboa.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis; Eva Morais; Pedro Barroso.
6. 4 hours/week (2L + 2T); 2nd semester; 3rd year.
7. Lectures and tutorials.
8. Final exam.
9. Course not offered in any other language other than Portuguese.
10. 5.0.

1. Fluid Mechanics II – 0916.
2. Fundamental of permanent flow: Bernoulli and generalized Bernoulli.
Incompressible fluid flow at permanent state: Mass conservation equation, momentum differential equations. Discussion of simple solutions: 1D (Bernoulli), 2D for plane and cylindrical flow. Compressible fluid flow in permanent state: conservation equation, momentum differential equations and conservation energy differential equation.
3a) Fundamental equation for fluid mechanics (Fluid I) and differential equations.
3b) To give knowledge of fluid flow in laminar and turbulent state for mechanical engineering students. Fluid behavior in viscous or non viscous can be described by linear differential equations: Navier-Stokes incompressible fluid flow and Euler for compressible fluid flow. The main objective is to establish these differential and obtain the velocities contour, pressure evolution and the temperature profile.
3c) A Rouboa, 2003 Mecânica dos Fluidos I (Apontamentos da aula), Universidade de Trás-os-Montes e Alto Douro; JF Douglas, Problemas resueltos de Mecanica de Fluidos, Volume 1, Edt Belisco ISBN :84-85198-50-6; JF Douglas, Problemas resueltos de Mecanica de Fluidos, Volume 2, Edt Belisco ISBN :84-85199-50-6; Francisco de Assis A Bastos, Problemas de Mecânica dos Fluidos, Edt Guanabara Kougan ISBN :85-7030-010-7.
4. Compulsory.
5. Abel Rouboa; Eliseu Monteiro.
6. 4h/week (2T, 2TP and 1P); 2nd semester; 3th year.
7. Lectures and practical classes.
8. 1 case study with presentation and discussion 20% and final written exam 80%.
9. No.
10. 5.0.

1. Mechanical Engineering Design I – 0914.
2. Basics notions of mechanical engineering design. Stress and strength considerations. Failure theories, factor of safety and reability. Codes and materials. Fatigue of materials: stress-life definitions. Design of screws, fasteners and connections. Design of shafts. Design of mechanical springs. Wedded joints. Lubrification.
3a) Basic Knowledge on Mathematics and Physics.
3b) To provide students with theoretical basis of fundamental concepts of mechanical component design.
3c) Joseph Edward Shigley, Mechanical Engineering Design; Robert C. Juvinal, Fundamentals of Machine Component Design; Alfredo da Silva Ribeiro, Dimensionamento de Elementos de Máquinas.
4. Compulsory.
5. Alfredo da Silva Ribeiro; António Vasconcelos Lima.
6. 5h/week (2T, 3TP); 2nd semester; 3rd year.
7. Lectures, practical classes.
8. Test or final exam
9. No.
10. 5.0.

4th Year

1. Microprocessors and Microcomputers – 0961.
2. Microcomputer organization; microprocessor organization; addressing; Intel 8086/88 microprocessor features; Assembly programming; Assembly programming for the Intel 8086/88 microprocessors family; peripherals; interrupts; evolution of processors and microcomputer architectures; microcontrollers.
3a) Skills in programming and computer architecture.
3b) Understanding of the overall operation of today's computers and abbility to build Assembly programs.
3c) M Malone, 1995 The Microprocessor: a biography, Telos Springer-Verlag; T Bartee, Computer Architecture and Logic Design, McGraw-Hill; Gilmore, 1989 Microprocessors: Principles and Applications, McGraw-Hill; M Rafiquzzaman, 1992 Microprocessors – Theory and Applications (Intel/Motorola), Prentice-Hall; E Junior, J Santos, 1989 Programando em Assembler 8086/8088 – IBM PC Makron Books McGraw-Hill.
4. Compulsory.
5. Benjamim Fonseca; António Marques.
6. 5 hr/week (2 T+1TP+2P); 1st semester; 4th year.
7. Oral theoretical explanation, in theoretical classes; "paper" implementation of practical exercises, in theoretical-practical classes; computer implementation of the exercises that were made in the theoretical-practical classes, in the practical classes.
8. Final examination, with a theoretical component and a theoretical-practical component (50% each one)
9. No.
10. 5.0.

1. Automation I – 1205.
2. Air compression theory. Compressors. Air treatment and distribution. After-coolers and air dryers. Principles of pneumatics. Pneumatic circuits design. Sequential and cascade method. Electropneumatics.
3a) Thermodynamic.
3b. To introduce students, in a systematic way, to, theorical as well as practical, automation field. At the end of this discipline the student is supposed to be able to: Design automated machines and equipment, Design automated processes, Design and implement pneumatic and electropneumatic circuits, Analyze pneumatic, electropneumatic and electrical circuits diagrams, Develop circuit diagrams.
3c) José Novais, 1995 Ar Comprimido Industrial, Ed. Caloust Gulbenkian; José Novais, 1991 Método Sequencial, Ed. Caloust Gulbenkian; 1990 Introdução à Pneumática, Ed. FESTO.
4. Compulsory.
5. Amadeu Borges; Paulo Guimarães.
6. 4h/week (2T, 2P); 1st semester; 4th year.
7. Lectures, practical classes and laboratories.
8. Presentation of an essay 25%; written and oral examination 75%.
9. No.
10. 5.0.

1. Mechanical Technology II – 0158.
2. Material removal processes.
3a) Materials Science knowledge.
3b) Fundamentals of chip-type machining processes.
3c) Davim, J Paulo, 1995 Princípios da maquinagem; Livraria Almedina; Coimbra; Degarmo E Paul, Black JT and Kohser RA, 1997 Materials and Processes in Manufactoring Prentice Hall, 8th Edition; Gerling, H 1967 À Volta da Máquina Ferramenta, Editorial Reverte; Rossi M 1970 Máquinas Operatrizes Modernas, Editorial Cientifico-Medica; Kalpakjian S 1997 Manufactoring Processes for Engineering Materials Adison-Wesley Publishing Company, 3ª Edition; Pais, J Santos; 1989 Movimentos e relações geométricas na maquinagem, Apontamentos da disciplina de Tecnologia da Maquinagem da Universidade do Minho; Pais, J Santos 1989 Força e potência de maquinagem Apontamentos da disciplina de Tecnologia da Maquinagem da Universidade do Minho; Pais, J Santos 1989 Geometria das ferramentas para maquinagem Apontamentos da disciplina de Tecnologia da Maquinagem da Universidade do Minho.
4. Compulsory.
5. Licínio Dias A. Jorge; José Xavier.
6. 5h/week (2T+1TP+2P); 2nd semester; 4th year.
7. Lectures, practical classes and laboratories.
8. One practical work and one written test; final written exam.
9. Não.
10. 5.0.

1. Automation II – 1206.
2. Programmable Logic Controllers (PLCs), PLCs Programming Languages, Ladder Logic Diagrams, System modelling using Sequential Flow Charts (GRAFCET), Hydraulic Principles, Pressure Valves, Flow Valves, Directional Valves, Hydraulic Generator, Differential Circuit, Hydraulic Circuit Project, Hydraulic Accumulators, Servo-hydraulics, Hydraulic circuits implementation with logic elements
3a) Basic knowledge of automation principles.
3b) To provide students with fundamental principles of programmable logic controllers, how to program a PLCs, how to use Sequential Flow Charts in the context of manufacturing systems modelling, as well as to understand and use the fundamentals principles of hydraulic by designing the corresponding circuits.
3c) René David and Hassane Alla 1992 Petri Nets & Grafcet, Prentice Hall; ADEPA/AFCET 1995; Le GRAFCET, Cépadues Editions; IDEC Micro PLC Technical Manual; Hydraulics – Theory and Applications, BOSH – HIDROMAC.
4. Compulsory.
5. Paulo Moura Oliveira; Amadeu Borges.
6. 4h/week (2T, 2P); 2nd semester; 4th year.
7. Lectures, practical classes and laboratories.
8. 2 case studies with discussion 30%; final written exam 70%.
9. No.
10. 5.0.

1. Power Electronics – 0966.
2. Power Conversion Categories. Conditioning Power Types. Electric Quantities. Harmonics. Power Semiconductors: Diode, BJT, MOSFET, GTO, IGBT, TRIAC, DIAC, SCR and MCT (models, features and technologies comparison). Command and Protection Circuits. AC-DC Converter (Rectifiers). DC-DC Converter (Buck and Boost). DC-AC Converter (Inverter). AC-AC Converter (Cicloconverter). Topologies; Modes of Operation; Methods of Command and Control. Typical Applications. UPS - Unit of Power Supply without Interruption. Command of Electrical Motors. Models of DC and AC Motors. Step Motors.
3a) For students already possessing a background in Electronic and Electric Machines.
3b) The discipline aims to endow the students of specific knowledge and technical skills in the areas of electrotechnics and electronics, namely in power semiconductors and switching circuits. These skills should allow the student to easily identify, analyse, modify and develop power-conditioning circuits. The students should be capable of, in face of a power conditioning requirement for a particular load, design the necessary power and command circuits, identify the allowed operating modes and determine the variation range in the characteristic electrical quantities of the converter and load.
3c) Ramshaw, RS, 1993 Power Electronics Semiconductor Switches, 1st Edition, Chapman & Hall;Mohan, N Undeland, TM Robbins, WP 1989 Power Electronics: Converters, Applications and Design, Jonh Wiley & Sons; Whittington MW 1993 Switched Mode Power Supplies in Practice Kilgenstey (Editora Wiley); Dewan, SB Straugmen, A 1975 Power Semiconductor Circuits, John Wiley & Sons. Notes supplied by teacher.
4. Compulsory.
5. José Manuel Ribeiro Baptista; Pedro Mestre.
6. 5h/week (2T, 1TP, 2P); 2nd semester; 4nd year.
7. Lectures, practical classes and laboratories.
8. 3 case studies 30%; final written exam 70%.
9. No.
10. 5.0.

1. Hydraulic Machines – 1207.
2. Introduction and definitions, examples, types of rotors, blade sections and cascades. One-dimensional calculations, energy exchanges, efficiencies, closed and open rotors, screws. Energy equation in fixed and moving frames. Euler equation for turbomachines, axial flow and radial flow machines. Dimensional analysis applied to turbomachines, head, efficiency and power curves, non-dimensional variables, similarity laws. The use of models, Cordier chart. Laws with two parameters, viscosity influence, cavitation, NPSH, Thoma coefficient, Rutschi chart. Applications with turbomachines. Ventilation and fans. Pressure losses in ventilation systems, energy loss curve, working conditions, similarity points, fan selection. Practical examples. Pumps and pumping installations, head losses, pipe diameter selection, working conditions. Practical examples.
3a) Basic knowledge in Turbomachinery. Description of the general features of turbomachines. Machine types. Energy analysis and geometry of rotors. Specific variables and performance. Applications to installations with fans and pumps. Lab tests of one pump and two turbines.
3b) College physics, algebra, basic diff. and integral calculus, fluid mechanics and thermodynamics.
3c) Falcão A 1999 Turbomáquinas, AEIST; Dixon, SL 1998 Fluid Mechanics and Thermodynamics of Turbomachinery, 4th edition. HB; Csanady T 1964 Theory of Turbomachines, McGraw – Hill; Macintyre, 1995 Ventilação Industrial e Controle da Poluição, Ed. Guanabara,; Macintyre, 1995 Bombas e Instalações de Bombeamento, Ed. Guanabara.
4. Compulsory.
5. Eliseu Leandro Magalhães Monteiro.
6. 4h/week; (2T + 2P); 2nd semestre; 4th year.
7. Lectures (2h/week) and Lab work (2h/week).
8. Two partial tests and/or a written exam. Lab reports. Students with marks higher than 75% may also undertake an oral exam.
9. No.
10. 5.0.

1. Thermal Machines – 1204.
2. Introduction to thermal machines. Generalities of power cycles. Study of IC engines, steam boilers, steam turbines, gas turbines and volumetric compressors.
3a) Thermodynamics.
3b) To provide the students with knowledge to enable them to operate and understand the use of I.C. engines, steam boilers, steam turbines gas turbines and volumetric compressors.
3c) Thermoptim Renaud Gicquel 2001 Systèmes énergétiques Tome 1: méthodologie d'analyse, bases de thermodynamique, composants, Ecole Mines Paris; Gordon van Wylen, R Sonntag, C Borgnakke, 1993 Fundamentals of Engineering Thermodynamics; M Moran, H Shapiro 2000 Fundamentals of Engineering Thermodynamics John Wiley & Sons; GFC Rogers, YR Maylew 1992 Engineering Thermodynamics Work and Heat Transfer Pearson Higher Education; Bernard D Wood 1991 Applications of Thermodynamics Waueland Press.
4. Compulsory.
5. Salvador Malheiro; Manuel Carlos Pires.
6. 4h/week (2T, 2TP); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 5.0.

1. Heat Transfer – 0962.
2. Fourier law. Heat conduction and other thermo-physical properties. Diffusion heat equation. Permanent heat conduction. Uinstady heat conduction. Bidimensional permanent conduction.Convection problem. Conservative diferencial equation for convection. Analogies between heat transfer mecanism. Extern and intern heat convection. Free and forced convection. Condensation and boil. Radiation. Radiation exchange between superficies.
3a) Fundamental state equations for mechanics, differential equations.
3b) A heat transfer is an exchange and transport between diferent materials (Solid materials or fluid). This permit an existent of a temperature gradient, this known by heat transfer. A final objective of heat transfer is not only to explain how is transferred but also to observe a transferred quantities and its specific conditions.
3c) Rouboa, AI 2002 Transferência de Calor por condução, publicado em Dezembro de 2002, disponível na biblioteca da UTAD; JP Holman, 1981 Heat transfert, McGraw-Hill; M Necati Ozisik 1985 Heat transfert, McGraw-Hill; WJ Minkowycz and all, 1988 Hand book of Numerical Heat Transfer, Edt. J. Willey.
4. Compulsory.
5. Abel Rouboa.
6. 4h/week (2T, 2PC); 1nd semester; 4th year.
7. Lectures and practical classes.
8. Final written exam (50% of T and 50% PC).
9. No.
10. 5.0.

1. Finite Element Method – 0970.
2. Linear elastic analysis of two-dimensional bodies. Displacement, strain and stress fields. Interpolation or shape functions. Strain matrix [B]. Elasticity matrix[D]. Stiffness matrix[K].Equilibrium of an element and of all domain. Load vector formulation. Co-ordinates transformation. Isoparametric elements. Numerical integration. Gauss quadrature. Introduction to commercial code of finite element method ANSYS 5.6.
3a) Numerical analysis and Computing programming.
3b) To introduce students to finite element method of analysis of structures of any shape. Linear elastic problems. To introduce students to a commercial code based on finite element method.
3c) CA Magalhães Oliveira, 1995 Introdução ao Método dos Elementos Finitos Departº Engª Mecânica – FEUP; O C Zienkiewicz, RL Taylor, Finite Elements Method - Basic Formulation and Linear Problems, 4th Edition; JN Reddy, 1985 An Introduction to the Finite Element Method, McGraw – Hill; Irwing, 1990 A First Course in Finite Element Method USA.
4. Compulsory.
5. Abel Rouboa.
6. 4h/week (2T, 2TP); 2nd semester; 4th year.
7. Lectures and practical classes.
8. 1 case study with presentation and discussion 40% and final written exam 60%.
9. No.
10. 5.0.

1. Structural Mechanics – 0965.
2. Degree of indeterminacy of structures. Virtual work and unit load method. Matrix formulation of unit load method. Determination of internal forces and displacements of statically determinate framed structures using a matrix approach. Classical and matrix approach of statically indeterminate framed structures using force method. Classical and matrix approach of statically indeterminate framed structures using displacement method.
3a) Solid Mechanics, Applied Mechanics, Linear Algebra.
3b) To introduce students to methods of analysis of statically indeterminate framed structures. Classical and Matrix presentation of force and displacement methods.
3c) CA Magalhães Oliveira, 1997 Análise Matricial de Estruturas, FEUP-DEMEGI; A Ghali, AM Neville 1978 Structural Analysis, Chapman and Hall; RC Coates, MG Coutie, FK Kong 1980 Structural Analysis, 2nd ed., Ed Nelson; Paulo M. M. Vila Real 1995 Teoria das Estruturas, FEUP, IPB.
4. Compulsory.
5. José Manuel Cardoso Xavier.
6. 4h/week (2T, 2TP); 1st semester; 4th year.
7. Lectures and practical classes, with the use of a computer.
8. Written exam and oral discussion, 100%.
9. No.
10. 5.0.

1. Measuring System – 0142.
2. Introduction to measurement systems. Resistive sensors; Signal conditioning for resistive sensors. Reactance variation and electromagnetic sensors; Signal conditioning for reactance variation sensors. Generating sensors. Signal conditioning for generating sensors. Digital sensors. Other sensing methods: Sensors based on semiconductor junctions, sensors based on MOSFET transistors, Ultrasonic-based sensors and fibber optic sensors. Telemetry and data acquisition. Signal and noise in the measurement systems. Instruments of electric measurement.
3a) No prerequisites.
3b) Give students the understanding of the principle of operation of the most common sensors, analyze of the electronic signal-conditioning circuits and the designing and implementing measuring systems (data acquisition system).
3c) Paulo Salgado, 2001 Electrónica e Instrumentação, Série didáctica, UTAD; Geoges Asch, Les capteurs en instrumentation industrielle, 4ª Edição, DUNOD; Pallás-Areny, Ramon W. John G, 1991 Sensors and Signal Conditioning, John Wiley & Sons, Inc.
4. Compulsory.
5. Paulo Alexandre Cardoso Salgado.
6. 6h/week (2T, 2P); 2st semester; 4th year.
7. Lectures, practical classes and laboratories.
8. Final test 70%; Laboratory 30%.
9. No.
10. 5.0.

1. Mechanical Engineering Design II – 0963.
2. Rolling-element bearings: types, load rating, selection, mounting details and lubrication. F1exible mechanical elements: flat., V and synchronous belts, roller chain. Spur and bevel gears: tooth motion, unequal-addendum tooth forms tooth loading.
3a) Theory of Elasticity and Static's.
3b) To provide a study of the decision-making processes with which mechanical engineers formulate plans for the physics realisation of machines, devices and systems.
3c) Costa, José DM, 1993 Órgãos de Máquinas II, DEM/FCTUC, Coimbra; Shigley, JR 1986 Mechanics Engineering Design primeira edição métrica, McGraw Hill; Henriot, O 1979 Traité Théorique et Pratique des Engrenages 6ª Edição, vol. 1 Theorie et Technologie.
4. Compulsory.
5. António M. Vasconcelos Lima.
6. 5h/week (2T, 2TP); 1st semester; 4th year.
7. Lectures, practical classes.
8. Final written exam 100%.
9. No.
10. 5.0.

5th Year

1. Industrial Costs – 0979.
2. Importance of industrial costs in a company. Quality and industrial costs. Elements, structure, setting and analysis of the utility o industrial costs. Economic analysis of investment projects.
3a) Basic mathematics.
3b) Prepare future engeneers to dialog with their colleagues of economy when confronted with the implementation of an industrial costs system and make them sensitive to aspects which can raise productivity and can minimize losses during the cicle of activity of a company (starting with the raw materials up to the sales of the finished products). Acquire simple tools, through a concrete case, to analyse de economic viability of an investment project.
3c) Jelen, FC, Black JH, 1983 Cost and optimization Engeneering, Mc. Graw Hill, New York; Marques A 1998, Concepção e análise de projectos de investimento, Ed. Bilbao Lda; Boéri D, 2001 Maîtriser la qualité. Tout sur la certification et la qualité totale, Maxima, Paris; Bertoni G, 1995 Os costes de produccion – Cómo se estiman e cómo se utilizan, 6ª ed. Index-Buffeti.
4. Cumpolsory.
5. Carolina Dominguez.
6. 4h/week (2T and 2P); 2nd semester; 5th year.
7. Lectures, practical classes with practical cases. Visit to a company.
8. 1 case study with presentation and discussion 50%, final written exam 50%.
9. No.
10. 4.0.

1. Climatization – 0981.
2. Psychometrics, water fraction quantification in moist air, psychometrics properties of moist air, psychometrics charts, wet bulb temperature, elementary psychometrics processes, air conditioning. Introduction to comfort, definition of comfort, definition of thermal comfort and thermal balance of the human body. Physical components of the weather of a place, air temperature of a place, temperature and geometric situation of the walls, agreed effect of the temperature of the air and the temperature of the walls of a place, agreed effect of the air temperature and air speed, equivalent temperature, relative humidity of air, agreed effect of the air temperature and the relative humidity, agreed effect of all variables in the thermal comfort, resultant temperature. Air quality, modelization of the air quality in confined spaces, control of the emissions of pollutants, control by removal, control by dilution. Climatologic bases, exterior temperature, exterior air humidity, wind, solar radiation. Thermal loads, heating load and cooling load.
3a) Thermodynamics, fluid mechanics and heat transfer.
3b) Determine the properties of moist air. Factors that influence the human comfort in confined spaces. Determine the air quality. Calculate air exchange per hour. Calculate thermal loads of heating and cooling.
3c) Jones WP Arnold, 1980 Air Conditioning Applications and Design; Raul Peragallo Torreira, Elementos Básicos de Ar Condicionado, Hemus; ASHRAE 1989 Handbook of Fundamentals; ASHRAE 1992 Handbook of HVAC Systems and Equipment; ASHRAE 1991 Handbook of HVAC Applications; ASHRAE Standard 62-1981, Ventilation for Indoor Air Quality; ASHRAE Standard 55-1981, Thermal Environment Conditions for Human Occupancy; FC McQuiston, J Parker, Heating, Ventilation and Air Conditioning – Analysis and Design, John Wiley.
4. Compulsory.
5. Eliseu Leandro Magalhães Monteiro.
6. 5h/week; (2T and 3P); 1st semester; 5th year.
7. Theoretician lectures and practical lectures
8. The evaluation of knowledge is carried out by a theoretician-practical test.
9. No.
10. 5.0.

1. Combustion – 0982.
2. Introduction: motivation to study combustion; definition of combustion; combustion modes and flame types. Combustion and thermochemistry: stoichiometry; first law of thermodynamics; adiabatic flame temperatures; second law considerations; equilibrium products of combustion.Droplet evaporation and burning. Solids combustion. Laser diagnostics applied to experimental studies of combustion.
3a) Fluid Mechanics, Thermodynamics and Heat Transfer.
3b) To sensitize students to the relevance of de combustion in the thermal engineering.
To introduce students in the combustion and thermochemistry: chemical kinetics, droplet evaporation and burning, burning of solids, combustion applied to the thermal engines, pollutant emissions.
3c) Stephen R Turns 1996 An introduction to combustion-concepts and applications McGraw-Hill;
Roger A Strehlow 1985 Combustion Fundamentals McGraw-Hill; DB Spalding Combustion and mass transfer.
4. Compulsory.
5. Salvador Malheiro.
6. 5h/week (2T, 3TP); 1st semester; 5th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 5.0.

1. Industrial Refrigeration – 0974.
2. Basic knowledge in industrial refrigeration. Description of the general features of industrial refrigeration. The vapor – compression cycle. Compressors. Condensers and evaporators. Expansion devices. Multipressure systems. Absorption refrigeration. Refrigerants.
3a) Fluid Mechanics, Thermodynamics and Heat Transfer.
3b) To provide students with the theoretical and practical basis in components of industrial refrigeration. The students should be able to design and calculate new industrial refrigeration installations.
3c) ASHRAE, 1990 Refrigeration Systems and Applications, ASHRAE Handbook; Anderson, SA Automatic Refrigeration, Maclaren & Sons Ldt; Stoecker, WS Industrial Refrigeration , Business News Publishing Company; Stoecker, WS Jones, JW 1982 Refrigeration & Air Conditioning, McGraw – Hill.
4. Compulsory.
5. Salvador Malheiro; Eliseu Monteiro.
6. 5h/week (2T, 3TP); 2nd semester; 5th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 5.0.

1. Business Management – 0971.
2. Introduction of basic concepts in business management; institiutional subsystem; management subsystem; operational subsystem
3a) Basic information about the funcitioning of businesses; introductory knowledge concerning financial and analytical accounting methods; and production managaement.
3b) Make the students aware of adequate management of business resources
3c) António de Sousa, 1990 Introdução à Gestão — Uma Abordagem Sistémica, Editorial Verbo, Lisboa. James Stoner, 1995 Administração, Prentice-Hall do Brasil.
4. Compulsory.
5. Maria Celina Pires Jorge.
6. 4h/Week (2T, 2P); 1st semester, 5th year.
7. Lecture/Discussion with practical cases.
8. One exam 50% and a presentation 50%.
9. No.
10. 4.0.

1. Energy Management – 0973.
2. Introduction to energy consumption and energy management. The energy issue in Portugal and in the world. Terminology. Instrumentation used for energy auditing. Energy balance. Energy audits. Energy specific consumption. Rationalization plan. Thermal equipment. Financial incentives. Introduction to the use of alternative energies. Eolic energy. Solar energy. Energy and exergy analyses of industrial processes. Energy technologies.
3a) Fluid Mechanics, Thermodynamics and Heat Transfer.
3b) Introduce the students to the energy issues and give them a general knowledge of the national and international energy policies. Teach the students so they can identify and measure energy fluxes in an industrial process and take measures to reduce energy expenditure. Introduce the students to the use of alternative energies, with emphasis to eolic and solar energies. Teach the students energy and exergy analyzes of industrial processes.
3c) John E 1980 The Exergy Method of Energy Systems Analysis Ahern-John Wiley&Sons; David A Industrial Energy Conservation Reay-Pergamon Press, Oxford-Paris; P Le Goff 1977 Curso de Energética Industrial Universidade Nova Lisboa; Carlos Pinho 2001 Gestão de Energia Térmica FEUP; DGE 1997 Manual do Gestor de Energia.
4. Compulsory.
5. Salvador Malheiro/Graça Moura
6. 5h/week (2T, 3TP); 2nd semester; 5th year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 5.0.

1. Production Management – 0980.
2. Production Planning and Control, Master Production Scheduling, Materials Requirements Planning, Lot Sizing, Production Scheduling, Capacity Planning, JIT, OPT.
3a) None.
3b) To give the students basic knowledge of production management, the production planning and control, the problematic of production sequencing and scheduling, detailed materials planning and capacity planning. To give interest about the different approaches to the production management.
3c) Heizer & Render 1993 Operations Management, Vollmann, John Wiley & Sons; T E William, LB & Whybark, DC 1992 Manufacturing Planning and Control Systems, Richard D. Irwin, Inc; Baker, KR 1974 Introduction to Sequencing and Scheduling, John Wiley & Sons.
4. Compulsory.
5. José Dinis Carvalho.
6. 4h/week (2T,2TP); 2nd semester, 5th year.
7. Lectures and tutorials.
8. Continuous evaluation, and written assessment and oral discussion.
9. No.
10. 4.0.

1. Industrial Informatics – 0969.
2. Introduction to Industrial Informatics (II): user needs and the role of II in an enterprise. Computer Integrated Manufacturing (CIM) and Flexible Manufacturing Systems (FMS). Information systems for production systems, or enterprises – Introduction to data bases; relational data bases and E-R (Entity-Relationship) models; applications of E-R models for production systems, or enterprises. CIM subsystems: Computer Aided Design (CAD), Computer Aided Process Planning (CAPP), Computer Aided Manufacturing (CAM), Production Planning and Control (PPC). ERP (Enterprise Resources Planning) systems. Integration of production systems, or enterprises – Integration of CAD/CAPP/CAM systems, and others. Integration mechanisms: the principle of "neutral data file (format) transfer", international standards, ISO 10303 – STEP standard. Elements of economical analysis of CIM systems and FMS. CIM and FMS systems design. Tools for CIM systems and FMS design: representation languages, simulation.
3a) Doesn't exists a specific prerequisite other than prerequisites defined by the course curricula and regulation.
3b) To provide to students 1) knowledge about elements of Industrial Informatics (II), 2) correct understanding of capacities and characteristics of informatics tools for industry available on the market, 3) to define correctly the requirements for informatics tools to be used in enterprise (with the objective of correct selection and acquisition regarding the enterprise needs), 4) capacity of conceptual specification of informatics tools needed in the enterprise, e 5) designing some simpler applications.
3c) Korth H F Silberschatz A 1986 Database system Concepts, McGraw-Hill; Scheer AW 1994 Business Process Engineering – Reference Models for Industrial Enterprises, Second, Completely Revised and Enlarged Edition (First Edition on 1989), Springer-Verlag; McMahon C Browne J 1993 CAD/CAM – From Principles to Practice, Addison-Weley; Ranky P G 1990 Computer Networks for World Class CIM Systems, CIMware Ltd. Handouts and other material prepared and compiled by the lecturer.
4. Compulsory.
5. Goran Putnik.
6. 4h/week (2T, 2TP); 1st semester; 5th year.
7. Lectures and laboratories.
8. 1 casse study or mini-project with presentation and discussion 50%; final written exam 50%.
9. No.
10. 5.0.

1. Mechanical Vibrations – 0968.
2. Free and forced response of single degree-of-freedom systems. Free and forced response of multi degree-of-freedom systems. Vibrations of continuous systems: strings, rods, shafts and beams.
3a) Particle and rigid body mechanics, deformable solid mechanics, linear algebra and differential equations.
3b) To introduce the the problem of dynamic modeling and response analysis of discrete and continuous mechanical systems.
3c) Meirovitch, L. 1986, Elements of Vibration Analysis, McGraw-Hill; Timoshenko, SP Young, DH Weaver, DH 1990, Vibration Problems in Engineering, John Wiley & Sons.
4. Compulsory.
5. José Lopes Morais; Nuno Dourado.
6. 5h/week (2T, 3TP); 2nd semester; 5th year.
7. Lectures and practical classes.
8. 2 written assessments 50%+50% or final written exam 100%.
9. No.
10. 5.0.

1. Materials Engineering III – 1208.
2. Introduction to the Study of Polymeric Materials; Basic Definitions and Nomenclature; Classification; Mechanical, Chemical and Physical Properties; Additives; Polymeric Materials Families – termoplastics, temperature hardeneble materials, elastomers; Molecular Weight Distribution; Crystalline, Seem-crystalline and Amorphous Materials; Commercial Thermoplastics, PVC, Acrylic, Polyamide, Policarbonate, Polisulfide, Transformation Processes – continues and non continues; Compression and Transfer Moulding; Thermoplastics Injection, Extrusion, Enformation, Reinforced Plastics; Foams.
3a) Acquired knowledge from Materials Engineering I, Materials Engineering II and Organic Chemistry.
3b) Deeper knowledge of Materials Science, particularly on polymeric materials, mainly their properties, applications and transformation processes.
3c)Powell, PC 1983 Engineering with Polymers, Chapman and Hall; Geier, M Duedal, D 1987 Guide Pratique des Materiaux Composites, Lavoisier Tec & Doc; Marques, T 1994 Sebenta de Apoio da FEUP; Assunção, A JM 1993 Métodos de Ensaio e Avaliação do Desempenho de Tubagens em Termoplásticos, Tese de mestrado; Reis, RG 1996 Sebenta de Introdução aos Materiais II, DEMET, FEUP; Pouzada, A Processamento de Materiais Poliméricos, DPUM; Silva, PL 2001 Textos de Apoio à Disciplina de Materiais de Engenharia III, UTAD.
4. Compulsory.
5. Paula Luisa Nunes Braga da Silva.
6. 4h/week (2T+2TP); 1st semester; 5th year.
7. Use of transparencies, films and practical exercises in Theoretical classes. Study visits to companies with some relevance on the area.
8. Test (90%) + Visits reports (10%) or Final Exam.
9. No.
10. 4.0.

1. Project – 0166.
2. Each project has its own program, defined by the tutor. Works in the areas of machine project, structural project, materials development and characterization, thermal processes and equipments project are purposed.
3a) It is necessary to have competences in all scientific and technological areas until the 4th year of the degree course.
3b) The objective is to integrate the knowledge acquired in various scientific and technological matters in the mechanical project.
3c) There is no specific bibliography.
4. Compulsory.
5. Abel Rouboa; Alfredo Ribeiro; José Morais; Paula Luísa; Salvador Malheiro.
6. 7h/week (7TP); annual; 5th year.
7. Practical classes.
8. Final report 80% and oral presentation 20%.
9. No.
10. 14.

Physics/Chemistry Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	General Physics I	8.0	General Physics II	8.0
	English I	3.0	English II	3.0
	Mathematics I	6.0	Mathematics II	6.0
	Introduction to computer Science	3.0	Chemistry and Informatic	3.0
	General Chemistry I	8.0	General Chemistry II	8.0
	Total	28.0	Total	28.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Analytical Chemistry	6.0	Organic Chemistry	7.0
	History of Education	4.0	Thermodynamics	7.0
	Mathematics III	6.0	Philosophy of Education	4.0
	Inorganic Chemistry	6.0	Electromagnetism	7.0
	Experimental Analytical Chemistry	2.0	Mathematics IV	6.0
	Electronics and Instrumentation	7.0		
	Total	31.0	Total	31.0
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	Quantum Mechanics	7.0	Biochemistry	5.0
	Physical Chemistry	7.0	Educational Psychology	6.0
	Sociology of Education	3.0	Curriculum Development	4.0
	Physic and Informatics	3.0	Optics Fundamentals	5.0
	Instrumental Analysis	7.0	Experimental Physics	2.0
			Physics of Waves	5.0
	Total	27.0	Total	27.0
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	Physics Education	8.0	Didactics of Chemistry	8.0
	Environmental Chemistry	5.0	Instructional Technology	6.0
	Option of Chemistry	6.0	Option of Physics	7.0
	History of Physics and Chemistry	4.0	Earth and Space Sciences	5.0
	Pedagogy differenced	3.0	School Organization and Administration	3.0
	Initiation to the Professional Practice	3.0		
	Total29	29.0	Total	29.0

Total studies: 230

1st year

1. General Physics I - 0118.
2. Vector calculus. Complements of mathematics. Measurements, errors and experimental data graphical analysis. Units and dimensions. Statics. Kinematics. Particle and particle systems dynamics. Rigid body dynamics. Simple harmonic oscillations. Elasticity. Fluid mechanics.
3a) Mathematics.
3b) The students should be able to solve basic kinematical and mechanical problems.
3c) Keller, FJ, et al. Physics: Classical and Modern, McGraw-Hill Book Company; Alonso, M & Finn, J Física um Curso Universitário, Edgard Blucher Lda.; Spiegel, M Análise Vectorial, McGraw-Hill Lda.; Feynman, RP et al. The Feynman Lectures on Physics, Addison-Wesley Publishing Company; Kittley, C et al. Berkeley Physics Course, McGraw-Hill Book Company; Deus, JD, Pimenta, Noronha, ..., Introdução à Física, McGraw-Hill; Sternheim and Kane General Physics, John Wiley & Sons. Halliday & Resnick Fundamentos de Física, Livros Técnicos e Científicos Editora. Young, Freedman University Physics, Addison-Wesley Publishing Company. Bueche, F Principles of Physics, McGraw-Hill Inc.; Almeida, JM et al. 2001 Física Geral (vol. I e vol. II), Série Didáctica, UTAD, Vila Real; Almeida, JM et al. 2001 Exercícios de Física Geral (vol. I e vol. II), Série Didáctica, UTAD, Vila Real.
4. Compulsory.
5. José Manuel Marques Martins de Almeida, Luís Morgado, Francisco Marinho.
6. 7,5 h/week (3 theoretical + 1,5 theoretical/practical + 3 practical); 1st semester; 1st year.
7. Lectures, practical and laboratory classes.
8. Laboratory 20% and final written exam 80%.
9. No.
10. 8.

1. English I - 0156.
2. Exchanging information, explaining diagrams, describing experiments, technical vocabulary, reading comprehension, sequencing instructions, extracting meaning from context.
3a) Pre-intermediate knowledge of English grammar, sentence structure and vocabulary.
3b) This course is designed to meet the language needs of students studying science courses by providing them with the necessary language framework needed to understand technical texts as well as communicate efficiently with a functional level of English.
3c) Blackie, D 1982 English for Physics, Nelson; Esteras, R 2003 Infotech English for computer users, Cambridge, 3rd edition, Hall, N & Shepheard, J 1995 The Anti-Grammar Grammar Book, Longman, 5th ed.; Murphy, R 1987 English Grammar In Use, Cambridge University Press. In addition the internet, various journals and newspapers will be used as sources of material.
4. Compulsory.
5. Paul Driver.
6. 2 h/week (2 TP); 1st semester; 1st year.
7. Lectures, communication activities, student presentations, reading/listening comprehensions.
8. Final exam.
9..Yes, English.
10. 3.

1. Mathematics I - 0209.
2. Functions of one variable: implicit and inverse functions; some special functions. Limits of functions and continuity: classification of discontinuity. Derivatives: higher order derivatives; implicit differentiation. Antiderivatives: techniques of integration. Rolle's theorem, Lagrange's theorem and Cauchy's theorem. L'Hopital's rule.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st vol., Weberand Schmidt; Apostol, TM 1967 Calculus, 1st vol., Wiley International Edition.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino, Carlos Jorge Pereira Monteiro.
6. 4h/week (2 theoretical + 2 theoretical/practical); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam - 100%.
9. No.
10. 6.

1. Introduction to Computer Science - 0342.
2. Fundamental concepts of computers. The operating system Windows. A word processor - Word. A spreadsheet - Excel. Software tools for oral presentation – Powerpoint. Internet.
3a) No prerequisites.
3b) To provide students with practice in using computers, some software tools (word processor, spreadsheet and tools for oral presentation) and internet.
3c) Azul, AA 2002 Introdução às Tecnologias de Informação - Bloco 1. Porto Editora; Perdicoúlis, Teresa Paula 2002. Introdução às Tecnologias de Informação. Universidade de Trás-os-Montes e Alto Douro. Sousa, S. & Sousa, Maria José 2002 Microsoft Office 2000 Para Todos Nós. FCA – Editora de Informática. Vários 2000 Microsoft Office 2000 Passo a Passo. Mc Graw-Hill; Lemos, M 1998 Estar na Internet. Mc Graw-Hill; Biow, L 1997 How to use computers, The complete visual solution. Macmillan Computer Publishing USA.
4. Compulsory.
5. Luís Gonzaga Mendes Magalhães.
6. 2 h/week (2 TP); 1st semester; 1st year.
7. Lectures/practical classes.
8. Final written exam - 35%; computer exam – 65%.
9. No.
10. 3.

1. General Chemistry I - 0708.
2. Atoms, molecules, and ions. Chemical reactions I: Chemical equations and reactions in aqueous solution. Chemical reactions II: Mass relationships. The gaseous state. Thermochemistry. Quantum Theory and the electronic structure of atoms. Periodic relationships among the elements. Chemical bonding I: Basic concepts. Chemical Bonding II: Molecular geometry and molecular orbitals.
3a) None other than the acceptance of the application.
3b) Providing the students with a profound knowledge on the principles and concepts of Chemistry, and make them understand the vital role that Chemistry plays on our daily lives.
3c) Chang, R 1944 Química., 5ª ed., McGraw Hill, Lisboa; Reger, D, Goode, Scott & Mercer, Edward 1997 Química - Princípios e Aplicações, Saunders College Publishing/Fundação Calouste Gulbenkian (Edição em Português), Lisboa.
4. Compulsory
5. Rui Ramos Vale: Ana Margarida Ferreira
6. 7 h/week (3 theoretical + 1 theoretical/practical + 3 practical); 1st semester; 1st year.
7. Lectures, problem solving tutorials and lab classes. Attendance in 2/3 of tutorials and lab classes is compulsory.
8. Two written assessments or final written exam (80%) + lab grade (20%).
9. No.
10. 8.

1. General Physics II - 0119.
2. Vector differential operators and coordinate systems. Electric charge and Coulomb's law. Electric field and potencial. Capacitors and dielectrics. Electric current. Electric circuits. Temperature and energy transfer.
3a) Mathematics and General Physics I.
3b) To provide students with the basic tools for electric circuit analysis.
3c) Keller, FJ, Gettys, WE & Stove, MJ Physics: Classical and Modern, McGraw-Hill Book Company; Alonso, M & Finn, J Física um Curso Universitário, Edgard Blucher Lda.; Spiegel, M Análise Vectorial, McGraw-Hill Lda.; Feynman, RP, Leighton, RB & Sands, M The Feynman Lectures on Physics, Addison-Wesley Publishing Company; Kittley, C, Knight, WD & Ruderman, MA Berkeley Physics Course, McGraw-Hill Book Company; Deus, JD, Pimenta, Noronha, ..., Introdução à Física, McGraw-Hill; Sternheim and Kane General Physics, John Wiley & Sons. Halliday & Resnick Fundamentos de Física, Livros Técnicos e Científicos Editora. Young, Freedman University Physics, Addison-Wesley Publishing Company. Bueche, F Principles of Physics, McGraw-Hill Inc.; Almeida, JM, Marques, PV, Marinho, F & Morgado, L 2001 Física Geral (vol. I e vol. II), Série Didáctica, UTAD, Vila Real; Almeida, JM, Marques, PV, Marinho, F & Morgado, L 2001 Exercícios de Física Geral (vol. I e vol. II), Série Didáctica, UTAD, Vila Real.
4. Compulsory.
5. Luís Morgado, Francisco Marinho, Jaime Viegas.
6. 6 h/week (2 theoretical + 1 theoretical/practical + 3 practical); 2nd semester; 1st year.
7. Lectures, practical classes and laboratories.
8. Laboratory 20% and final written exam 80%.
9. No.
10. 8.

1. English II - 0147.
2. Exchanging information, explaining diagrams, describing experiments, technical vocabulary, reading comprehension, Sequencing instructions, extracting meaning from context.
3a) Pre-intermediate knowledge of English grammar, sentence structure and vocabulary
3b) This course is designed to meet the language needs of students studying science courses by providing them with the necessary language framework needed to understand technical texts as well as communicate efficiently with a functional level of English.
3c) Blackie, D 1982 English for Physics, Nelson; Esteras, R 2003 Infotech English for computer users, Cambridge, 3rd edition, Hall, N & Shepheard, J 1995 The Anti-Grammar Grammar Book, Longman, 5th ed.; Murphy, R 1987 English Grammar In Use, Cambridge University Press. In addition the internet, various journals and newspapers will be used as sources of material.
4. Compulsory.
5. Paul Driver.
6. 2 h/week 2 (TP); 2nd semester; 1st year.
7. Lectures, communication activities, student presentations, reading/listening comprehensions.
8. Final exam.
9. Yes, English.
10. 3.

1. Mathematics II - 0216.
2. Taylor's formula. Integration: the definite integral. Applications of Integration. Improper Integrals. Sequences of real numbers: bounded and monotonic sequences. Series: series with nonnegative terms : comparison tests, the integral test, the ratio and root tests; absolute convergence - alternating series. Power series: expansion of functions; differentiation and integration of power series; Taylor and Maclaurin series.
3a) High-school Mathematical Analysis.
3b) To provide the basic concepts of Mathematical Analysis useful to teachers of Physics and Chemistry.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada “, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st vol., Weberand Schmidt; Apostol, TM 1967 Calculus “, 1st vol., Wiley International Edition.
4. Compulsory.
5. Maria Gabriela C. Direito, Fátima Ferreira
6. 5 h/week (2 theoretical + 3 theoretical/practical); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam - 100%.
9. No.
10. 6.

1. Chemistry and Informatic – 0477.
2. Hardware. Operating systems. Introduction to the Internet. Imaging treatment to Internet. HTML software (Frontpage and Netscape Composer). Chemistry programs demonstration (ACDLabs, Chemlab, Chemland, WinPerio, ChemDraw, Chem3D, Isisdraw, Vlab). Practical in ACDLabs (ChemSketch e Chem3D). Practical of Microsoft Word in writing scientific text. Practical of Microsoft Excel to solve common chemistry problems. The Solver of the Excel. Graphic representations in Excel and Microcal Origin.
3a) No prerequisites.
3c) Colombain, J 1997 Internet, Texto Editora, 1ª ed.; Kennedy, AJ 1997 Internet & World Wide Web, Guia de Navegação 2.0, Texto Editora; Guia Prático do Microsoft Office 97, 1997 Biblioteca Exame Informática, Abril/Controljornal Editora; Como construir páginas Web com o Office 97, Biblioteca Exame Informática; Coelho, P 2001 HTML 4 & XHTML, FCA, Editora de Informática; Coelho, P 2001 Frontpage 2002, FCA, Editora de Informática.
4. Compulsory.
5. Pedro Tavares.
6. 2 h/week; 2nd semester; 1st year.
7. Lectures/practical classes.
8. Students work presentation, and final exam with a strong practical component.
9. No.
10. 3.

1. General Chemistry II - 0709.
2. Intermolecular forces and liquids and solids. Physical properties of solutions. Chemical Kinetics. Chemical equilibrium. Acids and bases: general properties. Acid-base eqilibrium. Solubility equilibrium. Entropy, Free energy, and equilibrium. Electrochemistry.
3a) None other than the acceptance of the application.
3b) Carry on providing the students with a profound knowledge on the principles and concepts of Chemistry, and make them understand the vital role that Chemistry plays on our daily lives.
3c) Chang, R 1944 Química., 5ª ed., McGraw Hill, Lisboa; Reger, D, Goode, S & Mercer, E 1997 Química - Princípios e Aplicações, Saunders College Publishing/Fundação Calouste Gulbenkian (Edição em Português), Lisboa.
4. Compulsory.
5. Rui Ramos Vale, Ana Margarida Ferreira.
6. 7 h/week (3 theoretical + 1 theoretical + 3 practical); 2nd semester; 1st year.
7. Lectures, problem solving tutorials and lab classes. Attendance in 2/3 of tutorials and lab classes is compulsory.
8. Two written assessments or final written exam (80%) + lab grade (20%).
9. No.
10. 8.

2nd year

1. Analytical Chemistry - 0105.
2. Fundamentals of Analytical Chemistry. Errors in chemical analysis. Statistical evaluation of analytical data. Gravimetric methods of analysis. Titrimetric methods of analysis.
3a) General chemistry.
3b) To provide a rigorous background in both fundamental and practical aspects of the classical quantitative chemical analysis. To sensitise students to errors and uncertainties of analytical results. To introduce statistical methods for reliability evaluation of analytical data.
3c) Skoog, DA, West, DM & Holler, FJ 1996 Fundamentals of Analytical Chemistry, 7th ed., International Edition, Saunders College Publishing; Harris, DC 1999 Quantitative Chemical Analysis 5th ed., W. H. Freeman and Company; Miller, JC & Miller, JN 1993 Statistics for Analytical Chemistry, 3rd ed., Ellis Horwood Limited.
4. Compulsory.
5. Luís H. Melo de Carvalho, João Claro.
6. 3 h/week (2 theoretical + 1 theoretical/practical); 1st semester; 2nd year.
7. Lectures and tutorial classes.
8. Written exam (100%).
9. No.
10. 6.

1. History of Education - 0206.
2. Western Education: Greece and Rome (Ancient Age). European Education in Middle Ages: importance of Christianism. Renascence and Enlightment: “racionality”. Rousseau, Pestalozzi, Herbart and Froebel. XXth Century; "New School" moovement, Paulo Freire.
3a) No prerequisites.
3b) To know authors and crucial times for the development of Education. To analyze present times in order to preview future solutions.
3c) Abbagnano, N & Visalberghi, A 1982 História da Pedagogia, Livros Horizonte, Lisboa; Bowen, J 1985 Historia de la Educación Occidental, Herder, Barcelona; Chateau, J s.d. Os Grandes Pedagogos, Lisboa, Livros do Brasil.
4. Compulsory.
5. Carlos Alberto Magalhães Gomes Mota.
6. 3 h/week (1 theoretical +2 theoretical/practical); 1st semester; 2nd year.
7. Lectures and tutorial classes.
8. Written essay.
9. No.
10. 4.

1. Mathematics III - 0223.
2. The topology of the Euclidean space Rn. Limites, continuity and differenciability of vector-valued functions of several variables. Differentiation. Extrema of real-valued functions: unconstrained extrema; constrained extrema and Lagrange multipliers. Double and triple integrals. Change of variables and applications.
3a) Differential and integral calculus of one variable as well as basic notions of linear algebra and analytic geometry.
3b) To give the basic theory of differential and integral calculus of functions of several variables and show the practical aspects of all these matters namely through applications in physics.
3c) Breda, A & Costa, JN 1996 Cálculo com Funções de Várias Variáveis, 1ª ed. McGraw-Hill International Editions; Marsden, JE & Tromba, AJ 1988 Vector Calculus, 3rd ed., W.H. Freeman and Company; Swokovski, E 1994 Cálculo com Geometria Analítica, Vol II, 1ª ed., Mc Graw-Hill Ldª, S. Paulo.
4. Compulsory.
5. Anabela Borges, Carlos Rito.
6. 4 h/week (2 theoretical + 2 theoretical/practical); 1st semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written examination – 100%.
9. No.
10. 6.

1. Inorganic Chemistry – 0556.
2. Crystalline structure of solids. Energetic of solids. Solvents and solutions. Acid Base reactions. Redox reactions. Elemental studies and their compounds (H, O, P, B, S). Metallurgy and chemistry of metals. Metal complexes of d bloc.
3a) Good knowledge on general chemistry.
3b)
3c) Cavaleiro, A 1997 Química Inorgânica Básica, Universidade de Aveiro; Shriver, DF, Atkins, PW & Langford, GH 1990 Inorganic Chemistry, Oxford University Press; Chang, R 1994 Química, 5ª ed., McGraw-Hill de Portugal.
4. Compulsory.
5. Pedro Tavares.
6. 3 h/week (lectures); 1st semester; 2nd year.
7. Lectures classes.
8. Final written exam.
9. No.
10. 6.

1. Experimental Analytical Chemistry - 1648.
2. Systematic qualitative analysis. Quantitative analysis by gravimetric and titrimetric methods. Statistical evaluation of analytical data. Operations of Analytical Chemistry - reagents, preparation and conservation of standard solutions, use of gravimetric and volumetric equipment. Fundamental safety aspects.
3a) General chemistry.
3b) To provide a rigorous background in practical aspects of the classical qualitative and quantitative chemical analysis. To teach those laboratory skills that will give students confidence in their ability to design and conduct their experiments correctly in order to obtain reliable analytical data.
3c) Vogel, AI 1989 Vogel's Textbook of Quantitative Inorganic Analysis, 5th Ed. by Longman Scientific & Technical, U.K.; Skoog, DA, West, DM & Holler, FJ 1996 Fundamentals of Analytical Chemistry, 7th Ed. International Edition, Saunders College Publishing; Harris, DC 1999 Quantitative Chemical Analysis 5th Ed., W. H. Freeman and Company.
4. Compulsory.
5. Luís H. Melo de Carvalho, João Claro.
6. 3 h/week (practical); 1st semester; 2nd year.
7. Laboratory classes.
8. Written exam (60%) and practical mark (40%).
9. No.
10. 2.

1. Electronics and Instrumentation - 1649.
2. Errors and measurements. Introduction to the study of electronics: passive and active components, Ohm's law, Kirchoff's law, Joule's law, Thévenin and Norton's equivalents circuits. Diodes: the pn junction, working principle, clipping and clamping circuits, rectifying and filtering. Altern current: fasors, reactance, generalized Ohm's law and power factor. Transistors: working principle, pnp and npn junctions, the transistor as an amplifier, the field effect transistor. Logical circuits using diodes: Boole's logics, basic logical functions, Morgan's laws and truth tables. Operational amplifiers: characteristics, DC and AC analysis, feed-back circuits, circuits using amplifiers, impedances.
3a) Basics knowledge on mathematics: vectors and vector operators.
3b) It is pretended to take the student to understand the working principles of various electronic components and it's function as part of a circuit.
3c) Horowitz, P & Hill, W 1989 The Art of Electronics, 2º Edição, Cambridge Press; Jones, M 1977 A Practical Introduction to Electronic Circuits, Cambridge University Press; Senturia, SD & Wedlock, BD 1977 Electronic Circuits and Applications, John Wiley; Sedra, A & Smith, K 1991 Microelectronic Circuits, 3º Edição, CBS College Publishing; Young, EC 1988 Dictionary of Electronics, Penguin Books; Millman, J & Grabel, A 1987 Microelectronics, 2nd ed., McGraw-Hill Book Company; Duncan, T 1985 Electronics for Today and Tomorrow, John Murray.
4. Compulsory.
5. José Manuel Almeida.
6. 7,5 h/week (3 theoretical + 1,5 theoretical/practical +3 practical); 1st semester; 2nd year.
7. Lectures, practical classes and laboratories.
8. Laboratories reports 20% + Final exam 80%.
9. No.
10. 7.

1. Organic Chemistry - 0103.
2. Functional Groups, Alkanes and Cycloalkanes, Conformational Analysis, Stereochemistry, Spectroscopy, Nucleofilic substitution, Alkenes, Aromaticity, Alcohol's Aldeydes and Ketones, Carboxylic acids and derivatives, Radical reactions.
3a) No prerequisites.
3b) To show that the organic compounds properties are derivatively related with the functional groups present in the molecule.
3c) Solomons, G & Fryhle, C 2000 Organic Chemistry, 7th ed., John Wiley&Sons.
4. Compulsory.
5. Paulo Coelho, Maria Manuel Oliveira.
6. 5 hours/week (2 theoretical + 3 practical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam (70%) and practical work (30%).
9. No.
10. 7.

1. Thermodynamics - 0160.
2. The Language of Thermodynamics. Zero Law of Thermodynamics and Temperature. Simple Thermodynamic Systems. Work. Heat and the First Law of Thermodynamics. Ideal gas. The Second Law of Thermodynamics. The Carnot Cycle and the Thermodynamic Temperature Scale. Entropy. Thermodynamic potentials. Open systems. Pure substances. The Third Law of Thermodynamics. Elements of Statistical Mechanics.
3a) General Physics, Differential and integral calculus.
3b) To provide students with the theoretical basis in Thermodynamics and its fundamenta laws. The students should be able to apply their knowledge to several situations-problems relating diverse areas of Physics.
3c) Anacleto, JM 2002 Termodinâmica e Mecânica Estatística, Série Didáctica 29, UTAD; Zemansky; MW & Dittman RH 1997 Heat and Thermodynamics, 7th ed., McGraw-Hill; Güémez, J, C. Fiolhais & Fiolhais, M 1998 Fundamentos de Termodinâmica do Equilíbrio, Fundação Calouste Gukbenkian, Lisboa; Callen, HB. 1985 Thermodynamics and an Introduction to Thermostatics, 2nd ed., John Wiley; Fermi, E 1937 Termodinâmica, Almedina; Deus, JD, Pimenta, M, Noronha, Ana, Peña, Teresa & Brogueira, P 2000 Introdução à Física, 2a ed., McGraw-Hill.
4. Compulsory.
5. Joaquim Anacleto, Maria Adelaide Andrade.
6. 4,5 h/week (3 theoretical + 1,5 theoretical/practical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. 1 final written exam.
9. No.
10. 7.

1. Philosophy of Education - 0220.
2. To introduce students to the Philosophy of Education, its concepts and its methods, focusing on the language of educational theory and practice and discussing the educational values and goals.
3a) No prerequisites.
3b) Philosophy of Education: epistemology, basic concepts and methods. Aims and objectives in Education. Educational foundations: human nature and educability, ethics and moral education, values and attitudes, authority and discipline, social philosophy of education, freedom and education, models of teaching and models of education. Philosophy of Education, Project and Utopia.
3c) Moore, TW 1982 Philosophy of Education. London: Routledge & Kegan Paul; Fullat, O 1983 Filosofias de la Educación. Barcelona: CEAC.
4. Compulsory.
5. Manuel Barroso Magalhães.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Continuous evaluation or final exam.
9. No.
10. 4.

1. Electromagnetism - 0721.
2. Electrostatics: charges and fields. The electric potential. Electric fields around conductors. Electric currents. The Magnetic field. Electromagnetic inductance. Displacement current. Maxwell's equations. Alternating current circuits. Electric fields in matter.
3a) College algebra and basic differential and integral calculus.
3b) To teach some fundamental concepts of electricity and magnetism to prospective secondary school teachers and provide them with the ability to apply these concepts to the solution of both familiar and unfamiliar problems.
3c) Purcell E 1985 Electricity and Magnetism, McGraw-Hill, Singapore; Villate JE 1999 Electromagne-tismo, McGraw-Hill, Lisboa; Brito, L, Fiolhais, M & Providencia C 1999 Campo Electromagnético, Mc Graw-Hill, Lisboa; Fishbane, PM, Gasiorowicz, S & Thornton ST 1996 Physics for Scientists and Engineers, Prentice-Hall, New Jersey.
4. Compulsory.
5. ose Ferreira, Jaime Viegas, Daniel Alexandre.
6. 4,5h/week (3 theoretical + 1,5 theoretical/practical); 2nd semester; 2nd year.
7. Lectures, problem solving tutorials.
8. Written exam.
9. No.
10. 7.

1. Mathematics IV - 1650.
2. First order differential equations. Differential equations of higher order: Method of the undetermined coeficients. Euler-Cauchy equations. Vector-valued functions in the plane and in the space. Velocity and acceleration. Arc length. Vector fields. Divergence and curl. Integrals over paths and surfaces. Theorems of Green, Gauss and Stokes.
3a) Differential and integral calculus of one variable as well as several variables and also basic notions of linear algebra and analytic geometry.
3b) Introduce the basic differential equations and give the basic theory of vector analysis showing the practical aspects of all these matters namely through applications in physics.
3c) Breda, A & Costa, JN 1996 Cálculo com Funções de Várias Variáveis, 1ª ed., McGraw-Hill International Editions; Marsden, JE & Tromba, AJ 1988 Vector Calculus, 3rd ed., W.H. Freeman and Company; Swokovski, E 1994 Cálculo com Geometria Analítica, Vol II, 1ª ed., Mc Graw-Hill Lda., S. Paulo; Zill, D 1997, A First Course in Differential Equations with Modelling Appplications, 6ª ed., Brooks/Cole Publishing Company.
4. Compulsory.
5. Anabela Borges, Carlos Rito.
6. 4 h/week (2 theoretical + 2 theoretical/practical); 2nd semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8 Final written examination – 100%.
9. No.
10. 6.

3rd year

1. Quantum Mechanics - 0182.
2. The particle-wave duality, eigenstates, the Schrödinger equation, the harmonic oscillator, expected and expectable values, wave packets, the Heisenberg uncertainty principle, the Dirac formalism in quantum mechanics.
3a) Basic algebra, differential and integral calculus.
3b) To teach some fundamental concepts of quantum mechanics to prospective secondary school teachers and provide them with the ability to apply these concepts to the solution of both familiar and unfamiliar problems.
3c) Cohen-Tannoudji, C, Diu B & Lalöe, F 1977 Quantum Mechanics, vol. John Wiley, New York; Cohen-Tannoudji, C, Diu, B & Lalöe, F 1977 Quantum Mechanics, vol. II John Wiley, New York; Fishbane, PM, Gasiorowicz, S & Thornton, ST 1996 Physics for Scientists and Engineers, Prentice-Hall, New Jersey; Stauffer, D & Stanley HE 1995)FromNewton to Mandelbrot, Springer-Verlag, New York; Matthews, PT 1963 Introduction to quantum mechanics, McGraw-Hill, London.
4. Compulsory.
5. José Ferreira.
6. 4,5h/week (3 theoretical + 1,5 practical); 1st semester; 3rd year.
7. Lectures, problem solving practical.
8. Written exam.
9. No.
10. 7.

1. Physical Chemistry – 0185.
2. Behaviour of gases. Thermodynamic laws. Chemical Thermodynamic. Chemical equilibrium. Phases and solutions. Chemical kinetics. Diffraction techniques.
3a) Good knowledge on general chemistry.
3b)
3c) Atkins, PW 1999 Físico-Química, LTC Livros Técnicos e Científicos, 6ª ed., volumes 1, 2 e 3; Laidler, K & Meiser ,J 1999 Physical Chemistry, Houghton Mifflin, 3rd ed..
4. Compulsory
5. Pedro Tavares, José Sousa.
6. 6hours/week (2 lectures + 1 problems + 3 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 7.

1. Sociology of Education - 0190.
2. Genesis and development of Sociology of Education; Sociological approch of education; school and equality of opportunities; social and school differences; problematic of school success; school and labor world; school as a place for innovation and conflict.
3a) Students are required to have knowledges related to History of Education and Philosophy of Education.
3b) Students are supposed to question the theoretical differences and sociological levels of analysis that contribute to the explanation of the relationships between society and the Educatinal System, as well as the existing relationships inside school itself.
3c) Afonso, A. 1988 Insucesso, Socialização Escolar e Comportamentos Divergentes – Uma abordagem Introdutória, Revista Portuguesa de Educação, Braga; Formosinho, J 1987 Como Organizar a Escola para o Insucesso Educativo. Braga; Gomes, C 1998 A Interacção Selectiva na Escola de Massas. Braga: Instituto de Educação; Grácio, R 1986 Políticas do Ensino, efeitos perversos – o caso do secundário. Musgrove, F 1986 Família Educação e Sociedade. Porto: Rés Editora; Valente, B 1986 A Viragem da Escola. Lisboa: Livros Horizonte.
4. Compulsory.
5. Maria João de Carvalho.
6. 2h a week (2 theoretical/practical); 1st semester; 3rd year.
7. Theoretical classes and practical classes.
8. Test and Final Exam.
9. No
10. 3.

1. Physics and Informatics - 0478.
2. Identify and analyse the different hardware components. Implementation of physical systems in a worksheet environment (medium/advance level). Visual Basic for Applications environment programming. Numerical algorithms to solve physical problems. Search and present information in the web.
3a) First level physics knowledge.
3b) The students should be able to simulate several physical system, specially systems with complex analytical resolution e presenting the projects in the web.
3c) Sousa, MJ 1998 Fundamental Excel 97, FCA; Sousa, MJ 1998 Domine a 110% Excel 97, FCA; de Veries, PL 1994 A first Course in Computational Physis, Jonh Wiley & Sons; Gould, H & Tobochnick, J 1996 An Introduction to Computer simulation methods, Addison-Wesley Company (2ª edição); Garcia, A 1994 Numerical Methods for Physics, Prentice Hall; Campos, L, Vilar, S & Lúcio L Programação em VISUAL BASIC 6, Colecções FCA; Nina, N Curso Completo VISUAL BASIC 6, FCA; Coelho, PA Como Criar Páginas Web, FCA; Coelho, P Criação de Páginas na World Wild Web com HTML 4 & JAVA, FCA.
Encontrar a Informação Certa na Web, A.M. Ferreira, FCA†
4. Compulsory.
5. Norberto Jorge Gonçalves, Malik Amraoui.
6. 2 h/week (2 theoretical/practical); 1st semester; 3rd year.
7. Lecture/practical classes.
8. Practical exam 100%.
9. No.
10. 3.

1. Instrumental Analysis - 1651.
2. Characterisation of the instrumental analysis techniques and methods. Their vantages and limitations. Uncertainties in instrumental measurements. Sensitivity and detection limit for instruments. Introduction to electroanalytical chemistry. Potenciometric, coulometric and electrogravimetric methods. Introduction to absorption spectroscopy. Molecular ultraviolet and visible spectroscopy. Atomic spectroscopy based upon flame and electrochemical atomisation.
3a) No prerequisites.
3b) To transmit the general principles and practical aspects of the various methods and techniques. To provide the understanding of the their strengths and limitations.
3c) Harris, DC 1999 Quantitative Chemical Analysis, 5th ed. by W. H. Freeman and Company; D. A. Skoog, DA, West, DM & Holler, FJ 1996 Fundamentals of Analytical Chemistry; 7th ed. by Saunders College Publishing.
4. Compulsory.
5. Maria Cristina F. Oliveira, Cristina Antunes.
6. 6 h/week (3 practical + 1theoretical/practical + 2 theoretical); 1st semester; 3rd year.
7. Lectures, practical classes and laboratories.
8 . Final written exam (60%) + oral presentation (20%) + laboratory reports and discussion (20%).
9. No.
10. 7.

1. Biochemistry - 0007.
2. Major chemical constituents of cells; Water and its properties; Carbohydrates, Lipids, Proteins; Thermodynamics applied to the biological systems; Enzymes; Nucleotides, nucleic acids and hereditariness; Genetic expression and protein synthesis; Bioenergetics; Catabolic pathways.
3a) General Chemistry.
3b)
3c) Stryer 1995 Biochemistry, 4ª Edição, W. H. Freeman and Company, Inc., New York, USA; Seager, SL & Slabaugh, MR 2000 Chemistry for Today General, Organic, and Biochemistry, Ed. Brooks/Cole, 4th ed., UK; Weil, JH Bioquímica Geral, 2ª ed., tradução de Maria Celeste Lechner, Fundação Calouste Gulbenkian, Lisboa; Campos, LS 1998 Entender a Bioquímica, Escolar Editora; Halpern, MJ 1997 Bioquímica, Lidel edições gráficas; Voet, D & Voet, JG 1995 Biochemistry", 2nd ed., John Wiley and Sons Inc.
4. Compulsory.
5. Francisco Manuel Pereira Peixoto.
6. 4 hours/week; 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final theoretical and practical examination.
9. No.
10. 5.

1. Educational Psychology - 0435.
2. Conceptual framework principles; Physical, cognitive, social, sexual and personal development during school age; Major concerns of beginning teachers; Applications of behavioral approaches; The cognitive perspective and teaching practice; Motivation in classroom; Classroom management; Effective teaching; Teaching exceptional students.
3a) No prerequisites.
3b) Introduces the teacher-in-training to the psychological principles that govern teaching and learning.
3c) Arends, R.I 1995 Aprender a Ensinar. Lisboa: Editora McGraw-Hill de Portugal, Lda.; Biehler, R & Snowman, J 1997 Psychology applied to teaching (6th ed.), Boston: Houghton Mifflin Co.; Campos, B 1990 Psicologia do Desenvolvimento e Educação de Jovens. vols. I e II. Lisboa: Universidade Aberta. Lopes, J 2002 Alunos com dificuldades de aprendizagem: Da teoria à prática (5ª ed.), Série Didáctica, n.º 16, Vila Real, UTAD; Lopes, J 2002 A gestão da sala de aula: como prevenir e lidar com problemas de indisciplina (4ª ed.), Série Didáctica n.º 24, Vila Real, UTAD; Lopes, J 2002 Psicologia do adolescente: Implicações para o ensino (3ª ed.), Série Didáctica n.º 40, Vila Real, UTAD; Sprinthall, NA & Collins, WA 1994 Psicologia do Adolescente. Lisboa: Fundação Calouste Gulbenkian. Sprinthall, N & Sprinthall, R 1993 Psicologia Educacional. Lisboa: McGraw-Hill de Portugal, Lda. Woolfolk, A 1999 Educational Psychology (7th. ed.), New Jersey: Prentice-Hall.
4. Compulsory.
5. José Pinto Lopes.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, one written test or a final exam - 100%.
9. No.
10. 6.

1. Curriculum Development - 0436.
2. Nature and scope of curriculum studies. Some educational key concepts and terms. The concept of curriculum. The process of curriculum development. Basic components of a curriculum. Course design and instructional planning. Planning the evaluation of school learning.
3a) Although it is suitable for students with no prior specific knowledge, students enrolling in the course must have good, university level, reading and writing skills and a broad cultural background.
3b) After completing this course students should be able to: define a coherent and adequate framework for curriculum inquiry; understand the teacher's role in curriculum development; interpret the main official documents that shape the Portuguese Basic and Secondary School System; analyse syllabus of Mathematics for Basic and Secondary Portuguese Schools; plan and organize course units and evaluative activities.
3c) D'Hainaut, L 1980 Educação - dos fins aos objectivos. Coimbra: Livraria Almedina; Domingos, AM et al. 1984 Uma forma de estruturar o ensino aprendizagem. 2ª edição. Lisboa: Livros Horizonte; Messick, Rosemary, Paixão, Lyra & Bastos, Lília 1980 Currículo: Análise e Debate. Rio de Janeiro: Zahar Editores; Stenhouse, L 1986 An Introduction To Curriculum Research And Development. Londres: Heinemann; Zabalza, MA 2000 Planificação e Desenvolvimento Curricular na Escola. Porto: Edições Asa.
4. Compulsory.
5. José João Pinhanços de Bianchi.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.

1. Optics Fundamentals - 1652.
2. Geometric Optics as an approximation; Geometric Optics; Wave Optics; Interference; Diffraction.
3a) Good knowledge on calculus, integral and differential, vector analysis and electromagnetism.
3b) Students should get an overview of the basic concepts in optics and they should be able to use them to explain some everyday basic optic phenomenon's.
3c) Hecht, E 1974 Óptica, Fundação Calouste Gulbenkian; Born, M & Wolf, E 1980 Principles of Optics, Pergamon Press, New York.
4. Compulsory.
5. José Ramiro Afonso Fenandes.
6. 3,5 h/week (1,5 practical + 2 theoretical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 5.

1. Experimental Physics - 1653.
2. Units and dimensions. Direct and indirect measurements. Systematic and random errors. Most probable value of a measure. Error propagation. Graphical analysis. Fitting. Slope and y-intercept. Graphical analysis errors. Linearization. Last squares method. Kinematics: projectile motion. Dynamics: momentum conservation; moment of inertia and angular acceleration; forced and damped oscillatory motion; Electromagnetism: microwave radiation – polarization, reflection, refraction, absorption, diffraction; wave optics – diffraction by various sorts of apertures.
3a) First year calculus and physics.
3b) Students should understand the experimental method and apply it to the study of physical concepts.
3c) Abreu, M, Matias L. & L. Peralta, F 1994 Física Experimental – uma introdução, Ed. Presença; Halliday, R Fundamentos de Física, Livros Técnicos e Científicos Editora; Tipler, P 1997 Física (volumes 1, 3 e 4), Livros Técnicos e Científicos Editora; Alonso, F Física – um curso universitário, Edgar Blutcher Ltd; Almeida, JMM, Marinho, F & Morgado, L 2001 Sebenta de Física Geral, Vila Real, UTAD; Hecht, E 1996 Óptica, Fundação Calouste Gulbenkian.
4. Compulsory.
5. Jaime Pinto Ribeiro Viegas.
6. 3 h/week; 2nd semester; 3rd year.
7. Practical classes.
8. Class work and logbook (25%), reports (30%), written test (45%).
9. No.
10. 2.

1. Physics of Waves - 1654.
2. Simple harmonic movement (SHM): differential equation, energy in an SHM, superimposition of SHM, polarisation, dumped and non harmonic oscillations. Forced mechanical oscillators and applications to RLC circuits. Coupled oscillators. Transverse waves: wave notion, dispersion relation, wave interference, wave reflection and refraction on an interface and diffraction. Waves in gases and solids, the Doppler effect. Fourier analysis and applications.
3a) Basic knowledge of mathematics: derivates, integrals and differentials equations.
3b) It is pretended to take he student to model and solve analytically physical situations of periodic movements.
3c) Pain, HJ 1999 The Physics of Vibrations and Waves, John Wiley & Sons; French, S 1971 Newtonian Mechanics, WW Norton; Alonso, M & J. Finn, J Física um Curso Universitário, Edgard Blucher Lda; Keller, FJ, Getty's, WE & Stove, MJ 1992 Physics: Classical and Modern, McGraw-Hill Book Company; Feynman, RP, Leighton, RB & Sands, M 1964 The Feynman Lectures on Physics, Addison-Wesley Publishing Company.
4. Compulsory.
5. Daniel Alexandre.
6. 3.5h/ week (2 theoretical +1,5 theoretical/practical); 2nd semester, 3rd year.
7. Lectures and practical classes.
8. Final exam 100%.
9. No.
10. 5.

4th year

1. Physics Education - 0199.
2. The teaching and the learning of Physics: characteristics and problems of effective practices; The contribution of the Physics Education for the teaching and the learning of Physics; Formative Situation as tool for to prepare and to manage the curriculum; Physics Education and Epistemology; Learning of Physics Concepts; Resolution of problems of Physics; Experimental work in Physics; Evaluation; Management of the teaching - learning of Physics.
3a) Good knowledge in Introductory Physics I and II, Electromagnetism, Thermodynamics, Experimental Physics.
3b) Students should get: think on the Physics Teaching (why, for what, how to teach Physics?); develop the educational foundations of the Teaching and Learning of Physics; build an unified knowledge of all the great themes of Physics in the perspective of your learning; improve several methods to teach Physics and to evaluate the quality of the learning, based in the Physics Education research; develop competencies to conceive and use formative situations.
3c) Bloomfield, L 2001 How Things Work, New York. John Wiley & Sons, Inc; Lemeignam, G & Weil-Barais, A 1993 Construire des concepts en Physique. Paris Hachette Éducation; Lopes, JB 1994 Resolução de problemas em Física e Química - Um modelo para estratégias de ensino-aprendizagem. Lisboa. Texto Editora; Lopes, JB 2002 Processos e Entidades Envolvidos na Aprendizagem de Física. Aveiro. Universidade de Aveiro; Silva, AA 1999 Didáctica da Física. Porto. Edições Asa; Viennot, L 1996 Raisonner en Physique. Paris. De Boeck.
4. Compulsory.
5. J. Bernardino Lopes.
6. 6 h/week (2 practical + 2 theoretical/practical + 2 theoretical); 1st semester; 4th year.
7. Lectures and theoretical/practical and practical classes.
8. Final written exam (40%), 2 projects (45%) and 2 essay works (15/%).
9. No.
10. 8.

1. Environmental Chemistry - 0560.
2. Water pollution. Water and wastewater characterisation: physical, chemical and biological parameters. Alkalinity. Hardness. Dissolved oxygen. Biochemical Oxygen Demand. Chemical Oxygen Demand. Nitrogen species. Solids. Sulphate. Phosphorous. Oil and grease. Trace contaminants. Wastewater treatment: preliminary, primary, secondary and tertiary treatments. Disinfection. Pesticides. Insecticides. Herbicides. Solid Waste: landfill, incineration, dioxins and furans. Air Pollution. The atmosphere of Earth. Primary and secondary pollutants. Air pollutants: carbon monoxide and carbon dioxide, nitrogen oxides (NOx), hydrocarbons, volatile organic compounds (VOC), photochemical oxidants, sulphur oxides, particulate matter, lead. Air pollution situations: greenhouse effect, changes in stratospheric ozone, photochemical smog, acid rain
3a) Good knowledge on general chemistry.
3b) To provide students with an overview of anthropogenic activities impact in the Environment. The students should be able to interpret and identify water pollution and air pollution characteristics.
3c) Sawyer, CN, McCarty, PL & Parkin, GF, 2003 Chemistry for Environmental Engineering, 5th Ed., McGraw-Hill, NY; Baird, C 1999 Environmental Chemistry, 2nd Ed., W. H. Freeman Pub, NY; Warnek, P 1988 Chemistry of the Natural Atmosphere, Academic Press, NY; APHA 1998 Standard Methods for the Examination of Water and Wastewater, 19th Edition; Metcalf & Eddy 2003 Wastewater Engineering. Treatment and Reuse, 4th Ed., McGraw-Hill, NY.
4. Compulsory.
5. José Alcides Peres.
6. 3 h/week (2 theoretical + 1 theoretical/practical); 1st semester; 4th year.
7. Lectures, practical classes.
8. Final written exam .
9. No.
10. 5.

Opção de Química - 1655.

1. Complementary Physical Chemistry - 1662.
2. Fundamental concepts in Quantum theory. The Schrödinger equation and its solution. Atomic structure. Molecular structure. The Molecular Orbital theory. The Valence-bond theory. The Hückel method. Pure rotation spectra. Vibration-rotation spectra. Group theory.
3a) The students should possess a good background on mathematics, chemistry and physics.
3b) This course intends to cover several advanced topics in Physical Chemistry, to extend fundamental Quantum theory knowledge and to provide the essentials of group theory and its application to vibrational spectroscopy.
3c) Atkins, PW 1994 Physical Chemistry, Oxford University Press; Davidson, G 1991 Group Theory for Chemists, MacMillan Physical Science Series.
4. Optional.
5. Verónica Cortés de Zea Bermudez.
6. 5h/week (2 theoretical + 3 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final theoretical and practical examinations.
9. No.
10. 6.

1. Complementary Organic Chemistry - 1663.
2. Electrophilic Aromatic Substitution, the carbonyl group, Nucleophilic addition reactions, Nucleophilic substitutions in the acyl group, Synthesis and reactions of dicarbonyl compounds.
3a) No prerequisites.
3b) To show that the reactivity of the organic compounds can be understood on the basis of the reactions mechanism
3c) Solomons, G & Fryhle, C 2000 Organic Chemistry, 7th ed., John Wiley & Sons.
4. Optional.
5. Paulo Coelho, Maria Manuel Oliveira
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final written exam (70%) and practical work (30%).
9. No.
10. 6.

1. History of Physics and Chemistry - 1656.
2. Physics, Chemistry and the observational world. The origins and evolution of astronomy. The evolution of mechanics: the role of mathematics in the characterisation of motion; the importance of Newton's laws; the conservation principles. The evolution of thermodynamics. The theories of light and electromagnetism. The modern physics.
3a) General Physics and General Chemistry
3b) The intention is to clarify certain fundamental aspects of the nature and development of science; to explore some aspects of the evolution of Physics and Chemistry.
3c) Gibert Origens Históricas da Física Moderna, Fundação Calouste Gulbenkian; Rousseau. História da Ciência, Editorial Aster.
4. Compulsory.
5. Solange Mendonça Leite.
6. 3 h/week; 1st semester; 4th year.
7. Lectures.
8. Final written exam.
9. No.
10. 4.

1. Initiation to the Professional Practice - 1658.
2. Observation of classes and critical analysis of them based in Physics and Chemistry knowledge. Presentation of a technological object to the colleagues of the course, exploring the situation, elucidating the involved concepts, proposing tasks. Visit schools to find out of your working process and to do an evaluation of the teaching of P/C.
3a) Good knowledge in basic disciplines of Physics and Chemistry.
3b) To Train Physics and Chemistry teachers professional competencies.
3c) Bloomfield, L 2001 How Things Work, New York. John Wiley & Sons, Inc; Silva, AA 1999 Didáctica da Física. Porto. Edições Asa.
4. Compulsory.
5. J. Bernardino Lopes, Beatriz Magalhães.
6. 2h/week; 1st semester; 4th year.
7. Practical classes.
8. Individual presentations (3)
9. No.
10. 3.

1. Didactics of Chemistry - 0200.
2. Chemistry as an Exact Science – Scientific Methodology. Chemistry and Concept's Teaching. The use of Conceptual Maps in the Teaching of Chemistry. Chemistry and Problem Solving. Chemistry as an Experimental Science. Interaction of Chemistry and Society.
3a) Good knowledge on general subjects of Chemistry and Science Education.
3b) Students must approach Chemistry on the viewpoint of Science and Philosophy of Science, understand its internal logic structure and specific difficulties, and become aware of its strong interaction with other sciences and society.
3c) Lakatos Eva Mª & Marconi, Mariana Metodologia Científica, Editora Atlas S. Paulo; Arens, RI Ed. McGraw-Hill de Portugal; Moreira, MA & Buchweitz, B Novas Estratégias de Ensino - Aprendizagem Plátano Ed. Técnicas; Summerlin & Ealy, Demonstrações de Química, Jr. da Sociedade Portuguesa de Química; Cardoso, AC & Formosinho, SJ Química e o Quotidiano, Almedina.
4. Compulsory course unit.
5. Mª Gabriela S. Figueiredo, Beatriz Magalhães.
6. 6 h/week (2 theoretical + 2 tutorial + 2 practical); 2nd semester; 4th year.
7. Lectures. Tutorial classes: chemical problems solving; practical classes: surveying and setting of relevant laboratorial experiments for basic and secondary School Classes; Seminar: about experimental work and interaction Chemistry-Society (last tutorial and practical classes).
8. Final written exam; setting and execution of a laboratory experiment; translation and presentation of an article about Chemistry and Society.
9. No.
10. 8.

1. Instructional Technology - 0531.
2. Conceptual and historical delimitation of the discipline. The History of Communication. Difficulty and problems of communication. Communication's function. Audiovisual communication technology. Discretion to select a teaching media.
3a) No prerequisites.
3b) To reflect on the role of technique and communication in the contemporary civilization and the school. To argue about the advantages and disadvantages of media and communication uses in educational relations. To analyse the connections between the evolution of technique, communication and education. To rethink the education for media.
3c) Garcia, Ana, Muñoz-Repiso & Valcárcel 2003 Tecnologia Educativa. Implicaciones educativas del desarrollo tecnológico, Madrid, Editorial La Muralla; Silva, D & Bento 1998 Educação e Comunicação, Braga, Universidade do Minho; Ruiz & Capuzano, A 1992 Tecnologias Audiovisuales y Educacion, Madrid, Akal; Cloutier, J 1975 A Era de Emerec ou a Comunicação Áudio-Scripto-Visual na hora dos Self-Media, Lisboa, ITE; Flichy, Patrice 1991Une Histoire de la Communication Moderne. Espace Public et vie Privée, Paris, La Découvert; Breton, Philippe 1992 A Utopia da Comunicação, Lisboa, Instituto Piaget; Olivier, B 1992 Communiquer pour enseigner, Paris, Hachette; Postman, N Tecnopolia. Quando a Cultura se rende à Tecnologia. Lisboa, Difusão Cultural; Zabalza, MA & Núñez, A 1985 Introducción à la Comunicación Didáctica, Santiago de Compostela, Tórculo Ediciones.
4. Compulsory.
5. Joaquim José Jacinto Escola.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Test or final exam.
9. No.
10. 6.

Opção de Física - 1659.

1. Atomic physics - 0183.
2. The structure of matter, blackbody radiation, theory of relativity, central potentials, angular momentum, Coulomb potential - the hydrogen atom, spin, Born dispersion, perturbation theory, introduction to relativistic wave mechanics and Dirac equation, elementary particles-the quark model.
3a) Basic algebra, basic differential and integral calculus.
3b) To teach some fundamental concepts of atomic physics to prospective secondary school science teachers, and provide them with the ability to solve both familiar and unfamiliar problems in this field
3c) Salgueiro, L & Ferreira, JG 1973 Introdução à Física Atómica e Nuclear, vols. I e II, Tipografia Matemática, Lisboa; Blin, AH & Ferreira JG 2001 Introdução ao estudo do átomo, Universidade de Trás-os-Montes e Alto Douro, Vila Real; Krane, K 1996 Modern Physics, John Wiley, New York; Wilmott, JC 1975 Atomic Physics, John Wiley, London; Alonso, M & Finn, EJ 1968 Fundamental University Physics, vol. III, Addison-Wesley; Cohen-Tannoudji, C, Diu, B & Lalöe, F 1977 Quantum Mechanics, vol. II, John Wiley, New York; Fishbane, PM, Gasiorowicz, S & Thornton, ST 1996 Physics for Scientists and Engineers, Prentice-Hall, New Jersey.
4. Optional.
5. José Ferreira.
6. 4,5 h/week (3 theoretical + 1,5 theoretical/practical); 2nd semester; 4th year.
7. Lectures, problem solving tutorials.
8. Written exam.
9. No.
10. 7.

1. Advanced Physics Topics - 1664.
2. The Drude Theory of Metals. Fermi free-electron model. Crystal lattices. The Reciprocal Lattice. Crystal vibrations. Crystal binding. Band theory of solids. Nuclear Structure. Properties of the nucleus. Nuclear processes. Fundamental structure of matter.
3a) General Physics, Electromagnetism, Quantum Mechanics, Differential and integral calculus.
3b) To provide students with the theoretical basis of Solid State Physics and Nuclear Physics.
3c) Neil, W, Ashcroft, N & Mermin, D 1976 Solid State Physics, Holt, New York; M. Alonso, M, & Finn, EJ 1968 Fundamental University Physics, vol. III, Addison-Wesley; Burcham, WE 1979 Elements of Nuclear Physics, Longman, New York.
4. Optional.
5. Joaquim Anacleto.
6. 4,5 h/week (3 theoretical + 1,5 theoretical/practical); 2nd semester; 4th year.
7. Lectures and practical classes.
8. One final written exam.
9. No.
10. 7.

1. Earth and Space Sciences - 1660.
2. Special relativity. Fundamentals of general relativity. Cosmological models. The Big Bang. Cosmic rays. Solar system orbits. Eclipses. Tides. Volcanoes. Atmospherical phenomena. Sun and Earth magnetic fields. Aurorae. Essentials of Plasma Physics.
3a) Newtonian mechanics, optics and electromagnetism.
3b) Students should learn what are the physical fundamentals underlying some of the phenomena studied in the vast fields of earth and space sciences.
3c) Feynman, RP, Leighton, RB & Sands, M The Feynman Lectures on Physics, Addison-Wesley Publishing Company; D'Inverno, RA 1992 Introducing Einstein's Relativity, Oxford, Clarendon Press; Zeilik & Gregory 1998 Introductory Astronomy and Atrophysics, Saunders College Publishing. Lecture Notes. Internet sites on the subjects under study.
4. Compulsory course unit.
5. Pedro Manuel Cravino Serra.
6. 3 h/week (2 theoretical +1 theoretical/practical); 2nd semester; 4th year.
7. Lectures and theoretical/practical classes.
8. Final Exam.
9. No.
10. 5.

1. School Organization and Administration - 1661.
2. Education Planning and Administration. Socio-historical and organisational construction of the school. The new configuration of Portuguese educational administration. The school as institution and organisation. The new autonomy regime and organisational strategies of the teaching/learning process. Autonomy, planning and organisation of live in schools.
3a) No prerequisites.
3b) To analyse and understand the educational administration reform process. To Know and understand the school social-organisational functioning. Knowing and understanding the importance organisational structures in the development of autonomy and quality of the education.
3c) Afonso, N 1995 A Reforma da Administração Escolar. Lisboa: IIE; Barroso, J 1977 Autonomia e Gestão das Escolas. Lisboa: Ed. do Ministério da Educação; Lima, LC 1996 Construindo Modelos de Gestão Escolar. Lisboa: IIE; Marques, R 1997 Professores, Família e Projecto Educativo. Porto: Ed. Asa; Santiago, RA 1997 A escola representada pelos alunos, pais e professores. Aveiro: Ed. da Univ. de Aveiro.
4. Compulsory.
5. Jorge Gomes.
6. 2 h/week; 2nd semester; 4th year.
7. Theoretical/practical classes.
8. Periodic examination: written test (65%) and investigation paper (35%). Final exam (100%).
9. No.
10. 3.

Biology/Geology Degree (teaching of)

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Biology (An.)	10.5	Mathematics II	8.0
	General Geology (An.)	10.0	General Physics II	6.5
	Chemistry (An.)	10.5		
	Mathematics I	8.0		
	General Physics I	6.5		
	Total	45.5	Total	14.5
2nd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Biochemistry (An.)	11,5	History and Philosophy of Education	3.5
	General and Applied Botany (An.)	11.0	Mineralogy and Crystalography	6.0
	Quaternary Geology/Human Origins (An.)	5.0	Stratigraphic Palaeontology	5.0
	General and Applied Zoology (An.)	11.0		
	Statistic	5.0		
	History of Science	2.0		
	Total	45.5	Total	14.5
3rd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	General Ecology (An.)	10.0	Mineral and Energy Resources	5.0
	Petrology (An.)	13.0	Molecular Genetic and Biotechnology	6.0
	Curricular Development (An.)	6.5	Microbiology	5.0
	General Genetics	6.0		
	Fundamentals of Soil Science	3.5		
	Environmental Geology	5.0		
	Total	44	Total	16
4th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Inf. Appl. to Natural Sciences (An.)	5.0	Biology Education	5.5
	Educational Psychology (An.)	7.0	Educational Technologies	3.5
	Sociology of Education	4.0	Plant Physiology	6.0
	Geology Education	5.5	Compl. of Laboratorial Practical Geology	3.5
	Water Resources	5.5	Geology of Portugal	5.5
	Animal Physiology	6.5		
	Pract. Compl. of Laboratorial Biology	2.5		
	Total	36	Total	24

5th year: Pedagogic Probation

Total study: 240 ECTS

1st year

1. Biology - 0336.
2. Theory: Introduction to the study of cell biology. Constituent of the lives matter. Biological organization levels. Animal and plants cells: plasma membrane; cytoplasmic membrane systems; cell walls; nucleus; the cell cycle, m phase: mitoses and meiosis; aerobic respiration and the mitochondrion; photosynthesis and the chloroplast. The immune response. Practice: Optical and electronically microscopy. Colloidal theory. Living matter constituents. Histology technical for optical microscopy. Cellular division. Photosynthesis light need and the significance of photosynthetic pigments for photosynthesis. Fermentation versus respiration. Blood typing.
3a) No prerequisites.
3b) To acquire knowledge about the structure-function duality at the cellular level, general vision of the inherent biological processes of the prokaryotic virus and eukaryotic cells, as well as the morfo-functional interactions between the cells and the cellular organelles. It is pretended that students can fullfill proposed experiences in such away to get familiar to the laboratory.
3c) Azevedo, C 1999 Biologia Celular e Molecular, 3ª ed., Lidel, Edições Técnicas. Lisboa-Porto-Coimbra; Paniagua, R et al. 1993 Citologia y Histologia Vegetal y Animal- Biologia de las celulas y tejidos animales y vegetales, Interamericana - McGraw Hill, Madrid; Sheeler, B 1987 Cell and Molecular Biology, John Wiley & Sons, NY; Alberts, B et al. 2001 Molecular Biology of the Cell, Garland Publishing, Inc. NY.
4. Compulsory.
5. Teresa Maria Pinto, Carmen Moreira.
6. 5 h/week (3 practical + 2 theoretical); annual; 1st year.
7. Lectures and practical classes.
8. According to University Regulations, 4 written tests or a final exam - 100%.
9. No.
10. 10.5.

1. General Geology - 0452.
2. History of Geology; Building a planet; Earthquakes and Earth's interior; Minerals and rocks; Plate tectonics; Geologic Time; Deformation and mountain building; Weathering and soils; Running water; Deserts and wind; Glaciers; The oceans.
3a) Notions of Physics and Chemistry. Basic notions of Geology.
3b) To introduce students in methods and techniques for successful learning in the geology. To understand natural aspects of earth's surface and its interior.
3c) Chernicoff, S & Venkatakrishnan, R 1995 Geology. An introduction to physical geology, Worth Publishers Inc., 593 pp.; Tarbuck, EJ & Lutgens, FK 1997 Earth Science, Prentice-Hall, 638 pp.; Press, F & Siever, R 1994 Understanding earth, WH Freeman & Company, 593 pp..
4. Compulsory.
5. Luís Sousa, Nuno Vaz.
6. 5 h/week (2 theoretecal + 3 practical); annual; 1st year.
7. Lectures and practical classes.
8. Exam.
9. No.
10. 10.5.

1. Chemistry - 0003.
2. Atoms, molecules and ions. Chemical reactions. Gaseous state. Thermochemistry. Structure of matter. Intermolecular forces. Liquids and solids. Physical properties of solutions. Chemical kinetics. Chemical equilibrium. Acid-base equilibria. Solubility equilibria. Entropy, free energy and equilibrium. Eletrochemistry. Organic chemistry.
3a) No prerequisites.
3b) To provide a fundamental understanding of physical and organic chemistry, important to biologists and geologists, in a manner that is understandable, interesting and meaningful to beginning students. To Achieve a balance in theory and application and, when ever possible, to illustrate the basic principles with everyday examples.
3c) Chang, R 1994 Química, 5th ed., McGraw-Hill Inc.; Atkins, PN & Beran, JA 1990 General Chemistry, 2nd ed., W. H. Freeman & Company; Brescia, F et al. 1980 Fundamentals of Chemistry, 4th ed., Academic Press.
4. Compulsory.
5. Maria Gabriela Figueiredo.
6. 5 h/week (2 theoretical + 3 practical); annual; 1st year.
7. Final written test (80%) and laboratory performance (20%).
8. Lectures and practical classes.
9. No.
10. 10.

1. Mathematics I - 0209.
2. Introduction to complex numbers: definition of the complex numbers; properties of complex numbers. Functions of one real variable: implicit and inverse functions; the inverse trigonometric functions. Limits of functions and continuity; the Intermediate Value Theorem. Derivatives: the Chain Rule; higher order derivatives; implicit differentiation; the Mean Value Theorem; L' Hôpital' s Rule; Taylor's formula; Maximum-Minimum Problems. Antiderivatives: techniques of integration. Integration: the definite integral; the Fundamental Theorem of Calculus. Applications of integration: the area between two curves.
3a) High-school Mathematical Analysis.
3b) To provide students the basics concepts of Mathematical Analysis.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st vol., Weberand Schmidt; Apostol, TM 1967 Calculus, Wiley International Edition.
4. Compulsory.
5. Armando Figueiredo, Aline de Sousa Alves, Maria Luís Vasco.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 1st semester; 1st year.
7. Lectures and heoretical-practical classes.
8. Final written exam 100%.
9. No.
10. 8.

1. General Physics I - 0118.
2. Physical quantities and units. Vector calculus. Particle kinematics. Dynamics. Gravitation. Energy. Fluids. Temperature and kinetic theory. Heat. Thermodynamics.
3a) General Physics, Vector and Differential Calculus.
3b) To give a solid basis of Mechanics and a deep understanding of Statics. To apply the laws and concepts of Mechanics and of Statics in real situations.
3c) Colleta, VP 1995 Physics, WCB/McGraw-Hill; Alonso, M & Finn, EJ 1968 Fundamental University Physics, vols. I, II and III, Addison-Wesley.
4. Compulsory.
5. Joaquim Anacleto, Ramiro Fernandes, Francisco Marinho.
6. 4.5 h/week (3 theoretical + 1.5 theoretical/practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. One final written exam.
9. No.
10. 6.5.

1. Mathematics II - 0216.
2.. Algebric Structures. Vector Spaces: linear independence; spanning sets; basis and dimension; vectorial subspace. Linear Mappings: the algebra of linear mappings; kernel and image; linear mappings whose domain is a vector space of finite dimension. Matrices: matrix of a linear mapping relative to fixed basis; algebra of matrices; invertible matrices; rank of matrices. Systems of Linear Equations: matricial interpretation; a systematic method of solving systems of linear equations. Determinants: basic concepts; Laplace theorem; application to matrices and systems. Eigenvalues and Eigenvectors: basic concepts.
3a) Basic knowledge in logic, theory of sets, functions and secondary school level of algebra.
3b) To develop reasoning capacity of the student and to provide the basic concepts of Linear Algebra and Analytical Geometry.
3c) Giraldes, E et al. 1995 Curso de Álgebra Linear e Geometria Analítica, McGraw-Hill; Blyth, TS & Robertson, EF 1986 Matrices and Vector Spaces, Chapman & Hall; Blyth, TS & Robertson, EF 1994 Linear Algebra, Chapman & Hall.
4. Compulsory.
5. Elza Maria Alves de Sousa Amaral, Ângela Macedo Cardoso.
6. 6 h/week (3 theoretical + 3 theoretical/practical); 2nd semester; 1st year.
7. Lectures and theoretical/practical classes.
8. Written test (100%).
9. No.
10. 8.

1. General Physics II - 0119.
2. The Sun as a main source for energy on Earth. Nuclear fusion. Emission of radiation and particles from the Sun. Interaction with the Earth's atmosphere. Electromagnetic spectrum. Visible radiation and elementary optics. Use and production of energy for human use: conventional energies and renewable energies. Electricity: electrostatics, electric current, simple circuits and electricity distribution. Magnetism and the Earth's magnetic field. Relationships between electricity and magnetism: magnetic fields produced by electric currents and electromagnetic induction.
3a) Algebra and Trigonometry.
3b) Understand: how energy is produced, transformed, transported and used; the concept of efficiency in the context of energy; what is electromagnetic radiation and what are particles and the connection between both; the various forms of energy available; the basic principles governing the propagation of visible radiation, the basic optic instruments and how humans see; be able to build simple electric circuits and give reasonable scientific explanation to electric and magnetic phenomena. Develop team skills and the ability to develop new knowledge through autonomous research.
3c) Coletta, VP 1995 College Physics, St. Louis, Mosby-Year Book, Inc.; Bloomfield, LA 2001 How Things work: the physics of everyday life, NY, John Wiley & Sons, Inc.; Lecture notes. Websites on the various themes studied.
4. Compulsory.
5. José Paulo Cravino.
6. 4.5 h/week (3 theoretical + 1.5 theoretical-practical); 2nd semester; 1st year.
7. Lectures, problem solving sessions, experimental work (both demonstrations and experiments performed by the students) and group project work.
8. Written test (40%), group project work (45%) and short essays (15%).
9. No.
10. 6.5.

2nd year

1. Quaternary Geology (Human Origins) - 0453.
2. Following the history of discovery from the XVIII century until the most recent finds. Primate evolution from early fossils to vestiges of the human species (from Purgatorius to Homo sapiens). The Quaternary. The relationship between people and the environment in the past. The great changes. The first inhabitants of Portugal
3a) General knowledge of geology and Animal Biology.
3b) An Anthropological-biological approach to human origins. Introduction to Palaeo-Anthropology. The Quaternary and Man.
3c) Bahn, P & Vertut, J 1997 Journey through the Ice age, London, Weidenfeld & Nicolson; Carvalho GS et al. 1993 O Quaternário em Portugal – Balanço e Perspectivas, 198 pp., Lisboa, Edições Colibri; Jurman, R et al. 1997 Introduction to Physical Anthropology, 7º ed., 560 pp., Belmont, Ca. ITP; Stringer, C & Gamble, C 1994 In search of the Neanderthals, 247 pp., London, Thames & Hudson; Vilar, Clara (coordenação versão Portuguesa) 1998 Passo a passo a evolução humana, 84 pp., Lisboa, Ministério da Ciência e Tecnologia.
4. Compulsory.
5. Mila E. Simões de Abreu.
6. 2 h/week; annual; 2nd year.
7. Lectures/practical classes.
8. Continuous assessment 20% + 1 essay 40% (50% oral + 50% writing) + 2 short assignments: 20% (10% each) + 1 test 20%.
9. No.
10. 5.

1. General and Applied Botany - 0339.
2. Origin of life. Plant classification systems. Divison Schizophyta: diferential patterns of Procariota and Eucariota. Detailed treatment - Subkingdoms Thallophyta and Cormophyta. Thallophyta, Divison Schizophyta, Class Cyanophyceae. Division Prochlorophyta and the chloroplast origin of Chlorophyta and of terrestrial plants. Subkingdom Thallophyta: Divisions of Eucariotic Algae. Clorophyta: Prainophyceae; Trebouxiophyceae; Chlorophyceae; Charophyceae; and Ulvophyceae. Heterokontophyta: Phaeophyceae, Chrysophyceae; Parmophyceae; Sarcinochrysidophyceae; Xanthophyceae; Eustigmatophyceae; Bacillariophyceae; Raphidophyceae; and Dictyochophyceae. Rhodophyta. Pyrrophyta. Euglenophyta. Glauco-phyta. Haptophyta. Criptophyta. Fungi. Lichens. Heterotrophic Protists. Bryophyta. Cormophyta: Filico-phyta. Cycadophyta and Coniferophyta. Anthophyta. Examples. Histology. Organography.
3a) No prerequisites.
3b) It is intended that the students know plants in a general and applied perspective.
3c) Raven, PH et al. 1999 Biology of Plants, 6th ed., WH Freeman and Company/Worth Publishers, NY; Moore, R et al. 1998 Botany, 2nd ed., The McGraw-Hill Companies, Inc., Boston; South, GR & Whittick, A 1987 Introduction to Phycology, Blackwell Scientific Publications, Oxford; Van den Hoek, C et al. 1995 Algae, Cambridge University Press, Cambridge. Texts by the staff covering the full program.
4. Compulsory.
5. José M.G. Torres-Pereira, Victor M.F. Galhano.
6. 5 h/week (2 theoretical + 3 practical); annual; 2nd year.
7. Lectures and practical classes.
8. Two practical tests (2 h) and two theoretical tests (2 h) or one theoretical and practical final examination (4 h).
9. Yes.
10. 11.

1. Biochemistry - 0007.
2. Theoretical: Introduction; Aminoacids; Proteins; Enzimology; Vitamins and coenzymes; Carbohydrates; Lipids; Membrane transport; Carbohydrate metabolism; glicolyse and gliconeogenesis; Krebs cycle (citrate); Oxidative phosphorylation; Lipid metabolism: triglicerides and fatty acid catabolism; triglicerides, fatty acid, phospholipid and cholesterol/cholesterol derivatives anabolism; poli-isoprenic compounds; Nitrogen compound metabolism: aminoacids catabolism; aminoacids anabolism; synthesis of aminoacids derivatives: creatine, histamine, hormones and neurotransmistters. Practical: Introduction: basic knowledge of gravimetry, volumetric and statistic analysis; basic biochemical laboratory techniques. Aminoacids qualitative and quantitative analysis of: a) aminoacids; b) protein. Enzymes: enzyme kinetics analysis; qualitative and quantitative analysis of: a) carbohydrates; b) lipid; c) vitamin. Energetic metabolism: sucrose fermentation on yeast.
3a) Good knowledge on General (Inorganic) and Organic Chemistry.
3b) Show that Biochemistry has had and will continue to have extensive effects on many aspects of human endeavor. Biochemical concepts needed to a suite understanding of Biology as a global science and sub-areas of Life Sciences.
3c) Campos, LS 1998 Entender a Bioquímica, Escolar Editora, Lisboa; Champe, PC & Harvey, RA 1994 Biochemistry, 2nd ed., Lippincott-Raven Publishers, Philadelphia; McKee, T & McKee, JR 2003 Biochemistry: An introduction, 3rd ed., WCB McGraw-Hill, Boston; Nelson, DL & Cox, MM 2000 Lehninger Principles of Biochemistry, 3rd ed., Worth Publishers, NY; Osgood M & Ocorr, K 2000 The absolute, ultimate guide to Lehninger Principles of Biochemistry, 3rd ed., Worth Publishers, NY; Berg, JM et al. 2002 Biochemistry, 5th ed., W. H. Freeman and Company, NY.
4. Compulsory.
5. Dario Loureiro dos Santos, Celso Santos, Pedro Matos.
6. 5 h/week (2 theoretical + 3 practical); annual; 2nd year.
7. Lectures, practical classes and laboratories.
8. Written assessment/exams (theoretical and practical). Final classification: theoretical program – 75% e practical program – 25%.
9. No.
10. 11.5

1. General and Applied Zoology - 0338.
2. Embryology and Histology – gametogenesis, hormonal regulation of sexual cycle; fertilization; general features of embryonic development on vertebrate; origin, structure and functional significance of extraembryonic organs; derivatives of the primary germ layers; epithelial tissue; connective tissue; nervous tissue; muscular tissue; circulatory system; bone marrow and hematopoiesis; digestive system; respiratory system; excretory system; endocrine glands; male and female; reproductive system; general structure of large bone - ossification processes; skin and appendages; central nervous system. Zoology – General description of the main taxonomic groups of protists and animals. General characteristics of phyla and classes.
3a) Knowledge on Biology.
3b) To acquire knowledge on embryonic development of vertebrates, structural, morphologic and functional aspects of animal tissues and its topography and interrelations in the diverse organs. Classify protists and animals attending to their general characteristics and establish phylogenetic relationships among them.
3c) Costa, AC & Morato, X 1984 Desenvolvimento Embrionário dos Vertebrados, Ed. Verbo; Junqueira, LC & Carneiro, J 1990 Histologia Básica, Editora Guanabara; Burkitt, HG et al. 1994 Wheater – Histologia Funcional, Editora Guanabara; Hickman, CP et al. 2001 Integrated principles of Zoology, 11ª ed., McGraw-Hill, NY; Kukenthal, W et al. 1986 Guia de trabalhos práticos de Zoologia, Almedina, Coimbra.
4. Compulsory.
5. Luísa Valente, Jorge Ventura F. Cardoso, Sofia Santos.
6. 5 h/week (2 theoretical +3 practical); annual; 2nd year.
7. Lectures and practical classes.
8. Embryology and Histology (50%) – 2 written theory tests or final exam (25%) + oral practice exam (25%). Zoology – 2 written theory tests or final exam.
9. No.
10. 11.

1. Statistic - 0168.
2. Descriptive statistic: univariated and bivariated statistical variables. Linear Regression. Theory of probability: probability, conditional probability e independence of events. Unvariated random variables: discrete and continuous. Expected value and order parameters. Special distributions. Central limit theorem. Approximations.
3a) Knowledge on Combinatory and Calculus.
3b) To provide an introduction to probability and statistics.
3c) Reis, E et al. 1996 Estatística aplicada, Edições Sílabo, Lisboa; Guimarães, RC & Cabral, J 1998 Estatística, McGraw-Hill de Portugal Lda, Lisboa; Pestana, DD & Velosa, SF 2002 Introdução à probabilidade e à estatística, Fundação Calouste Gulbenkian, Lisboa; Murteira, BJ 1990 Probabilidades e estatística, McGraw-Hill de Portugal Lda, Lisboa; Rohatgi, V 1976 An introduction to probability theory and mathematical statistics, John Wiley & Sons, NY; Ross SM 1987 Introduction to probability and statistics for engineers and scientist,s John Wiley & Sons, NY.
4. Compulsory.
5. Sandra Dias, Helder Sousa.
6. 3,5 h/week (2 theoretical + 1,5 theoretical/practical); 1st semester; 2nd year.
7. Lectures and theoretical/practical classes.
8. Final written exam.
9. No.
10. 5.

1. History of Science - 0363.
2. Science as a milestone in contemporary life. A general framework for the History of Science: - What is Science? - Internal and external history of sciences; - Continuity and discontinuities in the history of scientific knowledge. The current debate on the nature of scientific knowledge: post-modernism, scepticism and sociological relativism. The Scientific Revolution in the 16th and 17th Centuries: - Remote beginnings; - Genesis of the "Experimental Philosophy". Brief chronology of scientific events from 17th to 20th Centuries.
3a) Although it is suitable for students with no prior specific knowledge, students enrolling in the course must have good, university level, reading and writing skills and a broad cultural background.
3b) On the completion of this course students should be able to: debate the relevance of Science in the contemporary societies; show some awareness of the interplay of internal and external factors in the History of Science; critically discuss the accounts of scientific knowledge given by different epistemological perspectives; analyse the implications of these epistemological perspectives for our understanding of the origin and development of Science; display a basic familiarity with the main factors of the Scientific Revolution in the 16th and 17th Centuries; identify some milestones in the dissemination of the scientific model of research between the 18th and 20th Centuries.
3c) Boorstin, D 1994 Os descobridores, 2ª ed., Lisboa: Gradiva; Kuhn, TS 2001 A estrutura das revoluções científicas, 6ª ed., São Paulo: Editoria Perspectiva; Lakatos, I & Musgrave, A 1979 (organizadores) A crítica e o desenvolvimento do conhecimento, São Paulo: Editora Cultrix; Smith, AGR 1973 A revolução científica nos séculos XVI e XVII, Lisboa: Editorial Verbo; Watkins, JWN 1990 Ciência e cepticismo, Lisboa: Fundação Calouste Gulbenkian.
4. Compulsory.
5. José João Pinhanços de Bianchi.
6. 1.5 h/week; 1st semester; 2nd year.
7. Lectures/practical classes.
8. Final written exam and practical work.
9. No.
10. 2.

1. History and Philosophy of Education - 0177.
2. To introduce students to the Philosophy of Education, its concepts and its methods, focusing on the language of educational theory and practice and discussing educational values and goals. To recognize the pedagogical innovations in different epochs.
3a) No prerequisites.
3b) Philosophy of Education: epistemology, basic concepts and methods. Aims in Education and educational foundations: human nature and educability. Ethics and moral education, values and attitudes; social philosophy of Education, freedom and Education; models of teaching and models of education. The Education in Greece, Rome, Middle Age, Renaissance, Modern and Present Times.
3c) Moore, TW 1982 Philosophy of Education, London: Routledge & Kegan Paul; Fullat, O 1983 Filosofias de la Educación, Barcelona: CEAC; Bowen, J 1972 A History of Western Education, vols. I-III, London: Methuen & Co. Ltd.
4. Compulsory.
5. Manuel Barroso Magalhães.
6. 3 h/week; 2nd semester; 2nd year.
7. Lectures/practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Continuous evaluation or final exam.
9. No.
10. 3.5.

1. Mineralogy and Crystallography - 0341.
2. Symmetry and crystallography. Crystal structures. Mineral classification. Minerals and their morphology, physical and chemical properties and genesis conditions. Non silicates - native metals, oxides, hydroxides, sulfides, carbonates, sulfates, phosphates and halides. Silicate classification - nesosilicates, sorosilicates, cyclosilicates, inosilicates, phylosilicates and tectosilicates. Optical mineralogy.
3a) No prerequisites.
3b) To introduce students, in a systematic way, into the understanding of the physical and chemical properties of minerals as a consequence of their internal structure, as well the mineral paragenesis. To emphasize some economic aspects and health effects of mineral dusts.
3c) Battey, MH 1981 Mineralogy for students, Longman Scientific & Technical (2ª ed.); Borges, FS 1980 Elementos de cristalografia, Fundação Calouste Gulbenkian (2ª ed.); Cornelius, K.; Cornelius, S & Hurlbut, CS 1985 Manual of Mineralogy (after James D. Dana), John Wiley, NY (20ª ed.); Nesse, WD 2000 Introduction to Mineralogy, NY: Oxford University Press.
4. Compulsory.
5. Elisa Preto Gomes, Rui Teixeira.
6. 4 h/week (2 theoretical + 2 theoretical/practical); 2nd semester; 2nd year.
7. Lectures and theoretical/practical classes.
8. Final exam (60% T + 40% TP).
9. No.
10. 6.

1. Stratigraphic Palaeontology - 0293.
2. The programme comprises the following topics: basic concepts of stratigraphy; context of stratified rocks in the geological cycle; correlating stratified sequences; fossilisation processes; systematic and palaeontological taxonomy; basic palaeozoology and palaeobotany; theories of evolution and extinction.
3a) No prerequisites.
3b) Sistematic introdution of the students to the principles, concepts and methods of Stratigraphy and Palaeontology.
3c) Black, RM 1988 The Elements of Palaeontology, 2nd ed., Cambridge University Press, Cambridge; Clarkson, ENR 1996 Invertebrate Palaeontology and Evolution, 3rd ed., Chapman & Hall, Cambridge; Vera Torres, JA 1994 Estratigrafia. Principios y Metodos, Editorial Rueda, Madrid; Nesse, WD 2000 Introduction to Mineralogy, NY: Oxford University Press.
4. Compulsory.
5. Artur Agostinho de Abreu e Sá.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. One poster and one essay (roughly 5 pages): 40%. Final exam: 60%.
9. No.
10. 5.

3rd year

1. General Ecology - 0026.
2. The notion of natural and cultural integrity. Considerations of scale and hierarchy. Indicators of ecosystem integrity. Measuring biological integrity and monitoring for ecosystem integrity. Bioindicators of the quality of water, soil and air. Population Dynamics. Extreme environments and adaptation. Genetic variation and environmental stress. Environmental stress, selection, evolution and extinction. Air pollution. Toxic elements. Acidification. Forest decline. Fossil fuels. Eutrophication. Pesticides. Species richness. Radioactive pollution.
3a) Notions of Biology and Geology.
3b) To understand the fundamental concepts in environmental ecology, such as environmental stress, ecological integrity, bioindicators, adaptation and evolution. To apply these concepts in the evaluation of the great and actual environmental issues.
3c) Andreasen, JK et al. 2001 Considerations for the development of a terrestrial index of ecological integrity, Ecological Indicators 1(1):21-36; Bijlsma, R & Loeschcke, V 1997 Environmental Stress, Adaptation and Evolution, Birkhauser Verlag, 325 pp.; Dale, VH & Beyeler, SC 2001 Challenges in the development and use of ecological indicators, Ecological Indicators 1(1):3-10; Freedman, B 1989 Environmental Ecology, Academic Press, 424 pp.; Fowler, J & Cohen, L 1990 Statistics for Ornithologists, British Trust For Ornithology, 22:173; Jeffrey, DW & Madden, B 1991 Bioindicators and Environmental Management, Academic Press, 224 pp.; Popp, J et al. 2001 Sustainability indices with multiple objectives, Ecological Indicators 1(1):37-48; Woodley, S et al. 1993 Ecological Integrity and the Management of Ecosystems, St. Lucie Press, 210 pp..
4. Compulsory.
5. João Alexandre Cabral, Pedro Teiga.
6. 3.5 h/week (2 theoretical + 1.5 theoretical-practical); annual; 3rd year.
7. Lectures and theoretical-practical classes.
8. A written report 25% and two written tests and/or a final written exam 75%.
9. No.
10. 10.

1. Petrology - 0344.
2. Basic concepts on the petrogenetic cycle. Petrography and petrogenesis of igneous, metamorphic and sedimentary rocks. The genesis of rocks and plate tectonics- spatial and temporal correlation of the magmatic, metamorphic and sedimentary processes.
3a) Basic concepts on General Geology and Mineralogy.
3b) To introduce students in the techniques and methods of study of rocks learning the meaning of its structural, textural, chemical and mineralogical characteristic. To study rocks at different scales, in order to understand correctly their genesis and tectonic settings.
3c) Adams, AE et al. 1991 Atlas of Sedimentary Rocks under the Microscope, Ed. Longman Scientific & Technical; Blatt, H & Tracy, R 1996 Petrology – Igneous, Sedimentary and Metamorphic, WH Freeman & Company, NY; Mackenzie, WS et al. 1991 Atlas of igneous rocks and their textures, Ed. Longman Scientific & Technical; Raymond, AL 1995 The Study of Igneous, Sedimentary and Metamorphic Rocks Wm, C. Brown Publ.; Winter, JD 2001 An Introduction to Igneous and Metamorphic Petrology, Prentice Hall; Yardley, BWD 1990 Atlas of Metamorphic Rocks and their Textures, Ed. Longman Scient. &Tech.
4. Compulsory.
5. Elisa Preto Gomes, Rui Teixeira, Margarida Alves.
6. 5 h/week (2 theoretical + 3 theoretical-practical); annual; 3rd year.
7. Lectures and theoretical-laboratory classes.
8. Reports about practical works – 20%, Option between two written tests or final exam – 80%.
9. No.
10. 13.

1. Curricular Development - 0436.
2. Curriculum and curricular development: a historical perspective. Curriculum and curricular development in relation to Educational Sciences and teacher training. Curriculum: The concept of curriculum and curricular development. Contexts/levels of decision-making for a curriculum. Educational project/ curricular project/teaching project. Curricular plan for the teaching of Portuguese. Teaching Plan: The functions and phases of planning. Types and levels of planning. Models of planning and views of learning. The elements and structure of a teaching unit.
3a) No prerequisites.
3b) To acquire fundamental knowledge for the performance as a teacher. To develop attitudes that allow the teacher to act in relation to the teaching/learning process. To view the act of teaching as a field of permanent research. To contribute with an active and critical participation in order to renovate the educational system.
3c) Domingos, A et al. 1984 Uma forma de estruturar o ensino e a aprendizagem, Lisboa: Livros Horizonte; González, J et al. 1999 ¿Como hacer unidades didácticas innovadoras? Sevilla: Díada Editora; Lemos, V et al. 1993 A nova avaliação da aprendizagem. O direito ao sucesso, Lisboa: Texto Editora; Machado, F et al. 1991 Currículo – problemas e perspectivas, Porto: Ed. Asa; Machado, F et al. 1991 Currículo e desenvolvimento curricular, Porto: Ed. Asa; Ribeiro, L 1991 Avaliação da aprendizagem, Lisboa: Texto Editora; Roldão, M 1999 Os professores e a gestão flexível do currículo. Perspectivas e práticas em análise, Colecção CIDInE, Porto: Porto Editora.
4. Compulsory.
5. Maria Helena Santos Silva.
6. 3 h/week; annual; 3rd year.
7. Theoretical-practical classes; Small and large group discussion to clarify different topics. Group work for analysing problems and discussing the teaching/learning process based on situations directly related to the reality in the schools. Research. Presentation/debate on different perspectives.
8. Carrying out or participating in group work during the theoretical-practical classes and evaluation tests or carrying out/participating in group work during the theoretical classes and the final exam.
9. No.
10. 6.5.

1. General Genetics - 0334.
2. A brief overview of the modern history of Genetics. Mendelian analysis. Chromosome theory of inheritance – Meiosis and Mitosis. Probability and statistics; Extensions of mendelian analysis: multiple allels, lethal genes, penetrance and expressivity, interaction between alleles. Sex-linked inheritance. Sex determination. Linkage and recombination. Cytogenetics. Changes in chromosome number and structure. Quantitative genetics. Population Genetics. The practical classes include resolution of problems and several practical works such as Drosophila melanogaster management, crosses during 2 to 3 generations involving two different autossomic genes, genes linked to the sex, linkage and mapping, population genetics and karyotypes.
3a) Basic knowledge on Citology, Biochemistry and Microbiology.
3b) Students should be sensitized for the importance of genetics as a fundamental basic science for understanding the basic mechanisms of the biology area, species biodiversity and evolution.
3c) Griffiths, AJF et al. 2000 An Introduction to Genetic Analysis, WH Freeman & Co.; Hartl, DL & Jones, EW 2002 Essential Genetics, Ed. Jones & Bartlett; Klug, WS & Cummings, MR 2002 Concepts of Genetics, International Edition, ed. Prentice Hall College Div.; Kohler, RE 1994 Lords of the Fly: Drosophila Genetics and the Experimental Life, University of Chicago Press; Russell, PJ 1998 Genetics, ed. Addison Wesley Longman; Tamarin, RH 2001 Principles of Genetics, International Edition, Ed. McGraw Hill; Stansfield, WD 1985 Genética, ed. McGraw-Hill.
5. Gilberto Igrejas, Ana Lúcia Sintra.
6. 6 h/week (4 practical + 2 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.

1. Fundamentals of Soil Science - 0337.
2. Soil concept. Soil composition. Soil's physical and chemical behaviour. The use of soil for agriculture. Man impact. Soil degradation and conservation.
3a) Students should have previous knowledge on Geology, Mineralogy and Chemistry.
3b) To provide the student with a global knowledge of the soil (the environment where plants grow) with respect to the main physical, chemical and biological properties. The student should also be able to understand the role f soil in man's ecosystem, identify the human activities that lead to the loss of soil and its degradation and how to avoid them.
3c) Costa, JB 1975 Caracterização e Constituição do Solo, Fundação Calouste Gulbenkian, Lisboa; Foth, HD 1978 Fundametals of Soil Science, 5th ed., J. Wiley & Sons, NY; O'Hare, G 198. Soils, Vegetation, Ecossystems, WE Marsden (ed.); Oliver & Boyd, London; Santos, JQ 1976 Aspectos Gerais da Fertilização, 2ª ed., Amoníaco Português, Lisboa; Santos, JQ 1983 Fertilizantes. Fundamentos e Aspectos Práticos da sua Utilização, 3ª ed., Publicações Europa-América; Schoeder, D 1984 Soils-Facts and Concepts, International Potash Institute, Berne.
4. Compulsory.
5. Marta Roboredo.
6. 3 h/week (2 practical + 1 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Exam admission: to obtain a minimum average grade of 10 out of 20 in 4 of 6 multiple choice questionnaires and attend 2/3 of the practical classes. Continuous evaluation: to obtain a minimum average grade of 10 out of 20 in 4 of 6 multiple choice questionnaires, attend 2/3 of the practical classes and to obtain a minimum grade of 10 out of 20 in one written test. The final classification is given by the formula: final classification = (a+3b)/4; a, average grade of the 4 best questionnaires; b, written test classification.
9. No.
10. 3.5.

1. Environmental Geology - 0354.
2. Introduction to the environmental geology; application to the territory planning. Internal geologic processes (seismic activity, volcanic activity and diapirism), surface geologic processes (mass movements, subsidence, rivers and river floods and coastal zones); environmental consequences; evaluation of the environmental risks and maps of risks;. Geologic resources and environment - exploration, recovery landscape and minimise of environmental impacts. Wastes storage - environmental management of wastes; restriction conditions and geologic parameters, conception and monitoring of the storage places. Medical geology. Environmental management and territory planning.
3a) Good knowledge on Geology and Hydrogeology.
3b) To provide that the student: 1) it establishes the relationship between the geologic sciences and the environmental problems through the identification of the causes and of the underlying processes; 2) identify preventive and correctives measures associated to the environmental management and territory planning.
3c) Coates, DR 1985 Geology and Society, London: Chapman & Hall; Coch, NK 1995 Geohazards - natural and human, New Jersey: Prentice Hall; Kehew, AE 1995 Geology for Engineers and Environmental Scientists, 2nd ed., New Jersey: Prentice Hall; Keller, EA 1992 Environmental Geology, 6th ed., NY: Macmillan Publishing Company; Lumsden, GI 1994 Geology and the Environment in Western Europe, Oxford: Clarendon Press; Montgomery, CW 1997 Environmental Geology, 5th ed., NY: WCB/McGraw-Hill; Murck, BW et al. 1996 Environmental Geology, NY: John Wiley & Sons, Inc; Pipkin, BW 1994 Geology and the Environment, Minneapolis/St. Paul: West Publishing Company; Plummer, CC & McGeary, D 1996 Physical Geology, 7th ed., Wn. C. Brown Publishers; Hammarstrom, M & Olsson, O (eds.) 1996 Aspo hard rock laboratory, 10 years of research, Swedish nuclear fuel and waste management company, 88 pp..
4. Compulsory.
5. Alcino Sousa Oliveira, Anabela Ribeiro Reis.
6. 3.5 h/week (2 theoretical + 1.5 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam, according to University Regulations.
9. No.
10. 5.

1. Mineral and Energy Resources - 0360.
2. Concept of natural and mineral resource. Distribution of mineral resources. Metalogenetic theories and classification of mineral deposits. Geological processes responsible for the formation of mineral deposits. Examples in Portugal and in world. Non metallic resources. Classification according to use. Distribution in Portugal. Prospection of mineral deposits. Some notions about geophysical methods. Energy resources: historic perspective. Fossil fuel resources: coal, oil and gas – processes of formation. Nuclear energy: nuclear fission - advantages and disadvantages; nuclear fusion: perspectives. Renewable energies, some notions and examples. Geothermal energy: kinds and examples in Portugal.
3a) No prerequisites.
3b) Give knowledge's about geologic resources as an all, as well as in their parts: mineral resources and energetic resources.
3c) Brown, GC & Skipsey, E 1986 Energy resources. geology, supply and demand, Open University Press; Geonovas 1991 Recursos minerais não metálicos em Portugal, vol. especial 2, ed. JT Oliveira e Luis Ramos; Guilbert, JM & Park, Jr. JF 1986 The geology of ore deposits, WH Freeman and Company, NY; Thompson, T 1995 Environmental geosciences, Saunders Golden Sunburst Series, NY; Velho, J et al. 1998 Minerais industriais, Gráfica de Coimbra, Ldª.
4. Compulsory.
5. Maria do Rosário Costa Pereira, José Carlos Leitão.
6. 3,5 h/week (1.5 practical + 2 theoretical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final theoretical examination (60%); Practice represents 40% of final value, and is composed by an group work with oral presentation (50%) and an practical examination (50%).
9. No.
10. 5.

1. Molecular Genetics and Biotechnology - 0340.
2. The nucleic acids. DNA replication. Gene expression (transcription and translation). Control of gene expression in prokaryotes and eukaryotes. Mutations and DNA repair mechanisms. Transposable genetic elements. Analysis of genetic variability by using molecular markers. The importance of the genetic variability in plant and animal breeding. Sexual processes in bacteria and bacteriophages. Recombinant DNA technology. Plant Biotechnology. Animal Biotechnology. Vaccines. Animal and human cloning. Gene therapy in humans. Human Genome Project. Other genomes sequenced.
3a) Basic knowledge on General Genetics, Cytology, Biochemistry and Microbiology.
3b) To understand the new technologies used in the nucleic acids research. To discuss the importance of the genetic variability in plant and animal breeding and to understand how to analise it. To know the benefits of the Biotechnology and of the genome sequencing in plant, animal and human areas.
3c) Walker, JM & Rapley, R 2001 Molecular Biology and Biotechnology, 4th ed., Royal Soc. Chem.; Videira, A 2001 Engenharia Genética. Princípios e Aplicações, Ed. Lidel, Lisboa; Rojo, MI 1999 Ingeniería Genética y transferencia génica, Ediciones Pirámide, Madrid; Glick, BR & Pasternak, JJ 1994 Molecular Biotechnology. Principles and applications of recombinant DNA, ed. ASM Press, Washington; Lewin, B 2000 Genes VII, Oxford University Press Inc..
4. Compulsory.
5. José Eduardo Lima Brito, Ana Lúcia Sintra, Maria do Carmo Varejão.
6. 6 h/week (4 practical + 2 theoretical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 6.

1. Microbiology - 0054.
2. Procariotic organization. Systematics and microbial evolution. Cell structure and morphology. Growth and control microbial. Antibiotic resistance. Metabolism microbial. Environmental microbiology. Micology. Virology.
3a) Good knowledge on biology, chemistry and biochemistry.
3b) Students should get on overview on the biology of microorganisms: Systematics, cell structure and function. Concepts in nutrition, biosynthesis, metabolism, growth and its control, should also be provided. General concepts of micology and virology.
3c) Pelczar, M et al. 1980 Microbiologia, Editor McGraw-Hill; Prescott, LM et al. 2002 Microbiology,5th ed., Editor McGraw-Hill; Wistreich, GA & Lechtman, MD 1988 Microbiology, 5th ed., Collier Macmillan Publishers, London; Pelczar, Jr. et al. 1993 Microbiology - Concepts and applications, Editor McGraw-Hill; Ketchum, PA 1988 Microbiology - Concepts and applications, John Wiley & Sons; Ferreira, WFC & Sousa, JC 1998 Microbiologia, Lidel, Edições Técnicas; Mammete, A 1989 Les virus: définition, structure et classification, In Virologie médicale, Éditions C et R, La Madeleine, France.
4. Compulsory.
5. Maria José Saavedra, António Conceição Almeida.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam theoretical and practical.
9. No.
10. 5.

4th year

1. Informatics Applied to Natural Sciences - 0331.
2. Introduction to Computer Systems; Operating Systems; Internet; text processing using Microsoft Word; utilisation of Microsoft Excel spreadsheets; introduction to databases.
3a) Basic skills in Arithmetic, Statistics and Logical Reasoning.
3b) To bring students the ability to use several computer tools that will be useful in their daily professional activity.
3c) Sousa, S & Sousa, Mª José 2001 Microsoft Office 2000 para todos nós, 4ª ed., FCA; Lecturer notes, either paper-based, or accessible through its personal web page: http://www.utad.pt/~benjaf/
4. Compulsory.
5. Benjamim Fonseca, Manuela Soares, António Soares.
6. 2 h/week; annual; 4th year.
7. Theoretical-practical classes. Oral presentation of some theoretical concepts; practical work based on time-sheets, with in-site attendance.
8. Written examination (25%) and two practical works (75%).
9. No.
10. 5.

1. Educational Psychology - 0435.
2. Conceptual framework principles; Physical, cognitive, social, sexual and personal development during school age; Major concerns of beginning teachers; Applications of behavioral approaches; The cognitive perspective and teaching practice; Motivation in classroom; Classroom management; Effective teaching; Teaching exceptional students.
3a) No prerequisites.
3b) Introduces the teacher-in-training to the psychological principles that govern teaching and learning.
3c) Arends, RI 1995 Aprender a Ensinar, Lisboa: Editora McGraw-Hill de Portugal, Lda.;Biehler, R & Snowman, J 1997 Psychology applied to teaching, 6th ed., Boston: Houghton Mifflin Co.;Campos, B 1990 Psicologia do Desenvolvimento e Educação de Jovens, vols. I e II, Lisboa: Universidade Aberta; Lopes, J 2002 Alunos com dificuldades de aprendizagem: Da teoria à prática, 5ª ed., Série Didáctica n.º 16, UTAD, Vila Real; Lopes, J 2002 A gestão da sala de aula: como prevenir e lidar com problemas de indisciplina, 4ª ed., Série Didáctica n.º 24, UTAD, Vila Real; Lopes, J 2002 Psicologia do adolescente: Implicações para o ensino, 3ª ed., Série Didáctica nº 40, UTAD, Vila Real; Sprinthall, NA & Collins, WA 1994 Psicologia do Adolescente, Lisboa: Fundação Calouste Gulbenkian; Sprinthall, N & Sprinthall, R 1993 Psicologia Educacional, Lisboa: McGraw-Hill de Portugal, Lda; Woolfolk, A 1999 Educational Psychology, 7th ed., New Jersey: Prentice-Hall.
4. Compulsory.
5. José Pinto Lopes.
6. 3 h/week; annual; 4th year.
7. Theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. One written test (50%) and a work group (50%) or a final exam - 100%.
9. No.
10. 7.

1. Sociology of Education - 0190.
2. Genesis and development of Sociology of Education; Sociological approch of education; school and equality of opportunities; social and school differences; problematic of school success; school and labor world; school as a place for innovation and conflict.
3a) Students are required to have knowledge related to History of Education and Philosophy of Education.
3b) Students are supposed to question the theoretical differences and sociological levels of analysis that contribute to the explanation of the relationships between society and the Educatinal System, as well as the existing relationships inside school itself.
3c) Afonso, A 1988 Insucesso, Socialização Escolar e Comportamentos Divergentes – Uma abordagem Introdutória, Revista Portuguesa de Educação. Braga; Formosinho, J 1987 Como Organizar a Escola para o Insucesso Educativo, Braga; Gomes, C 1998 A Interacção Selectiva na Escola de Massas, Braga: Instituto de Educação; Grácio, R 1986 Políticas do Ensino, efeitos perversos – o caso do secundário; Musgrove, F 1986 Família Educação e Sociedade, Porto: Rés Editora; Valente, B 1986 A Viragem da Escola, Lisboa: Livros Horizonte.
4. Compulsory.
5. Maria João de Carvalho.
6. 3 h/week; 1st semester; 4th year.
7. Theoretical-practical classes.
8. Test and final exam.
9. No.
10. 4.

1. Geology Education - 0454.
2. Curricula as organised knowledge. Curricula and Geology programs; the social context of the science class; social class and communication.
3a) Knowledge of Science Education and Geology.
3b) Learning to teaching Geology.
3c) Domingos, AM 1982 Uma forma de estruturar o ensino e a aprendizagem, Lisboa: Livros Horizonte; Pozo, JI 2001 Aprender y enseñar ciencia, Madrid: Ediciones Morata; artigos de revistas: Ensenãnza de las ciencias e Science Education.
4. Compulsory.
5. Alice Fontes.
6. 5 h/week (3 practical + 2 theoretical); 1st semester; 4th year.
7. Lectures and practical classes. Discussion; work in group.
8. One written essays and one written test or a final exam.
9. No.
10. 5.5.

1. Water Resources - 0355.
2. Movement of water in hydrosphere; Administration of water resources; Properties of aquifers; Hydraulic of groundwater flow; Prospecting, research and pumping of groundwater; Physical, chemical and bacteriologic properties of water; Pollution: slow death of fresh water; Hydrogeology of Portugal.
3a) No prerequisites.
3b) Knowledge about water resources as an all, as well as in their parts: superficial resources and groundwater.
3c) Custódio, E & Llamas, MR 1983 Hidrologia Subterranea, Tomos I e II, Ediciones Omega, SA, Barcelona; Lencastre, A 1984 Lições de Hidrologia, 1ª ed., Universidade Nova de Lisboa; Fetter, CW 1994 Applyed Hydrogeology, 3ª ed., Macmillan College Publishing Company; Hem, J 1985 Study and Interpretation of Chemical Characteristics of Natural Waters, 2ª ed., US Geol. Survey Water-Supply Paper 2254.
4. Compulsory.
5. Maria do Rosário Costa Pereira.
6. 3.5 h/week (2 theoretical + 1.5 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Final theoretical exam (60%) and final practical exam (40%).
9. No.
10. 5.5.

1. Animal Physiology - 0349.
2. Introduction to Physiology. Internal Environment. Body-Fluids Compartments. Molecular and Cellular Control Mechanisms. Neural Control Mechanisms. Sensory Systems. Hormonal Control Systems. Muscle. Circulation. Respiration. Kidneys and Osmotic Regulation. Digestion and Absorption of Food.
3a) Good knowledge on Anatomy, Histology, Biochemistry.
3b) The purpose of Physiology is to present, in general, the fundamental principles and facts of animal body function and explain how cells are coordinated to function as an organ, how organs cooperate in systems and how systems functions are controlled and integrated by whole organism when adapting to internal and external needs.
3c) Seeley, R et al. 1997 Anatomia e Fisiologia, L-Lusodidata, Lisboa; Vander, A et al. 2002 Human Physiology, 8th ed., McGraw-Hill; Guyton, A 2000 Textbook of Medical Physiology, WE Saunders.
4. Compulsory.
5. Teresa Rangel-Figueiredo, Victor Pinheiro, Paulo Rema.
6. 5 h/week (2 practical + 3 theoretical); 1st semester; 4th year.
7. Lectures and practical/laboratorial classes.
8. According to UTAD Regulations: attendance in 2/3 practical classes is compulsory; 2 written assessments or a final written exam (60% theoretical + 40% practical).
9. No.
10. 6.5.

1. Practice Complements of Laboratorial Biology - 0345.
2. Scientific methodology notions. The biology laboratory – localisation and aspects by security. The first assistance an accident course laboratorial. The function and preparation of solutions, reagents, colouring and gauge. The plants and animals in laboratory, the utility for the process apprenticeship-training.
3a) No prerequisites.
3b) To know the laboratorial biology methodology. To take actions for development appropriate the investigation laboratory. Development the taste for laboratorial activities. To affect for the science evolution and the technology innovator process.
3c) Armitage, KB 1970 Investigations in General Biology. NY: Academic Press; Behringer, MP 1973 Techniques and Materials in Biology, NY: McGraw-Hill; Brown, GD & Creedy, J 1971 Experimental Bioloy Manual, London: Heinemann Educational Books; BSCS 1965 Biological Science: Interaction of Experiments and Ideas. USA: Prentice-Hall Inc..
4. Compulsory.
5. José Manuel Torres-Pereira, Carmen Moreira.
6. 2 h/week; 1st semester; 4th year.
7. Theoretical-practical classes.
8. One written test or final exam –100%.
9. No.
10. 2.5.

1. Biology Education - 0458.
2. Scientific knowledge. Philosophy, History and Sociology of Science. Teaching and learning of science knowledge: Skinner, Piaget, Ausubel and Vygotsky. Cooperative Learning. Discussion over Science, Technology and Society – STS. STS education and science teachers.
3a) Knowledge of Science Education and Biology.
3b) Learning to teaching Geology.
3c) Pozo, JI 2001 Aprender y enseñar ciencia, Madrid: Ediciones Morata; Membiela, P 2001 Enseñanza de las ciencias desde la perspectiva CTS, Madrid: Narcea, SA Ediciones; Pujolás, P 2001 Atención a la diversidad y aprendizaje cooperativo en la educación obligatoria; Artigos de revistas: Ensenãnza de las Ciencias e Science Education.
4. Compulsory.
5. Alice Fontes.
6. 5 h/week (3 practical + 2 theoretical); 2nd semester; 4th year.
7. Discussion; work in group.
8. One written essays and one written test or a final exam.
9. No.
10. 5.5.

1. Educational Technologies - 0221.
2. Historical evolution and theoretical base of ET. The Instructional Design process. Theories of Instruction. Planning and design of instructional events. Planning and production of instructional materials.
3a) Its important a good knowledge in Curricular Development.
3b) To understand the theoretical framework of Educational Technology and Instructional Design; to use technological resources with the purpose of enhancing the learning outcomes.
3c) Cloutier, J 1975 A Era do Emerc, Lisboa: ITE; Freitas, C et al. 1997 Tecnologias de Informação e Comunicação na Aprendizagem, Ministério da Educação: Instituto de Inovação Educacional; Moderno, A 1992 A comunicação audiovisual no processo no processo didáctico, Aveiro: Departamento de Didáctica e Tecnologia da Educação da UA; Silva, BD 1998 Educação e Comunicação, Braga: Universidade do Minho; Taddei, N 1998 Educar com a Imagem (I e II), S. Paulo, Ed. Loyola.
4. Compulsory.
5. Fátima Assunção.
6. 3 h/week; 2nd semester; 4th year.
7. Theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to Universitary Regulations, the assesment is continuous and have: two written tests - 40%; Production of three sets of instructional materials - 60%.
9. No.
10. 3.5.

1. Plant Physiology - 0019.
2. 1st Part: Thermodynamics and their relations to plant physiology. 2nd Part: Photosynthesis. Electron transfer chain from water to NADPH. ATP phosphorylation. CO2 photosynthetic assimilation, the Calvin cycle -C3 plants, C4 plants and CAM plants. 3rd Part: Plant water relations. Water potential components: osmotic potential and pressure potential. Water absorption on roots. Water uptake on xy1em. Cohesion tension theory. Photosynthesis-transpiration compromise. Stomatic mechanism. 4th Part: Mineral nutrition. The importance of mycorrbizae. Physiologic function of mineral nutrients. 5th Part: Transport of photoassymilated on phloem. 6th Part: Morphogenesis. Hormones and growth regulators. Response of plants to extemal stimulus. Phytochromes. Pigment system "red-far red".
3a) Good knowledge on plant Cytology, Morphology, Histology and Biochemistry.
3b) The objective is to give a set of knowledge enabling the students to understanding a integrated way the plant growth and development under environmental conditions.
3c) Martinez, FG 1995 Elementos de Fisiología Vegetal, Madrid: Ediciones Mundi-Prensa; Moutinho Pereira, JM et al. 2001 Relações hídricas das plantas. A perda de água e o seu controlo, Série Didáctica - Ciências Aplicadas n° 170, UTAD, Vila Real, 39 pp.; Gomes-Laranjo, J et al. 2003 Fotossíntese bioenergética, Série Didáctica - Ciências Aplicadas n° 220, UTAD, Vila Real, 95 pp..
4. Compulsory.
5. José Gomes Laranjo, Eunice Areal.
6. 6 h/week (2 theoretical + 4 practical), 2nd semester, 4th year.
7. Lectures and practical classes.
8. As described on the Pedagogic Norms: continuos evaluation (2 written test, covering the theoretical and theoretical-practical 1ectures) or a final exam.
9. No.
10. 6.

1. Complements of Laboratorial Practical Geology - 0346.
2. Field description of sedimentary rocks; Field description of metamorphic rocks; Field description of igneous rocks; Mapping of geological structures; Basic geological mapping; Sample preparation and laboratorial works.
3a) Good knowledge on Geology.
3b) Application in several geological settings of the knowledge acquired in the Geology classes.
3c) Barnes, J 1995 Basic geological mapping, John Wiley & Sons; Chernicoff, S & Venkatakrishnan, R 1995 Geology. An introduction to physical geology, Worth Publishers, Inc.; Compton, RR 1985 Geology in the field, John Wiley & Sons; Fry, N 1984 The field description of metamorphic rocks, John Wiley & Sons; McCLay, K 1987 The mapping of geological structures, John Wiley & Sons; Ribeiro, A et al. 1979 Introduction à la geólogie générale du Portugal, Serviços Geológicos de Portugal; Thorpe, RS & Brown, JC 1985 The field description of igneous rocks, John Wiley & Sons; Tucker, M 1982 The field description of sedimentary rocks, John Wiley & Sons.
4. Compulsory.
5. Alcino Sousa Oliveira, Luís Manuel Oliveira Sousa.
6. 3 h/week; 2nd semester; 4th year.
7. Theoretical-practical classes.
8. Written essays (70%); exam (30%).
9. No.
10. 3.5.

1. Geology of Portugal - 0359.
2. The major elements – litostratigraphy, cronostratigraphy, paleogeography and geotectonics of the Hercinian Terraces (Proterozoic and Palaeozoic) following European geological systematic. The Hercynian orogeny – Granitisation, metamorfism and tectonics. The geological evolution of the alpine cycle – paleogeography, sedimentation and diastrophism. Evolution of the Meso-Cenozoic Borders, correlation to the opening of the Atlantic, with sedimentary mega-sequences. The post-Cretaceous evolution Inland basins, the major oscillatory cycle during the Miocene. The oceanic islands start their building up. Quaternary – Neotectonic, terracing fluviations, hydrotermalism.
3a) No prerequisites.
3b) To introduce the students the evolution of geological reconaissance of Portugal and its correlation with the geology of central Europe (Hercinides) and Neo-Europe (Alpines). The work of the pioneers on the XIX and XX centuries
3c) Ribeiro, A et al. 1979 Introdution à la Geologie General du Portugal, Serviços Geológicos de Portugal, Lisboa; Carta Geológica de Portugal à escala 1:1000000; Carta Geológica de Portugal à escala 1:50 000.
4. Compulsory.
5. Carlos Coelho Pires.
6. 3.5 h/week (2 theoretical + 1.5 practical); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Final theoretical exam (60%) and final practical exam (40%).
9. No.
10. 5.5.

Mathematics Degree (Teaching of)

Programme of Studies

1st YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Infinitesimal Analysis I	8.0	Infinitesimal Analysis II	8.0
	Introduction of Computing	6.0	Geometry	6.0
	Linear Algebra I	8.0	Programming Methods	6.0
	Fundamental Aspects of Mathematics	6.0	Linear Algebra I	8.0
	English as a Foreign language	3.0		
	Total	31.0	Total	28.0
2nd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Numerical Analysis	8.0	Differential Equation	5.0
	Infinitesimal Analysis III	8.0	Infinitesimal Analysis IV	8.0
	Algebra I	8.0	Algebra II	8.0
	Linear programming	5.0	Probabilities	8.0
	Total	29.0	Total	29.0
3rd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Statistics	8.0	Philosophy of Wducation	4.0
	History of Education	4.0	Differential Geometry	7.0
	Educational Psychology	5.0	Operational Research	5.0
	Elements of Topology	7.0	Curriculum Development	4.0
	General Physics	6.0	Differential Pedagogy	4.0
	History of Science	4.0	Number Theory	5.0
	Total	34.0	Total	29.0
4th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Didatics of Mathematics I	8.0	Sociology of Education	4.0
	Computing in the Teaching of Mathematics	5.0	Mechanics	8.0
	History of Mathematics	4.0	Didactics of mathematics II	8.0
	Educational Technology	5.0	Portuguese Culture	3.0
	Introduction to Professional Practice	3.0	School Administration	3.0
	Advance Analysis	8.0	Logic and Foundations	5.0
	Total	33.0	Total	31.0

Total Study: 244 ECTS

1st year

1. Infinitesimal Analysis I - 0423.
2. Topological notions of the real line. Sequences of real numbers: monotic sequences, bounded sequences, Cauchy sequences. Series: series with nonnegative terms, comparison test, test of Cauchy, test of d'Alembert and test of Raabe. Alternating series: test of Leibnitz. Absolute convergence and simple convergence. Functions of one variable: implicit and inverse functions; some special functions and its inverses. Limits and continuity of functions: classification of discontinuity; uniformly continuity.
3a) High-school Mathematical Analysis.
3b) To provide the elementary theory of calculus. To lead mathematics students to think about mathematical theorems, its proofs and criticise them.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st vol., Weberand Schmidt; Apostol, TM 1967 Calculus, 1st vol., Wiley International Edition.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino, Isabel Alexandra da Silva Vaz Nicolau.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 1st semester; 1st year.
7. Lectures and theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam - 100%.
9. No.
10. 8.

1. Introduction to Computing - 1666.
2. History of computers, and its industry. Security of computing systems. Type of computers (size, utility, and analogic/digital). Internal functioning of the computers. Initialisation and terminus. Communicating with the computer. Storage. Communicating the results. Software. Codification and number systems. Networks and communications. Problem solving. Operating system Windows. The wordprocessor Word. The spreadsheet Excel. Powerpoint. Email tool and internet browser. Elaboration of web pages: design, HTML programming, and Frontpage.
3a) No prerequesites.
3b) To acquaint students with the information technology language. To be able to use everyday software, such as wordprocessors, spreadsheets, presentation software, networking software. To introduce students to problem solving.
3c) Azevedo Perdicoúlis, Teresa 2002 Introdução às tecnologias da informação, Série Didáctica, Ciências Aplicadas, UTAD, Vila Real.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis, Luís Magalhães.
6. 5 h/week (2 theoretical + 3 theoretical-practical); 1st semester; 1st year.
7. Lectures and theoretical-practical classes.
8. Final exame 85% + project 15%.
9. No.
10. 6.

1. Linear Algebra I - 1667.
2. Operations and algebraic structures. Vectorial spaces: Linear dependence and independence. Basis and dimension. Vectorial subspaces. Linear applications: Kernel and image subspaces of a linear application. Matrices: Matrix of a linear application between vectorial spaces of finite dimension. Invertible matrices. Characteristic of a matrix. Change of basis matrix. Sistems of linear equations: Discussion and resolution of systems of linear equations. Matrices inversions, using matrix resolution of a system of linear equations. Determinants: Laplace theorem. Aplications.
3a) No prerequisites.
3b) Students should get concepts, technics and reasonings fundamentals in the Linear Algebra, according to the syllabus.
3c) Giraldes, E et al. 1995 Curso de Álgebra Linear e Geometria Analítica, Lisboa, McGraw-Hill; Agudo, F 1992 Introdução à Álgebra Linear e Geometria Analítica, Livraria Escola Editora; Cohn, P 1994 Elements of Linear Algebra, Londres, Chapman & Hall.
4. Compulsory.
5. Luís Roçadas.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 1st semester; 1st year.
7. Lectures and theoretical-practical classes.
8. Final written exam (100%) .
9. No.
10. 8.

1. Fundamental Aspects of Mathematics - 1841.
2. Logic (propositional calculus and predicate calculus); Methods of mathematical proof; Sets and Functions; Finite sets; Countable infinite sets and uncountable sets.
3a) High-school Mathematics.
3b) Introduction to abstract mathematics, furnishing the mathematical tools which shell be needed to future studies with abstract axiomatic orientation.
3c) Lima, EL 1976 Curso de Análise, vol. 1, Instituto da Matemática Pura e Aplicada, CNPq, Rio de Janeiro; Kenneth, AR 1992 Discrete Mathematics, Prentice Hall, Englewood Cliffs, New Jersey; Morash, RP 1991 Bridge to Abstract Mathematics: Mathematical Proof and Structures, 2nd ed., McGraw-Hill, NY.
4. Compulsory.
5. Emília Giraldes, Paulo Vasco.
6. 4 h 30 m/week (3 teoretical + 1 h 30 m theoretical-practical); 1st semester; 1st year.
7. Lectures and theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Three written tests or final exam 100%.
9. No.
10. 6.

1. English as a Foreign Language - 1842.
2. Exchanging personal information, sentence structure (positve/negative/interrogative, basic tenses, vocabulary, reading comprehension, prepositions, extracting meaning from context.
3a) Pre-intermediate knowledge of English grammar, sentence structure and vocabulary.
3b) This course is designed to meet the needs of students by providing them with the language framework needed to understand and communicate in written and spoken English of a functional level.
3c) Esteras, R 2003 Infotech English for computer users, Cambridge, 3rd ed.; Hall, N & Shepheard, J 1995 The Anti-Grammar Grammar Book, Longman 5th ed.; Murphy, R 1987 English Grammar In Use, Cambridge University Press. In addition the internet, various journals and newspapers will be used as sources of material.
4. Compulsory.
5. Paul Driver.
6. 2 h/week; 1st semester; 1st year.
7. Lectures classes. Communication activities, reading/listening comprehension, grammar exercises, oral presentations.
8. Final exam.
9..Yes, English.
10. 3.

1. Infinitesimal Analysis II - 0488.
2. Derivatives: higher order derivatives; implicit differentiation. Rolle's theorem, Lagrange's theorem and Cauchy's theorem for differentials functions. L'Hopital's rule. Taylor's formula. Antiderivatives: techniques of integration. Integration: the definite integral; applications of integration: the area between two curves, the volume of a solid of revolution and length of a curve. Polar and parametric coordinates. Improper integrals. Power series: expansion of function; differentiation and integration of power series; Taylor and MacLaurin series.
3a) High-school Mathematical Analysis.
3b) To provide the elementary theory of calculus. To lead mathematics students to think about mathematical theorems, its proofs and criticise them.
3c) Carvalho e Silva, J 1994 Princípios de Análise Matemática Aplicada, McGraw Hill, Lisboa; Swokowski, EW 1979 Calculus with Analytic Geometry, 1st vol., Weberand Schmidt; Apostol, TM 1967 Calculus, 1st vol., Wiley International Edition.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino, Isabel Alexandra da Silva Vaz Nicolau.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 2nd semester; 1st year.
7. Lectures and theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written exam - 100%.
9. No.
10. 8.

1. Geometry - 0494.
2. Affine Spaces: basic concepts. Vectorial equations of affine subspaces with finite dimension. Paralelism of affine subspaces. Metric geometry. Euclidean Spaces with dimension 3: external product. Homomorphism from Euclidean Space to itself.
3a) High- school algebra.
3b) To provide fundamental concepts about affine spaces and euclidean affine spaces.
3c) Agudo, FR 1992 Introdução à Álgebra Linear e Geometria Analítica, Livraria Escolar Editora, Lisboa; Giraldes, E et al. 1995 Curso de Álgebra Linear e Geometria Analítica, McGraw-Hill; Monteiro, A 2001 Álgebra Linear e Geometria Analítica, McGraw-Hill.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino, Paulo José Martins Vasco.
6. 4.5 h/week (3 theoretical + 1.5 theoretical-practical); 2nd semester; 1st year.
7. Lectures and theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam - 100%.
9. No.
10. 6.

1. Programming Methods -1669.
2. Problem solving. Introduction to Pascal. The programming environment Turbo Pascal. Structures of selection. Structures of repetition. Simple data types. Functions, procedures, and graphics. Arrays.
3a) Basic notions of Linear Algebra, and punctually would be desirable some knowledge of discrete Mathematics.
3b) To develop the capacity of problem solving and algorithm construction. To reinforce an adequate decision on data structures. To be able to distinguish concepts such as semantic and sintaxe. To develop programs in Pascal.
3c) Koffman, EB 1998 Turbo Pascal, 5th ed., Addison Wesley Longman, Inc.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis, Luís Magalhães.
6. 5 h/week (2 theoretical + 3 theoretical-practical); 2nd semester; 1st year.
7. Lectures and theoretical-practical classes.
8. Final exam 75% + project 25%.
9. No.
10. 6.

1. Linear Algebra II - 1670.
2. Eigenvalues and Eigenvectors. Dual Space. Bilinear mappings. Bilinear forms. Quadratic forms. Sesquilinears mappings. Sesquilineares forms. Inner product. Euclidean Spaces. Unitary Spaces. Analytic Geometry. Quadrics.
3a) High-school Algebra.
3b) To provide fundamental concepts about euclidean spaces and unitary spaces and background in geometric problems related with bidimensinal space and also tridimensional space.
3c) Agudo, FR 1992 Introdução à Álgebra Linear e Geometria Analítica, Livraria Escolar Editora, Lisboa; Giraldes, E et al. 1995 Curso de Álgebra Linear e Geometria Analítica, McGraw-Hill; Monteiro, A 2001 Álgebra Linear e Geometria Analítica, McGraw-Hill.
4. Compulsory.
5. Paula Maria Machado Cruz Catarino, André Gama Oliveira.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 2nd semester; 1st year.
7. Lectures and theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam - 100%.
9. No.
10. 8.

2nd year

1. Numerical Analysis - 0163.
2. Error theory. Conditioning of a mathematical problem. Stability of a numerical method. Numerical solution of nonlinear equations. Numerical solution of a system of linear equations. Polinomial interpolation. Least squares approximation. Numerical differentiation and integration. Numerical methods for ordinary differential equations with initial condition.
3a) Basic knowledge of Calculus, and preferably some programming knowledge in a high level language. Useful would also be some knowledge in matrices algebra and differential equations, however this background will be provided to the students during the course.
3b) To introduce students to approximation techniques, explaining when and why they are expected to work. To supply the students with good background which will enable them to further studies in the field of Numerical Analysis. To learn how to identify standard problems which require a numerical solution. To observe some examples of error propagation as a consequence of the application of numerical techniques. To determine, with good precision, a numerical solutions of problems whose solution cannot be obtained otherwise.
3c) Burden, RL & Faires, JD 1993 Numerical Analysis, 5th ed., PWS Publishing Co, Boston; Ferreira, JA & Patrício MF 1998/1999 Análise Numérica - Textos de Apoio, FCTUC, Dep. Matemática.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis, Luísa Morgado.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 1st semester; 2nd year.
7. Lectures and theoretical-practical classes.
8. Final exam.
9. No.
10. 8.

1. Infinitesimal Analysis III - 0490.
2. Some of the classical material of a first course in differential calculus of functions of several variables: topology of the euclidian space R^n; sequences in R^n; compactness; limits, continuity and differentiation of functions $f : D \subset R^n \to R^m$.
3.a) A good knowledge in differential calculus and basic properties of functions of a single real variable and a basic course in Linear Algebra and Analytic Geometry.
3.b) To provide a solid background in the differential calculus of functions of several variables and to develop the students' ability to prove results using rigorous reasoning as well as the capability to make use of the theorems in the solution of concrete problems (examples).
3c) Dias Agudo, FR 1989 Análise Real, vol. I, Escolar Editora, Lisboa; Lima, EL 1981 Curso de Análise, vol. 2, Projecto Euclides, Instituto de Matemática Pura e Aplicada, Rio de Janeiro; Marsden, JE & Hofman, MJ 1974 Elementary Classical Analysis, Freedman and Company, NY.
4. Compulsory.
5. José Luís S. Cardoso.
6. 3 h/week (3 theoretical + 3 theoretical-practical); 1st semester; 2nd year.
7. Theoretical and theoretical-practical classes.
8. Final exam.
9. No.
10. 8.

1. Algebra I - 0492.
2. Generalities in groupoids. Groups: Generalities. Integers modulo n. Congruences in groups. Normal subgroups. Quotient groups. Morphism. .The fundamental homomorphism theorem and isomorphism theorems. Cyclic groups. Finite Symmetric group. Cayley's theorem. Rings: Generalities. Divisors of zero. Integral Domains. Invertible elements. Fields. Characteristic. Congruences on rings. Ideals. Quotient ring Morphisms. The fundamental homomorphism theorem and isomorphism theorems.
3a. High-school Algebra.
3b. To provide some basic concepts of groups and rings.
3c) Durbin, JC 1985 Modern Algebra. An Introduction, Jonh Wyley & Sons, NY; Allenby, RBJT 1983 Rings, Fields and Groups. An Introdution to Abstract Algebra, Eduard Arnold; Monteiro, AJ & Matos, Isabel 1995 Álgebra – Um Primeiro Curso.
4. Compulsory.
5. Emília Giraldes, Luís Roçadas.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 1st semester; 2nd year.
7. Lectures and theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Three written tests or final exam 100%.
9. No.
10. 8.

1. Linear Programming - 1671.
2. The role and the objectives of the Operations Research (OR) and the Introdution to Linear Programming (LP) Formulating LP Problems (LPP). Geometrically Solving LPP. Introdution to Convex Linear Algebra Fundamental Properties of LPP. Solving LPP: The Simplex Method. Solving LP Problems with Other Model Forms: The Big-M Method and the Penalty Method. Compatibility and Redundancy in LPP. Degeneracy LPP. Introdution to Duality in LP. Fundamental Properties of Dual LPP. Sensitivity Analysis in LP Problems.
3a) Linear Algebra I.
3b) Students should be able to identify PL Models and to use correct algoritms to solve those models. Learn the basic rules of a Written Work.
3c) Bazaraa, MS et al. 1990 Linear Programming and Network Flows, John Wiley & Sons, EUA, 2nd ed.; Murty, KG 1983 Linear Programming, John Wiley & Sons, EUA, 2nd ed.; Ramalhete, M et al. 1984 Programação Linear, McGraw-Hill de Portugal, Lda, vol. I.
4. Compulsory.
5. Maria Manuel da Silva Nascimento.
6. 4.5 h/week (1.5 theoretical + 3 theoretical-practical); 1st semester; 2nd year.
7. Lectures and theoretical-practical classes.
8. 25% written work, presentation, oral discussion + 75% final written examination.
9. No.
10. 5.

1. Differential Equations - 0326.
2. Definitions and terminology. Classification of differential equations; initial value problems and boundary-value problems. Existence of a unique solution. First-order differential equations: separable variables; exact equations and integrating factors; linear equations and Bernoulli equations; solutions by substitutions. Applications of first-order equations: orthogonal and oblique trajectories; differential equations as mathematical models. Explicit methods of solving higher-order linear differential equations: homogeneous and nonhomogeneous equations; reduction of order; the homogeneous equations with constant coefficients; the method of undetermined coefficients; variation of parameters. Applications of second-order linear differential equations with constant coefficients.
3a) Familiarity with the basic definitions of Linear Algebra and Calculus.
3b) To provide the basics methods for solving differential equations and to describe in mathematical terms the behaviour of some real-life system or phenomenon, whether physical, sociological or economic.
3c) Braun, M 1984 Differential Equations and their Applications, 3ª ed, Springer-Verlag, NY; Bronson, R 1976 Moderna Introdução às Equações Diferenciais, Colecção Schaum, McGraw-Hill, Lisboa; Ferreira, MF 1995 Equações Diferenciais Ordinárias. Um primeiro curso com aplicações, McGraw-Hill, Lisboa; Ross, SH 1980 Introduction to Ordinary Differential Equations, 3ªed., John Wiley & Sons, NY; Zill, DG 1989 A First Course in Differential Equations with Applications, PWS-Kent Publishing Company, Boston.
4. Compulsory.
5. Sandra Isabel Ventura Ricardo.
6. 5 h/week (2 theoretical + 3 theoretical-practical); 2nd semester; 2nd year.
7. Lectures and theoretical-practical classes.
8. Final written exam 100%.
9. No.
10. 5.

1. Infinitesimal Analysis IV - 0491.
2. Taylor's formula of a function of several variables. Extrema of real functions of several variables. Constrained extrema an Lagrange multipliers. Multiple integrals. The change of variables theorem and applications. Line integrals and surface integrals. Theorems of Green, Gauss and Stokes.
3a) A good knowledge in differential and integral calculus of one variable as well as those topics related to functions of several variables treated in Infinitesimal Analysis III.
3b) To give the students a solid background in the differential and integral calculus of functions of several variables.
3c) Dias Agudo, FR 1974 Análise Real, vols. I e II, 2ª ed., Escolar Editora, Lisboa; Breda, A & Costa, JN 1996 Cálculo com Funções de Várias Variáveis, 1ª ed. McGraw-Hill International Editions; Lima, EL 1995 Curso de Análise, vol. 2, 4ª ed., Projecto Euclides, Instituto de Matemática Pura e Aplicada, Rio de Janeiro; Marsden, JE 1975 Elementary Classical Analysis, 2ª ed., Freedman and Company, NY; Marsden, JE & Tromba, AJ 1988 Vector Calculus, 3rd ed., WH Freeman & Company.
4. Compulsory.
5. Anabela Borges, Carlos Rito.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 2nd semester; 2nd year.
7. Lectures and theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written assessments or final written examination – 100%.
9. No.
10. 8.

1. Algebra II - 0493.
2. Integers:The Euclidean Algorithm. The Fundamental theorem of Arithmetic. Polynomials: The division Algorithm. Greatest common divisor. Factorization of Polynomials. Unique Factorization Domains. Quotient rings of F[x] (F corpo). Factorization and ideals. Field extensions. Polynomial equations: Roots of a polynomial. An Introdution to Galois Theory.An introduction to Lattices and Boolean Algebras.
3a) Good knowledge of Algebra I.
3b) To provide fundamental concepts about factorization in integral domains, Galois Theory and some basic concepts about lattices
3c) Durbin, JC 1985 Modern Algebra. An Introduction, Jonh Wyley & Sons, NY; Lang, S 1965 Algebra, Reading Manchets, Adition-Wyley; Monteiro, AJ & Matos, Isabel 1995 Álgebra - Um Primeiro Curso.
4. Compulsory.
5. Emília Giraldes, Paulo Vasco.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 2nd semester; 2nd year.
7. Lectures and theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Three written tests or final exam 100%.
9. No.
10. 8.

1. Probabilities - 0496.
2. An introduction to probability theory. Real random variables and probability laws. Real random vectors. Independence of real random variables.
3a) Infinitesimal Analysis (in \R and \Rn).
3b) The general target is to introduce the mathematics of randomness and to develop methods for calculating probabilities in practical situations.
3c) Gonçalves, E & Mendes Lopes, N 2000 Probabilidades - Princípios Teóricos, Escolar Editora; Murteira, B 1990 Probabilidades e Estatística, vol. I, 2a ed. revista, McGraw-Hill; Ross, SM 1987 Introduction to Probability and Statistics for Engineers and Scientists, Wiley, NY; Rohatgi, VK 1976 An 4. Compulsory.
5. Cristina Maria Tavares Martins, Maria de Fátima Monteiro Ferreira.
6. 4.5 h/week (3 theoretical + 1.5 theoretical-practical); 2nd semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam.
9. No.
10. 8.

3rd year

1. Statistics - 0168.
2. I - Descriptive and mathematical statistics - an introduction. II - Descriptive statistics: univariated and bivariated frequency distributions. III - Introduction to statistical inference: sample statistics and sampling distributions. IV - Parametric estimation: estimators and estimatives, confidence intervals. V - Tests of hypotheses: Neyman-Pearson tests, likelihood-ratio tests.
3a) Good knowledge on probability theory.
3b) To introduce the basic ideas and procedures of statistical analysis.
3c) Mood, AM et al. 1974 An Introduction to the Theory of Statistics, 3a ed., McGraw-Hill; Murteira, B 1990 Probabilidades e Estatística I, vols. I e II, 2a ed. revista, Mc Graw-Hill; Rohatgi, VK 1976 An Introduction to Probability Theory and Mathematical Statistics, Wiley; Saporta, G 1990 Probabilités, Analyse des Données et Statistique, Éd. Technip; Tassi, Ph 1992 Méthodes Statistiques, Economica.
4. Compulsory.
5. Maria Emília de Mesquita Nogueira, Maria de Fátima Monteiro Ferreira.
6. 4.5 h/week (3 theoretical + 1.5 theoretical-practical); 1st semester; 3rd year.
7. Lectures and theoretical-practical classes.
8. Final written exam 100%.
9. No.
10. 8.

1. History of Education - 0206.
2. Western Education: Greece and Rome (Ancient Age).European Education in Middle Ages: importance of Christianism.Renascence and Enlightment: 'racionality'.Rousseau, Pestalozzi, Herbart and Froebel.XXth Century; "New School" moovement, Paulo Freire.
3a) Computer programming. Algorithms.
3b) To know authors and crucial times for the development of Education. To analise present times in order to preview future solutions
3c) Abbagnano, N & Visalberghi, A 1982 História da Pedagogia, Livros Horizonte, Lisboa; Bowen, J 1985 Historia de la Educación Occidental, Herder, Barcelona; Chateau, J s.d. Os Grandes Pedagogos, Lisboa, Livros do Brasil.
4. Compulsory.
5. Carlos Alberto Magalhães Gomes Mota.
6. 3 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes and laboratories.
8. Written essay.
9. No.
10. 4.

1. Educational Psychology - 0435.
2. Developmental factors: Hereditary versus environment. Developmental theories: behaviourism and cognitivism: educational implications. Motivation in the classroom. Psychology of the classroom. Evaluation of school learning.
3a) No prerequisites.
3b) To introduce our students to educational psychology, emphasising theoretical and practical relevant aspects of the teacher's work in a school setting.
3c) Weiner, B 1992 Human motivation, NY; Springtall, RC 1994 Educational psychology, McGaw-Hill.
4. Compulsory.
5. Eduardo Cruz.
6. 4 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Test or final exam.
9. No.
10. 5.

1. Elements of Topology - 0497.
2. Metric spaces; continuous maps between metric spaces; metric subspaces; open and closed sets in a metric space; equivalent metrics; topological spaces; continuous maps; comparison of topologies; topological subspaces; interior, closure e boundary; limits and extension of continuous maps; sequences; convergence; complete metric spaces; extension of uniformly continuous maps; compact topological spaces; connected and arcwise-connected topological spaces; finite products of topological spaces.
3a) Knowledge on Set Theory and Analysis in Rn.
3b) The students should study the elementary theory of metric and topological spaces and to be able to understand the topological meaning the notions given in the lectures and to understand and manipulate the notions of continuity and convergence of mappings in these contexts.
3c) Lima, EL 1983 Espaços Métricos, Projecto Euclides; Lima, EL 1970 Elementos de Topologia Geral, Ao Livro Técnico; Armstrong, MA 1997 Basic Topology, Springer-Verlag; Munkres, J 2000 Topology, Prentice-Hall; Machado, A 1995 Topologia, Universidade Aberta.
4. Compulsory.
5. André Gama Oliveira.
6. 4.5 h/week (3 theoretical + 1.5 theoretical-practical); 1st semester; 3rd year.
7. Lectures and theoretical-practical classes.
8. Final exam – 100%.
9. No.
10. 7.

1. General Physics - 1843.
2. Vectors. Kinematics. Dynamics. Work and kinetic energy. Potential energy and conservation of energy. System mechanics. Fluids. Oscillations.
3a) Basic knowledge of Differential and Integral Calculus.
3b) Contact with basic concepts and laws of Physics. The aim of this course is to verify how physics can be a major field of application of mathematical tools.
3c) Alonso, M & Finn, EJ 1972 Física - um curso universitário, vol. 1 - Mecânica, Editora Edgard Blucher Ltda, S. Paulo; Halliday, D et al. 1997 Fundamentals of physycs extended, 5th ed., John Wiley & Sons, NY; Kittel, C et al. 1973 Mecánica, Berkeley Physics Course, vol. 1, editorial Reverté, Barcelona.
4. Compulsory.
5. Afonso Pinto.
6 4.5 h/week (3 theoretical + 1.5 theoretical-practical); 1st semester; 3rd year.
7. Lectures and theoretical-practical classes.
8. Final written exam.
9. No.
10. 6.

1. History of Science - 1844.
2. Science as a milestone in contemporary life. A general framework for the History of Science: - What is Science? - Internal and external history of sciences; - Continuity and discontinuities in the history of scientific knowledge. The current debate on the nature of scientific knowledge: post-modernism, skepticism and sociological relativism. The Scientific Revolution in the 16th and 17th Centuries. Remote beginnings. Genesis of the "Experimental Philosophy". Brief cronology of scientific events from 17th to 20th Centuries.
3a) Although it is suitable for students with no prior specific knowledge, students enrolling in the course must have good, university level, reading and writing skills and a broad cultural background.
3b) On the completion of this course students should be able to: debate the relevance of Science in the contemporary societies; show some awareness of the interplay of internal and external factors in the History of Science; critically discuss the accounts of scientific knowledge given by different epistemological perspectives; analyse the implications of these epistemological perspectives for our understanding of the origin and development of Science; display a basic familiarity with the main factors of the Scientific Revolution in the 16th and 17th Centuries; identify some milestones in the dissemination of the scientific model of research between the 18th and 20th Centuries.
3c) Boorstin, D 1994 Os Descobridores, 2ª ed., Lisboa: Gradiva; Kuhn, TS 2001 A estrutura das revoluções científicas, 6ª ed., São Paulo: Editoria Perspectiva; Lakatos, I & Musgrave, A (organizadores) 1979 A crítica e o desenvolvimento do conhecimento, São Paulo: Editora Cultrix; Smith, AGR 1973 A revolução científica nos séculos XVI e XVII, Lisboa: Editorial Verbo; Watkins, JWN 1990 Ciência e cepticismo, Lisboa: Fundação Calouste Gulbenkian.
4. Compulsory.
5. José João Pinhanços de Bianchi.
6. 1,5 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes.
8. Final written exam and practical work.
9. No.
10. 4.

1. Philosophy of Education - 0220.
2. To introduce students to the Philosophy of Education, its concepts and its methods, focusing on the language of educational theory and practice and discussing the educational values and goals.
3a) No prerequisites.
3b) Philosophy of Education: epistemology, basic concepts and methods. Aims and objectives in Education. Educational foundations: human nature and educability, Ethics and moral education, values and attitudes, autority and discipline, social philosophy of Education, freedom and Education, models of teaching and models of education. Philosophy of Education, Project and Utopia.
3c) Moore, TW 1982 Philosophy of Education, London: Routledge & Kegan Paul; Fullat, O 1983 Filosofias de la Educación, Barcelona: CEAC.
4. Compulsory.
5. Manuel Barroso Magalhães.
6. 3 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Continuous evaluation or final exam.
9. No.
10. 4.

1. Differential Geometry - 0327.
2. Differentiable curves; velocity and arc length; reparametrization by arc length; curvature; Frenet trihedron and torsion; regular surfaces; change of parameters and differentiable maps in surfaces; tangent space and differential of a map; areas, lengths and angles: the first fundamental form; orientation of surfaces; the geometry of the Gauss map; second fundamental form; the Gauss map in local coordinates.
3a) Knowledge on Linear Algebra and Analysis in Rn.
3b) To provide students an elementary study of local and global properties of curves and regular surfaces in R3. The students should be able to use the techniques and methods of differential calculus in those objects and to understand the geometrical meaning of the notions given in the lectures.
3c) Carmo, M 1976 Differential Geometry of Curves and Surfaces, Prentice-Hall; Araújo, PV 1998 Geometria Diferencial, IMPA; Pressley, A 2001 Elementary Differential Geometry, Springer-Verlag; Gray, A 1993 Modern Differential Geometry of Curves and Surfaces, CRC Press.
4. Compulsory.
5. André Gama Oliveira.
6. 4.5 h/week (3 theoretical + 1.5 theoretical-practical); 2nd semester; 3rd year.
7. Lectures and theoretical-practical classes.
8. Final exam – 100%.
9. No.
10. 7.

1. Operational Research - 0386.
2. Introduction to Operational Research. Game theory: brief history. Game theory in Economics. Mathematical formulation of differential games. Continuous and discrete games. Optimal control theory: Pontrjagin´s principle. Open-loop and feedback Nash equilibria. Hierarquical differential games. Open-loop Stackelberg games. Linear quadratic games. Many examples of application to Economy.
3a) Good knowledge of Linear Algebra, Optimisation, Differential Equations and Calculus III.
3b) To familiarise the students with optimisation problems with more than one optimisation agent, as well as with different optimality concepts. To acquaint the students with elementary control theory. To introduce the students to the formulation of classical problems in Economics in terms of differential games.
3c) Ballar, T & Olsder, GJ 1995 Dynamic Noncooperative Games Theory, Academic Press, London; Docker, E et al. 2000 Differential Games in Economics and Management Science, Cambridge University Press, Cambridge; Jank, G 2001 Introduction to non-cooperative dynamical game theory, Lecture notes, Dep. Matemática, FCTUC, Coimbra.
4. Compulsory.
5. Teresa Paula C. Azevedo Perdicoúlis, Manuela Rodrigues.
6. 4 h/week (2 theoretical + 2 theoretical-practical); 2nd semester; 3rd year.
7. Lectures and theoretical-practical classes.
8. Final exam.
9. No.
10. 5.

1. Curriculum Development - 0436.
2. Nature and scope of curriculum studies. Some educational key concepts and terms. The concept of curriculum. The process of curriculum development. Basic components of a curriculum. Course design and instructional planning. Planning the evaluation of school learning.
3a) Although it is suitable for students with no prior specific knowledge, students enrolling in the course must have good, university level, reading and writing skills and a broad cultural background.
3b) After completing this course students should be able to: define a coherent and adequate framework for curriculum inquiry; understand the teacher's role in curriculum development; interpret the main official documents that shape the Portuguese Basic and Secondary School System; analyse syllabus of Mathematics for Basic and Secondary Portuguese Schools; plan and organize course units and evaluative activities.
3c) D'Hainaut, L 1980 Educação - dos fins aos objectivos, Coimbra: Livraria Almedina; Domingos, AM et al. 1984 Uma forma de estruturar o ensino aprendizagem, 2ª ed., Lisboa: Livros Horizonte; Messick, Rosemary et al. 1980 Currículo: Análise e Debate, Rio de Janeiro: Zahar Editores; Stenhouse, L 1986 An Introduction to Curriculum Research and Development, Londres: Heinemann; Zabalza, MA 2000 Planificação e Desenvolvimento Curricular na Escola, Porto: Edições Asa.
4. Compulsory.
5. José João Pinhanços de Bianchi.
6. 3 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes.
8. Final written exam and practical work.
9. No.
10. 4.

1. Differential Pedagogy - 1657.
2. Individual systems; compensatory educational programs; mental deficiency designs; gifts children; methods of investigation in differential pedagogy; Planning instruction
3a) No prerequisites.
3b) To introduce our students in differential pedagogy, emphasising theoretical and practical relevant aspects of the teacher's work in a school setting.
3c) Jimenez, F 1987 Questiones sobre bases difereciales de la educación, Madrid, UNED; Kulik, JA Individual systems of instruction, In HE Mitzel (ed): Encyclopedia, pp. 851-858.
4. Compulsory.
5. Eduardo Cruz.
6. 3 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Test or final exam.
9. No.
10. 4.

1. Number Theory - 1845.
2. Principal of Finite Induction and Well-Ordering Principle. Divisibility. Prime Numbers and Their Distribution. The Theory of Congruences. Divisibility criteria. Wilson, Fermat and Euler Theorems. The Chinese Residues Theorem.
3a) It is required some concepts from Linear Algebra and from Algebra.
3b) Students should get an overview over Number Theory specially from historical point of view.
3c) Burton, DM 1976 Elementary Number Theory, Allyn and Bacon; Niven, I & Zuckerman, H 1965 An Introduction to the Theory of Numbers, John Wiley & Sons; Santos, JP 1998 Introdução à Teoria dos Números, IMPA.
4. Compulsory.
5. José Luís S. Cardoso.
6. 3 h/week (1.5 theoretical + 1.5 theoretical-practical); 2nd semester; 3rd year.
7. Lectures and theoretical-practical classes.
8. Final exam.
9. No.
10. 5.

4th year

1. Didactics of Mathematics I - 0499.
2. Learn and Teach Matematics: learning and teaching theories. The mathematics classroom: Didactical material and computers. Learn and Teach some Geometrical notions.
3a) Good mathematical knowledge for teaching.
3b) To develop the scientific thought; to improve comunication capacities; to acquire competence in the field of teaching.
3c) Matos, JM & Serrazina, L 1996 Didáctica da Matemática, Lisboa, Universidade Aberta.
4. Compulsory.
5. Cecília Costa.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 1st semester; 4th year.
7. Lectures and theoretical-practical classes.
8. Written essays with oral presentation and discussion 50%; exam 50%.
9. No.
10. 8.

1. Computing in the Teaching of Mathematics - 0503.
2. Graphic Calculators in the Education of Mathematics. Application of Graphic Calculators in the study of probabilities, statistics and functions. Limitations of Graphic Calculator. The “Ti-GraphLink”: connection between the Graphic Calculator and the computer. Advantages and disadvantages of the use of Graphic Calculators in Mathematics’ classes. Computers in the Education of Mathematics. Utilization of the “Geometer’s Sketchpad” program in the study: of Geometry, of optimisation problems and of functions. Brief presentation of “PowerPoint” program. The “Word” and the writing mathematical symbols. The Internet as auxiliary mean of the teacher.
3a) Knowledge of high-school Geometry, Probabilities, Statistics and Functions.
3b.Intends to present the students of Mathematics computational means which help them to prepare classes, subjects and in the motivation of their future students to eventual programmatic topics.
3c) Ministério da Educação 1997 Matemática: Programas 10º, 11º e 12º anos, Editorial do Ministério da Educação; Associação de Professores de Matemática 1999 T3, Modelação no Ensino da Matemática - Calculadora, CBL e CBR; Associação de Professores de Matemática 1999 T3, Estatística e Calculadoras Gráficas; Key Curriculum Press 1995 User Guide and Reference Manual-The Geometer’s Sketchpad. Key Curriculum Press; Associação de Professores de Matemática 1999 T3, Geometria com Cabri-géométre.
4. Compulsory.
5. Paulo Vasco.
6. 4 h/week; 1st semester; 4th year.
7. Theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Three written tests or final exam 100%.
9. No.
10. 5.

1. History of Mathematics - 0504.
2. Mathematics in Egypt and Babylonia; Mathematics on “Old” Greece; Some topics on the History of Mathematics in Portugal.
3a) Basic knowledge on Mathematics.
3b) To investigate on the appearance and development of some subjects in mathematics. To help to understand our cultural heritage, not only through the applications that mathematics have had, and still have, to the astronomy, physics, and other sciences, but also by the relations that has had, and still has , with other areas such as Art, Religion and Philosophy. To offer a “picture” to better understand the tendencies on the mathematical education in the past and in the modern days.
3c) Boyer, C História da Matemática; Collete, JP Histoire des Mathématiques; Joseph, GG The Crest of the Peacock; Hearth, T A History of Greek Mathematics I, II; Teixeira, F História das Matemáticas em Portugal.
4. Compulsory.
5. Elza Maria Alves de Sousa Amaral.
6. 3 h/week; 1st semester; 4th year.
7. Lectures/practical classes.
8. Work groups.
9. No.
10. 4.

1. Educational Technology - 0531.
2. Historical and conceptual introduction to Instructional Technology. Learning theories: their impact on the instructional process. The Instructional design paradigm. Stages of the ID process. Instructional media: instructional purpose and production techniques. The New Technologies of Instruction.
3a) No prerequisites.
3b) To know the diverse Educational Technology traditions, their concepts and theoretical foundations. To be able to use the instructional design process to design an instructional plan. To be familiar with the main kinds of instructional media, with an emphasis on the new information technologies.
3c) Gagné, RM (ed.) 1987 Instructional Technology: Foundations, Hillsdale, NJ: LEA; Heinich, R et al. 1998 Instructional Media and Technologies for Learning, 6th ed., Prentice Hall.
4. Compulsory.
5. José Costa Pinto.
6. 4h/week (2 theoretical + 2 theoretical-practical); 1st semester; 4th year.
7. Lectures and theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations. 1 written test (60%) and two practical assignments (40%).
9. No.
10. 5.

1. Introduction to Professional Practice - 1658.
2. Teaching practical knowledge: how to organise the classroom, how to manage pupils, how to begin a classroom task, etc.. Analysis of teacher's performance. Ethical problems.
3a) Good mathematical knowledge for teaching; psychological development theories.
3b) Develop the reflection capacity about teaching practices and about ethical aspects.
3c) Recent papers on mathematics education.
4. Compulsory.
5. Cecília Costa.
6. 2 h/week; 1st semester; 4th year.
7. Theoretical-practical classes. Group work and classroom observation.
8. Written essays with oral presentation and discussion 100%.
9. No.
10. 3.

1. Advanced Analysis - 1672.

2. Metric Spaces. Hölder and Minkowski's Inequalities. Some important examples of metric spaces: l^p, l^∞, s (sequences space), C[a,b] (space of continuous functions on [a,b]), B[a,b] (space of bounded functions on [a,b]), d (discrete metric space). Topology in a metric space. Separable set. Separability of l^p e non-separability of l^∞. Sequences. Completeness of a metric space. Completeness of $\Re^n$, C^n, l^∞, l^p, C[a,b] and of c (convergent squences space). Examples of incomplete metric spaces. Completion of a metric space. Normed Spaces. Banach Spaces. Metric Induced by the norm. Further properties of metric spaces. Completion of a normed space. Finit dimensional normed spaces and subspaces. Compactness and finite dimension. F. Riesz's lemma. Linear Operators. Bounded linear operators and continuous linear operators. Extension of a bounded linear operator. Linear Functionals. Algebraic dual. Linear operators and functionals on finite dimensional spaces. Normed space of operators. Dual Space. Dual spaces of $\Re^n$, C^n, l^1, l^p ($1<p<\infty$). Inner Product Spaces (pre-Hilbert) and Hilbert Spaces. Examples: $\Re^n$, C^n, L^2[a,b], l^2. Examples of non pre-Hilbert spaces: C[a,b] e l^p ($p \neq 2$). Parallelogram and Polarization Identities. Schwarz Inequality. Norm induced by a inner product. Completion of a inner product space.
3a) Some concepts of Linear Algebra are required.
3b) The purpose of the book is to give some preparation in Functional Analysis important for applications.
3c) Kreyszig, E 1989 Introductory Functional Analysis with Applications, John Wiley & Sons; Sunder, VS 1997 Functional Analysis, Spectral Theory, Birkhäuser, Advanced Texts.
4. Compulsory.
5. José Luís S. Cardoso.
6. 3 h/week (3 theoretical + 3 theoretical-practical); 1st semester; 4th year.
7. Lectures and theoretical-practical classes.
8. Final exam.
9. No.
10. 8.

1. Sociology of Education - 0190.
2. Genesis and development of Sociology of Education; Sociological approach of education; school and equality of opportunities; social and school differences; problematic of school success; school and labour world; school as a place for innovation and conflict.
3a) Students are required to have knowledges related to History of Education and Philosophy of Education.
3b) Students are supposed to question the theoretical differences and sociological levels of analysis that contribute to the explanation of the relationships between society and the Educational System, as well as the existing relationships inside school itself.
3c) Afonso, A 1988 Insucesso, Socialização Escolar e Comportamentos Divergentes - Uma abordagem Introdutória, Revista Portuguesa de Educação, Braga; Formosinho, J 1987 Como Organizar a Escola para o Insucesso Educativo, Braga; Gomes, C 1998 A Interacção Selectiva na Escola de Massas, Braga: Instituto de Educação; Grácio, R 1986 Políticas do Ensino, efeitos perversos - o caso do secundário; Musgrove, F 1986 Família Educação e Sociedade, Porto: Rés Editora; Valente, B 1986 A Viragem da Escola, Lisboa: Livros Horizonte.
4. Compulsory.
5. Maria João de Carvalho.
6. 2 h/week; 2nd semester; 4th year.
7. Theoretical-practical classes.
8. Test and Final Exam.
9. No.
10. 4.

1. Mechanics - 0328.
2. Introduction: Some considerations about the axiomatic concepts of rigid body, particle, space and time. Kinematics of a rigid body: degrees of freedom of a moving rigid body, vector fields of velocities, instantaneous axis of rotation, vector fields of the accelerations, translational motions, rotation about a fixed axis, plane, screw and tangent motions; moving coordinate systems, motion about a fixed point (Euler angles) and the general motion of a rigid body as a composition of simpler motions. Kinetics: Kinetics of systems of particles: some considerations about mass and mass-systems; the concepts and properties of the mass-center, the linear momentum, the kinetics momentum and the kinetics energy; Koenigs Theorems. Kinetics of a rigid body: moments and products of inertia, inertia matrix, principal axis, kinetic energy of a rigid body in a general motion. Dynamics: Dynamics law for rigid bodies; forces work, energy and power; conservative fields; conservation of energy; study of some particular motions: projectile motions under gravity, constrained particle motions, motion of a particle under a central force; some problems on general three-dimensional rigid body motions. Euler Equations for rigid body motions.
3a) Differential Geometry. Real analysis of one and several variables.
3b) To provide na introduction to the study of mechanics of rigid bodies.
3c) Brousse, P 1973 Cours de Mécanique, Armand Colin, Paris; Alves, AS 1989 Mecânica Geral, INIC/CMUC, Coimbra; Euvrard, D 1985 Cours de Mécanique Générale, Policopiado de Paris VI.
4. Compulsory.
5. Dina Maria Lucas Ferreira dos Santos Loff, João Sousa.
6. 4.5 h/week (3 theoretical + 1.5 theoretical-practical); 2nd semester; 4th year.
7. Lectures and theoretical-practical classes.
8. Final written exam 100%.
9. No.
10. 8.

1. Didactics of Mathematics II - 0500.
2. Learn and Teach Matematics: problem solving, project work, mathematical research. The mathematics classroom: mathematical communication, social interactions. Learn and Teach some Mathematical notions (such us: numbers, algorithms, estimation and functions).
3a) Good Mathematical knowledge for teaching.
3b) To develop the scientific thought; to improve communication capacities; to acquire competence in the field of teaching.
3c) Matos, JM & Serrazina, L 1996 Didáctica da Matemática, Lisboa, Universidade Aberta.
4. Compulsory.
5. Cecília Costa.
6. 6 h/week (3 theoretical + 3 theoretical-practical); 2nd semester; 4th year.
7. Lectures and theoretical-practical classes.
8. Written essay with oral presentation and discussion 20%; project 30%; exam 50%.
9. No.
10. 8.

1. Portuguese Culture - 1190.
2. The concept of culture; culture as synthesis; Culture and Society; Portuguese cultural spreading unity; Idiosyncratic variation in Portugal – historical, literary, spacial and economic and social criteria.
3a) Knowledge of Portuguese language.
3b) To ponder over the concept of culture taking in consideration its' transdisciplinary character; To identify characteristics elements of Portuguese culture; to analyse different subjects of Portuguese culture.
3c) Chertrier, R 1988 A História Cultural, Lisboa, Difel; Elias, R 1989 O Processo Civilizacional - I, Lisboa, D. Quixote; Dias, J 1985 Os elementos fundamentais da Cultura Portuguesa, Lisboa, ICNM; Laloup, J 1966 Cultura e Civilização; Lourenço, E 1999 O esplendor do caos, Lisboa, Gradiva; Lourenço, E 1978 O Labirinto da Saudade, Lisboa, D. Quixote; Marcuse, H 1970 Culture et Société, Paris, Ed. Minuit; Saraiva, AJ 1978 Para a História da Cultura em Portugal, Lisboa, Livraria Bertrand.
4. Compulsory.
5. Fernando Alberto Torres Moreira.
6. 4 h/week; 2nd semester; 4th year.
7. Theoretical-practical classes.
8. Constraint: attendance to 2/3 of practical classes. According to University Regulations, 2 periodic tests (each 50%) or a final exam (100%).
9. No.
10. 3.

1. School Administration - 1846.
2. Education Planning and Administration. Socio-historical and organisational construction of the school. The new configuration of Portuguese educational administration. The school as institution and organisation. The new autonomy regime and organisational strategies of the teaching/learning process. Autonomy, planning and organisation of live in schools.
3a) No prerequisites.
3b)To analyse and understand the educational administration reform process. To Know and understand the school social-organisational functioning. Knowing and understanding the importance organisational structures in the development of autonomy and quality of the education.
3c) Afonso, N 1995 A Reforma de Administração Escolar, Lisboa: IIE; Barroso, J 1977 Autonomia e Gestão das Escolas, Lisboa: Edifício do Ministério da Educação; Lima, LC 1996 Construindo Modelos de Gestão Escolar, Lisboa: IIE; Marques, R 1997 Professores, Família e Projecto Educativo, Porto: Ed. Asa; Santiago, RA 1997 A escola representada pelos alunos, pais e professores, Aveiro: Ed. da UA.
4. Compulsory.
5. Jorge Gomes.
6. 2 h/week; 2nd semester; 4th year.
7. Theoretical-practical classes. Documentation (text, graphics, flowcharts) exploration and questioning. Curricular and pedagogic management analysis and simulation practices.
8. Periodic examination: written test (65%) and investigation paper (35%) Final exam (100%).
9. No.
10. 3.

1. Logic and Foundations - 1847.
2. Propositional logic. Predicate logic. The teaching of logic (at non-superior level).
3a) Elementary set theory.
3b) To develop the scientific thought; to improve communication capacities; to develop the rigorous mathematical thought.
3c) Dalen, D van 1994 Logic and Structure, 3ª ed., NY, Springer-Verlag; Oliveira, AF 1996 Lógica e Aritmética, 2ª ed., Lisboa, Gradiva.
4. Compulsory.
5. Cecília Costa, Carlos Monteiro.
6. 4 h/week (2 theoretical + 2 theoretical-practical); 2nd semester; 4th year.
7. Lectures and theoretical-practical classes.
8. According to University Regulations, final exam - 100%.
9. No.
10. 5.

HUMANITIES & SOCIAL SCIENCES

Management Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Introductory Management I	7.0	Introductory Management II	7.0
	Economics for Managers I	5.0	Economics for Managers II	5.0
	Econ. &Social History of the XX Century	5.0	Statistics for Managers	7.0
	Management and Social Sciences	7.0	Sociology for Managers	7.0
	Applied Mathematics for Management I	5.0	Applied Mathematics for Management II	5.0
	Total	29	Total	31
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Accounting I	7.0	Accounting II	7.0
	Business Economic Theory	5.0	Management and International Commerce	4.0
	Organizational Behaviour	7.0	Human Resource Management	7.0
	Introductory Law	4.0	Business and Labour Law	5.0
	A. Quantitative Methods to Management	7.0	Financial Calculus	7.0
	Total	30	Total	30
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	Marketing I	6.0	Marketing II	6.0
	Financial Management	6.0	Financial Markets	6.0
	Business Strategy	6.0	Management of Innovation and Change	6.0
	Public and Municipal Administration	6.0	Management of Information Systems	6.0
	Value Chain Management	5.0	Analytical Accounting I	7.0
	Total	29	Total	31
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	Entrepreneurship	3.0	Project/Work Experience	30
	Workshop	2.0		
	Options			
	Business Taxation	7.0		
	Analytical Accounting II	6.0		
	Local Development	6.0		
	Marketing Research	6.0		
	Added Value for Endogenous Resources	6.0		
	Sales Management	6.0		
	Managing the Non-Profit Organization	6.0		
	Product and Brand Management	6.0		
	Analysis of Investments and Financial Risk	6.0		
	Local Organization	6.0		
	Audit	6.0		
	Communication and Promotion	6.0		
	Total	30	Total	30

Total credits: 240

1st year

1. Introductory Management I – 2055.
2. Evolution of the Thought in Administration. The company and its atmosphere. Functions of Administration: Planning, Organization, Leadership and Control. Innovation and Administration of the Change.
3a) No prerequisites.
3b) The discipline intends to supply a solid base of knowledge, fundamental notions of the Administration, through the theoretical concepts, and through illustrative practical cases of the subjects.
3c) Teixeira, Sebastião 1998 Gestão das Organizações, McGrawHill, Lisboa; Stoner, JA e Freeman, R. E 1995 Administração. Rio de Janeiro. Prentice Hall do Brasil; Hampton, David R 1992 Administração: Processos administrativos. São Paulo Brasil McGrawHill.
4. Compulsory.
5. Júlia Fragoso da Fonseca.
6. 4,5h/week (TP); 1st Semester; 1st year.
7. Lectures and practical classes. Participation in 3/4 of the practical classes in compulsory.
8. Final Exam; Work; Reading records and presence in the classes.
9. No.
10. 7.0.

1. Economics for Managers I – 2056.
2. Introduction to Market Economics (Supply and Demand Theories). Consumer Theory and Demand. Neo-classical Theory of the Firm. Market Structures (Perfect Competition; monopoly). The role of government in market economies.
3a) No prerequisites.
3b) To teach basic micro theory related with supply and demand, consumer and firm behaviour, and market structures.
3c) João Luís César das Neves 2001 Introdução à Economia. 6ª Edição, Verbo, Lisboa; José Mata 2000 Economia da Empresa Fundação Calouste Gulbenkian, Lisboa; Isabel Ucha 2000 Introdução à Economia – Guia de Apoio à Introdução à Economia - de João César das Neves - Sínteses, Exercícios e Soluções 3ª Edição, Verbo, Lisboa; Paul A Samuelson e William D Nordhaus 1999 Economia 16ª Edição, McGraw-Hill de Portugal, Lisboa.
4. Compulsory.
5. José Vaz Caldas.
6. 3 hours/week; 1st. Semester; 1st year.
7. Lecture and exercises.
8. Two midterms (or alternatively a final comprehensive exam).
9. No.
10. 5.0.

1. Economic and Social History of the 20th Century – 2023.
2. (1) Industrial waves: techno-economic cycles (2) Intellectual waves: economic thinking cycle. Multidimensional policy (3) Geo-economics - the change and making of power centres.
3a) No prerequisites.
3b) Dimensioning the rehabilitation of the economy in the long run, of the cycle school - in a process of revaluation of the economic history and thinking.
3c) Healey, Nigel M 1997 A Doutrina Económica da Nova Europa: da Comunidade à União, Lisboa, Instituto Piaget; Freidman, Thomas L 2000 Compreender a Globalização, Lisboa, Quetzal Editores Stoffäes, Christian 1987 A Crise da Economia Mundial, Lisboa, Dom Quixote.
4. Compulsory.
5. Maria José Lopes Gomes.
6. 3 hours/week; 1st semester; 1st year.
7. Lectures; exercises, workshops.
8. Choice between two methods: (1) periodic evaluation: written test and project team work; (2) final exam.
9. No.
10. 5.0.

1. Management and Social Sciences – 2057.
2. The relevance of the social sciences to questions linked to management, for example, the social scientific roots to the principle theories of administration and the organization of the business, including characteristics of the respective analytical methodologies and tools most often used.
3a) No prerequisites.
3b) The purpose of the discipline is make students aware that the adaptation of analytical methodologies and tools from the social sciences can be used in administration and management.
3c) Magretta, J 2002 What Management Is? How it Works and Why it´s Everyone´s Business New York: The Free Press; Sousa, António 1990 Introdução à Gestão - uma abordagem sistemática Lisboa, Edições verbo; Pinto, J Madureira e Silva, A Santos (org.), 1987, Metodologia das Ciências Sociais Porto: Afrontamento; Sainsaulieu, R 1997 Sociologia da Empresa. Organização Cultura e Desenvolvimento. Lisboa: Instituto Piaget.
4. Compulsory.
5. Timothy Koehnen.
6. 4,5 hours/week (4,5TP); 1st semester; 1st year.
7. Lecture and Discussion.
8. Assignments and exam.
9. The answer will be given in face of each particular case.
10. 7.0.

1. Applied Mathematics for Management I – 2058.
2. The topology of IR and IRn . Real-valued functions of several variables: definition, domain and graphs; examples from economics; exponential and logarithm. Limits, continuity and differentiability. The chain law. Homogeneous functions. Unconstrained extreme. Integration and applications.
3a) High-school mathematical analysis.
3b) To provide the elementary theory of differential and integral calculus of several variables and show the practical aspects of these matters related with economics and management.
3c) Chiang, Alpha 1982 Matemática para Economistas McGraw-Hill; Demidovitch, B 1993 Problemas e exercícios de Análise Matemática, McGraw-Hill, Lisboa; Pires, Cesaltina Agosto de 2001 Cálculo para Economistas, McGraw-Hill de Portugal; Swokowski, Earl 1983 Cálculo com Geometria Analítica, Vol. 1, 2. McGraw-Hill, S. Paulo.
4. Compulsory.
5. Anabela Borges.
6. 3 hours/week (3TP); 1st semester; 1st year.
7. Lectures and practical classes.
8. 2 written assessments or final written examination.
9. No.
10. 5.0.

1. Introductory Management II – 2059.
2. Information system, financial resources management, material resources management, Marketing; Human resources management.
3a) Without prerequisites.
3b) To provide the fundamental principles and basic notions of management and a perspective of the diverse management areas.
3c) Sousa, António 1990 Introdução à Gestão, Uma abordagem sistémica, Edições Verbo: Lisboa.
4. Compulsory.
5. Ana Paula Rodrigues.
6. 4,5 hours/week (TP); 2nd semester; 1st year.
7. Lecture/Discussion/Exercises.
8. Written reports, participation in class, exam.
9. No.
10. 7.0.

1. Economics for Managers II – 2060.
2. National Accounting. Price Index. SEC-95. Keynesian Theory: IS/LM analysis. Monetary and Fiscal policies. Inflation.
3a) No prerequisites.
3b) Basic macroeconomic tools to study the overall performance of an economy.
3c) Jorge Santos et al 2002 Macroeconomia: Exercícios e Teoria McGraw-Hill de Portugal, 2ª ed.; Rudiger Dornbush e Stanley Fisher 1993 Introdução à Macroconomia McGraw-Hill, Brasil.
4. Compulsory.
5. José Vaz Caldas/Leonida Correia.
6. 3 hours/week; 2nd semester; 1st year.
7. Lectures and exercises (3TP).
8. 1 midterm (or alternatively a comprehensive final written exam).
9. No.
10. 5.0.

1. Statistic for Managers – 2061.
2. Probability theory. Unidimensional random variables; discrete distributions and continuous distributions. Bidimensional random variables, independence and correlation. Most important discrete and continuous distributions. Inequalties and limit results. Statistical Inference; Introduction to sampling basic notion, point estimation and parametric interval estimation.
3a) Good knowledge in integration and Calculus.
3b) Students should get an overview of the statistical techniques and probabilistic models to make inference and decisions.
3c) Murteira, B Ribeiro CS Silva, JA Pimenta, C 2002 Introdução à Estatística McGraw-Hill; Curto JJ D Pinto, JCC 2000 Estatística para Economia e Gestão, Edições Sílabo; Guimarães, RC Cabral J 1998 - Estatística. McGraw-Hill de Portugal; Hogg & Tannis 2001 Probability and Statistical Inference 6ª edição, Prentice Hall; Reis, E Melo, P Andrade, R e Capalez, T 2000 Estatística Aplicada - Vol I e II, Edições Sílabo; Meyer, PL 1976 Probabilidade - Aplicações à Estatística, Ed. Livros Técnicos e Científicos Editora, S A.
4. Compulsory.
5. Irene Oliveira.
6. 4.5 hours/week TP 2nd semester; 1st year.
7. Lectures and practical classes.
8. 2 written tests or a final exam.
9. No.
10. 7.0.

1. Sociology for Managers – 2062.
2. The historical movement of rationalisation in the society. Labour concepts, the occupations of the industrial operator. The State, intellectual property and professionalism. The scientific organisation of labour. The rationalisation of the human factor in the organisation. Power, authority and bureaucracies. Growth of the tertiary sector. Open organisational systems cultural action and autonomy. Democratisation of labour relations.
3a) No prerequisites.
3b) The purpose of the discipline is make students aware of the historical evolution of the organisation of industrial labour, professions and the bureaucratisation of organisations.
3c) Chiavenato, Idalberto 1987 Teoria Geral da Administração (volumes 1 e 2) São Paulo, Macgraw-Hill; Bernoux, Philippe 1995 A sociologia das organizações Porto; Rés Freire, João 1993 Sociologia do trabalho uma introdução. Porto Afrontamento.
4. Compulsory.
5. Telmo Caria.
6. 4,5 hours/week (4,5TP); 1st semester; 1st year.
7. Lectures and Discussion.
8. Two reviews Lecture of short papers and tests.
9. No.
10. 7.0.

1. Applied Mathematics for Management II – 2063.
2.. Algebric Structures. Vector Spaces: linear independence; spanning sets; basis and dimension; vectorial subspace. Linear Mappings: the algebra of linear mappings; kernel and image; linear mappings whose domain is a vector space of finite dimension. Matrices: matrix of a linear mapping relative to fixed basis; algebra of matrices; invertible matrices; rank of matrices. Systems of Linear Equations: matricial interpretation; a systematic method of solving systems of linear equations. Determinants: basic concepts; Laplace theorem; application to matrices and systems. Eigenvalues and Eigenvectors: basic concepts.
3a) Basic knowledge in logic, theory of sets, functions and secondary school level algebra.
3b) To develop reasoning capacity of the student and to provide the basic concepts of Linear Algebra and Analytical Geometry.
3c) Giraldes, E Fernandes, V H Smith, M P 1995 Curso de Álgebra Linear e Geometria Analítica, McGraw-Hill; Blyth, T S Robertson, E F 1986 Matrices and Vector Spaces, Chapman and Hall; Blyth, T S Robertson, E F 1994 Linear Algebra, Chapman and Hall.
4. Compulsory.
5. Elza Maria Alves de Sousa Amaral.
6. 3 hours/week; 2nd semester; 1st year.
7. Lectures and exercises.
8. Written test.
9. No.
10. 5.0.

2nd year

1. Accounting I – 2028.
2. Introduction to the theory and practice of company accounting: assets and liabilities, wealth transactions, income statements, result determination, value added tax, tax benefits; revenue cycle. Detailed study of a general accounting plan: Portuguese accounting standardization, accounting principles the POC. The international normalization process: IASB and FASB context
3a) No prerequisites.
3b) At the end of semester students will be able to achieve a general understanding of financial and tax accounting according to national standards and law.
3c) Bento, J et al 1991 Plano Oficial de Contabilidade Explicado, Porto Editora; Borges, A Ferrão, M 1995 Manual de Casos Práticos de Contabilidade, Rei dos Livros, Lisboa; Borges, A et al 1999 Elementos de Contabilidade Geral, Rei dos Livros, Lisboa; Costa, C Alves Correia, G 1996 Contabilidade Financeira, Rei dos Livros, Lisboa.
4. Compulsory.
5. Carlos Machado dos Santos; Carmen Leal.
6. 4,5 hours/week;1st semester; 2nd year.
7. Lectures.
8. Written examination.
9. The answer will be given in face of each particular case.
10. 7.0.

1. Business Economic Theory – 2064.
2. Analysis costs-benefits and supply-demand. Neoclassic approach for production. Theory of Production. Cost Theory. Balance sheet analysis to maximize company profits. Perfect Competition Theory. Monopoly Theory . Theory of the oligopolies.
3a) Introductory knowledge to economics.
3b) One intends that the pupils will understand economic concepts of rigorous and systematic form and can analyse client behaviors for the economic-firms and apply the knowledge to problematic situations.
3c) Frank, Robert 1991 Microeconomia e Comportamento Mc Graw Hill; Varian, Hal 1987 Intermediate Microeconomics: A Modern Approach, New York.
4. Compulsory.
5. Manuel Joaquim Teixeira.
6. 3 hours/week; 1st semester; 2nd year.
7. Theoretician-practical classes.
8. Final written exam.
9. No.
10. 5.0.

1. Organizational Behaviour – 2065.
2. Organizational context; Individual and the organization: Learning, Behaviour, Communication, Perception and Motivation; Teamwork: Group learning and structure, Individual and the group; Structure and Organizational Processes: Structural elements, Strategy and Organizational design, Organizational Culture, Change and Development; Organizational management: Leadership, Decision-making, Negotiation and Conflict resolution.
3a) No prerequisites.
3b) The purpose of the discipline is to provide the skills to analyze the evidence which shows the similarities between organizational behaviour and management.
3c) Marques, C e Pina e Cunha, M 2000 Comportamento Organizacional e Gestão de Empresas. Lisboa: Publicações Dom Quixote; Pina e Cunha (org.) 2000 Teoria Organizacional. Perspectivas e Prospectivas. Lisboa: Publicações Dom Quixote; Sainsaulieu, R 1997 Sociologia da Empresa. Organização Cultura e Desenvolvimento. Lisboa: Instituto Piaget.
4. Compulsory.
5. Timothy Koehnen.
6. 4,5hours/week(4,5TP); 1st semester; 2nd year.
7. Lecture/Discussion/Exercises.
8. Written reports, exercises, exams.
9. The answer will be given in face of each particular case.
10. 7.0.

1. Introductory Law – 0373.
2. The fundamental legal institutions, Objective and subjective Law Interpretation; The relationship between juridical and commercial law. Individual rights and personal indeminization. Contracts and collateral. Civil Responsibility.
3a) No prerequisites.
3b) To make students aware of the idea that all management activities are oriented to the law and that the manager should be knowledgeable about technical aspects and institutional dynamics founded by the law and the fundamental rights of citizens and contractual obligations in the society.
3c) Mendes, João de Castro 1978 Teoria Geral do Direito Civil, Lisboa Edição AAFDL; Marques, J Dias 1992 Noções Elementares de Direito Civil Lisboa; Cunha, Paulo Ferreira 1992 Introdução à Teoria do Direito Rés-Editora, Ldª. Porto; Falcão, José Noções Gerais de Direito Rés-Editora Ldª. Porto; Pires de Lima e Antunes Varela, Código Civil Anotado.
4. Compulsory.
5. Margarida Gaspar.
6. 3 hours/week (3TP); 1st semester; 1st year.
7. Lecture and Discussion.
8. Written exams.
9. No.
10. 4.0.

1. Applied Quantitative Methods to Management – 2066.
2. Special problems of Linear Programming: Transportation model. Game theory. Goal programming. Nonlinear programming. Waiting lines: queuing theory. Chains of events: Markov analysis. Applied programming models. Analysis of Variance and multivariate statistical.
3a) No prerequisites.
3b) To provide the students the basic quantitative methods to increase the effectiveness and efficiency of the decision process.
3c) Gallagher, C A Hugh, J W 1980 Quantitative Methods for Business Decisions International Student Editions McGraw-Hill; Tavares, L V Oliveira, R C Themido, I H e Correia, F N 1996 Investigação Operacional, McGraw-Hill.
4. Compulsory.
5. Maria José Rainho.
6. 4,5 hours/week (TP); 1st semester; 2nd year.
7. Lectures and practical applications.
8. Final written exam.
9. No.
10. 7.0.

1. Accounting II – 2032.
2. Review of Accounting I. Depreciations, stock evaluation, inventory, investments. Annual financial statements. Balance sheet and income statement: further elements of financial reporting.
3a) No pre-requisites are required.
3b) At the end of semester students will be able to prepare, read and understand the basic elements of financial statements.
3c) Bento, J et al 1997 Plano Oficial de Contabilidade Explicado Porto Editora; Borges, A Ferrão, M 1995 Manual de Casos Práticos de Contabilidade, Rei dos Livros, Lisboa; Borges, A et al 1999 Elementos de Contabilidade Geral Rei dos Livros, Lisboa; Costa, C Alves, Correia G. 1996 Contabilidade Financeira, Rei dos Livros, Lisboa.
4. Compulsory.
5. Carlos Machado dos Santos; Carmen Leal.
6. 4,5 hours/week; 2nd semester; 2nd year.
7. Lectures.
8. Written examination.
9. The answer will be given in face of each particular case.
10. 7.0.

1. Management and International Commerce – 2067.
2. Internationalization and Globalization of the International Markets. Models and Theories of the International trade. Commercial restrictions to the International trade and Trade Policies. International Business Management. Culture and ethics. Organizational strategy and structures. Management of the diverse functional areas and the exportations-importations.
3a) No prerequisites.
3b) To provide the students the basic concepts of the functioning of the International Markets and the International Business Management.
3c) Krugman, P e Obstfeld, M 1996 International Economics – Theory and Policy. Addison-Wesley. Silva, J 1999 Economia Internacional. Sociedade Portuguesa de Inovação, Porto; Brito, Carlos Lorga, Susana 1999 Marketing Internacional. Sociedade Portuguesa de Inovação Porto.
4. Compulsory.
5. Carlos Fonseca; Manuel Tibério.
6. 3 hours /week (TP); 2nd semester; 2nd year.
7. Lectures-practical classes.
8. Written essay with oral discussion and a final written exam.
9. No.
10. 4.0.

1. Human Resource Management – 0691.
2. Historical evolution of the management of human resources. Management of staff and organization. Functional activities of human resources. The management of human resources in the future.
3a) No prerequisites.
3b) One intends that the students become aware of the importance of the human factor as competitive advantage of the organization and of the greater value obtained by the similarities between the management of human resources and the global management strategy of the organization.
3c) Caetano, A Vala, J 2000 Gestão de Recursos Humanos, contextos, processos e técnicas, RH Editora, Lisboa; Chiavenato, Idalberto 1995 Recursos Humanos, 3ª Ed., Atlas, São Paulo; Peretti, Jean-Marie 1997 Recursos Humanos 1ªEd., Edições Sílabo, Lisboa.
4. Compulsory.
5. Rui Madeira.
6. 4,5 hours/Week; 2nd semester; 3rd year.
7. Lecture, discussion and simulation.
8. Individual and group.
9. No.
10. 7.0.

1. Business and Labour Law – 2068.
2. General perspectives on Labour Legislation; Work Contracts and their ends; Rights and obligations of all Parties; Means to terminate contracts; Indemnities; Disciplinary and juridical labour processes; Collective Individuals: Commercial Lan; Corporations; Proprietary Rights.
3a) No prerequisites.
3b) The purpose of the unit is to make students aware of the evolution and principles of Labour Law and Knowledge pertinent to labour legislation. As well as labour relations and intevening organizations in the sector.
3c) Lobo Xavier B 1992 Curso de Direito do Trabalho Verbo: Lisboa. Leite, J e Coutinho de Almeida, F 1997 Legislação do Trabalho, Coimbra Editora Portugal; Código Comercial e das Sociedades Comerciais Diário da República.
4. Compulsory.
5. Margarida Gaspar.
6. 3 hours/week (3TP); 2nd semester; 2nd year.
7. Lecture and Discussion.
8. Written exams.
9. No.
10. 5.0.

1. Financial Calculus – 0641.
2. Introductory concepts. Processes of capitalization and discount. Interest rates. Financial instruments of debt loans amortization methods.
3a) Students are required to have a background in mathematics.
3b) The purpose of the discipline is to make students aware of the basic financial frameworks and techniques, which are crucial to understand the general evaluation of financial assets.
3c) Cadilhe, M 1993 Matemática Financeira Aplicada, 2ª Edição, Edições Asa, Porto; Nogueira, M e Santos, P 1993 Cálculo Financeiro, 7ª Edição, Lisboa, Texto Editora; Silva, A N 1993 Matemática das Finanças I, McGraw-Hill, Lisboa.
4. Compulsory.
5. Carlos Machado Santos
6. 4,5 hours/week; 2nd semester; 2nd year.
7. Lectures.
8. Written examination.
9. The answer will be given in face of each particular case.
10. 7.0.

3rd year

1. Marketing I – 2069.
2. Introduction to the marketing concept (nature, evolution and limits of marketing, marketing environment, marketing ethics); Market research; Consumer behaviour; Strategic marketing decisions, segmentation and positioning; Marketing-mix (product, price, place, promotion).
3a) No prerequisites.
3b) To provide the students the basic concepts of marketing and the principle instruments of market analysis and the strategic decisions in marketing. To sensitise students to the diverse marketing instruments available (marketing-mix).
3c) Lendrevie, J Lindon, D Dionísio, P e Rodrigues, V 1996 Mercator: Teoria e prática do marketing, Publicações D Quixote Lambin, JJ 2000 Marketing estratégico, McGraw-Hill.
4. Compulsory.
5. Ana Paula Rodrigues; Carlos Marques.
6. 4,5hours/week (TP); 1st semester; 3rd year.
7. Lectures; discussion; exams.
8. Final exam; Individual and group assignments; class participation.
9. No.
10. 6.0.

1. Financial Management – 0398.
2. Genesis and historical Evolution of Corporate Finance. Short Term Financial Management. Business Acquisition. Financial Planning Concepts. Programming Models for Investments and Financing. Long Term Financial Management.
3a) Prerequisites are a strong understanding of financial mathematics.
3b) Students are required to understand modern financial methods and techniques and also the respective theoretical framework to understand corporate finance.
3c) Brandão, E 2001 Finanças. Porto Editora: Porto; Myers, S e Brealey, R 1998 Princípios de Finanças Empresariais. Mcgraw-Hill:Lisboa; Weston, J e Brigham, E 2000 Fundamentos da Adminstração Finaceira Makron Books: São Paulo.
4. Compulsory.
5. José Maria Andrade; Júlia Fragoso.
6. 4,5 hours/week; 1st semester; 3rd year.
7. Lectures/ Discussion and Exercises.
8. Written examination and course-work.
9. No.
10. 6.0.

1. Strategic Management – 0779.
2. Introduction to strategic thinking. Strategic Analysis: external environmental and internal analysis; Strategy Formulation: mission and objectives, strategic and development options; Strategy Organization and Implementation: organizational structure, behavioural implementation, evaluation and control.
3a) No prerequisites.
3b) To provide the concepts and techniques used in understanding strategic planning process.
3c) Freire, Adriano 1999 Estratégia - Sucesso em Portugal, Editorial Verbo, 5ª edição, (Bibliografia base); Cardoso, Luís 1995 Gestão Estratégica das Organizações – Ao Encontro do 3º Milénio, Editorial Verbo, 1ª edição; Martinet, A Ch. 1992 Estratégia, Edições Silabo, 2ª edição.
4. Compulsory.
5. Mário Sérgio Teixeira; José Maria Andrade.
6. 4,5 hours/week (4,5 TP); 1st semester; 3rd year.
7. Lectures and Practical classes, with expositive and case study methods.
8. Written essays; Exam; Class participation.
9. No.
10. 6.0.

1. Public and Municipal Administration – 1285.
2. Introduction to Portuguese Public Administrative Organizations and Structures. Finances: Budgets and Plans. Human Resources and Training. The Decision Making Process for the Public Sector and the Integration/Adaptation to the community and the world.
3a) No prerequisites.
3b) The purpose of the discipline is to provide the skills in order to analyze the evidence which shows the similarities between organizational behaviour and management.
3c) Camacho, A Crujeira, C Lucena, J Pinho, I 1982 Gestão Pública: uma abordagem integrada, Livros Técnicos e Científicos, Lda; Denhardt, Robert 1990 Public Administration Theory in Naomi Lynn & Aaron Wildavsky (orgs) Public Administration Theory – The State of the Discipline. London, Chatham House Publishers; MOE, Ronald C 1994 The “Reinventing Government” Exercise: Misinterpreting the Problem, Misjudging the Consequences, in Public Administration Review, 54:111-22.
4. Compulsory.
5. Fernanda Nogueira.
6. 4,5 hours/week(4,5TP); 1st semester; 3rd year.
7. Lecture/Discussion/Exercises.
8. Written reports.
9. No.
10. 6.0.

1. Value Chain Management – 2070.
2. Primary activities of the value chain: logistic of entrance, operations, logistic of exit, marketing and sales and service; activities of support of the value chain: infrastructure of the company, human resources, purchases and supplying; identification of the strategically activities, tactics and of base of the chain of value of a company.
3a) No prerequisites.
3b) To provide the necessary basic concepts to the Management of the Value Chain.
3c) Carvalho, JM 1999 Logística. Lisboa: Edições Silabo; Carvalho, JM 1999 Logística Comercial. Lisboa: Texto Editora.
4. Compulsory.
5. Maria José Rainho; Carlos Fonseca.
6. 3 hours/week (TP); 1st semester; 3rd year.
7. Lectures, exercises.
8. Final written exam.
9. No.
10. 5.0.

1. Marketing II – 2071.
2. Service marketing, Business to business marketing, Social marketing, International marketing, CRM, marketing and internet.
3a) No prerequisites.
3b) The discipline intends to develop some of the principal specialities in the area of marketing.
3c) Brito, Carlos Melo e Paulo de Lencastre 2000 Os Horizontes do Marketing, Editorial Verbo, Lisboa.
4. Compulsory.
5. Ana Paula Rodrigues.
6. 4,5 hours/week (TP); 2nd semester; 3rd year.
7. Lectures; discussion; exams.
8. Final exam; Individual and group assignments; class participation.
9. No.
10. 6.0.

1. Financial Markets – 2072.
2. Financial Markets. Stocks, Bonds, Mutual funds and Performance evaluation. Futures, Options and Other Derivatives.
3a) Students are required to have financial mathematics in order to expose students to modern financial methods and techniques within the respective theoretical frameworks.
3b) This course, are used to evaluate a broad range of financial assets.
3c) Neves da Silva, A 1994 Mercado de Capitais e Derivados McGraw-Hill; Elton, Edwin Gruber, Martin 1995 Modern Portfolio Theory and Investment Analysis, 5.ª Ed; Hull, John 1994 Introdução aos Mercados Futuros e de Opções BM&F, S. Paulo.
4. Compulsory.
5. Carlos Machado dos Santos.
6. 4,5 hours/week; 2nd semester 3rd year.
7. Lectures.
8. Written examination and course-work.
9. The answer will be given in face of each particular case.
10. 6.0.

1. Management of Innovation and Change – 2073.
2. Basic strategy concepts for technology: Technology transfer contacts. International flow of technology. Integrating basic knowledge about technologies in the enterprise. Economic globalization, business strategies and technologies. Management and innovation for small and medium Portuguese business.
3a) No prerequisites.
3b) To provide the students the basic concepts to manage innovation/ technology To analysed the relations between technology and strategy – what are the implications for competitiveness. To make students aware of the importance of innovation management for Portuguese firms.
3c) Drucker, Peter F 1997 Inovação e Gestão 4ª Edição, Editorial Presença, Lisboa; Simões, Víctor Corado 1997 Inovação e Gestão em PME GEPE, Lisboa.
4. Compulsory.
5. José Portela; Carla Marques.
6. 4.5 hours/week (TP); 2nd semester; 3rd year.
7. Lectures, Discussion.
8. Presentations, Reports, written exam.
9. No.
10. 6.0.

1. Management of Information Systems – 2074.
2. Initiation of basic data, Information systems in the organization: Types and general strategic computer use. The organizaation and the Information Society.
3a) No prerequisites.
3b) Capacity to identify the informational needs in the context of the organization and establish the creation/updating of the computer system.
3c) Kroenke, David Hatch, Richard 1994 Management Information Systems; 3th Edition, McGraw-Hill, 813 pp., ISBN: 0-07-035938-5; O'Brien, James A 1997 Introduction to Information Systems: A Networked Enterprise Perspective; 2nd Alternate Edition, McGraw-Hill 656 pp., ISBN: 0-256-25196-7.; Pereira, José Luís 1998 Tecnologia de Bases de Dados; 2ª edição, FCA - Editora de Informática, Lda (distribuição Lidel) ISBN: 972-722-143-2; Slevin, James 2002 Internet e Sociedade; 1ª edição, Editora Temas e Debates, ©2000, ISBN: 972-759-299-6.
4. Compulsory.
5. Pedro Ferrão.
6. 3 hours/weed (3TP); 2nd semester; 3rd year.
7. Lectures and exercises.
8. Written reports and oral exam.
9. No.
10. 6.0.

1. Analytical Accounting I – 2033.
2. Introduction and development of analytical accountancy concepts. The Analytical Model. The production. The Costs. Allocating general costs of the firm. The methods to calculate the effective costs.
3a) No prerequisites.
3b) At the end of the semester, the students will be able to determine the unit costs of the transformed product.
3c) Caiado, António Campos Pires Contabilidade Analítica: Um Instrumento para Gestão Editora Rei dos Livros, Lisboa; Courtois, Guy Compreender a Contabilidade Analítica Editora Prisma; Margerin, Jacques e Ausset, Gerard Contabilidade Analítica: Um Instrumento de Gestão Editora Prisma; Pereira, Carlos Caiado e Vítor Seabra Franco Contabilidade Analítica Edição dos autores - docentes do ISCTE, Lisboa; Pereira, Carlos Caiado e Vítor Seabra Franco Contabilidade Analítica Edição dos autores - docentes do ISCTE, Lisboa.
4. Compulsory.
5. Carlos Machados dos Santos; Celina Jorge.
6. 4,5 hours/week; 2nd semester; 3rd year.
7. Lecture and practical exercises.
8. Written exam.
9. The answer will be given in face of each particular case.
10. 7.0.

4th year

1. Entrepreneurship – 2075.
2. Behavioural characteristics of entrepreneurs: creativity, uncertainty and risks, skills, knowledge, initiative; Enterprise Creation: ideas generation, juridical aspects, business plan.
3a) No prerequisites.
3b) To stimulate the entrepreneurship spirit of students and provide them basic knowledge on establishing a new business.
3c) Hisrich, Robert D & Peters, Michael 2001 Entrepreneurship, Mc Graw Hill Higher Education, 5ª edição.
4. Compulsory.
5. Mário Sérgio Teixeira.
6. 3 hours/week (3 TP); 1st semester; 4th year.
7. Lectures and exercises, case study.
8. Written essays; Exam; Class, participation.
9. No.
10. 3.0.

1. Workshop – 2076.
2. Prepare the students for the project/work experience.
3a) No prerequisites.
3b) The major objective for the unit is to allow the management student the opportunity to identify and integrate into the project/work experience.
3c) None.
4.Compulsory.
5. Fernanda Nogueira; Timothy Koehnen; Carlos Machado dos Santos.
6. 1 hour/week (1TP); 1st semester; 4th year.
7. Discussion/Seminar.
8. Identify the project/work experience.
9. The answer will be given in face of each particular case.
10. 2.0.

1. Business Taxation – 2078.
2. Introduction to the Portuguese fiscal system. Duties of the contributors. Tax on the income of the people (IRS). Tax on the income of the collective (IRC). Value added tax (IVA). Taxes on the ownership. Others taxes and charges. The accounting and the fiscal organization: a critical analysis. The Statute of the Chamber of the Official Technician of Accounts. The Deontological Code of the Official Technician of Accounts.
3a) No prerequisites.
3b) One intends that the pupils are capable to understand the specific legislation on the Portuguese fiscal system of applying it to the current situations of the companies and to understand the Statute of the Chamber of the Official Technician of Accounts as well as the Deontological Code of the Official Technician of Accounts.
3c) Appointments of the professor. Codes of the diverse types of taxes. Statute of the Chamber of the Official Technician of Accounts.
4. Optional.
5. Manuel Joaquim Teixeira.
6. 4,5 hours/week; 1st Semester; 4th year.
7. Lecture and exercises.
8. Final written exam.
9. No.
10. 7.0.

1. Analytical Accounting II – 2077.
2. Criteria for the effective costs regime. Standard costs regime. The costs and managerial decision making. Concurrent production.
3a) No prerequisites.
3b) At the end of the semester the student will be capable of applying the criteria for computing, situational analysis, specifically for production, being the case for concurrent production and the use of costs in the process of making decisions.
3c) Caiado, António Campos Pires Contabilidade Analítica: Um Instrumento para Gestão Editora Rei dos Livros, Lisboa; Courtois, Guy Compreender a Contabilidade Analítica Editora Prisma; Margerin, Jacques e Ausset, Gerard Contabilidade Analítica: Um Instrumento de Gestão Editora Prisma; Pereira, Carlos Caiado e Vítor Seabra Franco Contabilidade Analítica Edição dos autores - docentes do ISCTE, Lisboa.
4. Optional.
5. Carlos Machados dos Santos; Celina Jorge.
6. 4,5 hours/week; 1st semester; 4th year.
7. Lecture and practical exercises.
8. Written exam.
9. The answer will be given in face of each particular case.
10. 6.0.

1. Local Development – 2085.
2. Economic and Social Theories for Local Development. Processes, tools and mechanisms for the promotion of local development. Institutions and Local Development. Education and Participation for Local Development.
3a) No prerequisites.
3b) Develop a general knowledge about the nature, intent and objectives of local development. Review the concept of local development integrating the economic, cultural, environmental and social initiatives.
3c) Roger, A 1992 Adults Learning for Development London Cassell Educational Limited; Vachon, B 1993 Le Développement Local Théorie e Pratique Réintroduire l´humanin das la Logique de Développement Québec, Canada Gaetan Morin Éditeur.
4. Optional.
5. Timothy Koehnen.
6. 3 hours/week (TP); 1st semestre; 4th year.
7. Conferência, Discussão e exercícios.
8. Group and Individual Assignments and exam.
9. The answer will be given in face of each particular case.
10. 6.0.

1. Marketing Research – 2083.
2. Introduction to marketing research; Marketing research formulation; Data collection process and methods; Data analysis; Report preparation and presentation; Marketing research applications in Portugal.
3a No prerequisites.
3b) To provide the concepts and techniques used for understanding marketing research.
3c) Malhotra, Naresh K 1993 Marketing Research – An Applied Orientation, Prentice Hall International Editions, 1st Edition; Manuela Magalhães e HILL, Andrew 2000 Investigação por Questionário, Edições Sílabo, 1ª Edição; Reis, Elizabeth e Moreira, Raul 1993 Pesquiasa de Mercados Edições Sílabo 1ª Edição Aaker, D Kumar, V and Day, G 1995 Marketing Research John Wiley & Sons 5th Edition.
4. Optional.
5. Mário Sérgio Teixeira.
6. 3hours/week (3 TP); 1st semester; 4th year.
7. Lectures and exercises, with case study methods.
8. Written essays, Exam, Class participation.
9. No.
10. 6.0.

1. Added Value For Endogenous Resources – 2088.
2. Socio-economic context analysis of the theme. Definition and reflection about concepts of added-value, endogenous resources and quality. Explanation of possible ways to explore the valorisation of endogenous resources. The European Policy to protect the traditional argy-food products. Process valorisation analyse of some traditional endogenous resources. Rural Development.
3a) No prerequisites.
3b) To sensitize students to the relevance for the subject "added-value for endogenous resources". To assist students to explore the different way in which to create added-value for endogenous resources.
3c) Multon JL (coord.) 1994 La Qualité des Produits Alimentaires. Politique, incitations, gestion et contrôle. Technique & Documentation Lavoisier; Lagrange, L (coord.) 1999 Signes oficiels de qualité et développement agricole INRA. ENITA. Technique & Documentation - Lavoisier, Paris; Beranger, C e Valceshini, E (coord) 1999 Qualite des Produits Liee a leur origine INRA. Paris.
4. Optional.
5. Artur Cristóvão.
6. 3 hours/week (3TP); 1st semester; 4th year.
7. Lectures, Discussions, Simulations.
8. Presentations and reports.
9. No.
10. 6.0.

1. Sales Management – 2084.
2. Introduction to sales and merchandising program and process of sales, activities and career opportunity; Strategic Plan for Sales: External influences and business policies, organizing the sales force, estimated the demand territory and sales quotas, Carrying out the Sales program: Characteristics of sales people for recruiting, selecting and training, payment and incentive schemes; Monitoring and control of sales: sales analysis, costs and behaviour.
3a) No prerequisites.
3b) To introduce students to theoretical frameworks and analytical tools for the study of sales and sales management.
3c) Rodrigues, D 1999 Gestão de Vendas na Óptica de Marketing Edições Sílabo Lisboa; Rodrigues, D 1999 Venda Pessoal na Óptica de Marketing Edições Sílabo Lisboa.
4. Optional.
5. Ana Paula Rodrigues.
6. 3 hours/week (3TP); 1st semester; 4th year.
7. Lectures, Discussions.
8. Presentations, Reports and exams.
9. No.
10. 6.0.

1. Managing the Non-profit Organization – 2086.
2. Historical Aspects and concepts: The birth of non-profit organizatons.Types and Functions: NGOs; Charity, mutual assistance, associativism, reciprocity, cooperativism, and collective actions. The internal and external environment. Contemporary problems and organizaitonal challenges.
3a) No prerequisites.
3b) The major objective for the unit is to allow the management student to identify, understand and debate some of the relevant questions about the role of non-profit organizations for community development and organizational challenges.
3c) Drucker, P 1993 As Organizações sem Fins Lucrativos. Lisboa: Difusão Cultural.
4.Optional.
5. Chris Gerry.
6. 3 hours/week (3TP); 1st semester; 4th year.
7. Lectures, Discussions, Simulations.
8 Presentations, exercises, reports and exams.
9. No.
10. 6.0.

1. Product and Brand Management – 2081.
2. Introduction to product management. Marketing planning. Competitor and customer analysis. Sales forecasting. Product strategy and new product development. Pricing and trade and customer promotions. Advertising. Financial analysis for marketing planning.
3a) None, but students are supposed to have completed a course on Introductory Marketing (Marketing I).
3b) Students should work with data of the types that are typically available to brand and product managers and draft a marketing plan to achieve marketing objectives for a specific brand.
3c) Lehmann, Donald R Winer, Russell S 2002 Product Management. Irwin/McGraw-Hill, 3rd edition.
4. Optional.
5. Carlos Peixeira Marques.
6. 3hours/week (TP); 1st semester; 4th year.
7. Lectures and discussion of concepts, procedures and cases. Collection and analysis of marketing data in a computer environment. Draft and discuss a marketing plan.
8. Individual and group assignments; Exam.
9. No.
10. 6.0.

1. Analysis of Investments and Financial Risk – 2080.
2. Financial analysis and Theory of the Risk and Value. Politics of Formation of Wallets. Decisions of Investment. Decisions of Financing.
3 a) Without prerequisites.
3b) The objective of the discipline is that the students possess the fundamental theoretical concepts to analyze and to study the managerial projects, as well as the risk analysis.
3c) Barros, Carlos 1990 Decisões de Investimento e financiamento de projectos Edições Sílabo; Cebola, António 2000 Elaboração e análise de Projectos de investimento Edições Sílabo.
4. Optional.
5. Júlia Fragoso da Fonseca.
6. 3 hours (TP)/week; 1st Semester. 4th year.
7. Lecture and practical classes.
8. Final Exam; Exercises; Book reports.
9. No.
10. 6.0.

1. Local Organizations – 2087.
2. The double edge of organizations decisive instruments and the problems associated to planned rural development. Organizations and Development: their role and competencies, the interrelationships, limitations.
3a) No prerequisites.
3b) The major objective for the unit is to allow the management student the opportunity to identify, understand and debate some of the relevant questions about the role of local organizations for economic, social and cultural development as citizens and for the communities. Development of the Organization.
3c) Drucker, P 1993 As Organizações sem Fins Lucrativos Lisboa: Difusão Cultural; Esman, M e N Uphoff 1984 Local Organizations: Intermediaries in Rural Development Ithaca: Cornell University Press.
4. Optional.
5. Timothy Koehnen; Artur Cristóvão.
6. 3 hours/week (3TP); 1st semester; 4th year.
7. Lectures, Discussions, Simulations.
8. Presentations, exercises, reports and exams.
9. The answer will be given in face of each particular case.
10. 6.0.

1. Audit – 2079.
2. Basic audit concepts. Accounting principles. Auditing norms and professional activity. Auditing procedures and tests. The Auditing plan. Internal control structure. Direct tests of balances. The auditor's report.
3a) No prerequisites.
3b) To introduce students to basic concepts of Auditing and their legal environment. To make students aware of the Auditing areas of major risk.
3c) Costa, Carlos Baptista da 1995 Auditoria Financeira Lisboa Rei dos Livros; Carmichael, Douglas R Willingham, Jonh J Schaller, Carol A 1996 Auditing Concepts and Methods, McGraw-Hill.
4. Optional.
5. Carlos Machado dos Santos; Carmen Leal.
6. 3 hours/week (3 TP); 1st semestre; 4th year.
7. Conferência, Discussão e exercícios.
8. Group and Individual Assignments and exam.
9. No.
10. 6.0.

1. Communication and Promotion – 2082.
2. Global communication policy: Global communication process and components for, briefing preparation, communication mix and strategy; Publicity: Publicity campaign, Messages and creative strategies, Media plan, Campaign media assessment; Public Relations: objectives, target groups, types of communication, public communication plans; Alternative Promotional Means: direct marketing, sponsors, fairs and expositions.
3a) no prerequisites
3b) To provide the concepts and techniques used for understanding communication and promotion.
3c) Gomes, A 1999 Publicidade e Comunicação Texto Editora: Lisboa.
4. Optional.
5. Mário Sérgio Teixeira; Ana Paula Rodrigues; Carlos Marques.
6. 3 hours/week (3 TP); 1st semester; 4th year.
7. Lectures and exercises, with case study methods.
8. Written essays, Exam, Class participation.
9. No.
10. 6.0.

Nursery School Teaching Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Anthropology of Education	5.0	Earth Sciences	3.0
	Elements of Nature (Physics)	3.0	Motorial Expression	5.0
	Musical Expression I	5.0	Musical Expression II	5.0
	History of Education	5.0	Philosophy of Education	5.0
	Mathematics/Portuguese Language (levelling)	5.0	Children's Literature I	5.0
	Theory and Methods of Educ. Research	5.0	Mathematics	3.0
	Option 1	3.0	Educational Psychology	3.0
	Total	31.0	Total	29.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Motorial Development	4.0	Motorial Learning	5.0
	Visual Expression and Communication	5.0	Cognitive Development Psychology	3.0
	Dramatic Expression I	4.0	Portuguese Expression Techniques	3.0
	Computers in Education	3.0	Dramatic Expression II	5.0
	Nutrition, First Aids and Traumatology	3.0	Children's Literature II	3.0
	Observation of Educational Activities I	7.0	Plastic Expression and Communication	3.0
	Theory and Curriculum Development	5.0	Observation of Educational Activities II	7.0
	Total	31.0	Total	29.0
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	Cooperation in Educational Activities I	8.0	Cooperation in Educational Activities II	9.0
	Educational Devices	3.0	Intercultural Education	3.0
	Special Education	3.0	Social and Personal Training	3.0
	Methodology of Musical Expression I	4.0	Methodology of Dramatic Expression	4.0
	Methodology of Plastic Expression	4.0	Propaedeutics of Reading and Writing Acquisition	4.0
	Methodology of Motorial Activities	4.0	Methodology of Mathematics	4.0
	Methodology of Natural Sciences	4.0	Theory and Techniques of Creativity	3.0
	Total	30.0	Total	30.0
4th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Internship	22.0	Internship	22.0
	Internship Seminar	3.0	Educational Administration and Organisation	5.0
	Themes of Contemporary Culture	5.0	Internship Seminar	3.0
	Total	30.0	Total	30.0

Total study: 240 ECTS

VILA REAL

1st year

1. Anthropology of Education - 1144.
2. To introduce students to the Educational Anthropology, its concepts and methods, focusing on the complexity of human people and processes of knowledge.
3a) No prerequisites.
3b) Educational Anthropology: epistemology, basic concepts and methods. Objectives and Educational foundations: complexity of human nature and educability. Civilization, culture and processes of personalization and socialization; Education as a complex anthropological project: aims, global development (biological, intellectual, social and cultural); freedom and autonomy; communication and conviviality. Multiculturality and tolerance.
3c) Barbosa, M 1997 Antropologia Complexa do Processo Educativo, Braga: UM, IEP; Carvalho, AD 1992 A Educação como Projecto Antropológico, Porto: Afrontamento; Fullat, O 1997 Antropologia Filosofica de la Educación, Barcelona: Ariel.
4. Compulsory.
5. Manuel Barroso Magalhães.
6. 3 h/week; 1st semester; 1st year.
7. Lectures classes.
8. Continuous evaluation or final exam.
9. No.
10. 5.

1. Elements of Nature (Physics) - 0776.
2. The wave nature of light. Laws of reflection and refraction laws. Image formation: plane mirrors. The colour. Rectilinear motion in one dimension. Introduction to the concepts of velocity and acceleration. Newton's laws of motion. Gravitational interaction. Weight and mass. Archimedes law. Electric charge. Electrostatic interaction. Electric current. Electric current intensity, potential difference and resistance. Analysis of simple circuits; series and parallel circuits.
3a) No prerequisites.
3b) To provide students with a set of fundamental concepts from Physics. Students should be able to use correctly these concepts in the description and interpretation of everyday phenomena.
3c) Gomes de Sá, J 1994 Renovar as Práticas no 1º Ciclo pela Via das Ciências da Natureza, Porto Editora. Porto; Carvalho, R 1995 A Física no Dia-a-Dia, Relógio d'Água, Lisboa.
4. Compulsory.
5. Maria Adelaide Andrade.
6. 3 h/week (1 lectures + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam 60%; and practical work 40%.
9. No.
10. 3.

1. Musical Expression I - 1163.
2. To value the musical expression and creativity. To develop research methods, as well as promoting activities in the scope of participated projects.
3a) No prerequisites.
3b) It is intended through a vision to interdisciplinary an expressive way of arts, to provide to the pupils a vast fan of experiences, that allow it to develop its capacities of a gradual and acting form.
3c) Ostrower, F 2002 Criatividade e Processos de Criação, Editora Vozes, Petrópolis; Gordon, Edwin 2000 Teoria e Aprendizagem Musical para Recém-Nascidos e Crianças em Idade Pré-Escolar, Fundação Calouste Gulbenkian; Dennis, B 1973 Experimental Music in Schools, Oxford University Press; Gainza, Violeta de 1983 La improvisacion musical, Ricordi.
4. Compulsory.
5. Levi Leonido.
6. 5 h/week; 1st semester; 1st year.
7. Lectures and practical classes.
8. Assiduity 40%; Practical Work 30%; Continuous Evaluation 30%.
9. No.
10. 5.

1. History of Education - 0206.
2. Childhood concept: the building of this idea; Greece and Rome; Comenius and "Childhood School"; The first pedagogues on children's education; The first kindergartens; Industrial Revolution; "New School" movement; Historical evolution of childhood education in Portugal.
3a) No prerequisites.
3b) 1- To know authors and crucial times for the development of Education; 2- To analyse present times in order to preview future solutions.
3c) Abbagnano, Nicola & Visalberghi, A 1982 História da Pedagogia, Livros Horizonte, Lisboa; Bowen, James 1985 Historia de la Educación Occidental, Herder, Barcelona; Chateau, J s.d. Os Grandes Pedagogos, Lisboa, Livros do Brasil.
4. Compulsory.
5. Carlos Alberto Magalhães Gomes Mota
6. 3 h/week; 1st semester; 1st year.
7. Lectures classes.
8. Written essay.
9. No.
10. 5.

1. Portuguese Language (Levelling) – 1001/1178.
2. Phonetics e Phonology (the sounds of the speech and sound of the language, consonant and vowel classification). Morphology (word subclasses, morphologic analysis and classification). Syntax (sentence, clause and complete sentence, simple sentence and complex sentence). Orthography and writing improvement.
3a) High School – Portuguese B.
3b) To proceed the study of the Portuguese language in terms of a general introduction to some basic grammatical aspects; to identify and classify the phonemes of the Portuguese language; to analyse and classify morphological and syntactically; to produce texts with orthographic correction.
3c) Bechra, E 2002 Moderna Gramática Portuguesa, 37ª ed., Rio de Janeiro, Ed. Lucerna; Vilela, M 1999 Gramática da Língua Portuguesa, Coimbra, 2ª ed., Almedina; Cunha, C & Cintra, L 1987 Nova Gramática do Português Contemporâneo, 4ª ed., Lisboa, Sá da Costa; Mateus, Maria Helena et al. 2003 Gramática da Língua Portuguesa, 5ª ed., Lisboa, Caminho.
4. Optional.
5. Carlos Assunção, Teresa Moura.
6. 4 h/week (2 practical + 2 theoretical); 1st semester 1st year.
7. Lectures and practical classes.
8. One written text or a final examination.
9. No.
10. 5.

1. Mathematics (Levelling) - 1001/0990.
2. Statistics: terms and concepts; rates of occurrence; graphs, measure of location and dispersion, bidimensional division-, Relations of order in $\Re$: the whole of royals numbers and the real straight, the whole $\Re$ as ordinate whole, interspaces of real numbers, modulus of a real number, inequations, problems which resolution is make with 1st or 2nd degree of equations; Functions: generalities, affine function, quadratic functions, successions.
3a) No prerequisites.
3b) The aim of this subject is to provide the students who attended Mathematics up to the 9th form and those who attended Methods Quantitative in the 10th form, with the same level of knowledge of the students who attended Mathematics up to the 12th form.
3c) Polya, G 1996 A arte de resolver problemas, Interciência; Ralha, ME 1992 Didáctica da Matemática: perspectivas gerais sobre educação matemática, vol. 1, Universidade Aberta.
4. Optional.
5. Luísa Figueiredo.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. According to University Regulations, final exam -100%.
9. No.
10. 5.

1. Theory and Methods of Educational Research - 1145.
2. General guidelines for educational research design. Basic methods and techniques of empirical educational research. Basic methods and techniques of documentary educational research. Organisation and writing of research reports.
3a) No prerequisites.
3b) To promote a scientific attitude concerning educational problems. To develop skills for the exploitation of scientific literature. To offer a theoretical and practical basis to collect, analyse and interpret educational data.
3c) Azevedo, C & Azevedo, A 1998 Metodologia Científica. Contributos práticos para a elaboração de trabalhos académicos, 4ª edição. Porto: Ed. C. Azevedo; Bogdan, R & Sari, B 1994 Investigação Qualitativa em Educação. Uma Introdução à Teoria e aos Métodos, Porto: Porto Editora; Fox, D 1987 El processo de investigación en educación, 2ª ed., Pamplona: Ediciones Universidad de Navarra; Serrano, P 1996 Redacção e Apresentação de Trabalhos Científicos, Lisboa: Relógio d'Água Editores.
4. Compulsory.
5. José João Pinhanços de Bianchi, João Bartolomeu Rodrigues.
6. 3 h/week (2 lectures +1 practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Small written essay or small research project. Written examination.
9. No.
10. 5.

1. Computers - 1147/1330.
2. Basic Internet concepts: browsing, e-mail. Use of page-layout tools and presentation tools. Introduction to animated pictures creation and sound recording. Basic concepts on the creation of interactive multimedia tales.
3a) No prerequisites.
3b) The purpose of this discipline is to prepare students for using computers on the creation of graphic elements, for support of educational activities on kindergarten and pre-kindergarten environments. These can range from plain birthday cards to interactive multimedia tales.
3c) Alconchel, JD 2001 Microsoft Office XP, McGraw-Hill de Portugal, Lisboa.
4. Optional.
5. Leonel Morgado.
6. 3 h/week (1 theoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final test and assignments throughout the semester.
9. No.
10. 3.

1. Observation of Children's Psychological Characteristics - 1147/1848.
2. Physical, cognitive, moral, social and affective development in preschool children. Observation methods. Development and environment context. Development risk and vulnerability.
3a) No prerequisites.
3b) Knowledge and experience of observation methods at preschool children context.
3c) Bronfenbrenner, U 1996 The Ecology of Human Development, Harvard University Press; Morel, C 1999 ABC de la Psychologie de l'Enfant, Paris: Jacques Grancher; Lurçat, L 1982 Uma Escola Pré-Primária, Lisboa: Livros Horizonte; Vasconcelos, T 1997 Ao Redor da Mesa Grande – A Prática Educativa de Ana, Porto: Porto Editora.
4. Optional.
5. José Carlos Gomes da Costa.
6. 3 h/week (1 theoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Essay – 100%.
9. No.
10. 3.

1. Earth Sciences - 1150.
2. Structure and composition of the Earth; seismology. Global dynamics of the Earth: continental drift. Mineralogy notions. The rock cycle: magmatism, metamorphism and sedimentary processes
3a) Knowledge of general geology.
3b) To grant the students with the knowledge that enables a understanding of the Earth as a dynamic system, through a global perspective of the internal and external geodynamic processes. To study those same processes integrated in the rock cycle.
3c) Dercourt, PJ 1986 Geologia, Objectos e Métodos, Almedina, Coimbra; Gass, IG et al. 1984 Vamos Compreender a Terra, Almedina, Coimbra.
4. Compulsory.
5. Nuno Monteiro Vaz, Adelaide Guerra.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Final written theoretical exam (60%) and practical work (40%).
9. No.
10. 3.

1. Motorial Expression - 0366.
2. Perceptual motor abilities, fundamental motor skills, play and games.
3a) No prerequisites.
3b) To vivify a variety of motor experiences to aid students understanding the importance of movement in the development of the child.
3c) Williams, H 1983 Perceptual and motor development, Prentice-Hall: Inc, Englewood Clifs; Neto, C 1995 Motricidade e jogo na infância, Rio de Janeiro: Sprint.
4. Compulsory.
5. Maria Isabel Mourão Carvalhal.
6. 4 h/week (lectures-practical); 2nd semester; 1st year.
7. Theoretical-practical classes.
8. Assessment is based on coursework (CW) and end-of-semester exam (E).
9. No.
10. 5.

1. Musical Expression II - 1164.
2. To value the musical expression and creativity. To develop research methods, as well as promoting activities in the scope of participated projects.
3a) No prerequisites.
3b) It is intended through a vision to interdisciplinary an expressive way of arts, to provide to the pupils a vast fan of experiences, that allow it to develop its capacities of a gradual and acting form.
3c) Gordon, E 2000 Teoria e Aprendizagem Musical para Recém-Nascidos e Crianças em Idade Pré-Escolar, Fundação Calouste Gulbenkian; Ostrower, F 2002 Criatividade e Processos de Criação, Editora Vozes, Petrópolis; Dennis, B 1973 Experimental Music in Schools, Oxford University Press. Gainza, Violeta de 1983 La improvisacion musical, Ricordi; Martinez, O 1990 El discurso musical en el cine, Tese de Doutoramento, Universidade de Salamanca.
4. Compulsory.
5. Levi Leonido.
6. 5 h/week (5 TP); 2nd semester; 1st year.
7. Theoretical-practical classes.
8. Assiduity 40%; Practical work in group of public presentation 30%; Continuous Evaluation 30%.
9. No.
10. 5.

1. Philosophy of Education - 0220.
2. Epistemological introduction: Education as action. Knowledge in Education – epistemological paradigms. Statute and tasks of a Philosophy of Education. Towards a philosophical anthropology of education: The educational process as anthropogenesis. (Non)meeting between nature and civilisation; Educate towards what? Towards an educational axiology. 1. Previous questions (Judgements based on value/Judgements based on fact; what are values? universal values or relative values? is an education of values possible? ... and legitimate?). What values should there be for education? (Education and effectiveness; education and leisure/game; education and beauty; education and truth; education and being good/morality; education and transcendentalism) 3. Educational deontology (concepts of deontology and educational deontology; deontology of the educators and the educated). Axiological tables and pedagogical theories: Reading and critical analysis of the following works: Plato - The Apology of Socrates; St. Augustus – The Master; Paulo Freire – Pedagogy of Autonomy (required reading can vary from one year to the next).
3a) No prerequisites.
3b) Objectives of the field. To characterise the educational reality as an activity and as an object of knowledge and research. To analyse the various dimensions of man as a subject of the educational reality at its starting point, process and finalities. To identify the axiological universe as a fundamental objective of the educational process. To distinguish the present values in a certain theory or educational practice.
3c) Carvalho, AD 1988 Epistemologia das Ciências da Educação, Porto, Ed. Afrontamento; Dias, JR 1997 Abertura a uma reflexão sobre as metamorfoses da Pedagogia, Revista Portuguesa de Educação, 10(2):1-7; Fullat, O 1992 Filosofías de la Educación, Paideia, Barcelona, CEAC; Fullat, O 1997 Antropologia filosófica de la educación, Barcelona, Ariel Educación; Patrício, M 1993 Lições de axiologia educacional, Lisboa, Universidade Aberta; Réboul, O 1992 Les valeurs de l'éducation, Paris, PUF.
4. Compulsory.
5. Maria da Conceição Azevedo, Carlos Maia.
6. 3 h/week; 2nd semester; 1st year.
7. Lectures classes.
8. Final exam and assignments about the required reading.
9. No.
10. 5.

1. Children's Literature I - 1174.
2. Children's Literature and its different contexts. Universal Children's Literature. Origins and evolution of Children's Literature in Europe and in Portugal. The contemporary Children's Literature: ruptures e continuities. Children's Literature and the imaginary. Children's Literature: fantasy and reality. The child and its magic world. Children's Literature: the school's context and the promotion of reading habits. Communication and Folk Literature. Short-stories for children.
3a) No prerequisites.
3b) To acquire the necessary knowledge relevant in the theoretical and literary approach to Children's Literature. To understand how the magic and fantastic text work. To be aware of the importance of the short-story as a means to solve the children's developing problems. To increase the ability to understand and analyse the Literature for children.
3c) Barreto, AG 2002 Dicionário de Literatura Infantil Portuguesa, Porto, Campo das Letras; Bravo-Villasante, Carmen 1977 História da Literatura Infantil Universal, 2 vols., Lisboa, Vega; Gomes, JA 1991 Literatura Para Crianças e Jovens, Lisboa, Caminho; Mesquita, A 1999 A Estética da Recepção na Literatura Infantil, Vila Real, UTAD; Mesquita, A (coord.) 2002 Pedagogias do Imaginário - Olhares sobre a literatura infantil, Porto, ASA; Pires, Maria Laura s.d. História da Literatura Infantil Portuguesa, Lisboa, Vega; Rodari, G 1982 Gramática da Fantasia, S. Paulo, Summus Editorial.
4. Compulsory.
5. Armindo Mesquita, José Miguel Almeida.
6. 3 h/week; 2nd semester; 1st year.
7. Lectures lessons.
8. Students must do one written test or a final exam for those who couldn't do it.
9. No.
10. 5.

1. Mathematics - 0001.
2. Bivalent logic: Logical values and prepositions; Logical operations; Logical operation's properties. Conjunct's theory: Conjuncts and conditions; Conjuncts and operations; Conjuncts operations' properties. An intuitive approach to numbers from the naturals to the real Numbering systems. Binary relation. General and Arithmetic notions. Introduction to Geometry.
3a) No prerequisites.
3b) Having the knowledge and the skills that able the autonomy and precision in the instruction of mathematics concepts.
3c) Barros, MG 1971 Conjuntos Numéricos, Porto editora; Matos, JM & Serrazina, L 1997 Didáctica da Matemática, Universidade Aberta, Lisboa; Mendelson, E 1964 Introduction to Mathematical Logic, D. Van Nostrand Company; National Council of Teacher's of Mathematics 1991 Normas para o currículo e a avaliação em matemática escolar, APM e IIE, Lisboa; DEB Orientações curriculares para a Educação Escolar, Ministério da Educação , Lisboa.
4. Compulsory.
5. Helena Maria Lopes S. S. Agarez Monteiro.
6. 3 h/ week (1 lectures + 2practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Final written exam – 100%.
9. No.
10. 3.

1. Educational Psychology - 0435.
2. Learning Theories. Educational Implications of Learning Theories. Motivation and its Implications to Education. Maturity and its Implications to Education. Social Conditioning. The Problem of Retention and Forgetting. The Problem of Transfer.
3a) No prerequisites.
3b) To provide students with a comprehensive picture of some of the major educational psychological theories and issues and to develop their implications for the educational process.
3c) Alberto, PA & Troutman, AC 2003 Applied Behavior Analysis for Teachers, 6th ed., New Jersey: Merrill Prentice Hall; Bigge, ML & Shermis, SS 1999 Learning Theories for Teachers, 6th ed., NY: Longman; Driscoll, MP 2000 Psychology of Learning for Instruction, 2nd ed., Boston: Allyn and Bacon.
4. Compulsory.
5. Rosangela Bertelli.
6. 2 h/week (1 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. In accordance with the University's Regulations, two written tests or a final exam – 100%.
9. No.
10. 3.

2nd year

1. Motorial Development - 1165.
2. Biological maturation: concepts and assessment; somatic growth: measurements commonly used in growth studies; growth patterns in stature and body weight; growth patterns in other body proportions; changes in body proportions; development of physique: methods of assessing physique; somatotyping children; changes in somatotype during growth; body composition; development: development models and theories, development of fundamental patterns; perceptual-motor development and development of play and games: playgrounds.
3a) Good knowledge on Psychology.
3b) To understand the changes in motor behaviour from maturation, growth and development process; to know how to use instruments to observe and to access growth, fundamental motor pattern, perceptual-motor, and motor play.
3c) Gallahue, D 1993 Development physical education for today's children, 2ª ed., Iowa: Wm. C. Brown & Benchmark; Malina, R & Bouchard, C 1991 Growth maturation and physical activity, Champaign ILL: Human Kinetics; Mourão-Carvalhal, I 2000 Efeitos da Interacção dos factores socioculturais, biológicos e motores na prestação das habilidades motoras, corrida, salto, lançamento e pontapé em crianças de 7 e 8 anos de idade, Tese de Doutoramento, Vila Real: UTAD; Neto, C 1997 Jogo & desenvolvimento da criança.,Lisboa: FMH.
4. Compulsory.
5. Maria Isabel Mourão Carvalhal.
6. 3 h/week (2 theoretical + 1 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Written work, both essay type and problem solving, is an integral part of all semester. Assessment is based on coursework (CW) and end-of-semester exam (E). The final degree (FD) is based on this formula: FD = (3*CW + 7*E)/10.
9. No.
10. 4.

1. Visual Expression and Communication - 1166.
2. The development of communication process with special attention to the children drawing process. Study of the visual communication grammar.
3a) No prerequisites.
3b) Learn communication knowing the visual communicational scheme (see and look, polissemics, signification and meaning) and the visual grammar (point, line, texture, structure, harmony and kao's). Be able to be expressive with textile and ceramics tools. To know simply reproduction technology. Learn the evolution of children drawing (3 to 6 years) and understand his development.
3c) Amegon, S 1987 Pour une pédagogie active et créative, Quebec: PUF; Barret, M 1979 Educação em arte. Lisboa: Presença; Gandara, M 1990 Desenho infantil, Lisboa: Texto Editora; Gardner, H 1994 Educación artística y desarrollo humano, Barcelone: Paidos; Grignas, J 1987 Création de dévis éducatifs, Québec, JRPA; Griffond, J 1987 La naturaleza de la inteligencia humana, Barcelona: Paidós; Maslow, A 1987 La personalidad creadora, Barcelona: Kairos; Ravenne, C 1989 Être creatif, Paris: Esf.
4. Compulsory.
5. Maria João Campos Figueiredo Faceira.
6. 4 h/week ; 1st semester; 2nd year.
7. Theoretical-practical classes.
8. Two atelier works (originality and flexibility). 1 report (case study) about children expression and drawing (research), and a board process newspaper.
9. No.
10. 5.

1. Dramatic Expression I - 1167.
2. The body and the voice as instruments of expression and communication: the personal and projective dramatic play.
3a) No prerequisites.
3b) Development of the expression/communication capacities. Clime to the encouragement and development of the creativity and critic mind.
3c) Barret, Gisèle 1990 Pédagogie de L'Expression Dramatique, Paris, Feijoo; Gomes, A & Rolla, J 2003 Brincar a ser - Expressão e Educação dramática – 1º ciclo, Porto Editora; Houle, Michel 1987 Jeu Apprentissage, Les entreprises culturelles en Canada.
4. Compulsory.
5. José Carlos Monteiro Reis.
6. 4 h/week; 1st semester; 2nd year.
7. Theoretical-practical classes.
8. Participation and practical work with oral discussion - 60%; final writing work - 40%.
9. No.
10. 4.

1. Computers in Education - 0228.
2. Basic Internet concepts: navigation, e-mail. Search efficiency: search phrases and techniques for localisation of information. Basic productivity concepts on computer usage for text processing and spreadsheets. Efficient document formatting: consistency, presentation, global style management. Data visualisation: graphs seen as data-clarification tools. Ways to analyse data. Introduction to educational computer activities: transposing manual activities, fine motricity in a computer-use context. Advanced educational computer activities: computer programming tools for children.
3a) The student should possess basic hardware knowledge and be acquainted with programming in C.
3b) The purpose of this discipline is to confer to students with efficiency concepts on computer use, both production and time-wise, within a framework of computers as na educational medium and tool, as well as a teacher support tool. This aims to allow the students to be able to use any computer resources they come upon, in an efficient way and also to be able to define clear objectives for that use.
3c) Morgado, L et al. 2002 Apontamentos de Informática no Ensino - 1-Internet, Vila Real, UTAD; Morgado, L & Cruz, MGB 2002 Apontamentos de Informática no Ensino - 2-Introdução às Actividades Informáticas Educativas, Vila Real, UTAD. Schlein, AM et al. 2002 Find It Online: The Complete Guide to Online Research, Facts on Demand Press, BRB Publications, Tempa, Arizona, EUA; Alconchel, JD 2001 Microsoft Office XP, McGraw-Hill de Portugal, Lisboa.
4. Compulsory.
5. Leonel Morgado.
6. 3 h/week (1 theoretical + 2 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Final test and assignments throughout the semester.
9. No.
10. 3.

1. Nutrition, First Aids and Traumatology - 1168.
2. Nutrition and health. Normal nutrition and therapeutic diets for infants. Nutritional management of diseases and disorders for infants. Firsts aids.
3a) No prerequisites.
3b) To recognise the importance of diet in relation to health and the role of the Educator in nutrition education and health promotion. To know proceedings in firsts aids.
3c) Lifshitz, F 1982 Pediatric nutrition – Infant feedings, dificiences, diseases; Ministério da Educação 1995 Manual de Primeiros Socorros, Acidentes nas Escolas, Jardins de Infância e Campos de Férias, Ministério da Educação.
4. Compulsory.
5. Sandra Celina Fernandes Fonseca.
6. 3 h/week (2 theoretical + 1 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. According to University Regulations, 1 written test and 1 work group or a final exam – 100%.
9. No.
10. 3.

1. Observation of Educational Activities I - 1169.
2. Features of the different child care services; socio-pedagogic diversity and socio-judicial diversity of child care services. Group observation: theory and practice.
3a) No prerequisites.
3b) To provide the observation of educational activities in different contexts.
3c) Carvalho, Isabel 1996 Educação Pré-Escolar em Portugal, Ministério da Educação; Ministério da Educação 1997 Legislação; Estrela, A 1984 Teoria e prática de observação de classes, Lisboa: INIC.
4. Compulsory.
5. Isabel Rego, João Rodrigues.
6. 5 h/week (1 theoretical + 4 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Evaluation of the students integration into the educational spaces they observe; presence on seminar lectures (30%).
9. No.
10. 7.

1. Theory and Curriculum Development - 1170.
2. Approach to the term curriculum; curricular orientation for the Portuguese for early the childhood; instruction design: goals; contents; strategies/activities; evaluation.
3a) No prerequisites.
3b) Conceding a curriculum as a educational and instructive project determined by ideological, social, cultural and educational options; Analyse the main curriculum orientations for the early childhood; to know several perspectives about the decisions making about the instruction.
3c) Allal, Linda et al. 1986 Avaliação Formativa Num Ensino Diferenciado, Coimbra: Livraria Almedina; Depover, C & Nöel, Bernardette 1999 (eds.) L'évaluation des compétences et des processus cognitifs, Bruxelles: De Boeck Université; Gimeno Sacristán, J & Pérez Gómez, AI 1993 Comprender y transformar la enseñanza, Madrid: Ediciones Morata; Goodson, IF 1998 Currículo: teoria e história, Petrópolis: Editora Vozes; Leite, Carlinda; Fernandes, Preciosa 2002 A Avaliação das Aprendizagens dos Alunos- Novos Contextos,NnovasPráticas, Porto: Edições Asa; Ministério da Educação 1997 Orientações Curriculares para a Educação Pré-Escolar, Lisboa: Ministério da Educação; Ministério da Educação 1998 Qualidade e Projecto na Educação Pré-Escolar, Lisboa: Ministério da Educação; Pacheco, JA 1996 Currículo: Teoria e Práxis, Porto: Porto Editora; Tadeu da Silva, T 2000 Teorias do Currículo. Uma introdução crítica, Porto: Porto Editora; Zabalza, M 1992 Planificação e Desenvolvimento Curricular na Escola, Porto: Edições Asa.
4. Compulsory.
5. Carlos Alberto Ferreira.
6. 3 h/week (2 theoretical + 1 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. One written Test and a work or a final exam for those who couldn't do it. Attendance in 2/3 of practical lessons is compulsory.
9. No.
10. 5.

1. Motorial Learning - 0612.
2. Fundamental motor learning concepts; task analysis; motor learning models and theories; memory; retention and transfer theories; motor learning factors: previous, concomitants and posteriors; learning phases.
3a) Good knowledge on Psychology and Psychophysiology.
3b) Provide an introduction to motor learning concepts; to understand the changes in motor behaviour becoming from motor learning process; to understand the relationship between how to teach and how to learn; to diagnose the most appropriated learning strategies and experiences to increased performance.
3c) Godinho, M et al. 2002 Controlo motor e aprendizagem fundamentos e aplicações, 2ª ed., Cruz Quebrada: FMH; Schmidt, R & Wrisberg, C 2000 Motor learning and performance a problem-based learning approach, 2ª ed., Champaign ILL: Human Kinetics; Schmidt, R & Lee, T 1999 Motor control and learning: a behavioral emphasis, 3ª ed., Champaign, ILL: Human Kinetics Pub.
4. Compulsory.
5. Maria Isabel Mourão Carvalhal.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Written work, both essay type and problem solving, is an integral part of all semester. Assessment is based on coursework (CW) and end-of-semester exam (E). The final degree (FD) is based on this formula: FD = (3*CW + 7*E)/10.
9. No.
10. 5.

1. Cognitive Developmental Psychology - 1171.
2. Cognitive Developmental Psychology: an overview. Cognitive, moral, social and affective development in preschool children.
3a) No prerequisites.
3b) To familiarize students with the major topics and theories in cognitive development.
3c) Corine, M 1999 ABC de la Psychologie de l'Enfant, Paris: Jacques Grancher; Lourenço, O 1997 Psicologia de Desenvolvimento Cognitivo, Coimbra: Almedina; Lourenço, O 1992 Psicologia do Desenvolvimento Moral, Coimbra: Almedina; Papalia, D et al. 2001 O Mundo da Criança, Lisboa: McGraw-Hill.
4. Compulsory.
5. José Carlos Gomes da Costa.
6. 3 h/week (2 theoretical + 1 practical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Essay – 50%; Frequency test – 50%.
9. No.
10. 3.

1. Portuguese Expression Techniques - 1172.
2. Research methodologies in Social and Human Sciences. The oral text. The written text. The orthography. Orthographic correction. Textual typology.
3a) No prerequisites.
3b) Students should be able to use certain linguistic contents in oral and written communication; text production inserted in different typologies; to learn and use research methods in social and human sciences.
3c) Rei, JE 1994 Curso de Redacção II – O Texto, Porto, Porto Editora; Cunha, C & Cintra, L 1986 Nova Gramática do Português Contemporâneo, 3ª ed., Lisboa, Sá da Costa; Costa, Maria Rosa s.d. A Pontuação, Porto: Porto Editora.
4. Compulsory.
5. Teresa Moura.
6. 2 h/week; 2nd semester; 2nd year.
7. Theoretical classes.
8. One written text or a final examination.
9. No.
10. 3.

1. Dramatic Expression II - 1173.
2. Body and voice work. Development of the creativity. Corporal and dramatic expression.
3a) No prerequisites.
3b) To develop the dramatic language as a way of expression and communication with the group as a kind of game in a way to develop him self.
3c) Barret, Gisèle 1986 L'expression dramatique, pour une théorie de la pratique, Université de Montréal, Québec; Courtney, R 1976 Jogo, teatro e pensamento, Edições Perspectiva, S. Paulo (Brasil); Ryngaert, J-P 1986 O Jogo dramático no meio escolar, Ed. Centelha; Laferrière, G 1997 La pedagogía puesta en escena, Naque editora.
4. Compulsory.
5. José Carlos Monteiro Reis.
6. 4 h/week; 2nd semester; 2nd year.
7. Theoretical-practical classes.
8. Participation in the classes and a final report of the course (30%); Plan of the creation work (30%); Act and presentation in the class the creation work (40%).
9. No.
10. 5.

1. Children's Literature II - 1175.
2. Poetry for children. Folk and traditional poetry. Formal characteristics. Phonologic, rhythmic and metric structures. Lexical, syntactic e rhetoric aspects. Traditional and Oral Children's poetry and Contemporary Children's poetry. Pedagogic and artistic usage of poetry for children. The role of poetry in children's creativity and its educational importance.
3a) No prerequisites.
3b) To acquire the necessary knowledge relevant to the study of the poetic in Children's Literature. To awaken the child's sensitivity to poetry. To understand the pedagogic and entertainment function of poetry. To develop the ability to understand and analyse the Poetry for children.
3c) Jean, G 1996 Na escola da poesia, Lisboa, Instituto Piaget; Mesquita, AT 1998 A Fábula, Vila Real, UTAD; Rocha, Natércia 2001 Breve história da literatura para crianças em Portugal, nova edição actualizada, Lisboa, Caminho; Rodari, G 1982 Gramática da Fantasia, S. Paulo, Summus Editorial; Vale, F 2001 Teatro, Histórias e Rimas para as Crianças, Lisboa, Instituto Piaget; Vieira, Alice 1999 Eu Bem Vi Nascer o Sol – Antologia da Poesia Popular Portuguesa, 4ª ed., Lisboa, Editorial Caminho.
4. Compulsory.
5. Armindo Mesquita, José Miguel Almeida.
6. 2 h/week; 2nd semester; 2nd year.
7. Theoretical lessons.
8. Students must do one written test or a final exam for those who couldn't do it.
9. No.
10. 3.

1. Plastic Expression and Communication - 1176.
2. Sculpting with simple (Form and function, Learn to Work at three dimensions and texture and structure). Be expressive with recovery materials and be able to make express puppet production.
3a) General information about visual and technological communication.
3b) Experiences with three-dimensional works in order to know the fundamental elements of sculpture.
3c) Grignas, J 1987 Création de dévis éducatifs, Québec. JRPA; Griffond, J 1987 La matualeza de la inteligencia humana, Barcelona: Paidós; Maslo, A 1987 La personalidad creadora, Barcelona: Kairos; Ravenne, C 1989 Être creatif, Paris: Esf.
4. Compulsory.
5. Domingos Júnior.
6. 3 h/week; 2nd semester; 2nd year.
7. Theoretical-practical classes.
8. Practical works (50%) and written essays (50%).
9. No.
10. 3.

1. Observation of Educational Activities II - 1177.
2. The organisation of educational environment: the group. the time, the space, the relationship with parents and community; the early childhood teacher's profile; the portfolio, as an education and evaluation device.
3a) No prerequisites.
3b) To provide direct work with children, deepening the observation already made; to focus assisted intervention upon different aspects of education in kindergartens, trying always to justify the work done, promoting a search for new and better educational practices.
3c) Ministério da Educação 1997 Orientações Curriculares; Zazalba, M 1998 Qualidade em Educação Infantil, Porto Alegre, Artmed; Nunes, J 2000 O Professor e a acção reflexiva, Cadernos do CRIAP, nº 10, Lisboa: ASA; Portugal, Gabriela 1997 Qualidade de contextos Pré-Escolares: cinco perspectivas segundo L. Katz, in Cadernos de Educação de Infância, 42:15-17, Lisboa: APEI; Dec. Lei 240/2001 de 30 de Agosto Perfil geral de desempenho profissional do educador de infância e dos professores dos ensinos básico e secundário, Dec. Lei 241/2001 de 30 de Agosto Perfil especifico de desempenho profissional do educador de infância e dos professores dos ensinos básico e secundário.
4. Compulsory.
5. Isabel Rego, João Rodrigues.
6. 5 h/week (1 theoretical + 4 practical); 2nd semester, 2nd year.
7. Lectures and practical classes.
8. Individual portfolio and final group report - 60%. Work carried out at childhood education centres - 40%.
9. No.
10. 7.

3rd year

1. Cooperation in Educational Activities I - 1335.
2. Organization of the Educational Environment at kindergartens and nurseries. Spaces and materials (different ways to organize them, space management). Time and activity management (different options to structure and manage educational time). Types of activities (instruments for recording, managing and evaluating). Observation, planning and evaluation of educational activities (combination of the teacher's ideas with the ideas that spring from the group itself). Organization of portfolios as instruments for learning, information-gathering and thinking over.
3a) No prerequisites.
3b) To promote the acquisition of competences in order to ensure pedagogical intervention abilities for a better and more adequate response to the educational needs of the different contexts.
3c) Abramovich, Fanny 1997 Literatura Infantil, Editora Scipione, São Paulo; Spodek, B & Saracho, Olívia 1998 Ensinando Crianças de 3 a 8 anos, Editora Artes Médicas, Porto Alegre; Zabalza, MA 1998 Qualidade em Educação Infantil, Editora Artes Médicas, Porto Alegre; Apei (Associação Portuguesa de Educação de Infância) Cadernos de Educação de Infância, Publicação Periódica.
4. Compulsory.
5. Maria Gabriel Cruz.
6. 6 h/week (1 theoretical + 5 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Portfolio + Final report 50%. Work carried out on childhood educational centres 50%.
9. No.
10. 8.

1. Educational Devices - 0769.
2. The ludic and didactic materials as educational devices; playing as opportunity of development and learning; studies and theories about playing; analysis and classification of games and toys.
3a) No prerequisites.
3b) To call the attention of students for the importance of planning, managing and evaluating educational materials; examining and discussing the role of game in Early Childhood Educational Curriculum.
3c) Kishimoto, TM (org.) 1998 O Brincar e Suas Teorias, São Paulo: Pioneira/Educação; Garvey, Catherine 1992 Brincar, Lisboa: Ed. Salamandra; Lopes, Conceição O 1998 Comunicação e Ludicidade na formação do cidadão pré-escolar, Tese de Doutoramento, Universidade de Aveiro.
4. Compulsory.
5. Isabel Rego de Barros.
6. 3 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. Analysis and presentation of texts -30%. Written test - 30%. Practical group work (research and creation of an educational device) - 40%.
9. No.
10. 3.

1. Special Education - 0630.
2. Historical perspective – Attitudes and beliefs regarding handicapped people. The Portuguese Law Framework concerning Special Education. Basic concepts about ESN. Modalities of ESN. Resources for Special Education activities. Planning Special Education activities. Integrative/inclusive strategies of handicapped children as factors of enrichment of teaching practice.
3a) No prerequisites.
3b) To help students to be aware of children's Education Special Needs (ESN). To present ESN's prevalence, aetiology, signs, symptoms and characteristic behaviours. To develop skills in order to detect, evaluate and design corrective schemes. To promote a starting preparation concerning ESN in an inclusive school environment.
3c) Bautista, R 1997 Necessidades Educativas Especiais, Lisboa, Dinalivro; Correia, LM 1997 Alunos com Necessidades Educativas Especiais nas Classes Regulares, Porto Editora; Nielsen, LB 1999 Necessidades Educativas Especiais na sala de aula. Um guia para professores, Porto Editora; Dec.-Lei nº 319/91 de 23 de Agosto; Declaração de Salamanca 1994; Tetzchner, S & Martinsen, H 2000 Introdução à Comunicação Aumentativa e Alternativa, Porto Editora; Vilas Boas, Conceição & Peixoto, LM 2003 As crianças sobredotadas: conceito, características, intervenção educativa, Edições APPACDM de Braga.
4. Compulsory.
5. Teresa Carriço
6. 2 h/week; 1st semester; 3rd year.
7. Lectures classes.
8. Written examination - 60%; collective written essay with presentation - 40%.
9. No.
10. 3.

1. Methodology of Musical Expression I - 1336.
2. To introduce musical capacities in different vectors so that the students can develop the creativity and the desire of they consider the music as a fundamental discipline in process oh the artistic education.
3a) No prerequisites.
3b) It intends to sensitise the future teachers for a practice musical active in the School and out of her.
3c) Martins, Maria de Lurdes 1995 Música para crianças; Bastin, P & Hauver, P 1997 Viva a Música; Firmino, J 1998 Canções instrumentais para a Educação Musical.
4. Compulsory.
5. Adérito Gomes da Silveira.
6. 3 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. Report (40%) and frequency test (60%).
9. No.
10. 4.

1. Methodology of Plastic Expression - 1337.
2. Define and distinguish aims, strategies and resources; use the plan, project, control and evolution notions.
3a) General information about visual and technological communication
3b) The purpose of this discipline to make students to consider plastic on a integral and interdisciplined developed area.
3c) Amengon, S 1987 Pour une Pédagogie active et créactive, Quebec; Barret, M 1979 Educação em arte, Lisboa: Presença. Gandara, M 1990 Desenho infantil, Lisboa: Texto Editora; Gardner, H 1987 Educación artístic y desarrollo humens, Barcelona: Paidós.
4. Compulsory.
5. Domingos Júnior.
6. 3 h/week; 1st semester, 3rd year.
7. Theoretical-practical classes.
8. Practical works (50%) and written essays (50%).
9. No.
10. 4.

1. Methodology of Motorial Activities - 1338
2. Physical education methodology: direct, semi-direct and free. Long, medium and short lessons plans. Observation methodology. Success factors in the teaching learning process: academic learning time, feedback and affectivity.
3a) Good knowledge on methodology, motor development and motor learning.
3b) To know how to plan and to implement motor activities in kindergarten.
3c) Gallahue, D 1993 Development physical education for today's children, 2ª ed., Iowa: Wm. C. Brown & Benchmark;
4. Compulsory.
5. Maria Isabel Mourão Carvalhal.
6. 3 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. Written work, both essay type and problem solving, is an integral part of all semester. Assessment is based on coursework (CW) and end-of-semester exam (E). The final degree (FD) is based on this formula: FD = (3*CW + 7*E)/10.
9. No.
10. 4.

1. Methodology of Natural Sciences - 1339
2. Science Education in kindergarten: justification and meaning. Present perspectives about science teaching and learning and its ethical, epistemological, psychological and sociological basis. Curricular guidelines and implementation of investigations involving: assessment and planning; organization of space, time, activities (especially experimental ones), resources and communication. Educative Project in kindergarten and its relationship with Science Education and other areas.
3a) Essential knowledge of the basic scientific matters from the 1st and 2nd year.
3b) To promote the professional development on what concerns: - The understanding of the importance of the dimension of Science Education in cultural development of all citizens; Construction of pedagogical knowledge, capacities, attitudes and values in the area of Science Education, in a dialectic point of view between theory and practice.
3c) Astolfi, J-P (ed.) 1997 Pratiques de Formation en Didactique des Sciences, Paris: De Boeck; Cachapuz, A et al. 2001 Formação de Professores/Ciências – Textos de Apoio nº 1: Perspectivas de Ensino das Ciências, 2ª ed. Porto: CEEC; De Bóo, M (ed.) 2000 Laying the Foundations in the Early Years (Science 3-6), Hatfield: ASE; Driver, R et al. 2000 Young People´s Images of Science, 3th ed., Buckingham: Open Univ. Press; Goldsworthy, A et al. 2000 Developing understanding in scientific enquiry, Hartfield: ASE; Wray, D 1989 Project Teaching, London: Scholastic Pub. Ldt.
4. Compulsory.
5. Manuela Jorge.
6. 3 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. Diagnosis. Presentation and discussion of a project of investigation available in the kindergarten, justifying the options (50%). Organisation of a range of experiments including scientific and methodological justification (30%). Presentation of summaries of research articles in the area of science teaching and learning (20%). Evaluation of the discipline.
9. No.
10. 4.

1. Cooperation in Educational Activities II - 1340.
2. Observation, planning and evaluation of educational activities (combining the teacher's ideas with those arising from the group). Content Areas (Personal and Social Education, Communication and Expression, Knowledge of the World). Children groups – criteria for their creation, pedagogical options, adapting activities to group characteristics. Portfolio organisation as a tool for learning, information-gathering and thinking over. Pedagogic and curriculum models, and educational practice.
3a) No prerequisites.
3b) To promote the acquisition of competencies in order to ensure pedagogical intervention abilities for a better and more adequate response to the educational needs of the different contexts.
3c) Barros, Maria Guilhermina & Palhares, P 1997 Emergência da Matemática no Jardim de Infância, Porto Editora; Hohmmann, Mary & Weikart, DP 1997 Educar a Criança, Fundação Calouste Gulbenkian, Lisboa; Formosinho, Júlia 1996 Modelos Curriculares para Educação de Infância, Porto Editora, Departamento da Educação Básica, Núcleo de Educação Pré-Escolar, Ed. do Ministério da Educação; Ministério da Educação 1997 Orientações Curriculares para a Educação Pré-Escolar, Lisboa, Ministério da Educação.
4. Compulsory.
5. M.ª Gabriel Cruz ,Teresa Carriço.
6. 6 h/week (1 theoretical + 5 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Portfolio + final report 50%. Work carried out on childhood educational centres 50%.
9. No.
10. 9.

1. Intercultural Education - 0576.
2. Cultures and globalisation. Intercultural era. New scenarios for the public/formal school: from the assimilationist school to plural/democratic school: from segregation (exclusion) to integration (inclusion). Intercultural Education in action: critical perspectives in education: principles, concepts and contradictions around Intercultural Education; models of multi-intercultural Education. Educators' studies supported on an intercultural view: the needs of new professional elements and competencies to face school diversity; assistance in structuring the multi-intercultural educator.
3a) No prerequisites.
3b) Migration's history and intercultural concepts. Thinking over the construction of an effective public/formal school blended with quality; analysing theories and experiences of intercultural education; rethinking models of education studies with an intercultural view.
3c) Peres, AN 1999 Educação Intercultural: utopia ou realidade? Porto, Profedições; Rey, M 1986 Former les enseignants à l'éducation interculturelle? (Les travaux du Conseil de la coopération culturelle (1977-1983), Strasbourg, Conseil de L'Europe; Stoer, SR & Cortesão, L 1999 Levantando a Pedra, Porto: Edições Afrontamento.
4. Compulsory.
5. Américo Nunes Peres.
6. 2 h/week; 2nd semester; 3rd year.
7. Lectures classes.
8. Evaluation is negotiated with the students, thus according to the established in this institution. Final Evaluation: final exam.
9. Spanish, French, English.
10. 3.

1. Propaedeutics of Reading and Writing Acquisition - 1342.
2. Early conceptions about written language. Relations between metaphonological development and reading and writing acquisition. The acquisition of phonemic awareness in kindergarten. Models of reading and writing development. Kindergarten activities that promote reading and writing learning facilitation.
3a) No prerequisites.
3b) To provide an explanation and understanding of cognitive and linguistic processes underpinning reading and writing acquisition. To provide an explanation and understanding of reading and writing development, particularly in kindergarten and pre-school years. To provide the understanding of kindergarten role on formal reading and writing learning facilitation.
3c) Curto, LM et al. 2000 Escrever e Ler, vols. 1 e 2, Porto Alegre: ArtMed Editora; Harris, M & Hatano, G (eds.) 1999 Learning to read and write, Cambridge, Cambridge University Press; Morais, J 1998 Arte de Ler: Psicologia Cognitiva da Leitura, Lisboa, Cosmos; Vale, P 1999 Correlatos metafonológicos e estratégias iniciais de leitura-escrita de palavras no português: uma contribuição experimental, Dissertação de doutoramento, Vila Real, UTAD; Viana, FLP 2002 Da Linguagem Oral à Leitura, Lisboa: Fundação Calouste Gulbenkian.
4. Compulsory.
5. Ana Paula Vale.
6. 3 h/week ; 2nd semester; 3rd year.
7. Lectures-practical classes.
8. Written report about children metaphonological assessment experiment - optional 50% - Exam from 50% to 100%.
9. No.
10. 4.

1. Methodology of Dramatic Expression - 1341.
2. Models of dramatic practices in education. The dramatic expression in pre-school education: privileged moments, aims and activities.
3a) No prerequisites.
3b) Acquisition of theoretic-practical in dramatic expression teaching in pre-school.
3c) Barret, Gisèle 1990 Pédagogie de L'Expression Dramatique, Paris, Feijoo; Cardoso, C 1998 Pour une formation pluraliste en Expression Dramatique, Tese de Doutoramento, Université de la Sorbonne, Paris; Martins, A 1998 Actividades dramáticas nos jardins-de-infância Luso-Chineses, Macau, Fundação Macau e Direcção do Serviços de Educação e Juventude.
4. Compulsory.
5. Carlos Cardoso.
6. 3 h week; 2nd semester; 3rd year.
7. Theoretical-practical classes.
8. Participation and practical work with oral discussion - 60%; final writing work - 40%.
9. No.
10. 4.

1. Social and Personal Training - 1641.
2. Legal framework; Analysis of the curricular reform for Primary Education (Dec. 6/2001). The notion of Citizenship (Individual experience; Historical note; The Declaration of Human Rights and The Universal Citizenship. Who am I? – Personal Identity (The Relationship of personal identity with the dimensions of action, emotion, consciousness, freedom and project, pain, suffering and death). I and others (the person as a being facing another; human relations, human groups and ties of belonging; Conflict, indifference, communication ; The Spoken work and Silence; freedom, tolerance and autonomy; Solidarity, commitment, communion). The pedagogical relationship: its specificity and values. The training: a permanent process of personal growth.
3a) No prerequisites.
3b) Analyse your own personal growth. To affirm your own autonomy, responsibility and consciousness as a unique being. To respect your own rights as well as others according to the Justice system and equality. To formulate judgements based on your own decision making process. To act coherently with the values found. To identify the pedagogical meaning (and its possible contradictions) of intentional acts or unconsciously educational. To consider oneself as a subject of a permanent process of growing and training, assuming the responsibility for its implementation in the context of the subject, of the course, of the assignment, of the job, of life.
3c) Ministério da Educação 1997 Lei de Bases do Sistema Educativo; Lei 6/87, Lei-Quadro da Educação Pré-Escolar, Departamento da Educação Básica, Núcleo de Educação Pré-Escolar; Delors, J 1996 A Educação. Um Tesouro a Descobrir, Relatório para a UNESCO da Comissão Internacional sobre Educação para o século XXI, Porto, Ed. Asa; Csikszentmihalyi, M 1998 Novas atitudes mentais. Uma psicologia para o terceiro milénio, Lisboa, Círculo de Leitores; Frankl, VE 1993 Découvrir un sens à sa vie, Québec, Editions de l'Homme; Gusdorf, G 1991 Les Écritures du moi: Lignes de Vie I, Paris, Edtions Odile Jacob; Marques, R 1990 Educação Cívica e Desenvolvimento Pessoal e Social, Lisboa, Texto Editora; Patrício, MF 1992 Formação Pessoal e Social no Quadro da Escola Cultural, Évora, AEPEC.
4. Compulsory.
5. Maria da Conceição Azevedo, Francisco Barros.
6. 2 h/week; 2nd semester, 3rd year.
7. Theoretical classes.
8. Final exam and practical assignments .
9. No.
10. 3.

1. Methodology of Mathematics - 0501.
2. Importance of Mathematics in Preschool: A propose of Mathematics for Preschool; Space and ambient organisation in classroom; The educator role in Mathematics teaching; Choosing problems solving methodologies; Capacities versus Knowledge; Formal knowledge versus informal knowledge. Mathematics Domain: Logical principles; Identification; Classification; Form Collections; To serialise and to order; Number; Form and find patterns. Classroom environment: Problem solving; Communica-ting; Group work; Playing activities.
3a) Acquired Mathematical concepts along the High-school and Academic teaching.
3b) To provide students the basics concepts of Mathematical Analysis.
3c) Barros, Maria Guilhermina 1997 Emergência da Matemática no Jardim de Infância, Porto: Porto Editora; Ministério da Educação 1997 Orientações Curriculares para a Educação Pré-Escolar, Lisboa: Departamento da Educação Básica; Smole, Kátia 2000 Brincadeiras Infantis nas Aulas de Matemática, Porto Alegre: Artes Médicas.
4. Compulsory.
5. Pedro Barroso Magalhães.
6. 3 h/week (3 TP); 2nd semester; 3rd year.
7. Lectures-practical classes.
8. 3 practical works with discussion 50%; Final written exam 50%.
9. No.
10. 4.

1. Theory and Techniques of Creativity - 1343.
2. Understand the relation between game and children development. To know the creative process and creativity theories and technology (cognitive and humanistic model). Understand Interdisciplinary and creativity process. Apply creativity skills-to game and script (cartoon and film).
3a) No prerequisites.
3b) Know techniques of creativity development. Domain the main theories of creativity process; Develop creative mind and intelligence.
3c) Grignas, J 1987 Création de dévis éducatifs, Québec, JRPA; Griffond, J 1987 La matualeza de la inteligencia humana, Barcelona: Paidós; Maslow, A 1987 La personalidad creadora, Barcelona: Kairos; Ravenne C 1989 Être creatif, Paris: Esf.
4. Compulsory.
5. Ângela Cardoso.
6. 3 h/week; 2nd semester; 3rd year
7. Lectures and practical classes.
8. Practical works of recover materials; game or synopsis of visual script (original and clear). Board process newspaper.
9. No.
10. 3.

4th year

1. Iternship - 1352.
2. Creation and organization of curricula: organization of the educational environment; organization of the educational environment; planning; organization and evaluation. Though-over educational action and relationship (following a perspective of promotion of autonomy, cooperation, problem-solving and integration of families and of the community). Curriculum integration – the implementation of curricula in an integrated way, resorting to acquired knowledge and to distinct ways of promoting child learning over the several content areas: knowledge of the thematic areas; methodologies for promotion of learning.
3a) No prerequisites.
3b) To develop training curricula that respond to real needs in pedagogic practice, accompanying process and dynamics of change, promoting innovation and the quality of educational intervention. To develop the capacity of thinking critically, learning by reflecting on action.
3c) Basseadas, Eulália et al. 1999 Aprender e Ensinar na Educação Infantil, Editora Artes Médicas. Porto Alegre; Katz, Lilian & Chard, Sylvia 1997 A Abordagem de Projecto na Educação de Infância, Ed. Fundação Calouste Gulbenkian; Nicolau, Marieta 2000 A Educação Pré-escolar, fundamentos e didáctica, 10ª ed., Ed. Ática, São Paulo.
4. Compulsory.
5. Maria Gabriel Cruz, Isabel Rego Teresa Carriço, Ortélia Machado.
6. 15 h/week; annual; 4th year.
7. Organisation of a portfolio on pedagogical practice; problem identification and solving; project designing and deployment; problem-definition, thinking-over and evaluation of the training path; progressive increase in responsibility for the educational activity.
8. Portfolio (pedagogical project, annual planning of activities) + final report 40%. Work carried out on childhood educational centres 60%.
9. No.
10. 22.

1. Internship Seminar - 1353.
2. Methods for observation, organisation, planning and evaluation, both at mid-term and long-term; theoretical grounds. Portfolio organisation as tools for learning and systematic organisation of information leading to basis of the educational activity. Several methods of approaching the content areas (curriculum) employing methodologies for Expression and Communication, and Knowledge of the World, and other referenced knowledge. Models for pedagogy and curriculum; educational options.
3a) No prerequisites.
3b) To foster the integration of scientific and pedagogic issues relevant to the future Early Childhood teacher. To guide student-teachers in understanding the pedagogical models that sustain their practices.
3c) Afonso, AJ et al. 1999 Projectos educativos, planos de actividades e regulamentos internos, ASA Editores; Duckworth, Eleanor 1991 Ideias-maravilha em educação e outros ensaios em ensino e aprendizagem, Colecção Horizontes Pedagógicos, Publicação Instituto Piaget; Perrenoud, P 2001 Formando professores profissionais – Quais estratégias? Quais competências? 2ª ed. revista, Porto Alegre - ARTMED; Pinto, M & Sarmento, MJ 1999 Saberes sobre as crianças para uma bibliografia sobre a infância e as crianças em Portugal, Colecção Ifans, Universidade de Minho; Sacristán, JG 1998 O currículo - uma reflexão sobre a prática, 3ª ed., Porto Alegre - ARTMED; Spodek, B 2002 Manual de Investigação em Educação de Infância, Lisboa, Fundação Calouste Gulbenkian.
4. Compulsory.
5. Maria Gabriel Cruz, Isabel Rego, Teresa Carriço, Ortélia Machado.
6. 3 h/week; annual; 4th year.
7. Theoretical-practical classes.
8. Evaluation takes place both for training and for grading, based on the quality of records and on the evaluation of the seminar sessions conducted by students (and included in adequate sections of their portfolios); under evaluation is also the quality of involvement in work developed throughout the sessions.
9. No.
10. 3.

1. Themes of Contemporary Culture - 1143.
2. Mankind. Society and Culture.
3a) No prerequisites.
3b) To contribute to favour the growth of informed and active citizenship, compromised with a less fragmentary vision of the society and the world; to develop a communicative rationality; to participate in the reflection on the great questions of the contemporary times.
3c) Buber, M 1986 Qué es el Hombre? México-Madrid-Buenos Aires, Fondo de Cultura Económica; Gevaert, J 1988 El Problema del Hombre, Salamanca, Ediciones Sígueme; Coreth, E 1988 O que é o Homem? Lisboa, Verbo; Laín Entralgo, P 1988 Teoria y Realidad del Otro, Madrid, Alianza Editorial; Vilches, L 1993 La televisión: los efectos del bien y del mal, Barcelona, Paidós; Popper, C 1995 Televisão: Um Perigo para a Democracia, Lisboa, Gradiva; Hottois, G 1992 O Paradigma Bioético, Lisboa, Edições Salamandra; Jonas, H 1995 El Principio de la Responsabilidad. Ensayo de una Ética para la Civilización Tecnológica, Barcelona, Editorial Herder; AAVV 1996 Bioética, Lisboa - São Paulo, Editorial Verbo.
4. Compulsory.
5. Joaquim José Jacinto Escola.
6. 3 h/week; 1st semester; 4th year.
7. Lerctures classes.
8. Test or final exam.
9. No.
10. 5.

1. Educational Administration and Organisation - 0227.
2. Introduction to the study of organisation and scholastic administration. The new model of direction, administration and management of education: analysis of process in course.
3a) No prerequisites.
3b) To know the theory, process and proceeding of organisation and administration. To occasion and approach theoretical and practice, namely on a level of organisation and administration of the Portuguese system.
3c) Barroso, J 1995 Para uma Abordagem Teórica de Administração Escolar: a Distinção entre Direcção e Gestão, Revista Portuguesa de Educação, 8(1):33-56; Barroso, J 1997 Autonomia e Gestão das Escolas, ME, Lisboa; Brito, C 1991 Gestão Escolar Participada: na escola todos somos gestores, Texto Editora, Lisboa; Chiavenato, I 1985 Administração: teoria, processo e prática, McGraw-Hill, Lisboa; Diogo, J 1998 Parceria Escola-Família: a Caminho de uma Educação Participada, Porto Editora, Porto; Ministério da Educação 1997 Lei de Bases do Sistema Educativo, Lisboa; Lemos, J & Silveira, Teodolinda 1998 Autonomia e Gestão das Escolas: legislação anotada, Porto Editora: Porto; Sarmento, MJ 1998 Autonomia e Regulação da Mudança Organizacional das Escolas, Dep. de Ed. de F. C. da UL; Silva, P 1999 Escola e Família. Educação, Sociedades e Culturas, 11:83-108.
4. Compulsory.
5. Maria Ortélia Machado.
6. 3 h/week; 2nd semester; 4th year.
7. Lectures classes.
8. One written test and a work or a final exam for those who couldn't do it. Attendance in 2/3 of practical lessons is compulsory.
9. No.
10. 5.

CHAVES

1st year

1. Musical Expression I - 1163
2. Elementary musical knowledge and musical vocabulary. Timbre, rhythm, pitch, dynamic, time and form concepts. Active methods: Dalcroze; Orff; Martenot; Kodály; Susuky; Willems; van Hauwe; Wuytack.
3a) No prerequisites.
3b) To acquire sensitivity for the musical expression/education. To integrate relative basic knowledge to music. To provide didactics beddings for the development of activities of the musical expression/education in the pre-school education based in the active methods.
3c) Hauwe, P 1996 Manual da Flauta de Bisel, Instituto Orff: Porto; Mejia, Pilar 2002 Didáctica de la Música, Madrid: Pearsons Education, SA; Wuytack, J 1992 Canções de mimar - Curso Intensivo, Porto: Associação Wuytack; Zamacois, J 1986 Teoria de la Musica, Libro 1, Barcelona: Editorial Labor.
4. Compulsory.
5. Agostinho da Costa Dinis Gomes.
6. 5 h/week; 1st semester; 1st year.
7. Theoretical-practical classes.
8. According to the pedagogical rules, the evaluation will take into account the assiduity, the participation, the elaboration of a group work with presentation and the accomplishment of a frequency or final examination.
9. No.
10. 5.

1. Elements of Nature (Physics) - 0776.
2. The ways of Physics. From objects to matter. Particles and objects in interaction. From Technical objects to some physical concepts. Sound and hearing, light and vision. Environmental Physics. Astronomy.
3a) No prerequisites.
3b) Knowing fundamental Physic concepts. Correct using physic concepts in descriptions and interpretations of the varied physical events. Planning and holding of experimental activities. Developing oral and written communication skills of the physical descriptions and interpretations.
3c) Carvalho, R, 1995 A Física no Dia-a-Dia, Lisboa, Relógio d'Água; Balpe, C 1991 Les Sciences Physiques à l' École Èlèmentaire, Paris, Armand Colin; Fiolhais, C 1991 Física Divertida, Lisboa, Gradiva; Walker, J 1990 O Grande Circo da Física, Lisboa, Gradiva; Breckenridge, J 1998 Experiências Simples de Física com Materiais Disponíveis, Venda Nova, Bertrand Editora.
4. Compulsory.
5. Joaquim Adelino Neves Moreira.
6. 3 h/week (1 theoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam - 100%.
9. No.
10. 3.

1. Anthropology of Education - 1144.
2. Introduction (to be a man: a gift and a task). The object of the Anthropology of the Education. The human multidimensionality. Anthropological theories and education. A pedagogy of the duty. Educational practices and citizenship.
3a) None, besides those requires by the course.
3b) To valour the epistemological framing of the Anthropology of the Education; To understand the various dimensions of the human being; To know different anthropological conceptions; To apply those conceptions to the educational phenomenon; To be conscious of the intersubjective dimension of the educative project; To critically fundament a new axiological approach.
3c) Alvira, R 1998 La Razón de Ser Hombre: ensayo acerca de la justificación del ser humano, Madrid, Rialp; Bertrand, Y 1991 Teorias Contemporâneas de Educação, Lisboa, Instituto Piaget; Camps, Victoria 1991 La Imaginación Ética, Barcelona, Ariel; Bilbeney, N 1992 Aproximación a la Ética, Barcelona, Ariel; Carracedo, JR 1987 El Hombre y le Ética, Barcelona, Antropos; Dias de Carvalho, A 1988 Epistemologia das Ciências da Educação, Porto, Ed. Afrontamento; Gevaert, J 1991 El Problema del Hombre: introducción a la antropología filosofica, Salamanca, Ed. Sigueme; Maia, CF 2000 A Dimensão Ética e Educativa na Obra de Miguel Torga: um poeta do dever, Coimbra, Gráfica de Coimbra; Maia, CF 1996 Valores, Educação e Adolescência: a legitimidade de modelos em educação, Braga, APPACDM; Nogare, PD 1988 Humanismos e anti-humanismos: introdução à antropologia filosófica, Petrópolis, Vozes.
4. Compulsory.
5. Carlos Fernandes Maia, Manuel Barroso Magalhães.
6. 3 h/week; 1st semester; 1st year.
7. Theoretical classes. Presentation of the unit's contents by the teacher during the lectures. Question analysis from texts or work suggestions during the practical classes. In every class a mutual dialog between students and teacher is sought, as to enlighten the students and to establish convictions. Attendance to 2/3 of practical classes is compulsory.
8. According to University Regulations, one final written exam, consisting in four questions; or two written tests (with 50% weight to the final mark).
9. No.
10. 5.

1. History of Education - 0206.
2. Childhood concept: the building of this idea. Greece and Rome. Comenius and "Childhood School". The first pedagogues on children's education. The first kindergartens. Industrial Revolution. "New School" movement. Historical evolution of childhood education in Portugal.
3a) No prerequisites.
3b) 1- To know authors and crucial times for the development of Education. 2- To analyse present times in order to preview future solutions.
3c) Abbagnano, N & Visalberghi, A 1982 História da Pedagogia, Livros Horizonte, Lisboa; Bowen, J 1985 Historia de la Educación Occidental, Herder, Barcelona; Chateau, J s.d. Os Grandes Pedagogos, Lisboa, Livros do Brasil.
4. Compulsory.
5. Carlos Alberto Magalhães Gomes Mota.
6. 3 h/week; 1st semester; 1st year.
7. Theoretical classes.
8. Written essay.
9. No.
10. 5.

1. Mathematics (Levelling) – 1001/0990.
2. Numerical assemblages. Operations in numerical assemblages. Monomials and polynomials. Equations; problems resolution. Systems of equations; problems resolution. Notion of distance; modulus resolution. Applications. Valuation.
3a) No prerequisites.
3b) To develop mathematical thinking, organisation, intuition and creativity capacities. To acquire mathematical knowledge and aptitude to use it. To develop a sense of discovery and innovation in mathematics.
3c) Caraça, BJ Conceitos fundamentais da Matemática, Livraria Sá da Costa Editora; Neves, MA & Faria, ML Livros de Matemática (7º, 8º, 9º), Porto Editora; Polya, G A arte de resolver problemas, Rio de Janeiro, Editora Interciência; Segóvia, I & Castro, E 1999 Estimacion em calculo y medida, Madrid, Editorial Síntesis.
4. Optional.
5. Teresa de Jesus Morais Vaz Chaves.
6. 4 h/week (2 theoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes. An attendance in 2/3 of practical classes is compulsory.
8. According to University Regulation, 2 written tests or a final exam – 100%.
9. No.
10. 5.

1. Portuguese Language (Levelling) – 1001/1178.
2. Phonetics e Phonology (the sounds of the speech and sound of the language, consonant and vowel classification). Morphology (word subclasses, morphologic analysis and classification). Syntax (sentence, clause and complete sentence, simple sentence and complex sentence). Orthography and writing improvement.
3a) High School – Portuguese B.
3b) To proceed the study of the Portuguese language in terms of a general introduction to some basic grammatical aspects; to identify and classify the phonemes of the Portuguese language; to analyse and classify morphological and syntactically; to produce texts with orthographic correction.
3c) Bechra, E 2002 Moderna Gramática Portuguesa, 37ª ed., Rio de Janeiro, Ed. Lucerna; Vilela , M 1999 Gramática da Língua Portuguesa, Coimbra, 2ª ed., Almedina; Cunha, C & Cintra, L 1987 Nova Gramática do Português Contemporâneo, 4ª ed., Lisboa, Sá da Costa; Mira, Maria Helena et al. 2003 Gramática da Língua Portuguesa, 5ª ed., Lisboa, Caminho.
4. Optional.
5. Carlos Assunção, Teresa Moura.
6. 4h/week (2 practical + 2 theoretical); 1st semester; 1st year.
7. Lectures and practical classes.
8. One written text or a final examination.
9. No.
10. 5.

1. Theory and Methods of Educational Research - 1145.
2. Study skills; scientific writing and inquiry techniques; considerations about science; educational research; research process view; data collection techniques.
3a) No prerequisites.
3b) To foster: skills to critically use research; skills to integrate processes and techniques of scientific research in future professional practices; skills to be able to understand the state of the art of educational research.
3c) Arnal, J et al. 1992 Investigación educativa: fundamentos y metodologia, Barcelona: Ed. Labor; Azevedo, C & Azevedo, A 1994 Metodologia científica: contributos práticos para a elaboração de trabalhos académicos, Porto: C. Azevedo; Quivy, R & Campenhoudt, L 1992 Manual de investigação em ciências sociais, Lisboa: Gradiva; Tuckman, B 2002 Manual de investigação em educação, Lisboa: Fundação Calouste Gulbenkian.
4. Compulsory.
5. Maria Isabel Barros Morais Costa.
6. 3 h/week (2 theoretical + 1 practical); 1st semester; 1st year.
7. Lectures and practical classes including tutored group work.
8. An individual written test or paper; a group paper.
9. No (but possible, in Spanish or English).
10. 5.

1. Theatre in Education - 1344.
2. The educative value of the theatre. The theatre and the dramatic activities. The drama and its components. Theatre, dramatization and play. The script of a stage. The body in the space and the time of the theatre. The theatre and the society.
3a) No prerequisites.
3b) To discover the personality and to develop the expressive capacity, to learn to use the verbal and not verbal language in the expression-communication. To take conscience of the expressive potential of the body, to stimulate the creativity. To promote the release of fears, fears and blockades. To promote the dramatic art as a technology also to the service of other areas of knowing.
3c) Barata, José Oliveira 1979 Didáctica do Teatro, Coimbra, Livraria Almedina; Girard, G 1980 O Universo do Teatro, Coimbra, Livraria Almedina; García, Virginia 1995 El Teatro en el aula, Granada, Editorial Comares; Borges, Vera 2001 Todos ao Palco, Oeiras, Celta Editora.
4. Optional.
5. Marcelino de Sousa Lopes.
6. 3 h/week (1 theoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes. The assistance at least the 2/3 of the practical lessons are compulsory.
8. Continuous evaluation with presentation of individual and collective practical works. Presentation of a written work and a practical work of final evaluation.
9. No.
10. 3.

1. Computers - 1330.
2. Introduction to the operative systems MS-DOS/Windows. The Internet and its services. Introduction to the computer and educative activities – Design programs: Paint and Corel Draw; image processing programs: Photo Editor and Imaging; presentation programs - Power Point. Tools for programming of computers by children – ToonTalk.
3a) No prerequisites.
3b) To familiarise with the fundamental concepts and tools of the information and communication technologies (ICT), in a user optic; acquire confidence with ICT; to evaluate the potentialities and limitations of ICT; to get sure about these concepts and tools, to be able to operationally explore them in different contexts in a present or future activity; to express and to communicate in a proper way, using computational written, graphical, and oral supports and combinations of these components; to work in MS Windows; to work with Office tools; to use the Internet services, as email and the Web.
3c) Lister, AM 1998 Os Sistemas Operativos, Editorial Presença, 2ª ed., Lisboa; Shay, WA 1996 Sistemas Operacionais, Editora McGraw-Hill, São Paulo; Sousa, S & Sousa, M 1997 Microsoft Office 97 para todos nós, Biblioteca Exame Informática, FCA, Editora Informática; Gouveia, J & Magalhães, A Hardware para PCs e Redes, curso completo, FCA, Editora Informática; Guia Prático Powerpint 97, McGraw-Hill; Guia Prático Excel 97, McGraw-Hill.
4. Optional.
5. Ramiro Marques.
6. 3 h/week (1 theoretical + 2 practical); 1st semester; 1st year.
7. Lectures and practical classes. Compulsory assistance at 2/3 practical classes.
8. Following the pedagogic norms. 1 written test + 1 practical test or final exam – 100 %.
9. No.
10. 3.

1. Earth Sciences - 1150.
2. Morphogenesis of Earth. Origin of life. Alimentary needs. Nutrition and metabolism.
3a) No prerequisites.
3b) To know and apply different kind o rocks. To know and understanding the different theories related to the origin and evolution of beings. To discover the importance of health eating habits.
3c) Rosnay, J 1984 As origens da vida, Coimbra, Almedina; Pais, MS 1983 Noções de Biologia Celular, Lisboa, Difusão Editorial; Gass, IG et al. 1984 Vamos Compreender a Terra, Coimbra, Almedina.
4. Compulsory.
5. Luís Manuel Monteiro de Oliveira.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 1 written test or a final exam – 100%.
9. No.
10. 3.

1. Motorial Expression - 0366.
2. Perceptual motor abilities, fundamental motor skills, play and games.
3a) No prerequisites.
3b) To vivify a variety of motor experiences to aid students understanding the importance of movement in the development of the child.
3c) Williams, H 1983 Perceptual and motor development. Prentice-Hall: Inc, Englewood Clifs; Neto, C 1995 Motricidade e jogo na infância. Rio de Janeiro: Sprint.
4. Compulsory.
5. Maria Isabel Mourão Carvalhal.
6. 4 h/week; 2nd semester; 1st year.
7. Theoretical-practical classes.
8. Assessment is based on coursework (CW) and end-of-semester exam (E).
9. No.
10. 5.

1. Philosophy of Education - 0220.
2. Epistemological introduction: Education as action. Knowledge in Education – epistemological paradigms. Statute and tasks of a Philosophy of Education. Towards a philosophical anthropology of education: The educational process as anthropogenesis. (Non)meeting between nature and civilization; Educate towards what? Towards an educational axiology. 1. Previous questions (Judgements based on value/Judgements based on fact; what are values? universal values or relative values? is an education of values possible? ... and legitimate?). What values should there be for education? (Education and effectiveness; education and leisure/game; education and beauty; education and truth; education and being good/morality; education and transcendentalism) 3. Educational deontology (concepts of deontology and educational deontology; deontology of the educators and the educated). Axiological tables and pedagogical theories: Reading and critical analysis of the following works: Plato - The Apology of Socrates; St. Augustus – The Master; Paulo Freire - Pedagogy of Autonomy.
3a) No prerequisites.
3b) Objectives of the field. To characterize the educational reality as an activity and as an object of knowledge and research. To analyse the various dimensions of man as a subject of the educational reality at its starting point, process and finalities. To identify the axiological universe as a fundamental objective of the educational process. To distinguish the present values in a certain theory or educational practice.
3c) Carvalho, AD 1988 Epistemologia das Ciências da Educação, Porto, Ed. Afrontamento; Dias, JR 1997 Abertura a uma reflexão sobre as metamorfoses da Pedagogia, Revista Portuguesa de Educação, 10(2):1-7; Fullat, O 1992 Filosofías de la Educación, Paideia, Barcelona, CEAC; Fullat, O 1997 Antropologia filosófica de la educación, Barcelona, Ariel Educación; Patrício, M 1993 Lições de axiologia educacional, Lisboa, Universidade Aberta; Réboul, O 1992 Les valeurs de l'éducation, Paris, PUF.
4. Compulsory.
5. Maria da Conceição Azevedo, Carlos Maia.
6. 3 h/week; 2nd semester; 1st year.
7. Theoretical classes.
8. Final exam and assignments about the required reading.
9. No.
10. 5.

1. Musical Expression II - 1164.
2. Elementary musical notions and musical vocabulary. Time signature: 6/8; 9/8 and 12/8. Pedagogic resources for the Musical/Active Methods in Dalcroze, Orff, Martenot Kodály, Suzuki, Willems, van Hauwe and Wuytack based.
3á) No prerequisites
3b) To acquire sensitivity for the musical expression/education. To integrate relative basic knowledge to this substance. To provide didactics beddings for the development of activities of the musical expression/education in the pre-school education.
3c) Gonçalves, C s.d. Música para as crianças, Lisboa: Lisboa Editora; Hauwe, P 1996 Manual da Flauta de Bisel, Instituto Orff: Porto; Mejia, Pilar Pascual 2002 Didáctica de la Música. Madrid: Pearsons Education, SA; Wuytack, J 1992 Canções de mimar - Curso Intensivo, Porto: Associação Wuytack; Zamacois, J 1986 Teoria de la Musica, Libro 1, Barcelona: Editorial Labor.
4. Compulsory.
5. Agostinho da Costa Dinis Gomes.
6. 5 h/week; 2nd semester; 1st year.
7. Lectures/practical classes.
8. In accordance with the pedagogical rules, the evaluation will take into account the assiduity, the participation, the elaboration of a work of group with oral presentation and the accomplishment of a frequency or final examination.
9. No.
10. 5.

1. Children's Literature I - 1174.
2. Children's Literature and its different contexts. Universal Children's Literature. Origins and evolution of Children's Literature in Europe and in Portugal. The contemporary Children's Literature: ruptures e continuities. Children's Literature and the imaginary. Children's Literature: fantasy and reality. The child and its magic world. Children's Literature: the school's context and the promotion of reading habits. Communication and Folk Literature. Short-stories for children.
3a) No prerequisites.
3b) To acquire the necessary knowledge relevant in the theoretical and literary approach to Children's Literature. To understand how the magic and fantastic text work. To be aware of the importance of the short-story as a means to solve the children's developing problems. To increase the ability to understand and analyse the Literature for children.
3c) Bravo-Villasante, Carmen 1977 História da Literatura Infantil Universal, 2 vols., Lisboa, Vega; Diogo, A 1994 Literatura Infantil - História, Teoria, Interpretações, Porto, Porto Editora; Gomes, José António 1991 Literatura Para Crianças e Jovens, Lisboa, Caminho; Mesquita, AT 1998 A Fábula, Vila Real, UTAD; Mesquita, AT 1999 A Estética da Recepção na Literatura Infantil, Vila Real, UTAD; Pires, Maria Laura s.d. História da Literatura Infantil Portuguesa, Lisboa, Vega; Propp, V s.d. Morfologia do Conto, Lisboa, Vega; Rodari, G 1982 Gramática da Fantasia, S. Paulo, Summus Editorial.
4. Compulsory.
5. Armindo Mesquita, José Miguel Almeida.
6. 3 h/week ; 2nd semester; 1st year.
7. Theoretical classes.
8. Students must do one written test (with or without a project work) or a final exam for those who couldn't do it. Attendance in 2/3 of practical lessons is compulsory.
9. No.
10. 5.

1. Mathematics - 0001.
2. Proposition logic. Operations with propositions. Conditions logic. Operations with conditions. Groups logic. Operations with groups. Classification and sorting. Number in a genetic perspective. How the number is constructed. Natural numbers: historical comment. Geometric figures (in plane and in space).
3a) No prerequisites
3b) To develop mathematical thinking, organisation, intuition and creativity capacities.
To acquire mathematical knowledge and aptitude to use it. To develop a sense of discovery and innovation in mathematics.
3c) Silva, JS 1975 Compêndio de Matemática, Lisboa, GEP; Macias, ER 1987 Introducción a la Geometría, Madrid, Ediciones Anaya.
4. Compulsory.
5. Teresa de Jesus Morais Vaz Chaves.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes. An attendance in 2/3 of practical classes is compulsory.
8. According to University Regulation, 2 written tests or a final exam – 100%.
9. No.
10. 3.

1. Educational Psychology - 0435.
2. Learning Theories. Educational Implications of Learning Theories. Motivation and its Implications to Education. Maturity and its Implications to Education. Social Conditioning. The Problem of Retention and Forgetting. The Problem of Transfer.
3a) No prerequisites.
3b) To provide students with a comprehensive picture of some of the major educational psychological theories and issues and to develop their implications for the educational process.
3c) Alberto, PA & Troutman, AC 2003 Applied Behavior Analysis for Teachers, 6th ed., New Jersey: Merrill Prentice Hall; Bigge, ML & Shermis, SS 1999 Learning Theories for Teachers, 6th ed., NY: Longman; Driscoll, MP 2000 Psychology of Learning for Instruction, 2nd ed., Boston: Allyn and Bacon.
4. Compulsory.
5. Otília Fernandes.
6. 2 h/week (1 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes; 2/3 of practical classes are compulsory.
8. In accordance with the University's Regulations, two written tests or a final exam – 100%.
9. No.
10. 3.

2nd year

1. Motorial Development - 1165.
2. The prenatal Period. Biological changes in Infancy. Basic Concepts. Maturation. Growth. Maturation. Growth and Physical Activity. Motor-perceptive Development. Development of Motor Activities.
3a) No prerequisites.
3b) To understand the physical development of the children of the 0 to the 6 years. To understand the modifications in the motor behaviour resultant of the process of maturation, growth and development of the child; to dominate the techniques of comment and evaluation: basic growth, motor abilities, motor-perceptive Development and playful - motor.
3c) DeHart, G et al. 1992 Child Development, McGraw-Hill; Malina, R & Bouchard, C 1991 Growth, maturation, and physical activity, Champaign Il: Human Kinetics; Gallahue, D 1993 Development Physical Education for Today's Children, 2ª ed., Iowa: Wm. C. Brown & Benchmark; Mourão-Carvalhal, I 2000 Efeitos da Interacção dos factores socioculturais, biológicos e motores na prestação das habilidades motoras, corrida, salto, lançamento e pontapé em crianças de 7 e 8 anos de idade, Tese de Doutoramento, Vila Real, UTAD.
4. Compulsory.
5. Carlos Fernando Avelens Freitas.
6. 3 h/week (2 theoretical + 2 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. 1 written work and 1 theoretical test.
9. No.
10. 4.

1. Visual Expression and Communication - 1166.
2. The development of communication process with special attention to the children drawing process. Study of the visual communication grammar.
3a) No prerequisites.
3b) Learn communication Knowing the visual communicational scheme (see and look, polissemics, signification and meaning) and the visual grammar (point, line, texture, structure, harmony and kao's).. Be able to be expressive with textile and ceramics tools. To know simply reproduction technology. Learn the evolution of children drawing (3 to 6 years) and understand his development.
3c) Amegon, S 1987 Pour une pédagogie active et créative, Quebec: PUF; Barret, M 1979 Educação em arte, Lisboa: Presença; Gandara, M 1990 Desenho infantil, Lisboa: Texto Editora; Gardner, H 1994 Educación artística y desarrollo humano, Barcelone: Paidos; Grignas, J 1987 Création de dévis éducatifs, Québec, JRPA; Griffond, J 1987 La Naturaleza de la inteligencia humana, Barcelona: Paidós; Maslow, A 1987 La Personalidad creadora, Barcelona: Kairos; Ravenne, C 1989 Être creatif, Paris: Esf.
4. Compulsory.
5. Ângela Cardoso.
6. 4 h/week; 1st semester; 2nd year.
7. Lectures/practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Two atelier works (originality and flexibility). 1 report (case study) about children expression and drawing (research), and a board process newspaper.
9. No.
10. 5.

1. Dramatic Expression I - 1167.
2. The body and the voice as instruments of expression and communication: the personal and projective dramatic play.
3a) No prerequisites.
3b) Development of the expression/communication capacities. Clime to the encouragement and development of the creativity and critic mind.
3c) Barret, Gisèle 1990 Pédagogie de L'Expression Dramatique, Paris, Feijoo; Gomes, A & Rolla, J 2003 Brincar a ser - Expressão e Educação dramática – 1º ciclo, Porto Editora; Houle, M 1987 Jeu Apprentissage, Les entreprises culturelles en Canada.
4. Compulsory.
5. Marcelino de Sousa Lopes.
6. 4 h/week; 1st semester; 2nd year.
7. Theoretical-practical classes.
8. Participation and practical work with oral discussion - 60%; final writing work - 40%.
9. No.
10. 4.

1. Computers in Education - 0228.
2. Introduction to Information and Communication Technologies and to Computer Systems. Introduction to Windows Operating System. Text Processing. Electronic edition and presentation tools, Internet and World Wide Web. Introduction to educational computer activities.
3a) No prerequisites.
3b) This chair will have to allow to the pupil the familiarization with the concepts and basic tools of the technologies of the information, understood of the point of view of the user; to get abilities that allow itself to continue the enrichment of its knowledge and abilities in the domain of the technologies of the information; to strengthen the appropriation of these concepts and tools, of form to be capable operationally to explore them in contexts that if coat with practical relevance for its future activity, of student and professional.
3c) Manuals or reference books of Microsoft's Office 2000 or Office XP and ToonTalk Software. Notes elaborated by the professors of the chair.
4. Compulsory.
5. Ramiro Gonçalves.
6. 3 h/week; 1st semester; 2nd year.
7. Theoretical-practical classes. Accomplishment of practical tasks.
8. According to University Regulations. Attendance in 2/3 of classes is compulsory. Accomplishment of one written test of examination + Practical work or final exam.
9. No.
10. 3.

1. Nutrition, First Aids and Traumatology - 1168.
2. Nutrition and health. Normal nutrition and therapeutic diets for infants. Nutritional management of diseases and disorders for infants. Firsts aids.
3a) No prerequisites.
3b) To recognise the importance of diet in relation to health and the role of the Educator in nutrition education and health promotion. To know proceedings in firsts aids.
3c) Lifshitz, F 1982 Pediatric nutrition – Infant feedings, dificiences, diseases; Ministério da Educação 1995 Manual de Primeiros Socorros, Acidentes nas Escolas, Jardins de Infância e Campos de Férias. Ministério da Educação.
4. Compulsory.
5. Sandra Celina Fernandes Fonseca.
6. 3 h/week (2 theoretical + 2 practical); 1st semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 1 written test and 1 work group or a final exam – 100%.
9. No.
10. 3.

1. Observation of Educational Activities I - 1169.
2. Early Childhood institutions characterization; legal and curricular foundations of Early Childhood education; observation for self-education and for inquiry; data collection techniques: observation techniques.
3a) No prerequisites.
3b) To acquire essential knowledge to understand Early Childhood Institutions and surrounding communities; to be able to use observation processes and instruments in self-education and research contexts.
3c) Estrela, A 1984 Observação de classes e formação de professores, Lisboa: Fundação Caclouste Gulbenkian; Ministério da Educação 1997 Legislação. Lisboa: ME, DEB, GEDEP; Ministério da Educação 1997 Orientações curriculares para a educação pré-escolar, Lisboa: ME, DEB, GEDEP.
4. Compulsory.
5. Maria Isabel Barros Morais Costa.
6. 5 h/week (1 theoretical + 4 practical); 1st semester; 2nd year.
7. Lectures and practical classes; seminars with small groups; participant oriented observation in different contexts of Early Childhood Education.
8. Portfolio related to the theoretical syllabus and the topics observed; continuous evaluation about the participant oriented observation.
9. No (but possible in English and Spanish, upon request).
10. 7.

1. Theory and Curriculum Development - 1170.
2. The historical considerations and theoretical perspectives in the field: approaches to the concept of Curriculum: curriculum definitions and conceptions. From monocultural to common/comprehensive curriculum – intercultural/inclusive curriculum: the intervenient in curriculum planning and development; a look at the curriculum praxis; contributions to integrate cultural diversity in curriculum with/as a concern focus upon common/comprehensive curriculum – intercultural/inclusive curriculum; principles and criteria for the curriculum development: education reforms/changes; the pillars of education reforms/changes; analysis of the curriculum orientations in Pre-school education.
3a) No prerequisites.
3b) Analysing the aims and purposes of different theories; thinking over theories and practice of curriculum development; rethinking curriculum practice in education reforms and changes; analysing the curriculum purposes in Early Childhood Education.
3c) Gimeno Sacristán, J 1988 El curriculum: una reflexión sobre la práctica, Madrid, Ediciones Morata; Lundgren, UP 1992 Teoría del curriculum y escolarización, Madrid, Ediciones Morata, SA; Torres Santomé, J 1994 Globalización e interdisciplinaridad: el curriculum integrado, Madrid, Ediciones Morata.
4. Compulsory.
5. Américo Nunes Peres.
6. 3h/week (2 theoretical + 1 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Evaluation is negotiated with the students, thus according to the established in this institution. Final Evaluation: final exam.
9. Spanish, French, English.
10. 5.

1. Motorial Learning - 0612.
2. Fundamental motor learning concepts. Task analysis. Motor learning models and theories. Memory; retention and transfer theories. Motor learning factors: previous, concomitants and posteriors. Learning phases.
3a) Good knowledge on psychology and psychophysiology.
3b) Provide an introduction to motor learning concepts; to understand the changes in motor behaviour becoming from motor learning process; to understand the relationship between how to teach and how to learn; to diagnose the most appropriated learning strategies and experiences to increased performance.
3c) Godinho, M et al. J 2002 Controlo motor e aprendizagem fundamentos e aplicações, 2ª ed., Cruz Quebrada: FMH; Schmidt, R & Wrisberg, C 2000 Motor learning and performance a problem-based learning approach, 2ª ed., Champaign ILL: Human Kinetics; Schmidt, R & Lee, T 1999 Motor control and learning: a behavioral emphasis, 3ª ed., Champaign, ILL: Human Kinetics Pub.
4. Compulsory.
5. Maria Isabel Mourão Carvalhal.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Written work, both essay type and problem solving, is an integral part of all semester. Assessment is based on coursework (CW) and end-of-semester exam (E). The final degree (FD) is based on this formula: FD = (3*CW + 7*E)/10.
9. No.
10. 5.

1. Cognitive Developmental Psychology - 1171.
2. Cognitive Developmental Psychology: an overview. Cognitive, moral, social and affective development in preschool children.
3a) No prerequisites.
3b) To familiarize students with the major topics and theories in cognitive development.
3c) Corine, M 1999 ABC de la Psychologie de l'Enfant, Paris: Jacques Grancher; Lourenço, O 1997 Psicologia de Desenvolvimento Cognitivo, Coimbra: Almedina; Lourenço, O 1992 Psicologia do Desenvolvimento Moral, Coimbra: Almedina; Papalia, D et al. 2001 O Mundo da Criança, Lisboa: McGraw-Hill.
4. Compulsory.
5. Otília Fernandes.
6. 3 h/week (2 theoretical + 1 practical); 2nd semester; 2nd year.
7. Lectures and practical classes (attendance in 2/3 of practical classes is compulsory).
8. Essay – 50%; Frequency test – 50%.
9. No.
10. 3.

1. Portuguese Expression Techniques - 1172.
2. Research methodologies in Social and Human Sciences. The oral text. The written text. The orthography. Orthographic correction. Textual typology.
3a) No prerequisites.
3b) Students should be able to use certain linguistic contents in oral and written communication; text production inserted in different typologies; to learn and use research methods in social and human sciences.
3c) Rei, JE 1994 Curso de Redacção II – O Texto, Porto, Porto Editora; Cunha, C & Cintra, L 1986 Nova Gramática do Português Contemporâneo, 3ª ed., Lisboa, Sá da Costa; Costa, Maria Rosa s.d. A Pontuação, Porto: Porto Editora.
4. Compulsory.
5. Teresa Moura.
6. 2 h/week; 2nd semester 2nd year.
7. Lectures classes.
8. One written text or a final examination.
9. No.
10. 3.

1. Dramatic Expression II - 1173.
2. Body and voice work. Development of the creativity. Corporal and dramatic expression.
3a) No prerequisites.
3b) To develop the dramatic language as a way of expression and communication with the group as a kind of game in a way to develop him self.
3c) Barret, Gisèle 1986 L'expression dramatique, pour une théorie de la pratique, Université de Montréal, Québec; Courtney, R 1976 Jogo, teatro e pensamento, Edições Perspectiva, S. Paulo (Brasil); Ryngaert, J-P 1986 O Jogo dramático no meio escolar, Ed. Centelha; Laferrière, G 1997 La pedagogía puesta en escena, Naque Editora.
4. Compulsory.
5. Marcelino de Sousa Lopes.
6. 4h/week; 2nd semester; 2nd year.
7. Theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Participation in the classes and a final report of the course (30%); Plan of the creation work (30%); Act and presentation in the class the creation work (40%).
9. No.
10. 5.

1. Children's Literature II - 1175.
2. Poetry for children. Folk and traditional poetry. Formal characteristics. Phonologic, rhythmic and metric structures. Lexical, syntactic e rhetoric aspects. Traditional and Oral Children's poetry and Contemporary Children's poetry. Pedagogic and artistic usage of poetry for children. The role of poetry in children's creativity and its educational importance.
3a) No prerequisites.
3b) To acquire the necessary knowledge relevant to the study of the poetic in Children's Literature. To awaken the child's sensitivity to poetry. To understand the pedagogic and entertainment function of poetry. To develop the ability to understand and analyse the Poetry for children.
3c) Andersen, Sophia de Mello Breyner (org.) 2001 Primeiro Livro de Poesia – Poemas em Língua Portuguesa para a Infância e a Adolescência, 7ª ed., Lisboa, Editorial Caminho; Diogo, A 1994 Literatura Infantil - História, Teoria, Interpretações, Porto, Porto Editora; Gomes, JA 1991 Literatura Para Crianças e Jovens, Lisboa, Caminho; Magalhães, A 2001 O Limpa-Palavras e Outros Poemas, 2ª ed., Porto, Edições Asa; Mesquita, AT 1998 A Fábula, Vila Real, UTAD; Mesquita, AT 1999 A Estética da Recepção na Literatura Infantil, Vila Real, UTAD; Pires, Maria Laura s.d. História da Literatura Infantil Portuguesa, Lisboa, Vega; Rodari, G 1982 Gramática da Fantasia, S. Paulo, Summus Editorial; Vieira, Alice 1999 Eu Bem Vi Nascer o Sol – Antologia da Poesia Popular Portuguesa, 4ª ed., Lisboa, Editorial Caminho.
4. Compulsory.
5. Armindo Mesquita, José Miguel Almeida.
6. 2 h/week; 2nd semester; 2nd year.
7. Theoretical lessons, encouraging the individual and group interaction, participation and interest on the suggested activities and strategies.
8. Students must do one written test (with or without a project work) or a final exam for those who couldn't do it. Attendance in 2/3 of practical lessons is compulsory.
9. No.
10. 3.

1. Plastic Expression and Communication - 1176.
2. Sculpting with simple (Form and function, Learn to Work at three dimensions and texture and structure). Be expressive with recovery materials and be able to make express puppet production.
3a) General information about visual and technological communication.
3b) Experiences with three-dimensional works in order to know the fundamental elements of sculpture
3c) Girgnas, J 1987 Création de dévis éducatifs, Québec, JRPA; Griffond, J 1987 La matualeza de la inteligencia humana, Barcelona: Paidós; Maslow, A 1987 La personalidade creadora, Barcelona: Kairos; Ravenne, C 1989 Être créatif, Paris: Esf.
4. Compulsory.
5. Ângela Cardoso.
6. 3 h/week; 2nd semester; 2nd year.
7. Lectures/practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Practical works and written essays.
9. No.
10. 3.

1. Observation of Educational Activities II - 1177.
2. Early Childhood institutions characterization (specific topics). Activities description. Data collection techniques: inquiry to key-informants.
3a) No prerequisites.
3b) To foster students increased integration in the observed activities. To foster students understanding of the activities and contexts observed. To foster self-organization and research processes which can be useful to the future professionals.
3c) Ghiglione, R & Matalon, B 1993 O inquérito: teoria e prática, 2ª ed., Oeiras: Celta, pp. 89-98; Ministério da Educação 1997 Educação Pré-escolar: perguntas e respostas, Lisboa: ME, GEDEP; Zabalza, M 1991 Didáctica da educação infantil, Rio Tinto: Edições Asa.
4. Compulsory.
5. Maria Isabel Barros Morais Costa.
6. 5 h/week (1 theoretical + 4 practical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Portfolio related to the theoretical syllabus and the topics observed; continuous evaluation about the participant oriented observation.
9. No (but possible in Spanish or English).
10. 7.

3rd year

1. Cooperation in Educational Activities I - 1335.
2. Educational Intervention. Practical Planning. Space and Materials. Time and activity's management. Preliminary School's Projects. Pedagogy Project.
3a) No prerequisites.
3b) Supporting progressive integration, adaptation and participation/cooperation, guided during teaching activity on school-work community. Promoting acquisition and development of competences in the area of methods and techniques connected to the process of teaching/learning. Helping educational projects' intervention through planning, reflection and evaluation, in such a way to lead the student(s) to a more conscientious and fitted cooperation. Promoting critical reflection and debate around Preliminary Teaching's present issues and problems, in order to develop practical and cognitive competences.
3c) Hohmann, M et al. 1992 A Criança em Acção, Lisboa: Fundação Calouste Gulbenkian; Hohmann, M & Weikart, DP 1997 Educar a Criança, Lisboa: Fundação Calouste Gulbenkian; Ministério da Educação 1997 Orientações Curriculares para a Educação Pré-Escolar, Lisboa: Editorial do Ministério da Educação; Zabalza, MA 1992 Didáctica da Educação Infantil, Rio Tinto: Edições ASA.
4. Compulsory.
5. Maria José dos Santos Cunha.
6. 6 h/week (1 theoretical + 5 practical); 1st semester; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of lectures classes is compulsory.
8. Evaluation of the pedagogical practice and report/portfolio of the evidence of knowledge.
9. No.
10. 8.

1. Educational Devices - 0769.
2. Educational mechanisms and its relation towards the curriculum. Educational mechanism on pre-school context. Dramatic game and theatre as educational mechanisms. Articulation of the educational-recreational-didactics dimensions towards the production and using processes of the different educational mechanisms.
3a) No prerequisites.
3b) Developing a critical-reflexive attitude about the using of the recreational-didactics' materials used by teacher(s). Sensitise to the main importance of the selection, planning, management and evaluation of the materials used at the kindergarten. Stimulate creativity, responsibility and autonomy, in order to improve its best intervention towards the utilization and organization of the kindergarten's materials.
3c) Agüera, I 2002 Viva el Teatro! Madrid: Narcea; Aguilar, LF 2001 Expressão e Educação Dramática, Lisboa: IIE; Ander-Egg, E & Idáñez, MJA 1997 Cómo elaborar un proyecto. Guia para diseñar proyectos sociales y culturales, Madrid: Instituto de Ciências Sociales Aplicadas; Leite, C & Rodrigues, ML 2001 Jogos e Contos numa Educação para a Cidadania, Lisboa: IIE.
4. Compulsory.
5. Maria José dos Santos Cunha.
6. 3 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes. Attendance in 2/3 of lectures classes is compulsory.
8. According to University Regulations, 1 educational project of animation and 1 individual file with work proposals or a final exam – 100%.
9. No.
10. 3.

1. Special Education - 0630.
2. Portuguese legislation. Special education. Current trends. Psychopathology and Neuropathology in children. Learning disabilities. Gifted children.
3a) No prerequisites.
3b) To reflect on the importance of Special Education in the School and the Society. To appeal to the sensitivity of future professors on the specificities of children with special needs. To understand the pathology and the limitations of the child. To reflect on eventual alterations in Special Education in the age of the multimedia.
3c) Bautista, R 1997 Necessidades Educativas Especiais, Dinalivro, Lisboa; Correia, LM 1997 Alunos com Necessidades Educativas Especiais nas Classes Regulares, Porto Editora, Porto; Damásio, A 1995 O Erro de Descartes, Europa América, Lisboa; Ministério da Educação, Dec.-Lei n.° 319/91 de 23 de Agosto, Diário da República, 1ª Série; Morato, A 1998 Deficiência Mental e Aprendizagem, Secretariado Nacional para a Reabilitação das Pessoas com Deficiência, Lisboa; Schneeberger de Athayde, J 1987 Elementos de Psicopatologia; Fundação Calouste Gulbenkian, Lisboa.
4. Compulsory.
5. Francisco Costa Barros.
6. 2 h/week; 1st semester; 3rd year.
7. Lectures classes.
8. Test or final exam.
9. No.
10. 3.

1. Methodology of Musical Expression I - 1336.
2. Curricular Orientations. Theories of the teaching/learning of Musical Education. Musical-pedagogical tendencies of the 20th century: Dalcroze, Orff, Kodály, Martenot, Willems, Suzuki, van Hauwe, Wuytack and others.
3a) No prerequisites.
3b) To know the Curricular Orientations of the pre-school education in what concerns to the Musical Expression. To know the actual methodologies of the musical-pedagogical tendencies.
3c) Gordon, E E 2000 Teoria de Aprendizagem Musical para Recém-nascidos e Crianças em Idade Pré-escolar, Lisboa: Fundação Calouste Gulbenkian; Mejia, Pilar 2002 Didáctica de la Música, Madrid: Pearsons Education, SA; Ministério da Educação 1997 Orientações curriculares para a educação pré-escolar, Lisboa: ME. DEB, GEDEP.
4. Compulsory.
5. Agostinho da Costa Dinis Gomes.
6. 3 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. In accordance with the pedagogical rules, the evaluation takes into in account the assiduity, the participation, the elaboration of a work of group with presentation and the accomplishment of a frequency or final examination.
9. No.
10. 4.

1. Methodology of Plastic Expression - 1337.
2. Define and distinguish aims, strategies and resources; use the plan, project, control and evolution notions.
3a) General information about visual and technological communication.
3b) The purpose of this discipline to make students to consider plastic on a integral and interdisciplined developed area.
3c) Amengon, S 1987 Pour une Pédagogie active et créactive, Quebec; Barret, M 1979 Educação em arte, Lisboa: Presença. Gandara, M 1990 Desenho infantil, Lisboa: Texto Editora; Gardner, H 1987 Educación artístic y desarrollo humens, Barcelona: Paidós.
4. Compulsory.
5. Ângela Cardoso.
6. 3 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Practical works (50%) and written essays (50%).
9. No.
10. 4.

1. Methodology of Motorial Activities - 1338.
2. Physical education methodology: direct, semi-direct and free. Long, medium and short lessons plans. Observation methodology. Success factors in the teaching learning process: academic learning time, feedback and affectivity.
3a) Good knowledge on methodology, motor development and motor learning.
3b) To know how to plan and to implement motor activities in kindergarten.
3c) Gallahue, D 1993 Development physical education for today's children, 2ª ed., Iowa: Wm. C. Brown & Benchmark.
4. Compulsory.
5. Maria Isabel Mourão Carvalhal.
6. 3 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes.
8. Written work, both essay type and problem solving, is an integral part of all semester. Assessment is based on coursework (CW) and end-of-semester exam (E). The final degree (FD) is based on this formula: FD = (3*CW + 7*E)/10.
9. No.
10. 4.

1. Methodology of Natural Sciences - 1339.
2. The ecological consumer; Studying ecosystems; The interaction in ecosystems: the involving part of man in ecosystems, natural resources, waste and conservation of nature; Morph physiologic study of some vertebrates; Botany: root, stalk, leaves, flowers and fruits.
3a) No prerequisites.
3b) To understand and acquire attitudes of respect towards the environment, taking into consideration its present conditions/state, as well as its threats. To acquire scientific Knowledge related to some characteristics of beings.
3c) Tedesco, JC 1997 Ser Professor num Mundo em Mudança; Zabalza, MA 1991 Los darios de classe: documento para estudiar cualitativamente los dilemas prácticos de los professores, Barcelona, PPU; Ministério da Educação 1990 Ensino Básico: programas do 1º ciclo, Algueirão, Editorial do ME.
4. Compulsory.
5. Luís Manuel Monteiro de Oliveira.
6. 3 h/week; 1st semester; 3rd year.
7. Theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Presentation of a separate essay regarded to the contents and a final exam.
9. No.
10. 4.

1. Cooperation in Educational Activities II - 1340.
2. Educational Intervention. Practical Planning. Projects in Pre-school Education. Quality and projects in Pre-school education.
3a) No prerequisites.
3b) To promote progressive and oriented integration, adaptation and participation/co-operation in teaching practice in the school community. To promote the acquisition and development of competences, methods and techniques related with the teaching-learning process. To enhance the intervention in the educational processes through sessions of planning, reflection and evaluation in order to lead the pupil to a more conscious and adjusted co-operation. To promote the critical reflection and discussion of the most actual questions and problems of pre-school education, as a way of developing cognitive and practical competences.
3c) Brickman, NA & Taylor, LS 1996 Aprendizagem Activa, Lisboa: Fundação Calouste Gulbenkian; Franco, JA et al. 1998 Experiências Inovadoras no Ensino. Inovação Pedagógica, Lisboa: Instituto de Inovação Educacional; Hohmann, M & Weikart, DP 1997 Educar a Criança, Lisboa: Fundação Calouste Gulbenkian; Ministério da Educação 1997 Orientações Curriculares para a Educação Pré-Escolar, Lisboa: Editorial do Ministério da Educação; Oliveira Formosinho, J (org.) 1996 Educação Pré-Escolar – A construção social da moralidade, Lisboa: Texto Editora.
4. Compulsory.
5. Maria José dos Santos Cunha.
6. 6 h/week (1 theoretical + 5 practical); 2nd semester; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of lectures classes is compulsory.
8. Evaluation of the pedagogical practice and report/portfolio of the evidence of knowledge.
9. No.
10. 9.

1. Intercultural Education - 0576.
2. Cultures and globalization. Intercultural era. New sceneries for the public/formal school: from the assimilationist school to plural/democratic school: from segregation (exclusion) to integration (inclusion). Intercultural Education in action: critical perspectives in education: principles, concepts and contradictions around Intercultural Education; models of Multi-intercultural Education. Educators' studies supported on an intercultural view: the needs of new professional elements and competences to face school diversity; assistance in structuring the multi-intercultural educator.
3a) No prerequisites.
3b) Migration's history and intercultural concepts. Thinking over the construction of an effective public/formal school blended with quality; analysing theories and experiences of intercultural education; rethinking models of education studies with an intercultural view.
3c) Peres, AN 1999 Educação Intercultural: utopia ou realidade? Porto, Profedições; Rey, M 1986 Former les enseignants à l'éducation interculturelle? (Les travaux du Conseil de la coopération culturelle (1977-1983), Strasbourg, Conseil de L'Europe; Stoer, SR & Cortesão, L 1999 Levantando a Pedra, Porto: Edições Afrontamento.
4. Compulsory.
5. Américo Nunes Peres.
6. 2 h/week; 2nd semester; 3rd year.
7. Lectures classes.
8. Evaluation is negotiated with the students, thus according to the established in this institution. Final Evaluation: final exam.
9. Yes, Spanish, French, English.
10. 3.

1. Propaedeutics of Reading and Writing Acquisition - 1342.
2. Early conceptions about written language. Relations between metaphonological development and reading and writing acquisition. The acquisition of phonemic awareness in kindergarten. Models of reading and writing development. Kindergarten activities that promote reading and writing learning facilitation.
3a) No prerequisites.
3b) To provide an explanation and understanding of cognitive and linguistic processes underpinning reading and writing acquisition. To provide an explanation and understanding of reading and writing development, particularly in kindergarten and pre-school years. To provide the understanding of kindergarten role on formal reading and writing learning facilitation.
3c) Curto, LM et al. 2000 Escrever e Ler, vols. 1 e 2, Porto Alegre: ArtMed Editora; Harris, M & Hatano, G (eds.) 1999 Learning to read and write, Cambridge, Cambridge University Press; Morais, J 1998 Arte de Ler: Psicologia Cognitiva da Leitura, Lisboa, Cosmos; Vale, P 1999 Correlatos metafonológicos e estratégias iniciais de leitura-escrita de palavras no português: uma contribuição experimental, Dissertação de doutoramento, Vila Real, UTAD; Viana, FLP 2002 Da Linguagem Oral à Leitura, Lisboa: Fundação Calouste Gulbenkian.
4. Compulsory.
5. Ana Paula Vale.
6. 3 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes.
8. Written report about children metaphonological assessment experiment - optional 50%. Exam from 50% to 100%.
9. No.
10. 4.

1. Methodology of Dramatic Expression - 1341.
2. Models of dramatic practices in education. The dramatic expression in pre-school education: privileged moments, aims and activities.
3a) No prerequisites
3b) Acquisition of theoretic-practical in dramatic expression teaching in pre-school.
3c) Barret, Gisèle 1990 Pédagogie de L'Expression Dramatique, Paris, Feijoo; Cardoso, C 1998 Pour une formation pluraliste en Expression Dramatique, Tese de Doutoramento, Université de la Sorbonne, Paris; Martins, A 1998 Actividades dramáticas nos jardins-de-infância Luso-Chineses, Macau, Fundação Macau e Direcção do Serviços de Educação e Juventude.
4. Compulsory.
5. Marcelino de Sousa Lopes.
6. 3 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes.
8. Participation and practical work with oral discussion - 60%; final writing work - 40%.
9. No.
10. 4.

1. Social and Personal Training - 1641.
2. Legal framework; Analysis of the curricular reform for Primary Education (Dec. 6/2001). The notion of Citizenship (Individual experience; Historical note; The Declaration of Human Rights and The Universal Citizenship. Who am I? – Personal Identity (The Relationship of personal identity with the dimensions of action, emotion, consciousness, freedom and project, pain, suffering and death). I and others (the person as a being facing another; human relations, human groups and ties of belonging; Conflict, indifference, communication; The Spoken work and Silence; freedom, tolerance and autonomy; Solidarity, commitment, communion). The pedagogical relationship: its specificity and values. The training: a permanent process of personal growth.
3a) No prerequisites.
3b) Analyse your own personal growth. To affirm your own autonomy, responsibility and consciousness as a unique being. To respect your own rights as well as others according to the Justice system and equality. To formulate judgements based on your own decision making process. To act coherently with the values found. To identify the pedagogical meaning (and its possible contradictions) of intentional acts or unconsciously educational. To consider oneself as a subject of a permanent process of growing and training, assuming the responsibility for its implementation in the context of the subject, of the course, of the assignment, of the job, of life.
3c) Ministério da Educação 1997 Lei de Bases do Sistema Educativo; Lei 6/87, Lei-Quadro da Educação Pré-Escolar, Departamento da Educação Básica, Núcleo de Educação Pré-Escolar; Delors, J 1996 A Educação. Um Tesouro a Descobrir, Relatório para a UNESCO da Comissão Internacional sobre Educação para o século XXI, Porto, Ed. Asa; Csikszentmihalyi, M 1998 Novas atitudes mentais. Uma psicologia para o terceiro milénio, Lisboa, Círculo de Leitores; Frankl, VE 1993 Découvrir un sens à sa vie, Québec, Editions de l'Homme; Gusdorf, G 1991 Les Écritures du moi: Lignes de Vie I, Paris, Edtions Odile Jacob; Marques, R 1990 Educação Cívica e Desenvolvimento Pessoal e Social, Lisboa, Texto Editora; Patrício, MF 1992 Formação Pessoal e Social no Quadro da Escola Cultural, Évora, AEPEC.
4. Compulsory.
5. Maria da Conceição Azevedo, Francisco Barros.
6. 2 h/week; 2nd semester, 3rd year.
7. Lectures classes.
8. Final exam and practical assignments.
9. No.
10. 3.

1. Methodology of Mathematics - 0501.
2. Importance of Mathematics in Preschool: A propose of Mathematics for Preschool; Space and ambient organization in classroom. The educator role in Mathematics teaching; Choosing problems solving methodologies; Capacities versus Knowledge; Formal knowledge versus informal knowledge. Mathematics Domain: Logical principles; Identification; Classification; Form Collections; To serialize and to order; Number; Form and find patterns. Classroom environment: Problem solving; Communicating; Group work; Playing activities.
3a) Acquired Mathematical concepts along the High-school and Academic teaching.
3b) To provide students the basics concepts of Mathematical Analysis.
3c) Barros, Maria Guilhermina 1997 Emergência da Matemática no Jardim de Infância, Porto: Porto Editora; Ministério da Educação 1997 Orientações Curriculares para a Educação Pré-Escolar, Lisboa: Departamento da Educação Básica; Smole, Kátia 2000 Brincadeiras Infantis nas Aulas de Matemática, Porto Alegre: Artes Médicas.
4. Compulsory.
5. Pedro Barroso Magalhães.
6. 3 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes.
8. 3 practical works with discussion 50%; Final written exam 50%.
9. No.
10. 4.

1. Theory and Techniques of Creativity - 1343.
2. Understand the relation between game and children development. To know the creative process and creativity theories and technology (cognitive and humanistic model). Understand Interdisciplinary and creativity process. Apply creativity skills-to game and script (cartoon and film).
3a) No prerequisites.
3b) Know techniques of creativity development. Domain the main theories of creativity process; Develop creative mind and intelligence
3c) Gingras, J 1987 Création de dévis éducatifs, Québec, JRPA; Guilford, J 1987 La matualeza de la inteligencia humana, Barcelona: Paidós; Maslow, A 1987 La personalidad creadora, Barcelone: Kairos; Ravenne, C 1989 Être créatif, Paris: Esf.
4. Compulsory.
5. Ângela Cardoso.
6. 3 h/week; 2nd semester; 3rd year.
7. Theoretical-practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Practical works of recover materials; game or synopsis of visual script (original and clear). Board process newspaper.
9. No.
10. 3.

4th year

1. Internship - 1352.
2. Students are responsible for curriculum development and implementation in real Early Childhood classes; promoting learning methodologies (articulated with Student-teacher Training Seminar).
3a) No prerequisites.
3b) To foster student-teachers ability to be autonomous and critical in their educative performance.
3c) Please, c.f. bibliography of the Student-teacher Training Seminar. In addition, bibliography is recommended to each student-teacher according to their needs.
4. Compulsory.
5. Maria Isabel Barros Morais Costa, Maria Alcina Lopes de Carvalho.
6. 15 h/week; annual; 4th year.
7. Practical classes. Supervised pedagogical practice in Early Childhood real classes; sessions of reflection about pedagogical practice with the supervisors.
8. Portfolio related to the sessions of pedagogical practice.
9. No.
10. 22.

1. Internship Seminar - 1353.
2. General and specific profile of Early Childhood teachers; curriculum development for Early Childhood Education; project development in Early Childhood schools.
3a) No prerequisites.
3b) To foster the integration of scientific and pedagogic issues relevant to the future Early Childhood teacher. To guide student-teachers in understanding the pedagogical models that sustain their practices.
3c) Cardona, Maria João 1997 Para a história da Educação de Infância em Portugal: o discurso oficial (1834-1990), Porto: Porto Editora; Formosinho, Júlia (org.) 1996 Modelos curriculares para a educação de infância, Porto: Porto Editora; Ministério da Educação 1997 Orientações curriculares para a educação pré-escolar, Lisboa: ME, DEB, GEDEPE.
4. Compulsory.
5. Maria Isabel Barros M. Costa, Vanda Maria F. Soeima Gonçalves.
6. 15 h/week; annual; 4th year.
7. Lectures classes; tutorial sessions with groups of student-teachers.
8. Continuous assessment; written work about an official text about curriculum development for Early Childhood Education.
9. No.
10. 3.

1. Themes of Contemporary Culture - 1143.
2. Social and Personal Education. Education for Human Rights. Consumer's Education. Health Education. Environmental Education. Political Education. Sexual Education.
3a) No prerequisites.
3b) Reflecting, investigating and analysing questions connected to the contemporary themes that fascinate or affright the nowadays society. Promoting moments of active participation, reflection, criticism and debate, in order to gradually acquire conscience to the need of taking part on an active society. Acquire a general sight of today's world and its problems.
3c) Byrne, K 2001 Anorexia e Bulimia, S. João do Estoril: Principia; Caride, JA & Meira, PA 2001 Educación ambiental y desarrollo humano, Barcelona: Ariel; Conselho Nacional de Educação 2000 Educação Intercultural e Cidadania, Lisboa: Editorial Ministério Educação; Watkins, KP & Durant, L 2001 Cómo trabajar com niños y familias afectados por las drogas, Madrid: Narcea; Vieira, CT & Vieira, RM 2000 Promover o Pensamento Crítico dos Alunos, Porto: Porto Editora; Vinuesa, MP 2002 Construir los valores, Bilbao: Desclée De Brouwer.
4. Compulsory.
5. Maria José dos Santos Cunha.
6. 3 h/week; 1st semester; 4th year.
7. Lectures classes. Attendance in 2/3 of lectures classes is compulsory.
8. According to University Regulations, 1 written test, 1 group work/presentation and participation in the class or a final exam – 100%.
9. No.
10. 5.

1. Educational Administration and Organization - 0227.
2. Different organizational matters. Organizational theories and school organization. Educational management's organization. School's administrative structure. Instruments to the school's autonomy. Administrative organs and school's management. Principles and guiding. Strategic management at schools. Job and Career Status.
3a) No prerequisites.
3b) Enable future teachers to the critical analysis of the educational administration towards different theories. Acknowledge the organizational structure of Public Administration. Analysing principles and guiding of the autonomy's regimen, administration and management of public schools, from the Portuguese Law 115-A/98. Analysing and reflecting the kind of strategic management. Promoting reflections about Teachers career Status – Job, Career, Performance's Evaluation.
3c) Costa, JA et al. 2000 Liderança e estratégia nas organizações escolares, Aveiro: Universidade de Aveiro; Estêvão, C 1998 Gestão estratégica nas escolas, Lisboa: IIE; Lima, LC 1992 A escola como organização e a participação na organização escolar, Braga: Instituto de Educação da Universidade do Minho; Whitaker, P 2000 Gerir a mudança nas escolas, Porto: ASA.
4. Compulsory.
5. Maria José dos Santos Cunha.
6. 3 h/week; 2nd semester; 4th year.
7. Lectures classes. Attendance in 2/3 of lectures classes is compulsory.
8. According to University Regulations, 1 written test, 1 group work/presentation and participation in the class or a final exam – 100%.
9. No.
10. 5.

Primary School Teaching

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Developmental Psychology	4.0	Mathematics I	5.0
	History of Education	4.0	Philosophy of Education	4.0
	Musical Expression	5.0	Motor Activity	4.0
	Anthropology of Education	4.0	Psychology of Education	4.0
	Theory and Methods of Educational Research	5.0	Children's Literature	5.0
	Elements of Physics	4.0	Life Sciences	4.0
	Option I	4.0	Earth Sciences	4.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Theories of Curriculum and Curriculum Develop.	4.0	Education Sociology	4.0
	Mathematics II	5.0	Educational Technologies	5.0
	Informatics of Education	4.0	Phonetic and Morphology of Portuguese	4.0
	Portuguese Syntax and Semantics	4.0	Portugal's Geography	4.0
	Elements of Chemistry	4.0	Portugal History	4.0
	Plastic Expression	5.0	Reading and Writing Acquisition	5.0
	Theories of Learning	4.0	Dramatic Expression	4.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	Special Education	4.0	Mathematics Methodology	5.0
	Educational Communication	4.0	Methodology of Portuguese	5.0
	Personal and Social Development	3.0	Intercultural Education	3.0
	Social Sciences Methodology	5.0	Health Education	3.0
	Observation and Planning	5.0	Expressions Methodology	6.0
	The Methodology of Natural Sciences	5.0	Cooperation in Teacher training	8.0
	Educational Organization	4.0		
	Total	30.0	Total	30.0
4th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Themes of Contemporary Culture	4.0	Environmental and Consumer Education	5.0
	Option II	3.0		
	Period of Training (Annual)	40.0		
	Seminar on Teacher Training (Annual)	8.0		
	Total	55.0	Total	5.0

Total studies: 240

1st year

1. Developmental Psychology - 0180.
2. Developmental Psychology: an overview. Conceptions of infancy, childhood and adolescence. Physical, cognitive, social and affective development in infancy. Physical, cognitive, social and affective development in childhood. Physical, cognitive, social and affective development in adolescence.
3a) No prerequisites.
3b) To understand the Developmental Psychology as a dynamic body of methods and knowledge. To understand the human development as a dynamic process that is constantly changing and growing.
3c) Corine, M 1999 ABC de la Psychologie de l'Enfant, Paris: Jacques Grancher; Lourenço, O 1997 Psicologia de Desenvolvimento Cognitivo, Coimbra: Almedina; Papalia, AD et al. 2001 O Mundo da Criança, Lisboa: McGraw-Hill; Sprinthall, N & Collins, W 1999 Psicologia do Adolescente, Lisboa: Calouste Gulbenkian.
4. Compulsory.
5. Eduardo Cruz.
6. 3 h/week (2 practical + 1 theoretical); 1st semester; 1st year.
7. Theory and practical classes (attendance in 2/3 of practical classes is compulsory).
8. Essay – 50%; Frequency test – 50%.
9. No.
10. 4.

1. History of Education - 0206.
2. Western Education: Greece and Rome. European Education in Middle Ages: importance of Christianism. Renascence and Enlightment: 'racionality'. Rousseau, Pestalozzi, Herbart and Froebel. XXth Century; "New School" moovement, Paulo Freire.
3a) No prerequisites.
3b) To know authors and crucial times for the development of Education. To analyze present times in order to preview future solutions.
3c) Abbagnano, Nicola & Visalberghi, A 1982 História da Pedagogia, Livros Horizonte, Lisboa; Bowen, J 1985 Historia de la Educación Occidental, Herder, Barcelona; Chateau, J s/d Os Grandes Pedagogos, Lisboa, Livros do Brasil.
4. Compulsory.
5. Carlos Alberto Magalhães Gomes Mota.
6. 3 h/week (2 practical + 1 theoretical); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Written essay.
9. No.
10. 4.

1. Musical Expression - 0518.
2. To value the musical expression and the creativity to develop research methods.
3a) No prerequisites.
3b) It is intended, through the body and the musical instruments to take the students to a group of existences that they allow them to develop its capacities in a progressive way.
3c) Martins Maria de Lurdes 1995 Música para crianças; Pierre, B & Hauver, PV 1997 Viva a Música; Fírmino, J 1998 Canções instrumentais para a Educação Musical.
4. Compulsory.
5. Agostinho Gomes.
6. 4 h/week (2 practical + 2theoretical); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Report (30%); Participation (20%); exam (50%).
9. No.
10. 5.

1. Anthropology of Education - 1144.
2. To introduce students to the Educational Anthropology, its concepts and methods, focusing on the complexity of human people and processes of knowledge.
3a) No prerequisites.
3b) Educational Anthropology: epistemology, basic concepts and methods. Objectives and Educational foundations: complexity of human nature and educability. Civilization, culture and processes of personalization and socialization; Education as a complex anthropological project: aims, global developement (biological, intelectual, social and cultural); freedom and autonomy; comunication and conviviality. Multiculturality and tolerance.
3c) Barbosa, M 1997 Antropologia Complexa do Processo Educativ, Braga: UM, IEP; Carvalho, AD 1992 A Educação como Projecto Antropológico, Porto: Afrontamento; Fullat, O 1997 Antropologia Filosofica de la Educación, Barcelona: Ariel.
4. Compulsory.
5. Carlos Maia and Manuel Barroso Magalhães.
6. 2 h/week; 1st semester; 1st year.
7. Lectures classes.
8. Continuous evaluation or final exam.
9. No.
10. 4.

1. Theory and Methods of Educational Research - 1145.
2. General guidelines for educational research design. Basic methods and techniques of empirical educational research. Basic methods and techniques of documentary educational research. Organisation and writing of research reports.
3a) No prerequisites.
3b) To promote a scientific attitude concerning educational problems. To develop skills for the exploitation of scientific literature. To offer a theoretical and practical basis to collect, analyse and interpret educational data.
3c) Azevedo, C & Azevedo, A 1998 Metodologia Científica. Contributos práticos para a elaboração de trabalhos académicos, 4ª edição. Porto: Ed. C. Azevedo; Bogdan, R & Sari, B 1994 Investigação Qualitativa em Educação. Uma Introdução à Teoria e aos Métodos, Porto: Porto Editora; Fox, D 1987 El processo de investigación en educación, 2ª edição. Pamplona: Ediciones Universidad de Navarra; Serrano, P 1996 Redacção e Apresentação de Trabalhos Científicos, Lisboa: Relógio d'Água Editores.
4. Compulsory.
5. João Bartolomeu Rodrigues and Isabel Costa.
6. 3 h/Week (2 practical + 1theoretical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Small written essay or small researh project. Written examination.
9. No.
10. 5.

1. Elements of Physics - 1146.
2. The wave nature of light. Laws of reflection and refraction laws. Image formation: plane mirrors. The color. Rectilinear motion in one dimension. Introduction to the concepts of velocity and acceleration. Newton's laws of motion. Gravitational interaction. Weight and mass. Archimedes law. Electric charge. Electrostatic interaction. Electric current. Electric current intensity, potential difference and resistance. Analysis of simple circuits; series and parallel circuits.
3a) No prerequisites.
3b) To provide students with a set of fundamental concepts from Physics. Students should be able to use correctly these concepts in the description and interpretation of everyday phenomena.
3c) Sá, JG de 1994. Renovar as Práticas no 1º Ciclo pela Via das Ciências da Natureza Porto Editora. Porto; Carvalho, R 1995 A Física no Dia-a-Dia, Relógio D´Água. Lisboa.
4. Compulsory.
5. Maria Adelaide Andrade and Joaquim Moreira.
6. 3 h/week (2 practical + 1 theoretical); 1st semester; 1st year.
7. Lectures and practical classes.
8. Final written exam 60%; and practical work 40%.
9. No.
10. 4.

1. Mathematics (Levelling) - 0001
2. Statistics: terms and concepts; rates of occurrence; graphs, measure of location and dispersion, bidimensional division-, Relations of order in $\Re$: the whole of royals numbers and the real straight, the whole $\Re$ as ordinate whole, interspaces of real numbers, modulus of a real number, in equations, problems which resolution is make with 1st or 2nd degree of equations; Functions: generalities, aim function, quadratic functions, successions.
3a) No prerequisites.
3b) The aim of this subject is to provide the students who attended Mathematics up to the 9th form and those who attended Methods Quantitative in the 10th form, with the same level of knowledge of the students who attended Mathematics up to the 12th form.
3c)
4. Compulsory.
5. Helena Monteiro.
6. 4 h/week (2 practical + 2 theoretical), 1st semester, 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, final exam -100%.
9. No.
10. 4.

1. Portuguese Grammar - 1159.
2. Phonetics e Phonology (the sounds of the speech and the sound of the language, consonant and vowel classification, Morphology (word subclasses, morphologic analysis and classification); Syntax (sentence, clause and complete sentence, simple sentence and complex sentence), Orthography and writing improvement.
3a) High School - Portuguese B.
3b) To proceed the study of the Portuguese language in terms of a general introduction to some basic grammatical aspects; to identify and classify the phonemes of the Portuguese language; to analyse and classify morphological and syntactically; to produce texts with orthographic correction.
3c) Bechara, E 2002 Moderna Gramática Portuguesa, 37ª ed., Rio de Janeiro, Ed. Lucerna; Vilela, M 1999 Gramática da Língua Portuguesa, Coimbra, 2ª ed., Almedina; Cunha, C & Cintra, L 1987 Nova Gramática do Português Contemporâneo, 4ª ed., Lisboa, Ed. Lisboa, Sá da Costa; Mateus, Maria Helena et al 2003 Gramática da Língua Portuguesa, 5ª ed., Lisboa, Caminho.
4. Compulsory.
5. Sónia Nogueira.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 1st year.
7. The students induce the theoretical principles or they receive the conceptual schemes for deduction and practical analysis, comparing, resorting to exhibitions or to participated lessons, working individually or in group.
8. One written test (frequency) or a final examination (exam) for those who can’t do the frequency.
9. No.
10. 4.

1. Mathematic I - 0209.
2. Bivalent logic: logical values and prepositions; logical operations; Logical operation's properties. Conjunct's theory: conjuncts and conditions; Conjuncts and operations; Conjuncts operations' properties. An intuitive approach to numbers from the naturals to the real Numbering systems: binary relation; General and Arithmetic notions.
3a) No prerequisites.
3b) Having the knowledge and the skills that able the autonomy and precision in the instruction of mathematics concepts.
3c) Barros, MG 1971 Conjuntos Numéricos, Porto editora; Matos, JM & Serrazina, L 1997 Didáctica da Matemática, Universidade Aberta, Lisboa; Mendelson, E 1964 Introduction to Mathematical Logic, D. Van Nostrand Company; National Council of Tacher's of Mathmatics 1991 Normas para o currículo e a avaliação em matemática escolar, APM e IIE, Lisboa.
4. Compulsory.
5. Helena Monteiro and Teresa Chaves.
6. 3 h/week (2 practical + 1 theoretical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Final Written exam – 100%.
9. No.
10. 5.

1. Philosophy of Education - 0220.
2. Epistemological introduction: Education as action; Knowledge in Education - epistemological paradigms; Statute and tasks of a Philosophy of Education. Towards a philosophical anthropology of education: The educational process as anthropogenesis; (Non)Meeting between nature and civilization; Educate towards what? Towards an educational axiology 1. Previous questions (Judgements based on value/Judgements based on fact; What are values?; Universal values or relative values?; Is an education of values possible? And legitimate?). What values should there be for education? (Education and effectiveness; Education and leisure/game; Education and beauty; Education and truth; Education and being good/morality; Education and Transcendentalism). Educational deontology (Concepts of deontology and educational deontology; Deontology of the educators and the educated). Axiological tables and pedagogical theories: Reading and critical analysis of the following works: Plato - The Apology of Socrates: St. Agoustus – The Master, Paulo Freire - Pedagogy of Autonomy (required reading can vary from one year to the next).
3a) No prerequisites.
3b) Objectives of the field. To characterize the educational reality as an activity and as an object of knowledge and research.; To analyse the various dimensions of man as a subject of the educational reality at its starting point, process and finalities; to identify the axiological universe as a fundamental objective of the educational process; to distinguish the present values in a certain theory or educational practice.
3c) Carvalho, AD 1988 Epistemologia das Ciências da Educação, Porto, Ed. Afrontamento;.Dias, JR 1997 Abertura a uma reflexão sobre as metamorfoses da Pedagogia, Revista Portuguesa de Educação; Fullat, O 1992 Filosofías de la Educación: Paideia, Barcelona, CEAC; Fullat, O 1997 Antropologia filosófica de la educación, Barcelona, Ariel Educación; Patrício, M 1993 Lições de axiologia educacional, Lisboa, Universidade Aberta.; Réboul, O 1992 Les valeurs de l'éducation, Paris, PUF.
4. Compulsory.
5. Maria da Conceição Azevedo and Carlos Maia.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester, 1st year.
7. Theoretical and practical classes.
8. Final exam and assignments about the required reading.
9. No.
10. 4.

1. Motor Activity - 0366.
2. Motor. development. Biological organization of all the growing process. Exercise and maturation process. Program of Physical Education for primary school.
3a) No prerequisites.
3b) Provide knowledge about motricity and ad quire the principles of the primary program of physical education for schools. Ad quire practical knowledge for a simulation in a practical class.
3c) Boulch, J 1984 La Educacion psicomotriz en la escuela primaria, .ediciones Paidós Ibérica, S.A; Robert, R 1987 Moticidade Humana, Edicões Pila Teleña. Madrid; Malina, R & Bouchard, C 1991 Growth, maturation and physical activity.Champaign Il: Human Kinetics.
4. Compulsory.
5. Dolores Monteiro and Luís Vaz.
6. 4 h/week (2 theoretical + 2 practical); 2nd semester; 1st year.
7. Lectures and practical classes.
8. Assessment is based on a course practical work (CPW) and end-of-semester exam (E). The final degree (FD) is based on this formula: FD = (CPW + E)/2.
9. No.
10. 4.

1. Psychology of Education - 0435.
2. Developmental factors: Hereditary versus Environment. Developmental theory of Jean Piaget: educational implications. Social factors in intellectual development: Vygotsky: educational implications. Bruner: discovery learning: educational implications. Behaviorism: Skinner: educational implications.
3a) No prerequisites.
3b) To introduce our students to educational psychology in relation to teacher' work in a school setting.
3c) Piaget, J & Inhelder, B 1977 La psychologie de l'enfant, Que sais-je?; Peixoto, F 1993 Bruner: a importância da educação, Cadernos de Educação de Infância; Vygotsky and Education 1990 Instructional implications and applications of sociohistorical psychology, Cambridge University Press.
4. Compulsory.
5. Eduardo Cruz and Otília Fernandes.
6. 3/week (1theoretical + 2practical); 2nd semester 1st year.
7. Lectures and practical classes.
8. Test or final exam.
9. No.
10. 4.

1. Children's Literature - 1148.
2. Children's Literature and its different contexts. Universal Children's Literature. Origins and evolution of Children's Literature in Europe and in Portugal. The contemporary Children's Literature: ruptures e continuities. Children's Literature and the imaginary. Children's Literature: fantasy and reality. The child and its magic world. Children's Literature: the school's context and the promotion of reading habits. Communication and Folk Literature. Short-stories and poetry for children. The Contemporary Portuguese Children's Literature.
3a) No prerequisites.
3b) To acquire the necessary knowledge relevant in the theoretical and literary approach to Children's Literature. To understand how the magic and fantastic text work. To be aware of the importance of the short-story and poetry as a means to solve the children's developing problems. To increase the ability to understand and analyse the Literature for children.
3c) Barreto, AG 2002 Dicionário de Literatura Infantil Portuguesa, Porto, Campo das Letras; Bravo-Villasante, Carmen 1977 História da Literatura Infantil Universal, 2 vols., Lisboa, Vega; Gomes, JA 1991 Literatura Para Crianças e Jovens, Lisboa, Caminho; Mesquita, A 1999 A Estética da Recepção na Literatura Infantil, Vila Real, UTAD; Mesquita, A (Coord.) 2002 Pedagogias do Imaginário – Olhares sobre a literatura infantil, Porto, Asa; Pires, Maria Laura s/d História da Literatura Infantil Portuguesa, Lisboa, Vega; Rodari, G 1982 Gramática da Fantasia, S. Paulo, Summus Editorial.
4. Compulsory.
5. Armindo Mesquita and José Miguel Almeida.
6. 6h/week (4 practical + 2 theoretical); 2nd semester; 1st year.
7. Lectures and practical lessons encouraging the individual and group interaction, participation and interest on the suggested activities and strategies
8. Students must do one written test (with or without a project work) or a final exam for those who couldn't do it. Attendance in 2/3 of practical lessons is compulsory.
9. No.
10. 5.

1. Life Sciences - 1149.
2. Life on Hearth, life origin theories; Taxonomy; The cell, cellular structure, fungi and lichens; Organic and inorganic elements essential to life; Plant evolutionary adaptations, angiosperms, gymnosperms, seeds germination; Photosynthesis and respiration; Vegetal anatomy and physiology; Human anatomy and physiology; Human alimentary needs; AIDS; Drugs, symptoms and consequences.
3a) Not applicable – Introductory discipline.
3b) To provide an actualized formation on Life Sciences; To promote the reflective thought on science; To foment the elaboration and execution capacity of group works, where the accomplishment of experiences occupies an important paper in results demonstration.
3c) (2002) A vida ao microscópio, Blocos 1 e 2; Gonçalves, Salomé & Amaral, Carla (ed.) 1984 Biologia Funcional, Porto Editora; Carvalho, A et al. (ed.) 1992 Livraria Almedina, Coimbra; Human Anatomy, Internacional Edition; Robert, Carola et al. (ed.) 1980 Microbiologia, McGraw-Hill, NY: Volume 1; Pelczar, RC (ed.) 1982 Tratado de Botânica, McGraw-Hill, São Paulo: 6ª Edição. Strasburger. Ed: Marin, Barcelona.
4. Compulsory.
5. João Coutinho and Luís Oliveira.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester; 1st year.
7. Theoretical and practical lessons.
8. As described on the Pedagogic Norms. Continuous evaluation (1 written test, covering the Theoretical and theoretical -practical lectures) or a final exam.
9. Not applicable.
10. 4.

1. Earth Sciences - 1150.
2. Morphogenesis of Earth. Origin of life. Alimentary needs. Nutrition and metabolism.
3a) No prerequisites.
3b) To know and apply different kind o rocks. To know and understanding the differents theories related to the origin and evolution of beings. To discover the importance of health eating habits.
3c) Rosnay, J 1984 As origens da Vida, Coimbra, Almedina; Pais, MS 1983 Noções de Biologia Celular, Lisboa, Difusão Editorial; Gass, IG et al 1984 Vamos Compreender a Terra, Coimbra, Almedina.
4. Compulsory.
5. Luís Oliveira and José Carlos Leitão.
6. 3 h/week (2 practical + 1 theoretical); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 1 written test or a final exam – 100%.
9. No.
10. 4.

2nd year

1. Theories of Curriculum and Curriculum Development - 0214.
2. The historical considerations and theoretical perspectives in the field: approaches to the concept of Curriculum: curriculum definitions and conceptions. From monocultural to common/comprehensive curriculum – intercultural/inclusive curriculum: the intervenient in curriculum planning and development; a look at the curriculum praxis; contributions to integrate cultural diversity in curriculum with/as a concern focus upon common/comprehensive curriculum – intercultural/inclusive curriculum; principles and criteria for the curriculum development: education reforms/changes; the pillars of education reforms/changes; analysis of the curriculum orientations in Elementary Education.
3a) No prerequisites.
3b) Analysing the aims and purposes of different theories; thinking over theories and practice of curriculum development; rethinking curriculum practice in education reforms and changes; analysing the curriculum purposes in Elementary Education.
3c) Sacristán, JG 1988 El curriculum: una reflexión sobre la práctica, Madrid, Ediciones Morata; Lundgren, UP 1992 Teoría del curriculum y escolarización, Madrid, Ediciones Morata, S.A; Santomé, JT 1994 Globalización e interdisciplinaridad: el curriculum integrado, Madrid, Ediciones Morata.
4. Compulsory.
5. Américo Nunes Peres and Carlos Ferreira.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 2nd year.
7. Theory and practice
8. Evaluation is negotiated with the students, thus according to the established in this institution. Final Evaluation: final exam.
9. No.
10. 4.

1. Mathematic II - 0216.
2. Plan and space Geometry: polygons and polygon lines; regular polyhedrons and not regular, convex and concave polyhedrons; Platonic solids; Platonic solids; Concepts of: straight line, semi –straight line and straight line segment; Plan definition; Relative position of straight lines and plans; Deduction of the area formula's and of the polygons perimeter's. Solid formula's deduction; Relation between areas and volumes of similar figures. Plan transformation: Vectorial calculus; Symmetrical definition; Translation; Rotation and Homothety; Transforming composing; Plan similarities. Greatness: greatness characteristic's; Measures and units of measuring. The calculator in teaching / learning mathematics process.
3a) No prerequisites.
3b) Having the knowledge and the skills that able the autonomy and precision in the instruction of mathematics concepts.
3c) Barros, DM 1986 As Geometrias e o Ensino da Geometria; Barros, DM Geometria para o Ensino Primário, Sugestões para workshops; Fernandes, DM 1994 Educação Matemática no 1º Ciclo de Ensino Básico, Porto Editora; Fernandes, DM Aprender Matemática com a Calculadora e a Folha de Cálculo, Porto Editora.
4. Compulsory.
5. Helena Monteiro and Teresa Chaves.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Final Written exam – 100%.
9. No.
10. 5.

1. Informatics in Education. - 0228.
2. Introduction: information/data, informatics. Computer structure and functioning. Hardware / Software. Operating systems: importance, study grounds, constituents programs. Windows operating system: basics notions, advanced notions and specifications. Word text processor: basics notions and advanced notions. Pedagogic auxiliary construction across presentation software – Power Point. Internet utilization: context, basics notions, services and examples. Education support exercises.
3a) No prerequisites.
3b) Give the student with knowledge of computer functioning and informatics utility in the context of the education process.
3c) Fera, 2000 Curso Integrado de Introdução à Informática; Fera, 2000 Curso Integrado de Windows, Fera 2000 Curso Integrado de Word; Ferreira, AM Encontrar Informação Certa na Web, FCA, Editores.
4. Compulsory.
5. Hugo Silva and Manuela Soares.
6. 3 h/week; 1st semester; 2nd year.
7. Lectures and laboratories.
8. Written test 20%, Laboratory 80%.
9. No.
10. 4.

1. Portuguese Syntax and Semantics - 0312.
2. Historical approach of syntax; sentence grammar; text grammar.
3a) No prerequisites.
3b) To prepare students to teach the Portuguese language at an intermediate level in secondary schools, enabling them through detailed discussions and reflection to acquire a sound knowledge of the ways the language operates.
3c) Vilela, M 1999 Gramática de Valências: Teoria e Aplicação, Almedina, Coimbra; Vilela, M 1996 Gramática da Língua Portuguesa, Almedina, Coimbra; Fonseca, J 1993 Estudo de Sintaxe-Semântica e Pragmática do Português, Porto Editora, Porto.
4. Compulsory.
5. Gonçalo Fernandes and José Machado.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. One written test at the end of the semester and/or final written examination.
9. No.
10. 4.

1. Elements of Chemistry - 0516.
2. Chemistry and its contributions to a more integrated vision of science in Primary School. Some basic concepts in the context of daily problems and controversies: - Atomic structure of matter; short historical evolution and the state of knowledge; - Air, atmosphere and climatic changes; - Water, particularities of its chemical structure and its influence on the life existence; - Energy and energetic resources.
3a) It would be desirable that they had previous bases on scientific formation when beginning the career.
3b) Taking into account that the majority of the students background is not on scientific areas, the aims are: - To make them understand and value the dimension of scientific culture in the children and young people cultural development; - (Re) construct basic concepts required to work with the 1st Cycle programme and its contents; - Develop attitudes and capacities in order to get a better and clear understanding of the world, including the capacity of intervention.
3c) ACS 1993 Chemistry in the Community, Dubuque: Kendall-Hunt; Burton, G. et al. 1994 Salters Advanced Chemistry, London: Heinnman; Gonçalves, ME (Org.) 2000 Cultura Científica e Participação Pública, Oeiras: Celta Ed.; Reiss, MJ 1993 Science Education for a Pluralist Society, Buckingham: Open Univ. Press.
4. Compulsory.
5. Manuela Jorge and Anair Leite.
6. 3 h/week (1 theoretical + 2 pratical); 1st semester; 2nd year.
7. Theoretical with a more expositive aspect around texts, videos. Practical carrying out courses of C/T/S/A mobilizing contents above-mentioned.
8. Diagnosis. To make: - a group work evolving experimental activities (60%); - an individual test (40%). Evaluation of the discipline.
9. No.
10. 4.

1. Plastic Expression - 0529.
2. Polissemic system, signification and meaning and visual grammar (point, line texture, structure, harmony and kaos). Understand interdisciplinary and creativity process, applying creativity skills to game and script.
3a) General information about visual and technological communication.
3b) Polissemic system, signification and meaning and visual grammar (point, line texture, structure, harmony and kaos). Understand interdisciplinary and creativity process, applying creativity skills to game and script.
3c) Berger, J 1972 Modos de ver, Lisboa: Ed. 70; Kandinsky, W 1970 Ponto, linha e plano, Lisboa: Ed. 70; Munari, B 1981 Das coisas nascem coisas, Lisboa: Ed. 70; Osborn, 1970 A apreciação da Arte, Lisboa: Vertente; Read, H 1993 A educação pela Arte, Lisboa: Caminho.
4. Compulsory.
5. Domingos Júnior and Ângela Cardoso.
6. 4 h/week; (2 theoretical + 2 practical)); 1st semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 classes is compulsory.
8. Pratical works (50%) and written essays (50%).
9. No.
10. 5.

1. Theories of Learning - 0597.
2. Learning Theories. Educational Implications of Learning Theories. Motivation and its Implications to Education. Maturity and its Implications to Education. Social Conditioning. The Problem of Retention and Forgetting. The Problem of Transfer.
3a) No prerequisites.
3b) To provide students with a comprehensive picture of some of the major educational psychological theories and issues and to develop their implications for the teaching and learning process.
3c) Alberto, PA & Troutman, AC 2003 Applied Behavior Analysis for Teachers, 6th ed. New Jersey: Merrill Prentice Hall; Bigge, ML & Shermis, SS 1999 Learning Theories for Teachers, 6th ed. NY: Longman; Driscoll, MP 2000 Psychology of Learning for Instruction, 2nd ed. Boston: Allyn and Bacon.
4. Compulsory.
5. Rosangela Bertelli and Otília Fernandes.
6. 3 h/week (2 practical + 2 theoretical); 1st semester; 2nd year.
7. Lectures and practical classes. 2/3 of practical classes required.
8. In accordance with the University's Regulations, two written tests or a final exam – 100%.
9. No.
10. 4.

1. Education Sociology - 0190.
2. Sociology: a brief history of the discipline. Education Sociology: sources, intervention areas and development vocations. Education and sociological tendencies. Social education search: evolution, meanings and consequences. Sociological interest studies: the place of education in society.
3a) No prerequisites.
3b) Development of a theorical framework and of reflection about education from a sociological perspective. Reflection about social functions of school.
3c) Arroteia, JC Análise Social da Educação e Acção Educativa, Aveiro: Universidade de Aveiro; Giddens, A Sociology, Cambridge: Polity Press; Pinto, CA 1995 Sociologia da Escola, Lisboa: Ed. McGraw Hill de Portugal.
4. Compulsory.
5. Artur Cabugueira and Maria João Carvalho.
6. 3 h/week (2 practical + 1 theoretical); 2nd semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. A written test and a work or a final exam.
9. No.
10. 4.

1. Educational Technologies - 0221.
2. Historical and conceptual introduction to Instructional Technology. Learning theories: their impact on the instructional process. The Instructional design paradigm. Stages of the ID process. Instructional media: instructional purpose and production techniques. The New Technologies of Instruction.
3a) No prerequisites.
3b) To know the diverse Educational Technology traditions, their concepts and theoretical foundations. To be able to use the instructional design process to design an instructional plan. To be familiar with the main kinds of instructional media, with an emphasis on the new information technologies.
3c) Robert, MG (Ed.) 1987 Instructional Technology, Foundations, Hillsdale, NJ: LEA; Heinich, M et al. 1998 Instructional Media and Technologies for Learning, (6th ed.). Prentice Hall.
4. Compulsory.
5. José Costa Pinto, Ana Maria Bastos and Carla Marques.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations. 1 written test (60%) and two practical assignments (40%).
9. No.
10. 5.

1. Phonetic and Morphology of Portuguese - 0307.
2. Human language and phonetic universe of communication. Distinction of phonetic and phonology. Different theories of phonetic and phonology. Portuguese phonologic systems. Flexional and derivational morphology. Morphologic analyses of Portuguese. Formation of words.
3a) No prerequisites.
3b) To acquire knowledge of Portuguese language; to know methods of linguistic analyses on phonetic, phonology and morphology levels; to accede techniques of practical analyses from pragmatic linguistic situations, to learn how to develop didactic units on phonetic, phonology and morphology levels.
3c) Barbosa, JM 1994 Introdução ao Estudo da Fonologia e Morfologia do Português, Coimbra, Almedina; Coseriu, E 1986 Introduction a la Linguistica, 2ª ed., Madrid; Faria, H (org.) 1996 Introdução à Linguística Geral e Portuguesa, Lisboa, Ed. Caminho; Martins, MRD 1988 Ouvir Falar – Introdução à Fonética do Português, Lisboa, Ed. Caminho; Mateus, MHM 1998 Fonética, Fonologia e Morfologia do Português, Lisboa, U. A.; Vilela, M 1979 Estruturas lexicais do Português, Coimbra, Almedina, 1979.
4. Compulsory.
5. Rui Dias Guimarães and Felicidade Morais.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 2nd year.
7. Lectures and practical classes. Maps. Notes. Exercises on phonetic, phonology and morphology.
8. Constraint: attendance to 2/3 of practical classes. According to the rules, 2 periodic tests (each 50%) or a test and investigation, or a final exam 100%.
9. No.
10. 4.

1. Portugal's Geography - 0517.
2. Geographical education values. The child and the space. Portugal's physical outlines. The population. Rural activities. The industry. The urban agglomeration. The regional unbalances. Portugal's natural regions. Portugal's place in the world.
3a) No prerequisites.
3b)To make contact with Portugal's homogeneity and heterogeneity. To relate the knowledges in Portugal's Geography with other related subjects in order to learn the global character of the environmental studies. To develop the Geographic culture, the space knowledge abilities and the ability to "think the space".
3c) Arroteia, JC 1985 Portugal: perfil geográfico e social, Lisboa, Livros Horizonte; Daveau, Suzane 1995 Portugal Geográfico, Lisboa, Edições João Sá da Costa.
4. Compulsory.
5. António Manuel de Sousa Pires.
6. 3 h/week; 2nd semester; 2nd year.
7. Lecture classes. Attendance in 2/3 of the classes is compulsory.
8.According to University Regulations, 1 written test or a final exam - 100%.
9. No.
10. 4.

1. Portugal History - 0528.
2. Origins, formation and evolution of Portugal. Education and culture in the medieval period. Portugal in the 15th century: humanism and experience. Portugal in the 17th century. The Enlightenment period.
3a) No prerequisites.
3b) To provide a rigorous information that makes possible a critical reflection of the Portugal History namely the educative and cultural problematic.
3c) Cortesão, J 1966 Os factores democráticos da formação de Portugal, Lisboa, Livraria Portugália; Marques, A 1982 História de Portugal, Lisboa, Ed. Palas; Matoso, J 1993 História de Portugal, Lisboa, Círculo de Leitores; Saraiva, AJ 1994 A Cultura em Portugal, Lisboa, Gradiva; Serrão, JV 1977 História de Portugal, Lisboa, Ed. Verbo; Serrão, J 1981 Dicionário de História de Portugal, Liv. Figueirinhas.
4. Compulsory.
5. Manuel Silva Gonçalves.
6. 3 h/week; 2nd semester; 2nd year.
7. Lectures practical classes.
8. According to University Regulations, 1 written test or a final exam - 100%
9. No.
10. 4.

1. Reading and Writing Acquisition - 0532.
2. Relations between metaphonological development, specifically phonemic acquisition, and reading and writing acquisition. Phonological and orthographic inputs in reading and writing development, particularly in Portuguese. Models of reading and writing development. Reading and writing disabilities.
3a) No prerequisites.
3b)
To provide an explanation and understanding of cognitive and linguistic processes underpinning reading and writing acquisition. To analyse different models of reading and writing development.
3c) Berninger, VW & Richardes, TL 2002 Brain literacy for Educators and Psychologists, Amsterdam: Academic Press; Harris, M & Hatano, G (eds) 1999 Learning to read and write, Cambridge, Cambridge University Press; Hoien, T & Lundberg, I 2000 Dyslexia: from theory to Intervention, Dordecht: Kluwer; Morais, J 1998 Arte de Ler: Psicologia Cognitiva da Leitura, Lisboa, Cosmos; Vale, P 1999 Correlatos metafonológicos e estratégias iniciais de leitura-escrita de palavras no português: uma contribuição experimental, Dissertação de doutoramento. Vila Real, UTAD; Viana, FLP 2002 Da Linguagem Oral à Leitura, Lisboa: Fundação Calouste Gulbenkian.
4. Compulsory.
5. Ana Paula Vale.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Written report about children spelling assessment - optional 50% Exam from 50% to 100%.
9. No.
10. 5.

1. Dramatic Expression - 0534.
2. The body and the voice as instruments of expression and communication: the personal and projective dramatic play.
3a) No prerequisites.
3b) Development of the expression/communication capacities. Clime to the encouragement and development of the creativity and critic mind.
3c) Aguilar, L 2001 Expressão e Educação Dramática-Guia Pedagógico para o 1º ciclo do ensino básico, IIE, Lisboa; Barret, Gisèle 1990 Pédagogie de L'Expression Dramatique, Paris, Feijoo; Gomes, A & Rolla, J 2003 BRINCAR A SER-Expressão e Educação dramática – 1º ciclo, Porto Editora; Houle, M 1987 Jeu Apprentissage, Les entreprises culturelles enr. Canada.
4. Compulsory.
5. Carlos Cardoso and Marcelino Lopes.
6. 4 h/weekly (2 practical + 2 theoretical); 2nd semester, 2nd year.
7. Lectures and practical classes.
8. Participation and practical work with oral discussion - 60%; final writing work - 40%.
9. No.
10. 4.

3rd year

1. Special Education - 0630.
2. Portuguese legislation. Special education. Current trends. Psychopathology and Neuropathology in children. Learning disabilities. Gifted children.
3a) No prerequisites.
3b) To reflect on the importance of Special Education in the School and the Society. To appeal to the sensitivity of future professors on the specificities of children with special needs. To understand the pathology and the limitations of the child. To reflect on eventual alterations in Special Education in the age of the multimedia.
3c) Bautista, R 1997 Necessidades Educativas Especiais, Dinalivro; Lisboa; Correia, LM 1997 Alunos com Necessidades Educativas Especiais nas Classes Regulares, Porto Editora; Porto; Damásio, A 1995 O Erro de Descartes, Europa América; Lisboa; Ministério da Educação; Dec.-Lei n.° 319/91 de 23 de Agosto; Diário da República; 1ª Série A; Morato, P 1998 Deficiência Mental e Aprendizagem, Secretariado Nacional para a Reabilitação das Pessoas com Deficiência; Lisboa; Schneeberger de Athayde, J 1987 Elementos de Psicopatologia, Fundação Calouste Gulbenkian; Lisboa.
4. Compulsory.
5. Francisco Costa Barros and Eduardo Cruz.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Test or final exam.
9. No.
10. 4.

1. Educational Communication - 1139.
2. Conceptual delimitation of the discipline. The History of Communication. Communication in the age of television. Theories of Communication. Models of Educational Communication. Communication and relations.
3a) No prerequisites.
3b) To reflect on the role of technique and communication in the contemporary civilization and the school. To argue about the advantages and disadvantages of media and communication uses in educational relations. To analyze the connections between the evolution of technique, communication and education. To ponder the alterations introduced in the education in this age of the television. To rethink the education for media.
3c) Cloutier, J 1975 A Era de Emerec ou a Comunicação Áudio-Scripto-Visual na hora dos Self-Media, Lisboa, ITE; Flichy, Patrice 1991 Une Histoire de la Communication Moderne. Espace Public et vie Privée, Paris, La Découvert; Breton, P 1992 A Utopia da Comunicação, Lisboa, Instituto Piaget; Olivier, B 1992 Communiquer pour enseigner, Paris, Hachette; Postman, N Tecnopolia. Quando a Cultura se rende à Tecnologia, Lisboa, Difusão Cultural; Zabalza, AN 1985 Introducción à la Comunicación Didáctica, Santiago de Compostela, Tórculo Ediciones.
4. Compulsory.
5. Joaquim José Jacinto Escola and Francisco Costa Barros.
6. 4 h/week (2 practical + 2 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Test or final exam.
9. No.
10. 4.

1. Personal and Social Development - 1140.
2. Interpersonal relations. Social life. Health. Environment. Consumption.
3a) No prerequisites.
3b) To acquire a new ethical conscience on the main current problems; To understand the new implications of a planetary citizenship; To analyse and to understand the nature of emergent ethical discourse; To identify oneself with one or more ethical discourse; To learn to reflect critically on the moral and ethical discourse in education.
3c) A.A.V.V. 1998 Repensar a Cidadania nos 50 anos da Declaração Universal dos Direitos do Homem, Ed. Notícias. Lisboa; Baptista, I 1998 Ética e educação. Estatuto ético da relação educativa, Univ. Portucalense, Porto; Barbas, S 1998 Direito ao Património Genético, Almedina, Coimbra; Conseil de l'Europe (s/d) Education à la citoyenneté mondiale. Education à la solidarité internationale, Strasbourg; Eco, U 1998 Cinco Escritos Morais. Difel, Lisboa; Hodge, J 1995 Heidegger e a ética, Instituto Piaget, Lisboa; Hottois, G 1990 O Paradigma bioético, Ed. Salamandra, Lisboa; Kagan, J & Lamb, S 1990 The emergence of morality in young children, The University of Chicago Press; Lipovestsky, G 1998 A era do Vazio. Ensaio sobre o individualismo contemporâneo, Relógio d'Água, Lisboa; Morin, E & Progogine, E 1998 A sociedade em busca de valores, Instituto Piaget, Lisboa; Namer, G & Cingolani, P 1995 Morale et Société, Meridiens Klinesieck, Paris; Martins, GO 1993 Escola de Cidadãos, Ed. Fragmentos, Lisboa; Valadier, P 1998 A anarquia dos valores. Será o relativismo fatal?, Inst. Piaget, Lisboa; Vidal, M & Santidrian, P 1983 Ética personal. Las actitudes éticas, Vols.1,2 e 3, Madrid.
4. Compulsory.
5. Maria da Conceição Azevedo and Francisco Costa Barros.
6. 3 h/week (2 practical + 1 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Test or final exam.
9. No.
10. 3.

1. Social Sciences Methodology - 1152.
2. The social sciences. Social sciences methodology; environmental studies methodology. Environmental studies tips for teaching.
3a) No prerequisites.
3b) To develop abilities linked to the methodology of social sciences and environmental studies in a global view. To develop several strategies according to the social and familiar heterogeneity of children. To create the ability to teach citizenship education.
3c) Roldão, Mª do Céu 1995 O Estudo do Meio no 1º ciclo, Lisboa, Texto Editora; Ricardo, Mª Manuel et al. 1994 O trabalho de Projecto, Lisboa, Texto Editora.
4. Compulsory.
5. António Manuel Pires and Artur Cabugueira.
6. 3 h/week (2 practical+ 1 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University regulations, 1 written tests + work presentation or final exam (100%).
9. No.
10. 5.

1. Observation and Planning – 1295.
2. The discipline initiates a wider area and more directly implicated in the construction of teaching professionalism, generally designated as Practical Pedagogy, in a narrower collaboration with teachers of local Schools. This way, the themes to work on can't be restricted to the ones that are enunciated and considered as being essentials: I – Importance of observation and reflection, theoretically well-funded, in teachers formation and in professional life. Models of observation. Techniques and instruments for gathering information. The role of the observer. II – Participated observation of different appearances of educational reality. The space and the resources. The educative relation. Interaction teacher – student and between students. Pedagogical models and teaching methodologies. The evaluation process. The current curricular reorganization: the diverse projects and their connection with the work classroom.
3a) The basic and structural disciplines should have permitted to develop conceptual tables that facilitate informed and critical "reading" of what is being observed.
3b) Contribute for personal and professional development of the students that are future teachers so that they can assume themselves as subject of their own formation, building competences (knowledge, capacities, attitudes and values) needed for their professional functions. In an attitude of permanent questioning and actualisation of their practices, as being social actors intervening in the educative process.
3c) Estrela, A 1990 Teoria e Prática de Observação de Classes, Lisboa: Inic; Canário, R 1992 Inovação e Projecto Educativo de Escola, Lisboa: Educa; Gomez, MT 1993 Como Criar uma Boa Relação Pedagógica, Porto: Ed. Asa; Leite, E et al. 1989 Trabalho de Projecto - Aprender por Projectos Centrados em Problemas, Porto: Afrontamento; Perrenoud, PH 1993 Práticas Pedagógicas, Profissão Docente e Formação, Lisboa: Dom Quixote; Pollard, A 2000 Reflective Teaching in the Primary School – A Handbook for the Classroom, 3th ed., London: Cassell.
4. Compulsory.
5. Manuela Jorge and Luís Oliveira.
6. 5 h/week (2 theoretical + 3 practical); 1st semester; 3rd year.
7. Theoretical: Debate based in questions flowing from the observations that were done and from the texts that were read. Practical: Organization and orientation of the different groups of students. Observation, along the semester, of educative situations in the classroom of co-operant teachers.
8. Based in portfolios constituted by the following elements: diagnostic evaluation, synthesis related to each observation in school (15%); pertinent and relevant participation, with reference to readings effectuated, in reflection sessions and debate (10%); site, school and class report /15%); final report upon all the observations that were done in schools with duly well-founded reflection (40%); individual and personal reflection about the evolution of their conceptions and competences, and also about their process of growing as a professional (20%).
9. No.
10. 5.

1. The Methodology of Natural Sciences - 1296.
2. Current perspectives about the teaching/learning of sciences: - The nature of science and how it can affect the teaching/learning of sciences. The relationship between Science and Technology and Society. Objectives of a Scientific Education. The teaching/learning of sciences: a) Constructivism and the teaching/learning of sciences. The origins and characteristics of alternative concepts. Techniques for identifying alternative concepts. The construction of knowledge and conceptual change. How it can be affect the teaching/learning of sciences. b) Problem solving and the learning process related to sciences: the dichotomy between exercise solving and problem solving. Problem solving as a research methodology. c) Experimental activities and the learning process in science. Types of experimental activities and the skills involved. Experimental activities as problem solving. d) The planning of learning activities in a research perspective. School manuals and the learning of sciences: The importance of school manuals. School manuals and the scientific discourse. Critical analysis of some school manuals for Social Science.
3a) The need for having previous knowledge acquired through the subjects of Natural Sciences and Educational Sciences: Earth Sciences, Life Sciences, Elements of Chemistry, Curriculum Theory and Development, Theories of Learning, Sociology of Education.
3b) To acquire a vision of science corresponding to the perspectives of the new philosophy of science. To analyse how different concepts of teaching/learning and science itself can affect the teaching/learning of the Natural Sciences. To acquire skills that would allow the implementation of a teaching methodology oriented towards a learning process based on problem solving. To create activity plans with a research perspective. To analyse the programs and school manuals of Social Sciences in relation to how appropriate they are for the students and how they reflect current perspectives about the teaching of sciences. To develop an analytical attitude in relation to the teaching/learning process of the Natural Sciences. To view the act of teaching as a field of permanent research.
3c) Bonals, J 2000 El trabajo en pequeños grupos en el aula, Barcelona: Editorial Graó; Chalmers, A 1987 Qué es esa cosa llamada ciencia?, Madrid: Siglo Veintiuno; Driver, R et al. 1989 Ideas científicas en la infancia y la adolescencia, Madrid: Ediciones Morata; González, E 1992 Qué hay que renovar en los trabajos prácticos?, Enseñanza de las Ciências, 10 (2); Grau, R 1994 Qué es lo que hace difícil una investigación?, Alambique. Didáctica de las ciências experimentales nº2; Hodson, D 1988 Filosofia de la ciência y educacion científica, Em: Porlán; Garcia, J & Cañal, P Construtivismo y enseñanza de las ciencias, Sevilla: Díada Editora; Membiela, P (Ed.) 2001 Enseñanza de las ciencias desde la perspectiva Ciencia-Tecnologia-Sociedade, Madrid: Narcea; Osborne, R & Freyberg, P 1991 El aprendizage de las ciencias, Madrid: Narcea; Perales, J 2000 Resolución de problemas, Madrid: Editorial Síntesis; Pujol, MR 1994 Los trabajos prácticos en la Educacion Infantil e en la Educacion Primária, Alambique. Didáctica de las ciências experimentales, nº2; Sá, J 1994 Renovar as práticas no 1º ciclo pela via das Ciências da Natureza, Porto: Porto Editora; Watson, J 1994 Diseño y realización de investigaciones en las classes de ciências, Alambique. Didáctica de las ciências experimentales, nº2.
4. Compulsory.
5. Helena Santos Silva, Manuela Jorge and Luís Oliveira.
6. 3 h/week (1 theory + 2 practical); 1st semester; 3rd year.
7. Large group discussion, small group work, research and presentation of content by the teacher.
8. Practical work and test or practical work and final exam.
9. No.
10. 5.

1. Educational Organization - 1297.
2. Organization and administration in the context of teachers training; Administration Models and Administration of the School System; School as Organization; Models of school Analyse; The Law that rules the Educational System and the Reform of the Organization and School administration; Autonomy, democracy and Participation.
3a) Students are required some knowledge on Sociology of Education.
3b) Students School characterize the Administration of the Portuguese Educational System mainly in the most striking aspects of the organization and administration of schools, lead students to the critical analysis of the structures and the organizational and administrative functioning of the Educational System and school analyse some alternative models of the school organization.
3c) Afonso, AJ 1994 A Reforma da Administração Escolar – Abordagem Política em Análise Organizacional, Lisboa: Instituto de Inovação educacional; Barroso, J 1996 O estudo da Escola, Porto: Porto Editora; Beetham, D 1988 A Burocracia, Lisboa: Editorial Estampa; Brito, C 1991 Gestão escolar participada. Na Escola todos somos gestores, Lisboa: Texto Editora; Costa, JA 1996 Imagens Organizacionais e Projecto Educativo da Escola, Porto: Asa; Grácio, R 1981 Educação e Processo Democrático em Portugal, Lisboa: Livros Horizonte; Lima, L 1998 A Escola como Organização e a Participação na Organização Escolar, Braga: Instituto de Educação, 2ª ed..
4. Compulsory.
5. Jorge Gomes.
6. 3 h/week (1 theoretical + 2 practical); 1st semester; 3nd year.
7. Theoretical and practical classes.
8. Test and Final Exam.
9. No.
10. 4.

1. Mathematics Methodology - 0501.
2. Condition for a good mathematics education: secret for a good education; the role of mathematics teacher. Classroom environment: group work; research work. Mathematics in the curriculum: orientations pedagogical analysis. Numbers and Operations: evolution of concept of number and your representation; arithmetical operations and mental arithmetic. Form and space: spatial capacity and learning of geometrical figures. Grandeur and measure: acquisition of measure notion and samples of different grandeurs.
3a) Basics mathematics knowledge.
3b) The students should understand what is study object and objectives of didactics of mathematics; identify mathematics competences what students should to develop in first cycle; should be able to discuss the advantageous and disadvantageous from the different strategies of learning, as well as be able to take advantage of hers; to know principals objectives in the numbers and operations domain to develop in first cycle; to know principals objectives in geometry domain to develop in first cycle; to know principals objectives in the grandeurs and measures domain to develop in first cycle.
3c) Matos, JM 1996 Didáctica da Matemática, Lisboa: Universidade Aberta; Ralha, Elfrida 1992 Didáctica da Matemática, Lisboa: Universidade Aberta; Abrantes, P 1996 Investigar para Aprender Matemática, Lisboa: Associação de Professores de Matemática; Caraça, BJ 1996 Conceitos Fundamentais da Matemática, Lisboa: Gradiva; Bolt, B 1991 Actividades Matemáticas, Lisboa: Gradiva.
4. Compulsory.
5. José Félix Póvoa and Teresa Chaves.
6. 4 h/week (2 practical + 2theoretical); 2nd semester; 3rd year.
7. Lectures, practical classes.
8. Case study with presentation 50%; final written exam 50%.
9. No.
10. 5.

1. Methodology of Portuguese - 0536.
2. The changes in the Portuguese Class (PC). From the rhetorical classicism to the PC. The teaching of grammar and lexicon, composition and textual analysis. The teaching of the texts: literary, scholastic, journalistic and administrative. Treatment of an integral opus. Speaking to groups: oral expression. Planification and evaluation in the PC.
3a) No prerequisites.
3b) To acquire knowledge's of language and literature didactics; to know methods of teaching the language; to learn how to build and develop didactic units in the classroom; to create academic activities, regarding listening and speaking, reading and writing; to accede techniques of teaching communication in the classroom.
3c) Genouvrier, E & Peytard, J 1974 Linguística e Ensino do Português, Coimbra, Livraria Almedina; Rei, JE 1998 A Escola e o Ensino das Línguas, Porto: Porto Editora; Bredella, L 1989 Introdução à Didáctica da Literatura, Lisboa, Publicações D. Quixote; Celce-Murcia, M & Hilles, S 1988 Techniques and Resources Teaching Grammar, Oxford, Oxford University Press.
4. Compulsory.
5. Ana Paula Silva and Sílvia Fernandes.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 3rd year.
7. Maps. Notes. Planification and evaluation building exercises, vocabulary exercises, grammar exercises, written and orals analysis.
8. Continuous assessment or final exam.
9. No.
10. 5.

1. Intercultural Education - 0576.
2. Cultures and globalisation. Intercultural era. New sceneries for the public/formal school: from the assimilacionista school to plural/democratic school: from segregation (exclusion) to integration (inclusion). Intercultural Education in action: critical perspectives in education: principles, concepts and contradictions around Intercultural Education; models of Multi-intercultural Education. Teacher' studies supported on an intercultural view: the needs of new professional elements and competences to face school diversity; assistance in structuring the multi-intercultural teacher.
3a) No prerequisites.
3b) Migration's history and intercultural concepts. Thinking over the construction of an effective public/formal school blended with quality; analysing theories and experiences of intercultural education; rethinking models of education studies with an intercultural view.
3c) Peres, AN 1999 Educação Intercultural: utopia ou realidade?, Porto, Profedições; Rey, M 1986 Former les enseignants à l'éducation interculturelle?, Les travaux du Conseil de la coopération culturelle (1977-1983). Strasbourg, Conseil de L'Europe; Stoer, SR & Cortesão, L 1999 Levantando a Pedra, Porto: Edições Afrontamento.
4. Compulsory.
5. Américo Nunes Peres and Bartolomeu Rodrigues.
6. 2 h/week; 2nd semester; 3rd year.
7. Practical classes.
8. Evaluation is negotiated with the students, thus according to the established in this institution. Final Evaluation: final exam.
9. Spanish, French, English.
10. 3.

1. Health Education - 1154.
2. Health – the evolution of the concept. Strategies and methods in health promotion.
3a) No prerequisites.
3b) To recognise the importance and the role of the Educator in health education/promotion.
3c) Andrade, Mª Isabel 1995 Educação para a Saúde, Texto Editora; Egger, G et al. 1995 Health promotion – strategies and methods, McGraw Hill Book Company. Sidney; Who 1986 Ottawa charter for health promotion, An international conference on health promotion. The move tawards a new public health. Ottawa, Canada.
4. Compulsory.
5. Sandra Celina Fernandes Fonseca.
6. 3 h/week (2 practical + 2 theoretical); 2nd semester; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 1 written test and 1 work group or a final exam – 100%.
9. No.
10. 3.

1. Expressions Methodology - Musical Expression - 1155.
2. Emergent essential abilities of the National Curriculum of Basic Education, in what concerns to the Musical Expression in 1º level. Pedagogical-musical tendencies of the 20th century: Dalcroze, Orff, Kodály, Martenot; Willems, Suzuki, van Hauwe, Wuytack and others.
3a) No prerequisites.
3b) To know the orientations of the National Curriculum of Basic Education in what concerns to the Musical Expression/Education. To know the actual methodologies of the musical-pedagogical tendencies. To infer on the importance of music for the education of the humans
3c) Gomes, A 2003 A música como factor de autocrescimento individual e comunitário, dissertação de mestrado. Braga: Universidade do Minho; Hargreaves, D 1998 Música y desarrollo psicológico, Barcelona: Graó; Mejia, Pilar 2002 Didáctica de la Música, Madrid: Pearsons Education, S. A.; Ministério da Educação/DEB 2001 Currículo Nacional do Ensino Básico. Competências Essenciais, Lisboa: Ministério da Educação.
4. Compulsory.
5. Agostinho Gomes and Levi Leonido.
6. 4 h/week (2practical + 2 theoretical); 2nd semester, 3rd year.
7. Lectures and practical classes.
8. In accordance with the pedagogical rules, the evaluation will take into account the assiduity, the participation, the elaboration of a work of group with presentation and the accomplishment or final examination.
9. No.
10. 2.

1. Expressions Methodology - Plastic Expression - 1155.
2. Define and distinguish aims, strategies and resources; use the plan, project, control and evoluation notions.
3a) General information about visual and technological communication.
3b) The purpose of this discipline to make students to consider plastic on a integral and interdisciplined developed area.
3c) Amegon, S 1987 Pour une Pédagogie active et créactive, Quebec; Barret, M 1979 Educação em arte, Lisboa: Presença; Gandara, M 1990 Desenho infantil, Lisboa: Texto Editora; Gardner, H 1987 Educación artístic y desarrollo humens, Barcelona: Paidós.
4. Compulsory.
5. Domingos Júnior and Ângela Cardoso.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester, 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Practical works (50%) and written essays (50%).
9. No.
10. 2.

1. Expressions Methodology - Dramatic Expression - 1155.
2. Models of dramatic practices in education. The dramatic expression in Primary Education: privileged moments, aims and activities.
3a) No prerequisites.
3b) Acquisition of theoretic-practical in dramatic expression teaching in Primary Education.
3c) Aguilar, L 2001 Expressão e Educação Dramática-Guia Pedagógico para o 1º ciclo do ensino básico, IIE, Lisboa; Barret, Gisèle 1990 Pédagogie de L'Expression Dramatique, Paris. Feijoo; Cardoso, C 1998 Pour une formation pluraliste en Expression dramatique, Tese de Doutoramento. Université de la Sorbonne. Paris; Gomes, A & Rolla, J 2003 BRINCAR A SER-Expressão e Educação dramática – 1º ciclo, Porto Editora; Houle, M 1987 Jeu. Apprentissage. Les entreprises culturelles enr. Canada.
4. Compulsory.
5. Carlos Cardoso and Marcelino Lopes.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester, 3rd year.
7. Lectures and practical lessons.
8. Participation and practical work with oral discussion - 60%; final writing work - 40%.
9. No.
10. 2.

1. Cooperation in teacher training - 1156.
2. Each group of student will assume the development of the planning in the class, under the supervision/orientation of the teacher.
3a) No prerequisites.
3b) To acquire research/aalysis abilities; To establish and active connection between theory and practice; To know school projects; To cooperate in the teaching and learning process of a class in in elementary.
3c) Tedesco, JC 1997 Ser Professor num Mundo em Mudança,; Zabalza, MA 1991 Los darios de classe: documento para estudiar cualitativamente los dilemas prácticos de los professores, Barcelona, PPU; Ministério da Educação 1990 Ensino Básico: programas do 1º ciclo, Algueirão, Editorial do M. E.
4. Compulsory.
5. Carlos Ferreira and Luís Oliveira.
6. 4 h/week (2 practical + 2 theoretical); 2nd semester; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Assiduity and punctuality. Commitment/interest in the activities.
9. No.
10. 8.

4th year

1. Themes of Contemporary Culture - 1143.
2. Mankind. Society and Culture.
3a) No prerequisites.
3b) To contribute to favor the growth of informed and active citizenship, compromised with a less fragmentary vision of the society and the world; to develop a communicative rationality; to participate in the reflection on the great questions of the contemporary times.
3c) Buber, M 1986 Qué es el Hombre?, México-Madrid-Buenos Aires, Fondo de Cultura Económica; Gevaert, J 1988 El Problema del Hombre, Salamanca, Ediciones Sígueme; Coreth, E 1988 O que é o Homem?, Lisboa, Verbo; Entralgo, P 1988 Teoria y Realidad del Otro, Madrid, Alianza Editorial; Vilches, L 1993 La televisión: los efectos del bien y del mal, Barcelona, Paidós; Popper, C 1995 Televisão: Um Perigo para a Democracia, Lisboa, Gradiva; Hottois, G 1992 O Paradigma Bioético, Lisboa, Edições Salamandra; Jonas, H 1995 El Principio de la Responsabilidad. Ensayo de una ética para la Civilización Tecnológica, Barcelona, Editorial Herder; AAVV 1996 Bioética, Lisboa-São Paulo, Editorial Verbo.
4. Compulsory.
5. Joaquim José Jacinto Escola and Francisco Costa Barros.
6. 3 h/week; 1st semester; 4th year.
7. Theoretical classes.
8. Test or final exam.
9. No.
10. 4.

1. Educational Itineraries - 1378.
2. To characterize the differents educatives contexts and specials modalities: Recorrent Teaching; Special Education; Occupation of the Free Times and others.
3a) No prerequisites.
3b) To understand the Educative System of the differents contexts, imitiate in the family and continued in formals institutions.of the education and teaching.
3c) Chaves, E 2001 Introdução à Educação Especial: um modelo para professores, UTAD: Vila Real; Decretos –Lei: 319/91 de 23 de Agosto; 173/ME/91 de 23 de Outubro; 115/A/89 de 4 de Maio; Despacho Normativo nº 98 A/92; Roçadas, ME 1999 Formação Pessoal e Social: a formação complementar, DCE. UTAD: Vila Real; Castanheira, F 1997 Educação ao Longo da vida, DREN. Revista Educação, nº 3, Junho.
4. Optional.
5. Maria Ortélia Machado.
6. 3 h/week; 1st semester; 4th year.
7. Theoretical lessons, encouraging the individual and group interaction, participation and interest .
8. Writing essays with presentation and discussion presenting or a final exam for those who couldn't do it.
9. No.
10. 4.

1. School Journalism - 1861.
2. Conceptualisation of the realms of Communication. The process of communication. Analysis, attendance and production of school newspapers
3a) No prerequisites.
3b) To acknowledge the educational institution as having an important role in the study and interpretation of the processes and diverse contexts of education. Evaluate the importance of school journalism
3c) Berlo, DK 1989 O Processo da Comunicação, S. Paulo, Ed. Martins Fortes; Cazeneuve, J 1992 Guia Alfabético das Comunicações de Massas, Lisboa, Edições 70; Fiske, J 1993 Introdução ao Estudo da Comunicação, Porto, ASA; Freinet, C 1974 O jornal escolar, Lisboa, Estampa.
4. Optional.
5. Alexandre José Parafita Correia.
6. 2 h/week; 1st semester; 4th year.
7. Lectures classes.
8. Continuos assessement or final exam.
9. No.
10. 4.

1. Environmental and Consumer Education - 1137.
2. The pertinence of Environmental Education. Consequences of the interference of Human kind in the ecosystems. The production of wastes has a result of the human activity. Characteristics didactics of a project in Environmental Education. Consumer Education.
3a) No prerequisites.
3b) To exemplify situations of environment aggression; To develop practical activities to achieve Environmental Education; To contribute to the promotion of the sustainable development; To take conscience of the negative impacts on the global environment; To defend the use of alternative energies; To educate for great citizenship; To develop a active participation on the resolution of the consumer rights; To knowledge and to divulge the consumer rights.
3c) Aveiro, A & Basto, G 1992 Ecologia - A Casa da Vida, Porto: Porto Editora; Barrère, M 1993 Terra Património Comum, Lisboa: Instituto Piaget Divisão Editorial; Carapeto, C 1994 Ecologia - princípios e conceitos, Lisboa: Universidade Aberta; Carapeto, C 1998 Educação Ambiental, Lisboa: Universidade Aberta; Dron, D 1998 Ambiente e Escolha Políticas, Lisboa: Instituto Piaget; Giordan, A & Souchon, C 1997 La Educación Ambiental: guía práctico, (2ª Ed.). Sevilla: Díada Editora; Godinho, R 1996 Guia do Bom Cidadão Ecológico, Lisboa: C.M.L; Javna, J 1995 50 coisas simples que as crianças podem fazer para reciclar e salvar a Terra, Lisboa: Difusão Cultural; Nova, E 1994 Educar para o Ambiente, Lisboa: Texto Editora; Oliveira, F 1998 Educação Ambiental, (5ª Edição). Lisboa: Texto Editora; Pichat, P 1998 A Gestão dos Resíduos, Lisboa: Instituto Piaget divisão Editorial.
4. Compulsory.
5. Artur Salgado.
6. 3 h/week (2 practical + 1 theoretical); 2nd semester; 4th year.
7. The strategies/activities for teaching and learning methods is achieved by lectures and practical classes in a classroom context, using transparencies projections, watching and analysing video films, analysing and discussing texts. All these activities are executed individual and/or as working groups. Some research activities are all so made to make the connection between the lectures knowledge and its practical application.
8. According to the University regulations, one written test (60%) and one practical activity (40%) or final exam (100%).
Attendance in 2/3 of practical classes is compulsory.
9. No.
10. 5.

1. Period of Training - 1352.
2. Profound consideration and thoroughly examination of themes related to pedagogical practice, namely, curricular program of Primary Education as well as the main principles that are related with curricular reorganization.
3a) No prerequisites.
3b) Development of personal and professional competence and capacity, contributing to the integration of acquired theoretical knowledgment through his formation, with practical activities.
3c) Abrantes, P 2001 Princípios, medidas e implicações, Lisboa: M. E. (D. E. B.); Abrantes, P 2001 Avaliação das aprendizagens, Lisboa: M. E. (D. E. B.); Alarcão, I 1996 Formação Reflexiva de Professores: estratégias de formação, Porto: Porto Editora; Marques, R 1995 Educação Cívica e Desenvolvimento Pessoal e Social: objectivos, conteúdos e métodos, Lisboa: Texto Editora; Perrenoud, F 1993 Práticas pedagógicas, profissão docente e formação, Lisboa: Publicações D. Quixote.
4. Compulsory.
5. Eugénia Almeida, Ana Maria Bastos, Gastão Bianchi and Cristina Gomes.
6. 15 h/week; annual; 4th year.
7. Preparation, observation and reflection of students practical interventions in cooperating schools.
8. Performance evaluation: students practical interventions in cooperating schools and planning's – 75%; Characterization Report, Class Project and Final Report – 25%.
9. No.
10. 40.

1. Seminar on Teacher Training - 1353.
2. To develop personal and professional skills and competences, contributing to the integration of the theoretical knowledge acquired throughout their training together with practical and professional activities.
3a) No prerequisites.
3b) To have an increasingly independent professional attitude, critical and reflective. Development in the school/class educational projects.
3c) Canário, R 1992 Inovação e Projecto Educativo de Escola, Lisboa; Leite, Elvira 2001 Trabalho de Projecto, vol. I e II, Porto; Perrendoud, 2000 10 Novas Competências para Ensinar, Porto Alegre; Pollard, A, 2000 Reflective Teaching in the Primary School – A Handbook for the classroom, London.
4. Compulsory.
5. Eugénia Almeida, Ana Bastos and Paszkiewicz.
6. 4 h/week; annual; 4th year.
7. Lectures and practical classes.
8. Practical work, Instructional Performance and written report.
9. No.
10. 8.

Recreation Leisure and Tourism

Programme of Studies

	1st semester	ECTS	1st semester	ECTS
1st YEAR	Academy Activities	4.0	Recreation Activities	4.0
	Trading Law	4.0	Tourism Structure and Legislation	5.0
	Social and Economical History of Tourism	5.0	History and Portuguese Culture	4.0
	Economics Introduction	4.0	Foreign Language II (French)	5.0
	Foreign Language I (French)	5.0	Group Organization and Dynamics	4.0
	Mathematical Methods Applied to Recreation Leisure and Tourism	4.0	Health and Physical Condition	4.0
	Health Psychology	4.0	Computer Science Techniques	4.0
	Total	30	Total	30
	1st semester	ECTS	2nd semester	ECTS
2nd YEAR	Recreation and Leisure Management	4.0	Statistics Applied to Recreation Leisure and Tourism	4.0
	Facilities	4.0	Protected Areas Management	4.0
	History of Portuguese Art and Patrimony	5.0	Leisure Equipment Management	4.0
	Foreign Language III (English)	5.0	Foreign Language IV (English)	5.0
	Investigation Methods	4.0	Methodology of Physical Condition	4.0
	Techniques of Animation	4.0	Tourist Projects Planning	4.0
	Traumatology and First Aids		Tourism and Arrangement	5.0
	Total	30	Total	30
	1st semester	ECTS	2nd semester	ECTS
3rd YEAR	Natural Resources Conservation	4.0	Nature Activities	4.0
	Traditional and Collective Games	4.0	Biomechanics of Locomotion	4.0
	Foreign Language V (Spanish)	5.0	Tourist Resources Development	4.0
	Methodology of Open Air Physical Activities	4.0	Philosophy of Corporal Activities	4.0
	Transport and Lodgement	4.0	Foreign Language VI (Spanish)	5.0
	Cultural Tourism	5.0	Practice I	5.0
	Tourism and Regional Development	4.0	Tourism Sociology	4.0
	Total	30	Total	30
	1st semester	ECTS	2nd semester	ECTS
4th YEAR	Tourist Projects Evaluation	5.0	Cultural Anthropology	5.0
	Ecotourism	4.0	Ecology Applied to the Recreation Leisure and Tourism	4.0
	Political Institutions and Tourist Development	4.0	Practices III	5.0
	Marketing Applied to the Recreation Leisure and Tourism	4.0	Social Psychology of Physical Activities	4.0
	Practices II	5.0	Techniques of Animation for Special Populations	4.0
	Organizations Psychology	4.0	Tourist Promotion Techniques	4.0
	Recreation for Special Populations	4.0	Therapeutic Recreation	4.0
	Total	30	Total	30
5th YEAR	1st semester	ECTS	2nd semester	ECTS
	Training and Research Project	30	Training and Research Project	30
	Total	30	Total	30

Total of credits: 300

1st year

1. Academy Activities – 0772.
2. Physical Activity, Physical Fitness and Health (short considerations); Academy Activities: Physiological and Pedagogical issues (Aerobic Dance; Step; Slide; Muscular Strength and Endurance); Constitution and organization of a class; Music selection; Signalization and voice command; Gait and posture; Choreographies construction; High and low impact; Precautions with special populations. Facilities and equipments.
3a) Knowledge on Physiology of exercise.
3b) Understand the importance of physical activity and fitness to the well being of the populations, and the role of academies in exercise adherence; Be able to select and plan classes of a variety of academy activities.
3c) Abrantes, Catarina 2001 Para idênticas frequências cardíacas, a magnitude das adaptações agudas metabólicas, cárdio-respiratórias e perceptuais é variável em função do modo de exercício Tese de mestrado. ACSM 2000 Manual de Consulta para el Control Y la Prescripción de Ejercicio Editorial Paidotribo Barcelona; Baechle, Thomas R Earl, Roger W 2000 Programa Fitness: Musculación. Editorial Hispano Europea, S A Barcelona; Jucá, Marcos 1993 Aeróbica & Step. Bases Fisiológicas e Metodologia ISBN Editora Sprint; Martín, Sánches, D 1999 Bases para la enseñanza del aerobic Editorial Gymnos, Madrid; Vilanova, N Martínez, A Monge, A 1999 La Tonificación Muscular: teoria y prática Editorial Paidotribo, Barcelona.
4. Compulsory.
5. Catarina Abrantes.
6. 4h/week (theory - practice); 1st semester; 1th year.
7. Lectures and practical classes.
8. Final grade: Practical evaluation 40%; theoretical evaluation 40%; continue evaluation 20%.
9. No.
10. 4.

1. Trading Law – 0395.
2. Intruduction to the study of trading code and law. Constitution and aims of trading firms: Theory and practice from several perspectives
3a) No prerequisites.
3b) To provide students a background on trading law, to teach them how to create a trading firm.
3c) Ascensão, JO 1998 Direito Comercial, Parte Geral vol. 1, Lisboa; Cardoso, JP 1992 Noções de Direito Comercial, Rei dos Livros.
4. Compulsory.
5. Margarida Correia de Matos.
6. 3 h/week; semestral; 1st year.
7. Lectures classes.
8. 1 written test or a final exam – 100%.
9. No.
10. 4.

1. Social and Economical History of Tourism – 0764.
2. Historical approach of tourism in a social and economic perspective. Evolution of tourist activities in Portugal (Europe and the World), their social and economic consequences and patterns of development. Analysis of the situation of now our day's tourism practices and their future tendencies.
3a) No prerequisites.
3b) Provide students a theoretical background/basic knowledge of how tourism developed, what tourism is all about today and in what direction it is moving at national/European/world level.
3b) Oferecer aos alunos um panorama teórico/noções básicas da evolução histórica do turismo e da sua diversidade actual e futura, a nível mundial/europeu/nacional.
3c) Cunha, Licínio 2001 Introdução ao turismo. Lisboa e S ao Paulo: Editorial Verbo 447 p. ISBN 97222-2085-3-110179; Cunha, Licínio 1997 Economia e política do turismo. Alfragide: McGRAW-HILL de Portugal, 346 p. ISBN 972-8298-52-8; Towner, John 1996 An historical geography of recreation in the western world. 1540 – 1940 Chichester 312 p. ISBN 0-4719-4990-6; Pina, Paulo 1988 Portugal. O turismo no século XX. Lisboa: Lucidus, 255 p.; Sigaux Gilbert 1965 Histoire du tourisme. Genève: Éditions Rencontre; Lickorish, Leonard J e Jenkins, Carson L 1997 An introduction to tourism. Oxford: Butterworth/Heinemann, 244 p. ISBN 0-7506-1956-2; Smith, Stephen LJ 1991 Tourism Analysis. A handbook. Essex: Longman Scientific & Technical 312 p. ISBN 0-582-30150-5.
4. Compulsory.
5. Veronique Nelly Paul Marie Joukes Lapa.
6. 3h/week, 1st semester, 1st year.
7. Lecture classes with a practical variant: (oral presentation of) group work, search on the Internet, consultation of tourist magazines.
8. The student can choose between: 2 written tests (with our without oral presentations), 1 written test and 1 paper based upon research (with our without oral presentations), final exam.
9. No. Erasmus-students (speaking Spanish, French, German, English or Dutch) can be integrated.
10. 5.

1. Economics Introduction – 0364.
2. Economic Science: general concepts about Macroeconomics: Family and Enterprise economy. Markets and general equilibrium. Economic and Monetary politics.
3a) No prerequisites.
3b) To know the great economic problems placed to the Economic Theory and to put in perspective the Tourism Sector in a macroeconomics level in the Portuguese economy. Approach to the microeconomics analysis, with evidence on the Family, Enterprises and Productive Factors Markets. Analysis of the budgetary and monetary politics.
3c). Neves, João Luís César das 1992 Introdução à Economia, Lisboa, Editorial Verbo; Neves, JLC e Henderson, David R 2000 Enciclopédia de Economia, S João do Estoril, Principia; Phelps, Edmund 1985 Political Economy - An Introductory Text, W.W. Norton & Co, NY; Samuelson, Paul A e Nordhus, William D 1990 Economia, Mem Martins; Sousa, Alfredo de 1990 Análise Económica, Lisboa, Universidade Nova de Lisboa.
4. Compulsory.
5. Artur Carlos Crespo Martins Cabugueira.
6. 3 h/ week; 1st semester; 1st year.
7. Lectures and practical classes.
8. Written tests.
9. No.
10. 4.

1. Foreign Language I French – 1043.
2. Deepen and perfection gained acknowledgements and oral/written communication of the students in French used in a context of recreation, leisure and tourism.
Possible topics: grammar, vocabulary, pronunciation, present yourself, spell words, read and understand numbers, telephone conversations, business letters, reserve a room, describe accommodation, order in a restaurant, explain the way, understand and resume texts with a general context.
3a) No prerequisites.
3b) Students have to be able to understand situations (of basic/intermediate level) typical for a French speaking tourist context. Written and oral comunication and perception are stimulated.
3c) Descotes-Genon, C.e.a. 1992 La Voyagerie. Pratique du français du tourisme. Grenoble: Presses Universitaires de Grenoble, 240 p., ISBN 2 7061 0452 X; Abry, Dominique e Chalaron, Marie-Laure 2000 La grammaire des premiers temps: Volume 1, 2ª ed. revista e completada. Grenoble Presses Universitaires de Grenoble, ISBN 2-7061-0888-6; Carvalho, Olívio 1996 Gramática do Francês fundamental Porto Editora, 238 p., ISBN 972-0-20261-0.
4. Compulsory.
5. Veronique Nelly Paul Marie Joukes Lapa.
6. 5h/week, 1st semester, 1st year.
7. Practical classes.
8. The student can choose between: 2 written and 1 oral test (with our without a “continuous evaluation”; with or without group work with oral presentations) or one final exam.
9. French.
10. 5.

1. Mathematical Methods Applied to Recreation, Leisure and Tourism – 0765.
2. What is Mathematics; Definitions and basic methods of Algebra; Analysis, Geometry and Probability, Conditions; Functions; Problem solving.
3a) No prerequisites.
3b) To acquire basic concepts of the Mathematics; To understand that Mathematics belongs to everything and everybody at any time; To work with different methods of Mathematics; To study a function; calculate probabilities.
3c) Caraça, Bento Jesus Conceitos fundamentais da Matemática, Livraria Sá da Costa Editora; Lima, Elon Lages, 1989 Curso de Análise Volumes I e II, Projecto Euclides, impa; Polya, George, 1973 How to Solve It - A New Aspect of Mathematical Method, Princenton University Press, Princenton, New Jersey; Maria Elfrida Ramos de Matos, 1992 Didáctica da Matemática - Perspectivas Gerais sobre Educação Matemática, Universidade Aberta, Livros escolares do 3º ciclo e do Ensino Secundário.
4. Compulsory.
5. Cacilda dos Santos Paz.
6. 3h/week; 1st semester; 1st year.
7. Theoretical and Practical lessons with different strategies articulated to the necessities of the students.
8. Following the Institution Rules, Evaluation can be negotiated with the students; however, it is suggested a written test at the end of the term, where the minimum mark to aprove is 9.5 out of 20. There is no oral test in this subject.
9. No.
10. 4.

1. Health Psychology – 0766.
2. Definition and context of the Psychology of the Health; Health and Quality of life. Theoretical perspectives on Stress; situations and stress agents; mechanisms of stabilization of the stress; risk factors and individual vulnerability; stress and Disease. Emotions, Faiths and his/her relationship with the Health and Disease. Imunogenia and psychosocial pathogenies. Epidemiology and Psychological Support in the diseases that more they contribute to the Mortality.
3a) No prerequisites.
3b) To Face the Health in a holistic and multi-sectorial perspective, relating her/it with the human beings' Quality of life; To stimulate new glances and relative attitudes to the conceptions of Health; To develop knowledge and capacities to allow to improve the understanding and the interest for the Psychology of the Health; To include, in the development of the existential projects of the subjects, a group of positive attitudes and active and responsible behaviors that seek to promote the health and to prevent the disease, optimizing the psychological defenses.
3c) Ogden, J 1999 Psicologia da Saúde. Lisboa: Climepsi Brannon; L Feist, J 1992 Health psychology: an introduction to behavior and health. Califórnia Brooks Cole Publishing Company; Gatchel, RJ Baum, A 1983 An Introduction to Health Psychology New York Random House.
4. Obligatory.
5. Sofia Cochofel Quintela.
6. 3 h/week; 1st semester; 1st year.
7. Theoretical and Practical classes.
8. The evaluation process is negotiated with the students, respecting the norms of the institution. Final evaluation: final exam.
9. Spanish, French, English.
10. 4.

1. Recreation Activities – 0768.
2. These Recreation Activities represent the education of different activities.
3a) No prerequisites.
3b) This discipline is preparing the future graduates for the orientation and organization of fisical activites for example: walking, under wather activities.
3c) Miguel, Videira Carlos, Gomes 1996 Iniciação ao Montanhismo Serie didáctica 13 Vila Real; Bueno, P 1995 Alimentación en montaña Ediciones Desnivel España; Reis, V 1995 Corrida de Recreação e Lazer; Sebenta da disciplina de opção 2 Recreação Lazer, UTAD.
4. Compulsory.
5. Calin George Cojocnean.
6. 4h/week; half- yearly; 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulation, 1 written test or a final exam –100%.
9. No.
10. 4.

1. Tourism Structure and Legislation – 0773.
2. Legal principles of tourism activity. Legal organization related to the constitution, planning, development and management of programs in the tourism area.
3a) No prerequisites.
3b) To provide studants legal principles that rule tourism activities. To analyse legislation concerning touristic activity.
3c) Baptista, Mário 1990 O Turismo na economia, uma abordagem técnica, económica, social e cultural, Edição do Instituto Nacional de Formação Turística; Ferreira, Luís J do Nascimento 2003 Leis do Turismo, novos diplomas anotados e comentados Editora Quid juris Lisboa.
4. Compulsory.
5. Margarida Correia de Matos.
6. 3 h/week; 2nd semester; 1st year.
7. Lectures classes.
8. 1 written test or a final exam – 100%.
9. No.
10. 5.

1. History and Portuguese Culture – 0770.
2. Concept of culture. Geographical and sociological aspects of the Portuguese culture. Education and culture in the medieval period. Portugal in the 15th century: humanism and experience. Portugal in the 17th century. The enlightenment period.
3a) No prerequisites.
3b) To understand the cultural historicity and of the cultural and civilizational Portuguese manifestations
3c) Dias, JS da Silva 1988 Os descobrimentos e a problemática cultural do século XVI, Lisboa, Editorial Presença; Marques, A H de Oliveira, 1978 História de Portugal, Lisboa, Palas Editores; Mattoso, José, 1993 História de Portugal, Lisboa, Círculo de Leitores; Saraiva, A José, 1994 A Cultura em Portugal, Lisboa, Gradiva; Serrão, Joel 1981 Dicionário de História de Portugal, Lisboa, Liv. Figueirinhas.
4. Compulsory.
5. Manuel Silva Gonçalves.
6. 3h/week; 2nd semester; 1st year.
7. Lectures/practical classes.
8. According to University Regulations, 1 written test or a final exam - 100
9. No.
10. 4.

1. Foreign Language II French – 1097.
2. Deepen and perfection gained acknowledgements and oral written communication of the students in French used in a context of recreation, leisure and tourism. Follow up of “Língua Estrangeira I”.
Possible topics: grammar, vocabulary, pronunciation, present yourself, spell words, read and understand numbers, telephone conversations, business letters, reserve a room, describe accommodation, order in a restaurant, explain the way, understand and resume texts with a general context.
3a) No prerequisites.
3b) Students have to be able to understand situations of basic/intermediate level typical for French speaking tourist context. Written and oral comunication and perception are stimulated.
3c) Descotes-Genon, C e.a. 1992 La Voyagerie. Pratique du français du tourisme Grenoble: Presses Universitaires de Grenoble 240 p., ISBN 2 7061 0452 X; Abry, Dominique e Chalaron, Marie-Laure 2000 La grammaire des premiers temps Volume 1, 2ª ed. revista e completada Grenoble Presses Universitaires de Grenoble ISBN 2-7061-0888-6; Carvalho, Olívio 1996 Gramática do Francês fundamental Porto Editora 238 p., ISBN 972-0-20261-0.
4. Compulsory.
5. Veronique Nelly Paul Marie Joukes Lapa.
6. 5h/week, 2nd semester, 1st year.
7. Practical classes.
8. The student can choose between: 2 written and 1 oral tests with our without a continuous evaluation with or without group work with oral presentations or one final exam.
9. French.
10. 5.

1. Group organization and Dynamics – 1258.
2. History of group dynamics: conceptions and classification of groups. Institutions: organizations and cultures; organizational conceptions and the cultures of institutions. The group in action: group structure; motivation and group behaviour; group communication processes methods procedures; formal leadership and the distribution of power/authority control; conflicts and collaboration between groups.
3a) No prerequisites.
3b) Thinking over organizational conceptions and institutional cultures; the individual group involvement in a project; understanding the group structure and dynamics; identifying the advantages and disadvantages of group work effort.
3c) Carvalho Ferreira, JM Neves, J e Caetano, A 2001 Psicossociologia das Organizações Lisboa McGraw-Hill; Mucchielli, R 1976 La Dynamique des Grupes Paris Les Editions ESF; Sjolund, A s/d Dinâmica do Grupo Lisboa MEC.
4. Compulsory.
5. Américo Nunes Peres
6. 3h/week; 2nd semester; 1st year
7. Theory
8. Evaluation is negotiated with the students, thus according to the established in this institution. Final Evaluation: final exam.
9. Spanish, French, English.
10. 4.

1. Health and Physical Condition – 0771.
2. The Physical Condition-Health and its different concepts; Illnesses and its relation with the Physical Condition; Obesities; "Diabetes Mellitus"; Pregnancy and Physical Condition; Arterial Hypertension; Asthma; Epilepsy; Special Populations and the healthy Exercise.
3a) No prerequisites.
3b) Introduction to some inter-relations between the Physical Exercise, Nutrition and Health. They are boarded of simple and practical the relations between the Physical Activity and the Health/Diseases and the importance of specific exercises in the protection of Health; control of the Physical Condition and control of the corporal weight. It is made a boarding integrated to the Physical Activity in its sources of rehabilitation, Recreation and Competition. The students still will be collated with the characteristics of a variety of Special Populations, form to be able to plan, to implement and to evaluate programs and activities and to develop the levels of physical activity of the communities.
3c) Heyward, V 1991 Advanced Fitness Assessment & Exercise Prescription. Second Edition. Human Kinetics Books. Champaign. Illinois; Mcneill, R 1992 Physical Activity and Health. Society for the Study of Human Biology Symposium. Cambridge University Press; Haywood K 1986 Life Span Motor Development. Human Kinetics 2ª Ed.
4. Compulsory.
5. Carlos Fernando Avelens Freitas.
6. 3h/week (3 Theoretical); 2nd Semester; 1st Year.
7. Lectures.
8. 1 theoretical test.
9. No.
10. 4.

1. Computer Science Techniques – 0774.
2. Introduction to Information and Comunication Technologies and to the Informatic Systems; Introduction to Windows Operating System; Text Processing; Electronic edition and presentation tools, Internet and World Wide Web; Introduction to Datasheets.
3a) No prerequisites.
3b) This chair will have to allow to the pupil the familiarization with the concepts and basic tools of the technologies of the information, understood of the point of view of the user; to get abilities that allow itself to continue the enrichment of its knowledge and abilities in the domain of the technologies of the information; to strengthen the appropriation of these concepts and tools, of form to be capable operationally to explore them in contexts that if coat with practical relevance for its future activity, of student and professional.
3c) Manuais de referência do Office 2000 ou Office XP da Microsoft. Apontamentos elaborados pelos professores da cadeira.
4. Compulsory
5. Ramiro Gonçalves
6. 3h/week; 2nd semester; 1st year.
7. Lectures and practical classes. Acomplishment of practical tasks.
8. According to University Regulations. Attendance in 2/3 of classes is compulsory. Accomplishment of one written test of examination and Practical work or final exam.
9. No
10. 4.

2nd year

1. Recreation and leisure management facilities – 0781.
2. The concept recreation and leisure management facilities. The organization structures. The private and public management. The productivity.
3a) No prerequisites.
3b) To provide a set of technical knowledge and methods of recreation and leisure management.
3c) Torkildsen, G Leisure and Recreation Management. E&FN Spon; Slack, T Understanding Sport Organizations. Human Kinetics.
4. Compulsory.
5. Serôdio-Fernandes.
6. 3h/week (2T;2P); 1st semester; 2th year.
7. Lectures and practical classes.
8. Written essays and oral discussions30%; Exam 70%.
9. No.
10. 4.

1. History of Portuguese Art and Patrimony – 0783.
2. Introduction: art, patrimony and tourism. The great artistical corrents. Origins of the artistical phenomenons: the classical past legate. The European architecture from the romanic to the neoclassicism and its expression in Portugal.
3a) No prerequisites.
3b) To understand esthetical framing conception of the artistical creations and its historicity. To sensitize to the importance of the cultural Portuguese patrimony. To foment a diacronical vision that considers the succession of the esthetical styles and corrents.
3c) Janson, HW 1998 História da Arte, Lisboa Fundação Calouste Gulbenkian; Bazin, Germain 1992 História da Arte: da pré-história aos nossos dias, Venda-nova Bertrand Editora; 1995 História da Arte Portuguesa. Lisboa, Círculo de Leitores; Mohen, Jean-Pierre 1999 Les Sciences du Patrimoine: identifier, conserver, restaurer Paris, Editions Odile Jacob; Audrerie, Dominique 1997 La notiont la proteccion du patrimoine Paris, Presses Universitaire de France.
4. Compulsory.
5. Manuel Silva Gonçalves.
6. 3h/week; semester; 2nd year.
7. Lectures/practical classes.
8. According to University Regulations, 1 written test or a final exam - 100
9. No.
10. 4.

1. Foreign Language III – English – 0795.
2. Development of oral and written competence in specific areas related with recreation, leisure and tourism, understood as essential tools for effective communication in future work scenarios.
3a) The students are expected to understand basic English (oral and written) and to produce oral and written messages related with real life situations.
3b) To understand oral and written utterances in different contexts. To. produce oral and written utterances in different contexts. To get involved in the learning process (formal correction//fluency)
3c) Harding, Keith and Paul Henderson, 2001 High Season Oxford OUP Course book, workbook, teacher's book, cassette; Helgesen, Marc and Keith Adams, 1996 Workplace English, Travel File Essex Longman Student's book, workbook, teacher's book, cassette; Jacob, Miriam and Peter Strutt, 1997 English For International Tourism Essex Longman Course book, workbook, teacher's book, and cassettes; Hashemi, Louise and Raymond Murphy, 2000 English Grammar in Use. Suplementary Exercises Cambridge CUP; Murphy, Raymond 2002 English Grammar in Use 2nd edition, Cambridge, CUP; Parrot, Martin 2000 Grammar for English Language Teachers Cambridge CUP Vocabolario McCarthy; Michael and Felicity O'Dell, 2001 English Vocabulary in Use, Test Your English vocabulary in Use Cambridge, CUP; Seal, Bernard 1989 Vocabulary Builder 2 Essex Longman; Vince, Michael 1996 First Certificate Language Practice Oxford, Macmillan Heinemann, English Language Teaching Referênсy; Davidson, Rob 1993 Tourism 2nd edition, Essex Longman. Dictionaire, rewius and jornals.
4. Compulsory.
5. Maria Otelinda Costa.
6. 5h/week; 1st semester; 2nd year.
7. Practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Oral and written assignments, individually or in group, and written test(s) or final exam.
9. Yes.
10. 5.

1. Investigation Methods – 0794.
2. Scientific characteristics of investigation. Study technics, of written and research. Global perspective of the investigation process. Gathering, treatment and interpretation of the information. Leisure, recreation, tourism and investigation.
3a) No prerequisites.
3b) To Know the investigation process and the different methods of investigation in Social Sciences. To reflect about science and the scientific process production, in particular in Social Sciences, specially in the recreation, leisure and tourism problems. To be able to project and to perform an investigation project.
3c) Arnal, J Del Rincón D Latorre A 1994 Investigación educativa: fundamentos y metodologia. Barcelona Ed Labor; Azevedo, C Azevedo, A 1992 Metodologia Científica: contributos práticos para a elaboração de trabalhos académicos. Porto; Azevedo, C Fox, D 1994 El Processo de investigación en educación. Pamplona Ed. Universidad de Navarra; Moreira, CD 1994 Planeamento e estratégias de investigação social Lisboa ISCSP; Quivy, R Campenhoudt, LV 1992 Manual de Investigação em Ciências Sociais Lisboa IPQ.
4. Compulsory.
5. Artur Carlos Crespo Martins Cabugueira.
6. 3h/ week ; 1st semester; 2nd year.
7. Lectures and practical classes.
8. A written test and an investigation work or final exam.
9. No.
10. 5.

1. Techniques of Animation – 0786.
2. The Animation of the free time and idleness. The free time as vital and cultural time. The pedagogy of the idleness and free time. The scopes of the animation. The techniques and the resources. The animation and the entertainers.
3a) No prerequisites.
3b) To understand the plural scopes of the animation. To acquire abilities in the dominions of the Techniques and resources of Animation. To promote the appearance of a profile of Tourist Entertainer.
3c) Ander-EGG, Ezequiel 2000 Metodología y Práctica de la Animación Sociocultura. Madrid, Editorial CCS; Ventosa, Víctor, 1998 Manual del Monitor de Tiempo Libre. Madrid, Editorial CCS; Chávez, Antonio 2001 El Animador Barcelona, Alertes; Rueda, Laura 1997 Métodos para la Animación Sociocultural Madrid, Editorial CCS.
4. Compulsory.
5. Marcelino de Sousa Lopes.
6. 4h /2T+2P week; 1st semester; 2nd year.
7. Lectures and practical classes. The assistance at least the 2/3 of practical classes.
8. Continuous evaluation. Presentation of a theoretical work of inquiry seats in one of the scopes of the animation and a practical work with base in one of the animation techniques.
9. No.
10. 4.

1. Traumatology and Firsts Aids – 0777.
2. Helper's responsibilities. Emergency actuation.
3a) No prerequisites.
3b) To know proceedings in firsts aids.
3c) Baptista, J 1996 Primeiros socorros Editora Replicação, Lda. Lisboa; Ministério da Educação 1995 Manual de Primeiros Socorros, Acidentes nas Escolas, Jardins de Infância e Campos de Férias.
4. Compulsory.
5. Sandra Celina Fernandes Fonseca.
6. 2h/week; 1st semester; 2nd year.
7. Lectures-practical classes. Attendance in 2/3 of classes is compulsory.
8. According to University Regulations, 1 written test and 1 work group or a final exam – 100%.
9. No.
10. 4.

1. Adventure Sports and Tourism – 0778.
2. Methodology and business studies of adventure sports and tourism.
3a) Have a basic knowledge on business studies in sports.
3b) Understand the importance of this sector for the regional development. Advance strategies for intervection.
3c) Jensen, Clayne R 1995 Outdoor Recreation in America Human Kinetics USA; Marivoet, Salomé 1998 Aspectos Sociológicos do Desporto Livros Horizonte Lisboa; Quílez, Martín Pinos 1997 Guía Práctica de la Iniciación a los Deportes en la Naturaleza Gymnos Editorial Deportiva Madrid; Standeven, J & Knop, P 1999 Sport Tourism Human Kinetics.
4. Compulsory.
5. Rui Ferreira.
6. 4h/week (theory - practice); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Final grade: Practical Evaluation 40%; Theoretical Evaluation 40%; Continue Evaluation 20%.
9. No.
10. 4.

1. Statistics Applied to Recreation, Leisure and Tourism – 0801.
2. Definitions, Organization and Interpretation of data, Frequencies of a value of the variable, Sums, Measure of central tendency, Measure of non-central tendency, Graphic Representation, Measures of Dispersion, Multivaried distributions.
3a) No prerequisites.
3b) To acquire basic concepts of the Statistics, To identify variables, To identify and work with different types of samples, both biased and unbiased, To learn how to calculate different frequencies of a value of the variable, To build frequency tables, To do the stem and leaf representation of a distribution, To build and interpret all types of graphs of the Statistics, To calculate Measures of central and non-central tendency and of dispersion., To work with multivaried distributions, To interpret the results of a study.
3c) Livros escolares do Ensino Secundário; Meyer, PL, Probabilidades. Aplicações à Estatística; Montgomery; Douglas C e Runger, George, C 1999 Applied Statistics and Probability for Engineers, John Wiley & Sons, New York, 2ª Edição 1999 ou 1ª Edição 1994; Murteira, Bento J Probabilidades e Estatística, Vol I e Vol. II, 2ª Edição, McGraw-Hill de Portugal Ldª., Lisboa.
4. Compulsory.
5. Cacilda dos Santos Paz.
6. 3h/week; 2nd semester; 2nd year.
7. Theoretical and Practical lessons with different strategies articulated to the necessities of the students.
8. Following the Institution Rules, Evaluation can be negotiated with the students; however, it is suggested a written test at the end of the term, where the minimum mark to aprove is 9.5 out of 20. There is no oral test in this subject.
9. No.
10. 4.

1. Protected Areas Management – 0796.
2. European and international strategies for natural landscapes protection. Protection and conservation. Historical integration of protected areas. Concept evolution for protected areas. Protected areas in Portugal. General issues: biological diversity, conservation and environmental education. Rural desertification/human density; landscape degradation; natural environment integration. Natural resources deterioration. Protected areas classification and Natura 2000 network. International conventions. Local development and nature conservation.
3a). Knowledge of Ecology.
3b). To provide students with the theoretical and practical concepts, typologies and management tools.
3c) Ceballos-Lascuráin, H 1996 Tourism ecotourism and protected areas; Forman; RT, Godron M 1986 Landscape Ecology; Castroviejo, M Diaz, V 1996 Practicas para la planificacion de espacios naturales; Pardal, S 1988 Planeamento do território.
4. Compulsory.
5. João Bento.
6. 3h/week TP; 2nd semester; 2nd year.
7. Theoretical lectures, practical classes and field visits.
8. A case study presentation; final examination.
9. No.
10. 4.

1. Leisure Equipment Management – 0803.
2. The concept of management equipment of leisure. The management steps in leisure facilities.
3a) No prerequisites.
3b) To provide a set of technical knowledge and methods of recreation and leisure management.
3c) Torkildsen, G Leisure and Recreation Management E&FN SPON; SlackT Understanding Sport Organizations. Human Kinetics.
4. Compulsory.
5. Serôdio-Fernandes.
6. 3h/week ; 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Written essays and oral discussions30%; Exam 70%.
9. No.
10. 4.

1. Foreign Language IV – English – 0804.
2. Development of oral and written competence in specific areas related with recreation, leisure and tourism, understood as essential tools for effective communication in future work scenarios.
3a) The students are expected to understand fundamental English oral and written and to produce oral and written messages related with real life situations in the areas of recreation, leisure and tourism.
3b) To understand oral and written utterances in different contexts.To produce oral and written utterances in different contexts.To get involved in the learning process formal correction-fluency.
3c) Harding, Keith and Paul Henderson 2001 High Season Oxford OUP Course book, workbook, teacher's book, cassette; Helgesen, Marc and Keith Adams 1996 Workplace English, Travel File Essex Longman Student's book, workbook, teacher's book, cassette; Hashemi, Louise and Raymond Murphy 2002 English Grammar in Use. Suplementary Exercises Cambridge CUP; Murphy, Raymond 2002 English Grammar in Use 2nd edition, Cambridge CUP Vocabolário; McCarthy, Michael and Felicity O'Dell 2001 English Vocabulary in Use Cambridge CUP 2001 Test Your English vocabulary in Use, Cambridge, CUP; Seal, Bernard 1989 Vocabulary Builder 2 Essex Longman; Vince, Michael, 1996 First Certificate Language Practice Oxford Macmillan Heinemann, English Language Teaching; Davidson, Rob, 1993 Tourism 2nd edition, Essex Longman. Dicionaire. Rewius and Jornals.
4. Compulsory.
5. Maria Otelinda Costa.
6. 5h/week; 2nd semester; 2nd year.
7. Practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Oral and written assignments, individually or in group, and written tests or final exam.
9. Yes.
10. 5.

1. Methodology of Physical Condition – 0429.
2. Myths on the Physical Activities; General principles of Sports; Principles of Warm-up; Biological bases of the Sports; The Components of Exercises; The Conditional Capacities; Evaluation of the Physical Condition; Planning Exercises.
3a) No prerequisites.
3b) The transmission of theoretical slight knowledge on anatomy; physiology; methodology and evaluation of the physical condition of the individuals; lapsing of exercises and promotion of healthful styles of life. Introduction to the different instruments of evaluation of the physical condition, methods and its forms of application.
3c) Wilmore, J Jack, H & Costill, D 1994 Physiology of Sport and Exercice. Human Kinetics Books Champaign Illinois; Weineck, J 1992 Biologie du Sport Editions Vigot Paris; Heyward, V 1991 Advanced Fitness Assessment & Exercice Prescription Second Edition Human Kinetics Books Champaign Illinois.
4. Compulsory.
5. Carlos Fernando Avelens Freitas.
6. 4h/week 2 Practical + 2 Theoretical; 2nd Semester; 2nd Year.
7. Lectures and practical classes.
8. 1 written work and 1 theoretical test.
9. No.
10. 4.

1. Tourist Projects Planning – 0798.
2. Tourist project- concept. The importance of planning and management in tourist projects. Phases of a project. The system of management. Mission, aims and goals. Time, costs and resources. Programming control and organization. Dealing with people, politics and public relations as a project manager.
3a) No prerequisites.
3b) To define the concept of tourist project.To understand the impotance of management in a tourist project. To analyse the phases of a project. To analyse the system of a project management. To recognize the importance of a project planning. To define mission, aims and goals of o project. To evaluate time, costs and resources in a project. To recognize the importance of programming. To evaluate the importance of controlling to the success of a project. To recognize the importance of leadership in project management. To understand the role of motivation in a team for a successful project.
3c) Barros, Carlos 1994 Gestão de Projectos, 1ª Edição Lisboa Edições Sílabo; Lewis, James P 1999 Manual Prático da Gestão de Projectos – Guia de planificação, programação e controle de projectos. Mem Martins: Edições Cetop; RaynalL, Serge 2000 A Gestão por Projectos Lisboa Instituto Piaget, Colecção Sociedade e Organizações; Woiler, Samsão Mathias, Washington F 1999, Projectos – Planejamento, Elaboração e Análise. Brasil, São Paulo Editora Atlas Sa.
4. Compulsory.
5. António de Sousa e Silva.
6. 3 hours/week; 2nd semester; 2nd year.
7. Theoretical/Practical classes.
8. According to the “Pedagogic Rules”: 1 written frequency test 50%; elaboration of a tourist project 50% or a final examination 100%.
9. No.
10. 4.

1. Tourism and Arrangement – 0778.
2. Conceptual framework for tourism and arrangement. The territorial and environmental dimension of tourism. Ways of territorial implantation of the tourist activity. Arrangement an planning of the tourist territory. The Portuguese legal frame and territorial and tourist management Basic Law for the Arrangement and Management of the Territory and Planning. Lei nº 48/98, de 11 de Agosto and Legal System for the Territorial Management Instruments. Dec-Lei nº 380/99, de 22 de Setembro.
3a) No prerequisites.
3b). To recognize Tourism as a contemporary and complex phenomenon. To analyse the different arrangement of the tourist space. To recognize tourism as asystem. To analyse the diversity of space in tourist destinations. To know the main theories of evolution of tourist space. To analyse the role of tourism in the territorial development and construction of the landscape. To recognize the factors of tourist and arrangement and planning. To recognize the importance of institutional coordination and the complexity of tourist space management. To know the Basic Law for the Arrangement an Management of the Territory and Planning. Lei nº 48/98, de 11 de Agosto To know the Legal System for the Territorial Management Instruments. Dec-Lei nº 380/99, de 22 de Setembro.
3c) Vera, JF Coordenador; Palomeque, FL Marchena, MJ Anton, S 1997 Análisis Territorial del Turismo - Una nueva geogragia del turismo, Barcelona Editorial Ariel, Sa; Orea, DG 2002 Ordenacion Territorial, Madrid coedição Ediciones Mundi-Prensa e Editorial Agrícola Española, Sa.
4. Compulsory.
5. António de Sousa e Silva.
6. 3hours/week; 2nd semester; 2nd year.
7. Theoretical classes.
8. According to the Pedagogic Rules: 1 or 2 written tests or a final examination 100%.
9. No.
10. 5.

3rd year

1. Natural Resources Conservation – 1232.
2. Natural resources-Basic Notions: Renewable resources, Unrenewable resources. Sustainable development of resources: Dilemma conservation-exploration. Faunistic Resources: Principal treatment species among considerated groups, risk features. Agrological Resources: Its utilization in the perspe ctive other conservation resources and environmental quality. Agricultural and Forest Resources: Riparian vegetation functions and conservation interest. Hydrological Resources. Mineral and Energetic Resources: Alternative fonts of energy: its importance and present day meaning.
3b) Characterization of the main natural resources, its importance for the country, with the objective of tourism exploration.
3c) Naredo, JM & Parra F 1993 Hacia una ciencia de los recursos naturales Diaz-Pineda, F 1996 Ecologia y Desarrollo, Escalas y problemas de la dialéctica Desarrollo-Medio Ambiente. Editorial Complutense Madrid; Bifani, P 1981 Desarrollo y medio ambiente II. Los recursos naturales y la población Cuadernos del Cifca 25 Madrid.
4. Compulsory.
5. Aurora Monzón, Paula Bento.
6. 3h/week (1 practical + 2 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final written exam and practical project.
9. No.
10. 4.

1. Traditional and collective games - 1231
2. The traditional games, origin and evolution. The traditional games in the Portuguese culture. The importance of collective games in tourism.
3a)
3b) To provide a set of technical knowledge of the traditional and collective games in tourism.
3c) Serra, C 1999 Os Jogos Tradicionais em Portugal UTAD.
4. Compulsory.
5. Serôdio-Fernandes.
6. 3h/week; 1st semester; 3rd year.
7. Lectures and practical classes.
8. Written essays and oral discussions 30%; Exam 70%.
9. No.
10. 4.

1. Foreign Language V Spanish – 1235.
2. The course of Foreign Languages aims to get a sufficient level in order that pupils focus on their future work in daily and professional situations the student is being particularly prepared for.
3a) No prerequisites.
3b) Show how a language may be used according to a goal since the vocabulary is based on useful objectives and in communicative situations. Get that students learn what to say, how to say it, whom, when and where to say it. That students are able to make up dialogues and communicative tasks. Make the pupils interchange conversations, listen and extract information from different material and furthermore, read and organize information. Use the written and oral language in real situations.
3c). Universidad de Alcalá, 2000 Sueña 1 y 2. Libro del alumno y cuaderno de ejercicios. Madrid Anaya; Aavv, 2000 De dos en dos. Ejercicios interactivos de producción oral. Niveles básico e intermedio, Madrid Difusión; Ortega Garcia, Julia 1998 Preparados Listos Ya! Material de apoio, Lisboa Departamento do Ensino Secundário; Aguirre Beltrán, Blanca 2001 El español por profesiones: servicios turísticos, Madrid, Sgel; Sánchez Lobato, J y Aguirre, B 2002 Léxico fundamental del español Madrid Sgel; Moreno, Concha y Tuts, Martina 1997 El español en el hotel. Madrid Sgel.
4. Compulsory.
5. Jose Manuel Giménez García.
6. 5h/ week; 1st semester; 3rd year.
7. Practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, final exam.
9. Spanish language.
10. 5.

1. Methodology of the Open Air Physical Activities – 1227.
2. Methodology and organization of the open air events.
3a) Beneficts of physical activities.
3b) Knowledge of the open air physical activities and basics concepts of your organization.
3c) Jensen, Clayne R 1995 Outdoor Recreation in America Human Kinetics, USA; Marivoet, Salomé 1998 Aspectos Sociológicos do Desporto; Livros Horizonte, Lisboa; Quílez, Martín Pinos 1997 Guía Práctica de la Iniciación a los Deportes en la Naturaleza; Gymnos Editorial Deportiva, Madrid; Standeven, J. & Knop, P 1999 Sport Tourism Human Kinetics.
4. Compulsory.
5. Rui Ferreira.
6. 4h/week (theory - practice); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Final grade: Practical Evaluation 40%; Theoretical Evaluation 40%; Continue Evaluation 20%.
9. No.
10. 4.

1. Transport and Lodgement – 1230.
2. Basic concepts about Transports. Transports evolution. Essential factors in the choice of transports. Typology and characteristics. Competitive analysis of the different means of transport. Transports future.
3a) No prerequisites.
3b) Main operations analysis in the different means of transport. Problematic study of lodgement operations in a technical perspective.
3c) Roná, Ronaldo Di 2002 Transporte no turismo. S. Paulo; Manole, Linzma Yer E Guia Básico para a Administração hoteleira S Paulo, Editora Senac.
4. Compulsory.
5. Artur Carlos Crespo Martins Cabugueira.
6. 3h/ week; 1st semester; 3rd year.
7. Lectures and and practical classes.
8. A written test, works or final exam.
9. No.
10. 4.

1. Cultural Tourism – 1234.
2. From the view of the relationship between anthropology and tourism, in this discipline we try to understand the origins and the development of cultural tourism, therefore present the articulatino between tourism, culture and cultural heritage.
3a) No prerequisites.
3b) To think about the touristic use of culture and cultural heritage - To promote the practice of na alternative, vivential and experiencial tourism - To analyse the sociocultural impacts of the tourism.
3c) Nash, Donald e Smith, Velene, 1996 Anthropology of tourism, New York, Pergamon; Santana, Agustín 1997 Antropología y turismo Nuevas hordas, viejas culturas, Barcelona, Ariel; Smith, Velene coord. 1992 Anfitriones e invitados, Madrid, Endimión.
4. Compulsory.
5. Xerardo Pereiro.
6. 5 h/week; 1st semester; 3rd year.
7. Lectures. Working about ethnographic films. Analysis of texts and essays in applied anthropology to Tourism. Projecting and Developing Cultural Itineraries and Routes.
8. Acoording to University Regulations: Periodical Assessment: essays and exam. Final Assessment: Final exam 100%.
9. Spanish, Italian, English.
10. 5.

1. Tourism and regional development – 1226.
2. Growing and development. Systemic approach of development. The regions as local-egional development: problems and framing. The Portuguese territory: a strategic vision for the XXI century under the perspective of the National Plan for the Economic and Social Development 2000-2006. Modern society and urban spaces. Modern society and rural spaces. The importance of planning in local-egional development. The UE and the regional development in Portugal - Analysis of the Regional Plan for Development 2000-2006. The role of Tourism in regional development.
3a) No prerequisites.
3b) To distinguish the concept of growing and development. To understand the process of development, anning under a systemic approach. To recognize the regions as a system. To understand the framework and the problems of the local-egional development. To know the development of the Portuguese space-ritory under the vision of the National Plan for the Economic an Social Development 2000-2006. To recognize the importance of urban spaces in post-modern society. To understand the problems of the rural spaces in contemporary society. To recognize the importance of development process for the local-regional development Toanalyse the Regional Plan for Development 2000-2006. To evaluate the importance of tourism for the regional development.
3c) Aydalot, Philippe 1986 L'aptitude des milieux locaux à promouvir l'innovation, em Federwisch; Jacques, e Henry Zoller orgs, Technologie Nouvelle et Ruptures Regionales Paris, Economica; Aschet, F 1998 Metapolis - Acerca do futuro das cidades. Oeiras Celta Editora; Benko, G Lipietz, A 1994 As regiões ganhadoras. Distritos e redes. Os novos paradigmas da geografia económica. Oeiras Celta Editora.
4. Compulsory.
5. António de Sousa e Silva.
6. 3 hours/week; 1st semester; 3rd year.
7. Theoretical classes.
8. According to the "Pedagogic Rules": 1 or 2 written tests or a final examination 100%.
9. No.
10. 5.

1. Nature Activities – 1241.
2. Environmental Education. Interference of Human kind in the ecosystems. The production of wastes has a result of the human activity. Characteristics of a tourism project in a nature environment.
3a) No prerequisites.
3b) To exemplify situations of environment aggression; To develop practical activities to achieve Environmental Education; To contribute to the promotion of the sustainable development; To take conscience of the negative impacts on the global environment;
3c) Aveiro Basto, 1992 Ecologia - A Casa da Vida. Porto, Porto Editora; Barrére, M 1993 Terra Património Comum Lisboa Instituto Piaget Divisão Editorial; Carapeto, C 1998 Educação Ambiental Lisboa: Universidade Aberta; Dron, D 1998 Ambiente e Escolha Políticas Lisboa Instituto Piaget; Giordan, A Souchon, C 1997 La Educación Ambiental: guía práctico 2ª Ed. Sevilla Díada Editora; Nova, E 1994 Educar para o Ambiente Lisboa Texto Editora; Oliveira F, 1998 Educação Ambiental 5ª Edição Lisboa Texto Editora; Pichat, P 1998 A Gestão dos Resíduos Lisboa Instituto Piaget divisão Editorial.
4. Compulsory.
5. Artur Salgado; Rui Ferreira.
6. 4h/week; 2nd semester; 3rd year.
7. The strategies/activities for teaching and learning methods is achieved by lecture-practical classes in a classroom context, using transparencies projections, watching and analysing video films, analysing and discussing texts. All these activities are executed individual and/or as working groups. Some research activities are all so made to make the connection between the lectures and its practical application.
8. According to the University regulations, one written test (50%) and one practical activity (50%) or final exam (100%). Attendance in 2/3 of practical classes is compulsory.
9. No.
10. 4.

1. Biomechanics of Locomotion – 1238.
2. Fundamental biomechanical concepts. Relationship between fundamental concepts of Mechanics and Biomechanics. Considerations and terminology related to human walking. Biomechanical diagnosis of walking trails.
3a) Good knowledge on anatomy and physiology of the human musculo-skeletal system.
3b) Provide and introduction to Biomechanics, which include justifications for the study of Biomechanics of human locomotion in recreation, leisure and tourism. Provide a review of fundamentals concepts and principles of Biomechanics applied to the biomechanical diagnosis of walking trails.
3c) Abrantes, João MCS 1997 Biomecânica FMH/UTL Cruz Quebrada Portugal; Gabriel, Ronaldo 2001 Biomecânica dos Percursos Pedestres Universidade de Trás-os Montes e Alto Douro Vila Real Portugal; Whittle, Michael 1996 Gait Analysis Butterworth Heinemann Oxford. UK.
4. Compulsory.
5. Ronaldo Gabriel.
6. 3 h/week (2 Theoretical + 1 Pratical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Written work, both essay type and problem solving, is an integral part of all semester. Assessment is based on coursework (CW) and end-of-semester exam (E). The final degree (FD) is based on this formula: FD = (CW + E) / 2.
9. No.
10. 4.

1. Tourist Resources Development – 1237.
2. Tourist resource and tourist product. The tourist consumer. Marketing and communication in the development and promotion of the tourist resources and products. New trends and strategies for tourism and leisure. Emerging tourist resources and products. Cases study.
3a) No prerequisites.
3b) To distinguish tourist resource and tourist product. To recognize the importance of the tourist consumer in the development of tourist resources and products. To know the importance of marketing and tourist communication in the development of tourist resources and products. To know the new trends and strategies for tourism and leisure. To recognize emerging tourist resources and products. To analyse some plans for tourist development.
3c) AAVV 2001 Seminário Novas Estratégias para o Turismo Porto AEP - Associação Empresarial de Portugal; Baud-Bovy, M 1998 Tourism and recreation handbook of planning and design Oxford Architectural Press; Dubois, B 1993 Compreender o Consumidor, tradução e revisão técnica de Francisco Velez Roxo Lisboa Publicações D. Quixote, Colecção Ciências de Gestão/Gestão & Inovação; Gonzales, XMS (Direcção) 2001 Planeamento Estratéxico e Mercadotecnia Territorial Vigo: Eixo Atlântico do Noroeste Peninsular; Lamas, ARG 1991 Recursos naturais para o turismo e o desenvolvimento regional In II Encontro ambiente, turismo e cultura. Angra do Heroísmo (Açores), 4 p; Lanquar, R 2001 Marketing Turístico: de lo global a lo local Barcelona Ariel Turismo; Meer, Jan van der 1994 Tourism strategy and product development In Conference Urban Tourism & City Trips. Rotterdam, 5 f..
4. Compulsory.
5. António de Sousa e Silva.
6. 3hours/week; 2nd semester; 3rd year.
7. Theoretical classes.
8. According to the “Pedagogic Rules”: 1 or 2 written tests or a final examination (100%).
9. No.
10. 4.

1. Philosophy of Corporal Activities – 1240.
2. Philosophy and corporal activities: philosophic skills, conceptions and theories of leisure, recreation and tourism. Historical approach of corporal activities. Dualistic and holistic views of human nature and its implications. Corporal activities and values. Building of a personal philosophy of corporal activities.
3a) No prerequisites.
3b) To develop skills and reflexive practices of philosophical base applied to the domain of corporal activities. To deepen the knowledge about the man's conceptions and its implications in the implementation and valorization of corporal activities. To be capable to value the corporal activities in agreement with the consideration of its extrinsic and intrinsic merits.
3c) Kretchmar, RS 1994 Practical philosophy of spor. Champaign Human Kinetics; Dare, B Welton, G & Coe, W 1987 Concepts of leisure in western thought. A critical and historical analysis. Dubuque, IA Kendall/Hunt Publishing Company Edginton; Jordan CR, DJ DeGraaf, DG & Edginton, SR 1998 Leisure and life satisfaction. Foundational perspectives (2ª ed.) Boston McGraw-Hill; Jackson, EL & Burton, TL (Eds.) 1999 Leisure studies. Prospects for the twenty-first century State College, PA: Venture Publishing.
4. Compulsory course unit.
5. Octávio Valdemar Gonçalves.
6. 3h/week; 2nd semester; 3rd year.
7. Lectures (multimedia) + enlarged discussion in class of results of their research and reading records
8. 1 test (50%); 1 group work or 4 reading records (35%); assiduity and participation (15%).
9. No.
10. 4.

1. Foreign Language VI (Spanish) – 1236.
2. The course of Foreign Languages aims to get a sufficient level in order that pupils focus on their future work in daily and professional situations the student is being particularly prepared for.
3a) No prerequisites.
3b) Show how a language may be used according to a goal since the vocabulary is based on useful objectives and in communicative situations. Get that students learn what to say, how to say it, whom, when and where to say it. Those students are able to make up dialogues and communicative tasks. Make the pupils interchange conversations, listen and extract information from different material and furthermore, read and organize information. Use the written and oral language in real situations.
3c). Universidad de Alcalá, 2000 Sueña 1 y 2. Libro del alumno y cuaderno de ejercicios, Madrid Anaya; Aavv, 2000 De dos en dos. Ejercicios interactivos de producción oral. Niveles básico e intermedio, Madrid Difusión; Ortega Garcia, Julia 1998 Preparados Listos Ya! Material de apoio, Lisboa Departamento do Ensino Secundário; Aguirre Beltrán, Blanca 2001 El español por profesiones: servicios turísticos, Madrid, Sgel; Sánchez Lobato, J y Aguirre, B 2002 Léxico fundamental del español Madrid Sgel; Moreno, Concha y Tuts, Martina 1997 El español en el hotel. Madrid Sgel.
4. Compulsory.
5. Jose Manuel Giménez García.
6. 5h/ week; 2nd semester; 3rd year.
7. Practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, final exam.
9. Spanish language.
10. 5.

1. Practice I – 1242.
2. Investigation and research methods in recreation, Leisure and Tourism.
3a) No prerequisites.
3b) To improve the different methods of investigation and research in RLT, in contact with visited/watched places/institutions/organizations. To deepen the knowledge in different areas of RLT.
3c) Albarello, L et al. 1997 Práticas e Métodos de Investigação em Ciências Sociais Lisboa Gradiva Publicações, SA; Ghiglione, R Matalon, B 2001 O inquérito - Teoria e Prática 4ª edição. Oeiras Celta Editora; Quivy, R Campenhoudt, L Van 1998 Manual da Investigação em Ciências Sociais 2ª edição Lisboa Gradiva Publicações Ltda; Vasconcelos e Sousa, G 1998 Metodologia da Investigação, Redacção e Apresentação de Trabalhos Científicos Porto Livraria Civilização Editora.
4. Compulsory.
5. António de Sousa e Silva.
6. 3 hours/week; 2nd semestre, 3rd year.
7. Practical classes.
8. According to the "Pedagogic Rules": 1 or 2 written tests or a final examination (100%).
9. No.
10. 5.

1. Tourism sociology – 1239.
2. Sociology: basic concepts. The concept of Tourism and the Sociology of the Tourism. The tourism in the Social sciences. Time of work, time of vacations and free time. Motivations and values of the tourism. The sociocultural effects of the tourism.
3a) No prerequisites.
3b) Dominate some of the fundamental concepts of the Sociology; To problematize the tourist phenomenon to the light of those same form concepts to frame it in the spectrum vaster epistemologico than it is it of the Social sciences; To know to determine the motivations and the values that are in the base of the tourism while social phenomenon, in way to understand some of the reasons of your growth in the last decades; To notice some of the sociocultural effects of the tourism because of the contact that promotes among members of very disparate communities.
3c) Aron, Raymond 1991 As Etapas do Pensamento Sociológico, Lisboa Círculo de Leitores; Lickorish, Leonard J e Jenkins, Carson L 2000 Introdução ao Turismo, 2ª Edição Rio de Janeiro, Editora Campus; Savelli, Asterio 1998 Sociologia del Turismo, Milano, Centro Italiano di Studi Superiori sul Turismo; Silva, J Albino, Mergulhão, Luís Filipe et al 2000, Turismo e Desenvolvimento no Norte Alentejo Lisboa, Edições Colibri.
4. Compulsory.
5. Luís Filipe Mergulhão.
6. 3h/week; 2nd semester; 3rd year.
7. Theoretical.
8. 2 written tests or final exam - 100%.
9. No.
10. 4.

4th year

1. Tourist Projects Evaluation – 1243.
2. Notions of Project, Plan and Program. Concept of Project. Classification of Projects. Investment concept. Classification of the investments. Profitability concept. The appreciation of Projects. Systems of incentives to the tourist investments. The Operational "Program of the Economy". SIPIE. SIME. SIVETUR.
3a) No prerequisites.
3b) to Know him/it PUTS, in what he/she concerns the tourist activity; To know that incentive systems to the investment exist and they are available in the extent of the it PUTS during QCA III; To know in that system of specific incentive is framed an investment that she intend to accomplish; To know the differences among each incentive system; To know, although in a rudimentary way, to organize a candidacy to the it PUTS.
3c) Abecassis, Fernando e Cabral, Nuno 1991 Análise Económica e Financeira de Projectos, 3ª Edição, Lisboa, Fundação Calouste Gulbenkian; Barros, Hélio 1991 Análise de Projectos de Investimento Lisboa, Edições Sílabo, Lda.; Hobbs, Peter 2001 Gestão de Projecto, Lisboa, Livros e Livros; Lewis, James 1999 Manual Prático da Gestão de Projectos, Colecção «Pensar a Gestão», n.º 32, Lisboa, Edições CETOP.
4. Compulsory.
5. Luís Filipe Mergulhão.
6. 3h/week; 1st semester; 4th year.
7. Practical classes.
8. Group Practical work and respective discussion.
9. No.
10. 5.

1. Ecotourism – 1248.
2. Presentation of ecotourism: Definition and evolution; Ecotourism and other parcels of tourism activities; Different variants of ecotourism; Bounds and Geographical distribution. Impacts: Economic evaluation; Environmental impacts; Socio-cultural outcomes; Local development; Carrying capacity and sustainability. Nature based tourism: Nature based tourism in Protected Areas; typologies; accommodation; Environmental education; Financing.
3a) Knowledge of Protected Areas Management and Nature Based Activities.
3b) To provide students with the characteristics and bounds related with ecotourism.
3c) Ceballos-Lascuráin, H 1996 Tourism ecotourism and protected areas; Weaver, D 2001 The Encyclopedia of Ecotourism.
4. Compulsory.
5. João Bento.
6. 3h/week (TP); 1st semester; 4th year.
7. Theoretical lectures, practical classes and field visits.
8. A case study presentation; final examination.
9. No.
10. 4.

1. Political Institutions and Tourist Development – 1247.
2. Power, organization and decision-making process. Political approach of the organizations. The State as an organization. The State under a systemic perspective. State and society. The modern State: elements, goals and functions. Organic structure of the XV constitutional Government. Programme and politics for the tourist development sector. Groups of interest and groups of pressure. The contribution of UE for tourist development. The role and position of the private sector.
3a) No prerequisites.
3b) To recognize: the importance of power and modern organizations in decision making: . the State as complex organization; the importance of groups of interest and groups of pressure. To understand: the different typologies of power in the organizations as an important factor; . the importance of the role and the position of the private sector for the construction of a new policy for the tourist development. To know. The elements, goals and functions of the modern State in contemporary society; the organic structure of the XV Institutional Government of Portugal and the Programme for the tourist sector; To reflect about: the importance of systemic study and analysis of the State in order to understand some decision-making processes; the importance of the modern State on the contemporary society
3c) Galbraith, John Kenneth 1983 Anatomia do Poder Lisboa: Difel, Difusão Editorial, L.tda; Goeldner, Charles R Ritchie, JRBrent 2002 Turismo - Princípios, Práticas e Filosofias, 8ª Edição. Brasil, Porto Alegre: Bookman; Mintzberg, Henry 1995 Estrutura e Dinâmica das Organizações Lisboa: Publicações D. Quixote Colecção «Gestão e Inovação» Série «Ciências de Gestão».
4. Compulsory.
5. António de Sousa e Silva.
6. 3 hours/week, 1st semester, 4th year.
7. Theoretical classes.
8. according to the “Pedagogic Rules”: global frequency test (75%) + written work (25%) or a final examination (100%).
9. No.
10. 4.

1. Marketing Applied to the Recreation, Leisure and Tourism – 1246.
2. What is the Marketing. The crescent paper of the Marketing in the administration of the companies. The Marketing of services. The Tourist Marketing. Theoretical antecedents. The tourist product: singularities and specificities. The public-objective of the Tourist Marketing.
3a) No prerequisites.
3b) what is the Marketing; To take conscience of the growing importance that the Marketing has been coming to win at the level of the administration of the companies, namely of the companies of the tourist section; To understand the specificities of the Marketing of services, above all in the section of the tourism, comparatively to the same activity but in other sections of the economy; To structure, although in way necessarily rudimentary, a strategy of Marketing for the section of the tourism;
3c) Camara, Pedro B da, Guerra, Paulo B e Rodrigues, Joaquim V 2001 HUMANATOR – Recursos Humanos & Sucesso Empresarial, 4ª Edição, Colecção «Gestão & Inovação», Lisboa, Publicações Dom Quixote; Lindon Denis et al 1999 Mercator – Teoria e Prática do Marketing, 8ª Edição, Colecção «Gestão & Inovação», Lisboa, Publicações Dom Quixote; Lumsdon, Les 1997 Tourism Marketing, London, International Thomson Business Press; Ruschmann, Doris 1995 Marketing Turístico, 2ª Edição, São Paulo, Papirus Editora.
4. Compulsory.
5. Luís Filipe Mergulhão.
6. 3h/week; 1st semester; 4th year.
7. Theoretical classes.
8. 2 written tests or final exam - 100%.
9. No.
10. 4.

1. Practices II – 1249.
2. Methods and processes of socket of decision in specific contexts of the Recreation, Leisure and Tourism. Application of the qualitative methods. The Recreation, Leisure and Tourism, in a perspective of the visitors' Environmental Education and of the population in general. Work of project in RLT.
3a) No prerequisites.
3b) to Elaborate and to present a project of practical activities to be implemented in the land (study visits, organization of other events, etc.), defining the specific objectives, face to the activities (actions) to develop, evaluating the time, the cost and the resources.
To acquire a deep conscience of the high strategic value, under the economical point of view, of the different aspects of the expression of the Life and of the Nature, understanding them as true tourist resources, considering them with perfect exploration possibility, in a sustained way, contributing like this to the development and well to be of the populations of a place and of an area.
3c) According to the project to develop.
4. Compulsory.
5. Artur Salgado/Margarida Matos.
6. 5h/week; 1st semester; 4th year.
7. Practical classes and presentation of the project in the own land. These activities are executed as individual work and/or I work of group.
8. In agreement with the Pedagogic Norms, I project practical (100%) or final exam (100%).
Presupposes the presence to 2/3 of the practical classes.
9. No.
10. 5.

1. Organizations psychology – 1244.
2. Context of the exercise of the Organizational Psychology; concept of Organization; general characteristics of an Organization. Theoretical perspectives about the organizations (Scientific Organization of the Work of Taylor, Administrative perspective of Fayol, Bureaucratic model of Max Weber, School of the Human relations, approach Sistémica of the Organizations). Individuals and Groups in the Organizations. Climate and organizational culture, organizational structures, to can, conflict and negotiation.
3a) No prerequisites.
3b) to develop analysis capacities and of psychological intervention in the organizational context; to know and to know to use techniques and instruments of organizational evaluation and of administration of human resources.
3c) Ferreira, JMC Neves, J & Caetano, A 2001 Manual de Psicossociologia das Organizações Lisboa: McGraw-Hill; Chambel, MJ & Curral, L 1995 Psicossociologia das Organizações Lisboa: Texto Editora.
4. Compulsory.
5. Sofia Cochofel Quintela.
6. 3 h / week; 1st semester; 4th year.
7. Theoretical and Practical classes.
8. Evaluation process is negotiated with the students, respecting the norms of the institution. Final evaluation: final exam.
9. Spanish, French, English.
10. 4.

1. Recreation for Special Populations – 1245.
2. The Subject of Recreation for Special Populations is in the pedagogic area of the Human and Social Sciences. It has sufficiently as concern a formation solid in areas of comparative studies of the recreation, lazer and tourism for they intervene in the offer of services to special populations, senior, faulty and sick in recovery phase.
3a) No prerequisites.
3b) The goal of this subject is to endow the profissional in Recreation Lazer and Tourism of knowledge basic relative ace populations in study, it wants in the theoretical plan it wants in the operational plan. On the other hand, it intends the subject to endow the individual of relative knowledge to the services and activities that can be yours to dispose in the attendance to these populations. Leaving above of the referred in a private way with this subject the following specific goals: 1. Acquisition of knowledge and concepts on conditions of health and social problems that harm the certain individuals' capacity to participate in recreation activities. 2. Study of the attitudes of the society in relation to the special populations (disabilities peoples, aged, etc...) 3. Transmission of theoretical concepts concerning those populations. 4. Introduction to the concepts methodologies in the installment of recreation services in special populations. 5. Organization of programs and appropriate activities to those populations.
3c) Araújo, J 1986 Guia do Animador e Dirigente Desportiv, Lisboa: Caminho; Bullock, C & Mahon, M 1997 Introduction to Recreation services for people with Disabilities, Champaign: Sagamore Publishing; Dumazedier, J 1974 Sociologia Empirica do Lazer, S. Paulo: Editora Perspectiva.
4. Compulsory.
5. Victor Manuel Teixeira Queirós Monteiro.
6. 4 hours /week (two theoretical hours and two hours practices) 1st semester; 4th year.
7. The subject of Recreation for Special Populations is taught falling back upon the methods exhibition and teaching of concepts.
8. In agreement with the pedagogic norms, 1 written test or final exame. 100%.
9. English.
10. 4.

1. Cultural Anthropology – 1254.
2. Present the basic concepts, principles and problems in social and cultural anthropology. Especial atention is given to the cultural human diversity and to the change on the organization and meaning of language, economic, social estructure, kinship, identities, politics, religion, gender and urbanism.
3a) No prerequisites.
3c) Bernardi, Bernardo 1974 Introdução aos estudos etno-antropológicos Lisboa, Edições 70; Kottak, Conrad Philips 1997 Antropología Cultural. Espejo para la Humanidad Madrid, McGraw-Hill. Harris, Marvin e Johnson, Olivier 2000 Cultural Anthropology Needham Heights (Massachusetts) Allyn and Bacon.
4. Compulsory.
5. Xerardo Pereiro.
6. 3h/week; 2nd semester; 4th year.
7. Lectures. Working about ethnographic films. Analysis of texts and essays in applied anthropology to the Recreation, Leisure and Tourism.
8. Acoording to University Regulations: Periodical Assessment: essays and exam. Final Assessment: Final exam (100%).
9. Spanish, Italian, English.
10. 5.

1. Ecology applied to RLT – 1245.
2. Ecology concept. Aquatic ecosystems: structure and function; representative communities. Terrestrial ecosystems: Biogeography -historical factors and patterns in community structure; Population dynamics: interactions; habitats requirements; The ecosystems in the space-time. Characterization of some threatened species. Examples of activities to promote environmental attitudes.
3a) Knowledge from other disciplines: Natural resource conservation; Classified areas management; Nature activities.
3b) The main goals of the discipline is to introduce ecological principles of the ecosystems structure and function as resource that provide educational and recreational opportunities; and also to provide available tools that could answer the society's increasing interest by environmental questions.
3c) Bolen, EG & Robinson WL 1995 Wildlife ecology and management Prentice Hall, New Jersey; Morrinson, ML Marcot, BG & Mannan, RW 1992 Wildlife-Habitat relationship, concepts and applications The University of Wisconsin Press; Sacarrão, GF 1991 Ecologia e Biologia do Ambiente, As Interdependências do Homem Publicações Europa América.
4. Compulsory.
5. Aurora Monzón; Paula Bento.
6. 3h/week; 2nd semester; 4th year.
7. Lectures/ practical classes.
8. Final written exam and practical project.
9. No.
10. 4.

1. Practice III – 1256.
2. To understand the foundings and the importance of Recreation, Leisure and Tourism in the context of the development both of the regions and the country.
3a) No prerequisites.
3b) To formulate a Strategic Development Project in the area of Recreation, leisure and Tourism.
3c)
4. Compulsory.
5. Artur Salgado; Margarida Correia de Matos; Emanuel Brandão.
6. 5 h/week; 2nd semester; 4 th year.
7. Pratical classes. Attendance in 2/3 of pratical classes in compulsory.
8. Final written work or a final exam – 100%.
9. No.
10. 5.

1. Social Psychology of Physical Activities – 1255.
2. The relation between Leisure and Social Psychology; Socialization and Development of Leisure and Physical Activities; Psychological benefits of Leisure: Concepts, Theories and Evidences; The Perception of Freedom and the Intrinsic Motivation: The Psychological foundations of Leisure; The Behaviours of Leisure to Life-span.
3a) No prerequisites.
3b) The transmission of theoretical slight knowledge on Leisure and Social Psychology, the concepts, the theories and the evidences.
3c) Mannell, R & Kleiber, D 1997 A Social Psychology of Leisure Venture Publishing, Inc. State College; Adams, PA G & Marshall, S 1996 A Developmental Social Psychology of Identity: Understanding the Person-in-Context Journal of Adolescence, 19, 429 – 442; Mota, M 1996 Efeitos Psicológicos do Exercício Físico In de Mestrado, Universidade do Minho Braga.
4. Compulsory.
5. José Jacinto Branco Vasconcelos Raposo; Carlos Fernando Avelens Freitas.
6. 3h/week (3 Theoretical); 2nd Semester; 4th Year.
7. Lectures.
8. 1 Theoretical Test.
9. No
10. 4.

1. Techniques of Animation for Special Populations – 1251.
2. The Subject of Techniques of Animation for Special Populations is in the pedagogic area of the Human and Social Sciences. It has sufficiently as concern a formation solid in areas of comparative studies of the recreation, lazer and tourism for they intervene in the offer of services to special populations, senior, faulty and sick in recovery phase.
3a) No prerequisites.
3b) The goal of this subject is to endow the profissional in Recreation Lazer and Tourism of techniques basic relative ace populations in study, in the operational plan. On the other hand, it intends the subject to endow the individual of relative competences to the services and activities that can be yours to dispose in the attendance to these populations.
3c) Hugonnier-Clayette, S 1994 A deficiência visuail. Aspectos psicoevolutivos y educativos Málaga Ed. Aljibe; Jauregui, M & Lopez, M 1994 Discapacidad Motorica. Aspectos psicoevolutivos y educativos Málaga Ed. Aljibe; Monreal, S 1995 Deficiência auditiva. Aspectos psicoevolutivos y educativos Málaga Ed. Aljibe.
4. Compulsory.
5. Victor Manuel Teixeira Queirós Monteiro.
6. The subject of Recreation for Special Populations is half-yearly (2nd), being in the fourth year of the course in Recreation Lazer and Tourism. The hourly load is of 4 weekly hours, divided in two blocks: two theoretical hours and two hours practices.
7. The subject of Techniques of Animation for Special Populations is taught falling back upon the methods instruction directly and cooperative learning.
8. In agreement with the pedagogic norms, written report and Participation in Activities or final exam 100%.
9. English.
10. 4.

1. Tourist Promotion Techniques -1253.
2. Introduction: the Market. Restricted definition of Market. Enlarged definition of Market. The Promotion. Strategies of Promotion. The Promotion as a macro-process. The Promotion as a personal computer-process. The implementation of the strategy of Promotion. Main characteristics of the tourist Promotion. Techniques of Tourist Promotion.
3a) No prerequisites.
3b) Take conscience of the importance that the promotion has been coming to win in the section of the tourism; To know that is the market, namely the real tourist market and potential; To know that is the promotion, getting to define not only a coherent and effective strategy, as well as to know to implement her; To know which the specific characteristics of the tourist promotion; To know which are some of the main ones and more used techniques of tourist promotion.
3c) Conceição, Cristina Palma 1998 Promoção turística e (re)construção social da realidade, Sociologia Problemas e Práticas, n.º 28, pp. 67-89; Loudon, David e Bitta Albert, J Della 1993 Consumer Behavior 4th Edition, London, McGraw-Hill International Editions; Witt, S e Moutinho, L (eds.) 1994 Tourism Marketing and Management Handbook 2nd Edition New Jersey, Prentice-Hall International, Inc.; Vieira, José M Carvalho 2000 Inovação e Marketing de Serviços Lisboa, Editorial Verbo.
4. Compulsory.
5. Luís Filipe Mergulhão.
6. 3h week; 2nd semester; 4th year.
7. Theoretical classes and practical classes.
8. 1 test and a practical work of group, both with 50%.
9. No.
10. 4.

1. Therapeutic Recreation – 1250.
2. The concepts of leisure and recreation from an historical and philosophical perspective; Therapeutic recreation historical and conceptual development; Program design; Management of therapeutic recreation in clinical settings; Management of therapeutic recreation in community settings; Musculosketal, neurological, and neuromuscular system impairments; Sensory and other hidden impairments; Cognitive impairments; Psychological impairments; Social impairments; Children in health care settings; The aging process; Future trends.
3a) No prerequisites.
3b) Examine the fundamental aspects of the therapeutic recreation profession and practice; Apply the therapeutic process to different populations and individualize treatments; Have a general understanding of the nature of several illnesses, disabilities, and other conditions, and the therapeutic recreation role to assist the individual in maintaining or improving health and well-being; Apply the knowledge in the project design, preparation of protocols and individualized treatment plans; Understand the requirements of professionalism and ethical behavior.
3c) Austin, DR & Crawford, ME 2001 Therapeutic recreation: An introduction Boston Allyn and Bacon; Carter, MJ Van Andel, GE & Robb, GM 1995 Therapeutic recreation: A practical approach Prospect Heights, Illinois Waveland Press.
4. Compulsory.
5. Carla Maria C. A. Teixeira.
6. 4h/ week; 2nd semester; 4th year.
7. Theoretical (2h) and practical (2h) classes.
8. Evaluation is negotiated with students. Final Evaluation: final exam.
9. English.
10. 4.

5th year

1. Training and Research Project – 1257.
3a) No prerequisites.
3b) To implement the student's academy education through his/her contact with the reality of the working world, giving him/her the opportunity to deepen his/her practical skills and his/her future integration in a working activity. To apply the knowledge and the theoretical/practical competences and skills, acquired through his/her academy education. To develop a Research Project in Recreation, Leisure and Tourism Area, in an interdisciplinary and transdisciplinary way, and according to the Enterprise/Institution, taking into consideration the individual Research Project assumed by the student and the Coordinating Training Commission
3c) Quivy, R e Campenhaoudt, LV 1998 Manual da Investigação em Ciências Sociais, 2ª Ed, Lisboa, Gradiva Publicações; Ritchie, JRB e Goeldner, CR 1994 Travel Turism and Hospitality Research: a Handbook for managers and Researcher, 2Ed. New York, John Wiley & Sons; Mitra, A e Lanford, S 199, Research Methods in Park, Receration and Leisure Services, Champaign, Sagamore Publishing, Inc:
4. Compulsory.
5. Américo Nunes Peres.
6. 18h/week; 1st and 2nd semester, 5th year.
7. Theoretical-Practical.
8. According to the "Training Regulation and Research Project": Chapter VIII, Evaluation, Art.11, Art 12 and Art 13.
9.
10. 60.

English/German Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Sociology of Education	5.0	History of Education	4.0
	English Language I (Annual)	11.0		
	Introduction to Linguistic Studies (Annual)	9.0		
	Introduction to Literary Studies (Annual)	9.0		
	German Language I (Annual)	13.0		
	German Culture (Annual)	9.0		
	Total	56.0	Total	4.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Philosophy of Education	4.0	Learning and Education Psychology	5.0
	English Language II (Annual)	11.0		
	English Literature I (Annual)	9.0		
	German Literature I (Annual)	9.0		
	English Culture (Annual)	9.0		
	German Language II (Annual)	13.0		
	Total	55.0	Total	5.0
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	English Linguistics	3.0	School Organization and Administration	2.0
	Curriculum Development	3.0	Educational Technologies	3.0
	English Literature II (Annual)	9.0	German Linguistics	3.0
	German Literature II (Annual)	9.0		
	English Language III (Annual)	9.0		
	North American Literature (Annual)	9.0		
	German Language III (Annual)	10.0		
	Total	52.0	Total	8.0
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	Option AI	3.0	Option AII	3.0
	Literary Theory (Annual)	9.0		
	English Language IV (Annual)	9.0		
	German Language IV (Annual)	9.0		
	Option PI_1 (Plano 2) (Annual)	9.0		
	English Didactics (Annual)	9.0		
	German Didactics (Annual)	9.0		
	Total	57.0	Total	3.0
5th YEAR	1st Semester		2nd Semester	
	English Seminar (Annual)	10.0		
	German Seminar (Annual)	10.0		
	Practice	40.0		
	Total	60.0	Total	0.0

Total studies: 300

1st year

1. Sociology of Education - 0190.
2. Education, society and Sociology of Education. Education and sociologic perspectives. Society, education, development and social mobility. Society and function of the educational organisation.
3a) No prerequisites.
3b) To know and question about the main concepts and levels of sociologic analysis of education; contribute to a sociologic reflection of the teaching - pedagogic process.
3c) Arroteia, JC 1991 Análise social da educação, Leiria: Roble Ed.; Azevedo, J 1994 Avenidas da liberdade - Reflexões sobre a Política Educativa, Porto: Ed. Asa; Pinto, Conceição 1995 Sociologia da Escola, Lisboa: McGraw Hill; Santos, BS 2000 A crítica da razão indolente, Porto: Afrontamento.
4. Compulsory.
5. Jorge Gomes.
6. 4 h/week (2 theoretical + 2 practical) 1st semester; 1st year.
7. Questioning and/or reformulation of social-organizational concepts and practices.
8. Continuous evaluation: written test (60%) and investigation paper (40%); or Final exam (100%).
9. No.
10. 5.

1. History of Education - 0206.
2. To introduce students to the pedagogical ideas and fundamental educative practice and to recognise the pedagogical innovations in different epochs.
3a) No prerequisites.
3b) Introduction to the study of History of Education: basic concepts, the education in Greece, Roman, Middle Ages, Renaissance, Modern and Present Times. History of Portuguese schooling.
3c) Bowen, J 1972 A History of Western Education, vols. I-III, London: Methuen & Co. Ltd.; Mialaret, G & Vial, J (coord.) 1981 Histoire Mondiale de l´Education, vols. I-IV, Paris: PUF; UNESCO (Org. Delors, J 1996 Educação, um tesouro a descobrir, Rio Tinto: Ed. ASA.
4. Compulsory.
5. Manuel Barroso Magalhães.
6. 2 h/week (1 theoretical + 1 practical); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Continuous evaluation or final exam.
9. No.
10. 4.

1. English I - 0156.
2. Various grammatical structures: passive voice, verb forms and tenses, indirect speech, inversion of the subject, conditionals, prepositions, and pronouns amongst others. Writing skills: letter writing, articles and CVs. Vocabulary: dictionary work, idiomatic expressions, idioms, phrasal verbs, spelling and note-taking amongst others. Phonetics: alphabet, transcription, intonation and stress function.
3a) No prerequisites.
3b) To revise and consolidate students' diverse experiences of English. To correct basic mistakes in grammar, spelling and punctuation. To focus on the following skills: reading, listening, speaking and writing.
3c) Hewings, M 2001 Advanced Grammar In Use, Cambridge: C.U.P.; McCarthy, M 2002 English Vocabulary in Use – Advanced, Cambridge: C.U.P.; Swan, M 1995 Practical English Usage, Oxford: O.U.P.; Vince, M Advanced Language Practice, Oxford: Heinemann.
4. Compulsory.
5. Maria Augusta Pinheiro.
6. 5 h/week; annual; 1st year.
7. Practical classes. Attendance in two thirds of classes is compulsory.
8. Two written tests and two interviews.
9. Teaching language: English
10. 11.

1. Introduction to Linguistic Studies - 0273.
2. Theoretical introduction to the basic principles of Linguistics as science of language. Introduction to the most important areas of linguistic description/analysis (Phonetics, Phonology, Morphology, Syntax, Semantics and Pragmatics).
3a) No prerequisites.
3b) To bring students to an understanding of the complexity of verbal human language and its properties; to encourage the application of theoretical and manipulative basic concepts to the scientific study of verbal language; to provide relevant information about crucial aspects of modern investigation in linguistics; to encourage the awareness of the knowledge of language and research work in linguistics.
3c) Faria, Isabel et al. (orgs) 1996 Introdução à Linguística Geral e Portuguesa, Lisboa, Caminho; Saussure, F 1979 Cours de Linguistique Générale, éd. Critique de Tullio de Mauro, Paris, Payot; Fromkin, Victoria & Rodman, R 1983 An Introduction to Language, New York, Holt, Rinehart and Winston.
4. Compulsory.
5. António Moreno.
6. 4 h/week (2 theoretical + 2 practical); annual; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam.
9. No.
10. 9.

1. Introduction to Literary Studies - 0274.
2. The literary studies: ambit and subject of study. Literature as an institution. The literary production. The literary communication. Literary text and archtextuality. Questions of literary periods.
3a) No prerequisites.
3b) To understand how literature works. To acquire competence in the field of textual analysis.
3c) Eco, U 1983 Leitura do Texto Literário, Lisboa, Presença; Fokkema, DW & Kunne-Ibsch, E 1977 Theories of literature in the twentieth century, London, C. Hurst & Company; Reis, C 1995 O Conhecimento da Literatura, Coimbra, Almedina; Silva, VMA 1991 Teoria da Literatura, 8ª ed. Coimbra, Almedina.
4. Compulsory.
5. Henriqueta Maria Gonçalves.
6. 4 h/week (2 theoretical + 2 practical); annual; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam – 100%.
9. No.
10. 9.

1. German Language I - 0440.
2. Students are expected to develop their written and oral skills: Reading comprehension, grammar, vocabulary, oral work, discussion, video and film, writing
3a) No prerequisites.
3b) The course aims at improving the spoken and written language.
3c) Nebe-Rikabi, Ursula 2000 Fremde Sprache Deutsch, Teile 1/2, Leipzig, Schubert-Verlag; Kuhne, B 2000 Grundwissen Deutschland, München, Iudicum-Verlag; Clamer, F 2001 Übungsgrammatik für die Grundstufe, Wiesbaum, Verlag Liebaug-Dartmann.
4. Compulsory.
5. Michael Düring.
6. 6 h/ week; annual; 1st year.
7. Practical classes. Sentence building -, vocabulary -, grammar exercises, writing.
8. Continuous assessment or final exam.
9. Course unit taught in German.
10. 13.

1. German Culture - 0441.
2. In the first semester the students will be presented with comprehensive information regarding the historical, social and cultural development of the german-speaking countries between Reformation and the 1st quarter of the 20th century. In the second semester the students will approach themes related to the 20th century.
3a) Basic skills in German. Some knowledge of European History.
3b) To provide knowledge of History, Ideas and Culture in German-speaking countries. This seminar will be the support for further studies in German Language, Literature and Linguistics.
3c) Drijard, A 1983 Alemanha-Panorama histórico-cultural, Lisboa, D. Quixote; Opitz, A 1998 Sociedade e Cultura Alemãs, Lisboa, U. Aberta; Scheidl, L et al. 1996 Dois Séculos de História Alemã, Coimbra, Minerva.
4. Compulsory.
5. Marta Isabel Rente Correia.
6. 4 h/week; annual; 1st year.
7. Lectures and practical classes. Seminar methodology; students have to attend 2/3 of the totality of seminars.
8. Periodical assessment (3 written tests; oral presentations or written essays) or final exam (100%).
9. On an experimental basis, and if necessary, German.
10. 9.

2nd year

1. Educational Philosophy.- 0220.
2. Philosophy and educational issues. The methods used in philosophical analysis (Cartesian doubt; Hegelian dialectics; Husserl´s phenomenology; philosophical hermeneutic) The educational process and the onto-anthropological. Representations of the different philosophical models and their consequent educational processes in Portuguese philosophy.
3a) No prerequisites.
3b) Developing the philosophical exercise skill which simultaneously implies the hermeneutic, critical and reflexive skill. The systematic study of some fundamental issues of the Educational Philosophy: the systematic dimension mainly answers the strategic element of the philosophical argument and the foundations of demonstration its critical dimension leads to the acknowledgement and justification of each position in it self and to the comprehension of its historical-cultural context.
3c) Abbagnano, NA 2000 História da Filosofia, vols. I-IV, Lisboa; 1981, História da Pedagogia, vols. 10-13, Lisboa; Soveral, E 2001 Educação para a era tecnológica, Lisboa; 1993 Educação e Cultura, Lisboa; Avanzini, G 1975 A Pedagogia no Século XX, vols. I e II, Lisboa; Carvalho, A 1992 A Educação como Projecto Antropológico, Santa Maria da Feira.
4. Compulsory.
5. Cristiana de Soveral and Paszkiewicz.
6. 3 h/week (2 practical + 1 theoretical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.

1. Learning and Educational Psychology – 1191.
2. Learning Theories. Educational Implications of Learning Theories. Motivation and its Implications to Education. Maturity and its Implications to Education. Social Conditioning. The Problem of Retention and Forgetting. The Problem of Transfer.
3a) No prerequisites.
3b) To provide students with a comprehensive picture of some of the major educational psychological theories and issues and to develop their implications for the teaching and learning process.
3c) Alberto, PA & Troutman, AC 2003 Applied Behavior Analysis for Teachers. 6th ed. New Jersey: Merrill Prentice Hall; Bigge, ML & Shermis, SS 1999 Learning Theories for Teachers. 6th ed. NY Longman; Driscoll, MP 2000 Psychology of Learning for Instruction. 2nd ed. Boston: Allyn and Bacon.
4. Compulsory.
5. Rosangela Bertelli.
6. 5 h/week (3 practical + 2 theoretical); 2nd semester; 2nd year.
7. Lectures and practical classes. 2/3 of practical classes required.
8. In accordance with the University's Regulations, two written tests or a final exam – 100%.
9. No.
10. 5.

1. English II – 0147.
2. To consolidate the students' knowledge acquired in English I; to ensure that students are confident in their use of English at an advanced level; to further develop the following skills: reading, writing, listening and speaking; to provide background information concerning contemporary cultural issues throughout the English speaking world.
3a) No prerequisites.
3b) To provide practice in the following areas: grammar, vocabulary (including idioms and set expressions), phonetics (including intonation, rhythm in sentences and compound words), writing (production of various and different types of writing) and speaking (including debating and speech presentation).
3c) Coursebook to be set at the beginning of the academic year; Longman Language Activator, 2000 Longman; Side, R & Wellman, G 2000 Grammar and vocabulary for Cambridge Advanced and Proficiency, Longman; Turton, N 1997 ABC of Common Grammatical Errors, MacMillan Heinemann; Carter, R. et al. 1995 Exploring Grammar in Context, CUP; Reid, JM The Process of Composition, Longman; Hogen, S et al. 1993 Sound Advantage, Longman, book & set of 4 cassetes.
4. Compulsory.
5. Maria Augusta Pinheiro.
6. 5 h/week; annual; 2nd year.
7. Practical classes. Attendance in 2/3 of all classes is compulsory.
8. According to University regulations and criteria for continuous assessment: 4 written tests; 2 interviews; class work, homework and extended essay or project – 100%.
9. Course unit taught in English.
10. 11.

1. English Literature I – 0291.
2. Approaching English poetry: Theme, Tone, Diction, Imagery, Rhythm, Structure, Rhymes and Sound Effects. English Romanticism and canonical English romantic poets: William Blake, William Wordsworth, Samuel Taylor Coleridge, John Keats, Lord Byron, Percy Bysshe Shelley.
3a) Basic understanding of the functioning of the literary idiom and basic knowledge of British cultural history.
3c) Bygrave, S (ed.) 1996 Romantic Writings. London, NY: Routledge and Open University; Day, A 1996 Romanticism. London, NY: Routledge; Hobsbaum, P 1996 Metre, Rhythm and Verse Form. London, NY: Routledge; Montgomery, M et al. 2000 [1992] Ways of Reading. Advanced Reading Skills for Students of English Literature. London, NY: Routledge; Wu, D (ed.) 1994 Romanticism. An Anthology. Oxford and Cambridge: Blackwell.
4. Compulsory.
5. José Eduardo Reis.
6. 4 h/week (2 practical + 2 theoretical), annual; 2nd year.
7. Lectures and practical classes.
8. Two written tests or a final exam – 100%.
9. No, but possible in English.
10. 9.

1. German Literature I – 0292.
2. The aim of this course is to give a view of German literature during the 20th century. It will be shown that a 'revolution' took place in literary production when compared to the 'traditional literature' that preceded it. Particular attention will be paid to modern aesthetics and to most important currents of thought during this period of time. The importance of the Second World War for the German history, culture and literature will also be an important feature of the programme.
3a) No prerequisites.
3c) Beutin, W et al. 1994 História da Literatura Alemã – Das origens à modernidade, vol. 2, trad. 2, trad. AM Lopes/F. Ribeiro/J. Barrento, Lisboa: Apáginastantas, Cosmos; Francke, H-P (ed.) 1983 Von 1945 bis zur Gegenwart, Stuttgart: Ernst Klett; Krauss, H (ed.) 1994 Vom Nullpunkt zur Wende, Essen: Klartext; Raddatz FJ 1987 Zur deutschen Literatur der Zeit. Traditionen und Tendenzen. Materialien zur Literatur der DDR, vol. 1, Hamburg: Rowohlt; Schnell, R (ed.) 1993 Geschichte der deutschsprachigen Literatur seit 1945, Stuttgart; Ribeiro AS 1999 Literatura Alemã II, Lisboa: Universidade Aberta; Vilas-Boas, G (coord.) 1998 Literatura Alemã III, Lisboa: Universidade Aberta.
5. Clara Guimarães Ervedosa.
6. 4 h/week (2 practical + 2 theoretical); annual; 2nd year.
7. Lectures and practical classes. Compulsory attendance of practical classes.
8. Continuous evaluation + 1 written test at the end of the semester.
9. No.
10. 9.

1. English Culture – 0329.
2. Defining Culture; Cultural Changes: Moments in History; English Literary Culture and Social Criticism
3a) No prerequisites.
3b) To define the term “culture”. To study and discuss topics and themes about English history and English culture.
3c) Black, J 1997 A History of the British Isles, London: Macmillan; Williams, R 1984 [1963] Culture and Society, 1780-1950, Harmondsworth: Penguin Books; Willcox, WB. & Walter LA 1996 The Age of Aristocracy. 1688 to 1830. Lexington, Ma: DC Heath and Company; Marsden, G (ed.) 1990 Victorian Values. Personalities and Perspectives in Nineteenth Century Society, London: Longman.
4. Compulsory.
5. Orquídea Ribeiro.
6. 4 h/week (2 practical + 2 theoretical); annual; 2nd year.
7. Lectures and practical classes.
8. Two written tests or a final exam – 100%.
9. No, but possible in English.
10. 9.

1. German II - 0442
2. Students are expected to develop their written and oral skills: Reading comprehension, grammar, vocabulary, oral work, discussion, video and film, writing.
3a) No prerequisites.
3b) The course aims at improving the spoken and written language.
3c) Nebe-Rikabi, Ursula 2000 Fremde Sprache Deutsch, Teile 2/3, Leipzig, Schubert-Verlag; Kuhne, B, 2000. Grundwissen Deutschland, München, Iudicum-Verlag; Clamer, F 2001 Übungsgrammatik für die Grundstufe, Wiesbaum, Verlag Liebaug-Dartmann.
4. Compulsory.
5. Michael Düring.
6. 6 h/week; annual; 2nd year.
7. Practical classes. Sentence building - vocabulary - grammar exercises, writing.
8. Continuous assessment or final exam.
9. Course unit taught in German.
10. 13.

3rd year

1. English Linguistics – 0300.
2. What is linguistics? Grammar – its place in a language. The sentence – statements, commands, requests and exclamations. The structure of sentences. Types of sentences – simple, compound, multiple and complex. The order of words in a sentence. Prepositions, phrasal, adjectives, gerunds, infinitives and confusing expressions/words.
3a) No prerequisites.
3b) To broaden and deepen students' knowledge of the structure of standard English.
To enable students to achieve a higher competence of their linguistic performance.
3c) Austin JL 1962 How to Do Things with Words ,London: O.U.P.; Halliday MAK 1985 An Introduction to Functional Grammar, London: Edward Arnold; Matthews PH 1974 An Introduction to the Theory of Word-Structure, Cambridge: C.U.P..
4. Compulsory.
5. Stella Guedes do Nascimento Aguirre.
6. 3 h/week (2 practical + 1 theoretical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. One written test (60%) and a presentation (40%).
9. Teaching language: English.
10. 3.

1. Curriculum Development – 0436.
2. Nature and scope of curriculum studies. Some educational key concepts and terms. The concept of curriculum. The process of curriculum development. Basic components of a curriculum. Course design and instructional planning. Planning the evaluation of school learning.
3a) Although it is suitable for students with no prior specific knowledge, students enrolling in the course must have good, university level, reading and writing skills and a broad cultural background.
3b) After completing this course students should be able to: define a coherent and adequate framework for curriculum inquiry; understand the teacher's role in curriculum development; interpret the main official documents that shape the Portuguese Basic and Secondary School System; analyse syllabus of Mathematics for Basic and Secondary Portuguese Schools; plan and organize course units and evaluative activities.
3c) D'Hainaut, L 1980 Educação - dos fins aos objectivos, Coimbra: Livraria Almedina; Domingos, AM et al. 1984 Uma forma de estruturar o ensino aprendizagem, 2ª edição. Lisboa: Livros Horizonte; Messick, Rosemary Graves et al. 1980, Currículo: Análise e Debate, Rio de Janeiro: Zahar Editores; Stenhouse, L 1986 An Introduction To Curriculum Research And Development, Londres: Heinemann; Zabalza, MA 2000 Planificação e Desenvolvimento Curricular na Escola, Porto: Edições Asa.
4. Compulsory.
5. José João Pinhanços de Bianchi, Maria de Fátima Campos Assunção.
6. 3 h/week (2 practical + 1 theoretical); 2nd semester; 3rd year.
7. Lectures and pratical classes.
8. Final writen exam and practical work.
9. No.
10. 3.

1. School Organization and Administration – 0191.
2. Education Planning and Administration. Socio-historical and organizational construction of the school. The new configuration of Portuguese educational administration. The school as institution and organization. The new autonomy regime and organizational strategies of the teaching/learning process. Autonomy, planning and organization of live in schools.
3a) No prerequisites.
3b) To analyse and understand the educational administration reform process. To Know and understand the school social-organizational functioning. Knowing and understanding the importance organizational structures in the development of autonomy and quality of the education.
3c) Afonso, N 1995 A Reforma de Administração Escolar, Lisboa: IIE; Barroso, J 1977 Autonomia e Gestão das Escolas, Lisboa: Ed. do Ministério da Educação; Lima, LC 1996 Construindo Modelos de Gestão Escolar, Lisboa: IIE; Marques, R 1997 Professores, Família e Projecto Educativo, Porto: Ed. Asa; Santiago, RA 1997 A escola representada pelos alunos, pais e professores, Aveiro: Ed. da Universidade de Aveiro.
4. Compulsory.
5. Jorge Gomes.
6. 2 h/week (1 practical + 1 theoretical); 2nd semester; 3rd year.
7. Documentation (text, graphics, flowcharts) exploration and questioning. Curricular and pedagogic management analysis and simulation practices.
8. Periodic examination: written test (65%) and investigation paper (35%).
9. Final exam (100%).
10. 2.

1. Educational Technologies – 0221.
2. Historical and conceptual introduction to Instructional Technology. Learning theories: their impact on the instructional process. The Instructional design paradigm. Stages of the ID process. Instructional media: instructional purpose and production techniques. The New Technologies of Instruction.
3a) No prerequisites.
3b) To know the diverse Educational Technology traditions, their concepts and theoretical foundations. To be able to use the instructional design process to design an instructional plan. To be familiar with the main kinds of instructional media, with an emphasis on the new information technologies.
3c) Robert MG (ed.) 1987 Instructional Technology: Foundations, Hillsdale, NJ: LEA; Heinich, MM et al. 1998 Instructional Media and Technologies for Learning, 6th ed., Prentice Hall.
4. Compulsory.
5. José Costa Pinto.
6. 3 h/week (2 practical + 1 theoretical); 2nd semester; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations. one written test (60%) and two practical assignments (40%).
9. No.
10. 3.

1. German Linguistics - 0301.
2. What is linguistics? Grammar – its place in a language. The sentence – statements, commands, requests and exclamations. The structure of sentences. Types of sentences – simple, compound, multiple and complex. The order of words in a sentence. Prepositions, adjectives, gerunds, infinitives and confusing expressions/words.
3a) No prerequisites.
3b) To broaden and deepen students' knowledge of the structure of standard German. To enable students to achieve a higher competence of their linguistic performance.
3c) Austin JL 1962 How to Do Things with Words, Oxford: O.U.P.; Halliday MAK 1985 An Introduction to Functional Grammar, London: Edward Arnold; Matthews PH An Introduction to the Theory of Word-Structure, Cambridge: C.U.P..
4. Compulsory.
5. Maria Hilma Borges Marques Gomes.
6. 3 h/week (2 practical + 1 theoretical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. One written test (60%) and a presentation (40%).
9. Teaching language: German.
10. 3.

1. English Literature II – 0298.
2. Elizabethan and Jacobite England; analysis of Shakespeare an theatre: A Midsummer Night's Dream, As You Like It, Hamlet, Julius Caesar, Richard II, Othello by William Shakespeare.
3a) No prerequisites
3b) To read and analyse the Shakespearean plays: comedies, tragedies and history plays; literary and historic background.
3c) Bradley, AC 1985 Shakespearean Tragedy, London: Macmillan; Holderness, G (ed.) 1992 Shakespeare's History Plays.; Muir, K & Schoenbaum, S (eds.) 1980 A New Companion to Shakespeare Studies, Cambridge: Cambridge University Press; Serôdio, Maria Helena 1996 Shakespeare. A Sedução dos Sentidos, Lisboa: Edições Cosmos; Waller, G (ed.) 1991 Shakespeare's Comedies, Harlow: Longman. Richard II to Henry V, London: Macmillan; Mangan, M 1991 A Preface to Shakespeare's Tragedies, Harlow: Longman
4. Compulsory.
5. Delfina Rodrigues.
6. 4 h/week (2 practical + 1 theoretical); annual; 3rd year.
7. Lectures and practical classes.
8. One written test at the end of each semester (minimum score: 10 out of twenty) or final written exam.
9. No.
10.9.

1. German Literature II – 0299.
2. German Literature between Aufklärung and Realism.
3a) Language skills and cultural knowledge previously acquired are a basic condition to read and understand texts from the 18th and 19th century. Students should also have acquired some competence in textual analysis and interpretation.
3b) To deepen the knowledge of german literary production (poetry, drama and narrative fiction) in a historical perspective: Aufklärung, Sturm und Drang, Weimarer Klassik, Romanticism, Vormärz and Realism. To improve skills of interpreting literary texts in a broader intertextual/comparative approach.
3c) Primary bibliography (full texts): Lessing, GE 1772 Emília Galotti; Goethe, JW 1808 Faust I; Kleist, H 1810-11 Das Erdbeben in Chili; Keller,G 1874 Kleider machen Leute; Hoffmann, ETA 1816-17 Der Sandmann.
4. Compulsory.
5. Marta Isabel Rente Correia.
6. 3 h/week (2 practical + 1 theoretical); annual; 3rd year.
7. Seminar methodology; students have to attend 2/3 of the totality of seminars.
8. Periodical assessment (3 written tests; oral presentations or written essays) or final exam (100%).
9. On an experimental basis, and if necessary, German.
10. 9.

1. English III – 0330.
2. Various grammatical structures: passive voice, verb forms and tenses, indirect speech, inversion of the subject, conditionals, prepositions, and pronouns amongst others. Writing skills: letter writing, articles and CVs. Vocabulary: dictionary work, idiomatic expressions, idioms, phrasal verbs, spelling and note-taking amongst others. Phonetics: alphabet, transcription, intonation and stress function.
3a) No prerequisites.
3b) To revise and consolidate students' diverse experiences of English. To correct basic mistakes in grammar, spelling and punctuation.
3c) Hewings, M 2001 Advanced Grammar In Use, Cambridge: C.U.P.; McCarthy, M 2002 English vocabulary In Use – Advanced, Cambridge: C.U.P.; Swan, M 1995 Practical English Usage, Oxford: O.U.P.; Vince, M Advanced Language Practice, Oxford: Heinemann.
4. Compulsory.
5. David Shaw.
6. 4 h/week; annual; 3rd year.
7. Practical classes. Attendance in two thirds of classes is compulsory.
8. Two written tests and two interviews.
9. Teaching language: English.
10. 9.

1. North American Literature – 0332.
2. Representations of Nature in Nineteenth and Twentieth Century North American Literature: Nature is a concept that has evolved, remaining, nonetheless, a significant source of mythic renovation and reinvention in a country so concerned with the natural world.
3a) No prerequisites.
3b) This syllabus aims to give the students an overview of representative American literary texts that have at its core the symbolic meaning of nature.
3c) Davidson, C & Wagner-Martin, L (eds.) 1995 The Oxford Book of Women's Writing in the United States, NY: Oxford Univ. Press; Elliott, E (ed.) 1988 Columbia Literary History of the United States. NY: Columbia Univ. Press; Marx, L 1964 The Machine in the Garden: Technology and the Pastoral Ideal in America, NY: Oxford University Press; Nash, R 1973 Wilderness and the American Mind, New Haven: Yale Univ. Press; Ruland, R & Malcolm, B 1991 From Puritanism to Postmodernism: A History of American Literature, Harmondsworth: Penguin Books; Wagner-Martin, Linda & Davidson, Cathy (eds) 1995 The Oxford Companion to Women's Writing in the United States, NY: Oxford Univ. Press.
4. Compulsory.
5. Isabel Alves.
6. 4 h/week (2 practical + 2 theoretical); annual; 3rd year.
7. Lectures and practical classes.
8. Two written tests or a final exam – 100%.
9. No, but possible in English.
10. 9.

1. German Language III – 0443.
2. Students are expected to develop their written and oral skills: Reading comprehension, grammar, vocabulary, oral work and discussion. Using the Internet in German lessons. German culture and history (and Austria and Switzerland).
3a) Prerequisites: German I –IV.
3b) The course aims at improving the spoken and written language. German culture and history. Cooperation between the course German V / VI and students from Hungry (University of Baja).
3c) Perlmann-Balme, SW 2000 em-Brückenkurs, Ismaning, Hueber-Verlag; Kuhne, B 2000 Grundwissen Deutschland, München, Iudicum-Verlag; Hering, MPB 2002 em-Übungsgrammatik, Ismaning, Hueber-Verlag.
4. Compulsory.
5. Michael Laub.
6. 5 h/week; annual; 3rd year.
7. Lectures and practical classes.
8. Continous assessment or final exam.
9. Course unit taught in German.
10. 10.

4th year

1. Literary Theory - 0322.
2. The place of Literary Theory within the area of Literary Studies; Literary History; Literary Criticism; Comparative Literature; Cultural Studies; The literary canon; From the notion of influence to the notion of intertextuality; reception and reader-response theories – the school of Konstanz; Literary Hermeneutics – Paul Ricoeur.
3a) No prerequisites.
3b) It provides a comprehensive study of modern literary theory and its relationship to the other disciplines and areas of knowledge in a world dominated by the technologies of the audiovisual.
3c) Barthes, R 1986 The Rustle of Language, NY: Hill and Wang; Bakhtin, M 1981 The Dialogic Imagination, Austin: University of Texas Press; Balsey, Catherine 1980 Critical Practice, NY: Methuen; Bloom, H 1995 The Western Canon, London: MacMillan; Hutcheon, Linda 1988 A Poetics of Postmodernism NY: Routledge; Iser, W 1978 The Act of Reading, London: The JHUP; Jauss, HJ 1978 Pour une esthétique de la reception, Paris: Gallimard; Ricoeur, P 2000 Teoria da Interpretação, Lisboa: ed. 70; Silva, VM 1990 Teoria da Literatura, Coimbra: Almedina.
4. Compulsory.
5. Laura Fernanda Bulger.
6. 4 h/week (2 theoretical + 2 practical); Annual; 4th year.
7. Lectures and tutorials.
8. Constraint: attendance of 2/3 of practical classes; According to the rules: 2 periodic tests or a final exam plus a commentary on a literary work.
9. No.
10. 9.

1. English IV (Language and linguistics) - 0333.
2. Improving spoken and writing skills. Introduction Practice in oral presentations, Analysis of different text types for written composition and summary. Introduction to Applied Linguistics. Practice in peer teaching.
3a) No prerequisites.
3b) To provide practice at an advanced level in presentation skills. To gain insights into written discourse and provide practice in advanced writing. To provide practice in spoken and teaching skills.
3c) Stephens, Mary 1992 Practise Advanced Writing, Longman; Grellet, F 1996 Writing for Advanced Learners of English, Cambridge University Press; Cook, G 2003 Applied Linguistics, Oxford University Press; Cook, G 1995 Principles and Practice in Applied Linguistics, Oxford University Press.
4. Compulsory.
5. David Shaw.
6. 4 h/week; annual; 4th year.
7. Practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University regulations, 2 written tests and peer teaching or a final exam – 100%.
9. Yes. English.
10. 9.

1. German Language IV - 0444.
2. German language at Zertifkat Mittelstufenprüfung (ZMP) level or plus; use of all media linguistic aspects of German language.
3a) No prerequisites.
3b) Development of listening/speaking/reading/writing habilities; scientific essays, literature, TV, conversations, etc..
3c) Häussermann, et al. 1991 Sprachkurs Deutsch 4 neu, Frankfurt/M: (Diesterweg); Vorderwüllbecke, 1989 Stufen international 4, München.
4. Compulsory.
5. Joachim Kurth.
6. 6 h/week ; annual; 4th year.
7. Lectures and practical classes.
8. Continuous assessments or a final exam.
9. In German.
10. 9.

1. English Literature III – 0302.
2. English Fictional Narrative: from Romanticism to Modernism.
3a) No prerequisites.
3b) The main purpose of this course is to analyse the transformations of the English novel between 1816 and 1916; Students will discuss texts by Jane Austen, Thomas Hardy, Joseph Conrad and James Joyce. To develop skills in analysing narrative texts.
3c) Bradbury, M & McFarlane, J (eds.) 1976 Modernism, Harmondsworth: Penguin; Butler, C 1994 Early Modernism: Literature, Music and Painting in Europe 1900-1916, Oxford: Clarendon; Ford, B (ed.) 1982 From Dickens to Hardy, The Pelican Guide to English Literature. Vol. 6. Harmondsworth: Penguin; Forster, EM 1974 Aspects of the Novel, 1927. London: Edward Arnold; Gilbert, Sandra M & Gubar, Susan 1984 The Madwoman in the Attic: The Woman Writer and the Nineteenth Century Literary Imagination, 1979. New Haven and London: Yale UP; Graham, K 1988 Indirections of the Novel: James, Conrad and Forster, Cambridge: Cambridge UP, 1988. Series. London: Longman; Hewitt, D 1992 English Fiction of the Early Modern Period 1890-1940, NY: Longman; Kettle, A 1985 An Introduction to the English Novel, London: Hutchinson; Orr, J 1987 The Making of the Twentieth-Century Novel: Lawrence, Joyce, Faulkner and Beyond, London: Macmillan; Schwarz, D 1995 The Transformation of the English Novel 1890-1930: Studies in Hardy, Conrad, Joyce, Lawrence, Forster and Woolf, London: MacMillan;
4. Optional.
5. Isabel Alves.
6. 3 h/week (1,5 practical + 1,5 theoretical); annual; 4th year.
7. Lectures and practical classes.
8. Two written tests or a final exam - 100%.
9. No, but possible in English.
10. 9.

1. German Literature III – 0303.
2. The objective of this course is to give an anthological view of children's and youth literature during the romantic and the "Biedermeier" periods, two central epoches as far as the development of this literary genre is concerned. The popular characteristics as well the social educative and stabilising function of this kind of literature can only be explained referring to the central cultural moments of the "Sattelzeit". The texts which are included in the programme will also be analysed under a didactic perspective.
3a) No prerequisites.
3b) See point 2.
3c) Ariès, P 1998 Geschichte der Kindheit, München: dtv; Bastos, Glória 1999 Literatura Infantil e Juvenil, Lisboa: Universidade Aberta; Bettelheim, B 1985 (edição inglesa em 1975) Psicanálise dos contos de fadas, Lisboa: Bertrand; Ewers, H-H (org.) 1984 Kinder- und Jugendliteratur der Romantik, Stuttgart; Hunt, P 1991 Criticism, theory and children´s literature, London: Blackwell; Klotz, V 1987 Das europäische Kunstmärchen, München: dtv; Lüthi, M 1998 Es war einmal. Vom Wesen des Volksmärchens, Göttingen: Vandenhoeck und Ruprecht; Pech, K-U (org.) 1985 Kinder- und Jugendliteratur vom Biedermeier zum Realismus, Stuttgart; Propp, V 2000 (edição russa em 1928) Morfologia do Conto, Lisboa: Vega.
4. Compulsory.
5. Clara Guimarães Ervedosa.
6. 3 h/week (1,5 practical + 1,5 theoretical); annual; 4th year.
7. Lectures and practical classes. Compulsory attendance of 2/3 of the practical classes.
8. Continuous evaluation + 1 written test at the end of the semester.
9. No.
10. 9.

1. English Didactics – 1277.
2. Methodology/Didactics of Foreign Languages (FL). Short history of the processes, approaches and methods of FL teaching (19th and 20th centuries) – historical, linguistic and psycho pedagogical foundations. Current issues in FL teaching. Grammar: its teaching and learning. The culture and literature of the FL. The syllabus. Planning. Performing. Assessing. Manuals and other aids in teaching and learning FL.
3a) No prerequisites.
3b) Students should know, analyse and characterize the most relevant methods and approaches of FL teaching. They should also know, analyse and understand some methods and techniques of grammar, culture and literature teaching in the FL classroom. To know, analyse and characterize some types of FL syllabuses. To know some taxonomies of educational objectives taxonomies and perform unit and lesson planning. To know the theoretical bases, conceive and develop assessment and testing materials. To analyse manuals, to conceive and develop teaching aids.
3c) Howatt, APR 1984 A History of English Language Teaching, Oxford/NY: Oxford University Press; McLaughlin, B. (1988). Theories of Second Language Learning, London: Edward Arnold; Oxford, RL 1980 Language Learning Strategies, Rowley: Newbury House; Stern, HH 1984 Fundamental Concepts of Language Teaching, Oxford: Oxford University Press.
4. Compulsory.
5. José Manuel Belo; Idalina Gonçalves.
6. 4 h/week (2 practical + 2 theoretical); annual; 4th year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam - 100%.
9. No.
10. 9.

1. German Didactics - 1850.
2. Methodology/Didactics of Foreign Languages (FL). Short history of the processes, approaches and methods of FL teaching (19th and 20th centuries) – historical, linguistic and psycho pedagogical foundations. Current issues in FL teaching. Grammar: its teaching and learning. The culture and literature of the FL. The syllabus. Planning. Performing. Assessing. Manuals and other aids in teaching and learning FL.
3a) No prerequisites.
3b) Students should know, analyse and characterize the most relevant methods and approaches of FL teaching. They should also know, analyse and understand some methods and techniques of grammar, culture and literature teaching in the FL classroom, as well as analyse and characterize some types of FL syllabuses, together with some taxonomies of educational objectives taxonomies and perform unit and lesson planning. To know the theoretical bases, conceive and develop assessment and testing materials. To analyse manuals, to conceive and develop teaching aids.
3c) Howatt, APR 1984 A History of English Language Teaching, Oxford/NY: Oxford University Press; McLaughlin, B 1988 Theories of Second Language Learning, London: Edward Arnold; Oxford, RL 1980 Language Learning Strategies, Rowley: Newbury House; Stern, HH 1984 Fundamental Concepts of Language Teaching, Oxford: Oxford University Press.
4. Compulsory.
5. Maria Hilma Borges Marques Gomes.
6. 4 h/week (2 practical + 2 theoretical); annual; 4th year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam – 100%.
9. No.
10. 9.

1. German seminar - 1853.
2. Planning; skill based classroom activities; teaching literature; classroom aids and authentic materials; assessment; syllabus analysis; teacher roles.
3a) No prerequisites.
3b) Analyse and discuss the theoretical framework of some important issues and its interaction with practice.
3c) Doyé, P 1988 Typologie der Testaufgaben für den Unterricht Deutsch als Fremdsprache, Berlin: Langenscheidt; Neuner, G et al. 1985 Didáctica das Línguas Estrangeiras, Lisboa: As Páginas Tantas; Neuner, G et al. 1981 Übungstypologie zum Kommunikativen Deutschunterricht, Berlin: Langenscheidt; Piepho, HE 1980 Deutsch als Fremdsprache in Unterrichtsskizzen, Heidelberg: Quelleund Meyer.
4. Compulsory.
5. Maria Hilma Marques.
6. 2 h/week 82 theoretical + 2 practical); annual; 5th year.
7. Seminar work.
8. Written work (50%), presentation of the written work (10%); professional training file (10%); final report (15%); attitudes (15%).
9. No.
10. 10.

1. English seminar - 1853.
2. Planning; skill based classroom activities; teaching literature; classroom aids and authentic materials; assessment; syllabus analysis; teacher roles.
3a) No prerequisites.
3b) Analyse and discuss the theoretical framework of some important issues and its interaction with practice.
3c) Girard, D 1975 Linguística Aplicada e Didáctica das Línguas, Lisboa: Edtorial Estampa; Harmer, J 1983 The Practice of English Language Testing. London: Macmillan; Harrison, A 1983 A Language Testing Handbook, London: Macmillan; Krashen, SD 1982 Principles and Practice in Second Language Acquisition, Oxford: Pergamon Press; Littlewood, W 1981 Communicative Language Teaching, Cambridge: Cambridge University Press.
4. Compulsory.
5. José Manuel Belo, Idalina Gonçalves and Miguel Almeida.
6. 4 h/week (2 theoretical + 2 practical); annual; 5th year.
7. Seminar work.
8. Written work (50%), presentation of the written work (10%); professional training file (10%); final report (15%); attitudes (15%).
9. No.
10. 10.

Portuguese/French

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Sociology of Education	5.0	History of Education	5.0
	Intoduction to Linguistic Studies	4.5	Intoduction to Linguistic Studies	4.5
	Introduction to Literary Studies	4.5	Introduction to Literary Studies	4.5
	Communicating Skills in Portuguese	3.5	Communicating Skills in Portuguese	3.5
	French I	5.0	French I	5.0
	Latin I	3.5	Latin I	3.5
	Portuguese Culture	4.5	Portuguese Culture	4.5
	Total	35.0	Total	34.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	Educational Philosophy	4.0	Learning and Education Psycology	5.0
	Phonetic and Morphology of Portuguese	4.5	Phonetic and Morphology of Portuguese	4.5
	Portuguese Literature I	4.5	Portuguese Literature I	4.5
	French II	5.0	French II	5.0
	French Literature I	4.5	French Literature I	4.5
	Latin II	3.5	Latin II	3.5
	Brazilien Literature	3.5	Brazilien Literature	3.5
	Total	29.5	Total	30.5
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	School Organiztion and Administration	2.0	Educational Technologies	3.0
	Curriculum Development	3.0	Option II	3.0
	Option I	3.0	Syntax and Semantics of the Portuguese Language	4.5
	Syntax and Semantics of the Portuguese Language	4.5	Portuguese Literature II	4.5
	Portuguese Literature II	4.5	French III	5.0
	French III	5.0	French Literature II	4.5
	French Literature II	4.5	French Culture	4.5
	French Culture	4.5		
	Total	31.0	Total	29.0
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	History of the Portuguese Language	4.5	History of the Portuguese Language	4.5
	Literary Theory	5.0	Literary Theory	5.0
	French IV	4.5	French IV	4.5
	(Portuguese Literature III or French Literature III –Annual)	4.0	(Portuguese Literature III or French Literature III –Annual)	4.0
	Portugueses Didactics	4.5	Portugueses Didactics	4.5
	French Didactics	4.5	French Didactics	4.5
	Option III	3.0	Option IV	3.0
	Total	30.0	Total	30.
5th YEAR	1st Semester	ECTS	2ºSemestre	ECTS
	Portuguese Seminar	10.0	Portuguese Seminar	10.0
	French Seminar	10.0	French Seminar	10.0
	Practrice	10.0	Practrice	10.0
	Total	30.0	Total	30.0

Total of credits: 300

1st year

1. Sociology of Education - 0190
2. Education, society and Sociology of Education. Education and sociologic perspectives. Society, education, development and social mobility. Society and function of the educational organization.
3a) No prerequisite.
3b) To know and question about the main concepts and levels of sociologic analysis of education; contribute to a sociologic reflection of the teaching - pedagogic process.
3c) Arroteia, JC 1991 Análise social da educação. Leiria: Roble Ed.; Azevedo, J 1994 Avenidas da liberdade. Reflexões sobre a Política Educativa. Porto: Ed. Asa; Pinto, Conceição Alves 1995 Sociologia da Escola. Lisboa: McGrawHill; Santos, Boaventura Sousa. A Crítica da razão indolente. Porto: Apontamento.
4. Compulsory.
5. Jorge Gomes.
6. 4h/week (2hT + 2P) 1 st semester; 1st year.
7. Questioning and/or reformulation of social – organizational concepts and practices.
8. Continuous evaluation: written test (60%) and investigation paper (40%); or Final exam (100%)
9. No.
10. 5.0.

1. History of Education - 0206
2. To introduce students to the pedagogical ideas and fundamental educative practice and to recognize the pedagogical innovations in different epochs.
3a) No prerequisiste.
3b) Introduction to the study of History of Education: basic concepts, the education in Greece, Roman, Middle Ages, Renaissance, Modern and Present Times. History of portuguese schooling.
3c) Bowen, J. 1972 A History of Western Education (vol. I-III). London: Methuen § Co. Ltd.;
Mialaret, G & Vial, J (coord.) 1981 Histoire Mondiale de l´Education (vol. I-IV). Paris: PUF.; UNESCO (Org. Delors, J) 1996 Educação , um tesouro a descobrir. Rio Tinto: Ed. ASA.
4. Compulsory.
5. Manuel Barroso Magalhães.
6. 2 h/week; 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. continuous evaluation or final exam.
9. No.
10. 4.0.

1. Introduction to Linguistic Studies - 0273
2. Theoretical introduction to the basic principles of Linguistics as science of language. Introduction to the most important areas of linguistic description/analysis (Phonetics, Phonology, Morphology, Syntax, Semantics and Pragmatics).
3a) No prerequisite.
3b) To bring students to an understanding of the complexity of verbal human language and its properties; to encourage the application of theoretical and manipulative basic concepts to the scientific study of verbal language; to provide relevant information about crucial aspects of modern investigation in linguistics; to encourage the awareness of the knowledge of language and research work in linguistics.
3c) Faria, Isabel Hub et al 1996 (Orgs) Introdução à Linguística Geral e Portuguesa, Lisboa, Caminho; Saussure, Ferdinand de 1979 Cours de Linguistique Générale, éd. critique de Tullio de Mauro, Paris, Payot; Fromkin, Victoria and Rodman, Robert 1983 An Introduction to Language, New York, Holt, Rinehart and Winston.
4. Compulsory
5. António Moreno.
6. 4h/week; annual; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam.
9. No.
10. 9.0.

1. Introduction to Literary Studies - 0274
2. The literary studies: ambit and subject of study. Literature as an institution. The literary production. The literary communication. Literary text and archtextuality. Questions of literary periods.
3a) No prerequisite.
3b) To understand how literature works. To acquire competence in the field of textual analysis.
3c) Eco, Umberto 1983 Leitura do Texto Literário, Lisboa, Presença; Fokkema, DW and Kunne-Ibsch, E 1977 Theories of literature in the twentieth century, London, C. Hurst Company; Reis, C 1995 O Conhecimento da Literatura, Coimbra, Almedina; Silva, VM Aguiar e 1991 Teoria da Literatura, 8ª ed. Coimbra, Almedina.
4. Compulsory.
5. Henriqueta Maria Gonçalves.
6. 4h/week; annual; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam – 100%.
9. No.
10. 9.0.

1. Communicating Skills in Portuguese - 0304
2. Theoretical and practical approaches to grammar (morphologic, syntactic and semantic levels), text and argumentation in Portuguese Language.
3a) No prerequisite.
3b) Development of metalinguistic (analysis) and linguistic (practical) knowledge in written and spoken communication in Portuguese Language.
3c) Cunha, Celso and Cintra, LFL 1984 Nova Gramática do Português Contemporâneo. Lisboa: Edições; Lapa João Sá da Costa;Rodrigues, M 1984 (11ª ed.). Estilística da Língua Portuguesa. Coimbra: Coimbra Editora; Weston, Anthony 1992 (2ª ed). A Rulebook for Arguments. Indianapolis: Hackett. Trad. de Desidério Murcho 1996 A Arte de Argumentar. Lisboa: Gradiva.
4. Compulsory.
5. António Moreno.
6. 3h/week; annual; 1 st year
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Two written tests or final exam – 100%
9. No.
10. 7.0.

1. French I - 0305
2. Oral works ("jeux de rôles", dialogs, to explain short texts, to expose a book), written works (dialogs, narrative texts), oral comprehension (radio programs, songs), reading comprehension (from narrative texts), grammar (pronouns, articles, prepositions, structure and use of all tenses), translation.
3a) To know all the grammar rules.
3b) To homogenize the level of the group by consolidating the students' oral and written french skills, to deepen knowledge of the french grammar, to practise.
3c) Bady, J, Greaves, I and Petetin, A 1996 350 exercices de grammaire, niv. Débutant, nouv. Éd. Hachette; Cornaire Cl and Raymond PM 1999 La Production Écrite, coll. DLE, Clé International; Cornaire, Cl 1998 La Compréhension Orale, coll. DLE, Clé International; Lederer, M 1994 La Traduction aujourd'hui, coll. Hachette.
4. Compulsory.
5. Rosinha de Castro Mamede
6. 5h/week; annual; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of these classes.
8. 2 written tests (50%) + 1 oral test (50%) or a final exam: 1 written test (50%) + 1 oral test (50%) for students who obtain 8,5/20 in the written exam.
9. French.
10. 10.0

1. Latin I - 0306
2. The linguistic place of Latin: Latin as a member of the Indo-European family of languages; periods and types of Latin; the Romance languages. The language system: historical and practical phonetics; morphology; syntax; lexicon. The text: reading, translation and linguistic and stylistic analysis of selected texts from Julius Caesar, Cicero, Catullus, Pliny the Young, Martial, Suetonius; translation of short texts from Portuguese into Latin.
3a) No prerequisite.
3b) To acquire the essential rules of the phonetics, the morphology and the syntax and the basic vocabulary through selected texts from Latin literature. To find out in the chosen texts the meaning of some essential notions of the Latin civilization and culture..To become aware of the structure of the Latin language and its role in the development of the Portuguese language and, in addition, of the other Romance languages.
3c) Gaffiot, F 1993 Dictionaire Latin-Français, Paris, Hachete; Torrinha, Francisco Dicionário Latim-Português, 2ª ed., Porto, Domingos Barreira; Bayet, Jean 1965 Littérature Latine, Paris, Armand Colin; Ernout, A 1974 Morphologie Historique du Latin, 3ª ed., Paris, Klincksieck; Ernout, A and Thomas, F 1953 Syntaxe Latine, 2ª ed., Paris, Klincksieck; Monteil, Pierre 1986 Éléments de Phonétique et de Morphologie du Latin, Paris, Nathan; Niedermann, M 1953 Phonétique historique du Latin, 4ª ed., Paris, Klincksieck; Paratore, E 11987 História da Literatura Latina, Trad. de Manuel Losa, Lisboa, Fundação Calouste Gulbenkian.
4. Compulsory.
5. Joaquim da Costa Almeida.
6. 3h/week; annual; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam – 100%.
9. No.
10. 7.0.

1. Portuguese Culture - 1190
2. Contents: The concept of culture; culture as synthesis. The institutional forms of culture – from the monastery to the university. The travel as a cultural phenomenon (XV – XVIIth century). The travel or the exploration of cultural contrasts (XVIII-XIXth century). Eça de Queirós or the travelling laudation.
3a) Knowledge of Portuguese language.
3b) Objectivs: To ponder over the concept of culture taking in consideration its' transdisciplinary character; To identify the university as na institution of culture; to identify travels as a cultural phenomenon; to analyse the importance of travelling as a form of exploring cultural contrats.
3c) AA/VV 1997 História da Universidade em Portugal; AA/VV 1996 Uma História da Universidade na Europa; Almeida, DL de Cartas. Andrade, AB de 1965 Vernei e a cultura do seu tempo; Becckford, W Diário; Bernardino, T 1986 Sociedade e Atitudes Mentais em Portugal (1777-1810), Lisboa, INCM; Cidade, Hernâni 1963 A literatura portuguesa e a expansão ultramarina, 1963 Dias, SS 1998 Os Descobrimentos e a problemática cultural do século XVI, Lisboa, Editorial Presença; Moreira, F 2000 Filinto Elísio – o exílio ou o regresso impossível; Queirós, Eça de A cidade e as serras.
4. Cumpulsory.
5. Fernando Alberto Torres Moreira.
6. 4h/ week; 1st year; annual
7. Theorical and practical classes.
8. Constraint: attendance to 2/3 of practical classes. According to University Regulations, 2 periodic tests (each 50%) or a final exam (100%).
9. No.
10. 9.0.

2nd year

1. Educational Philosophy - 0220
2. Philosophy and educational issues. The methods used in philosophical analysis (Cartesian doubt; Hegelian dialectics; Husserl´s phenomenology; philosophical hermeneutic) The educational process and the onto-anthropological . Representations of the different philosophical models and their consequent educational processes in Portuguese philosophy.
3a) No prerequisite.
3b) Developing the philosophical exercise skill which simultaneously implies the hermeneutic, critical and reflexive skill. The systematic study of some fundamental issues of the Educational Philosophy: the systematic dimension mainly answers the strategic element of the philosophical argument and the foundations of demonstration; its critical dimension leads to the acknowledgement and justification of each position in it self and to the comprehension of its historical-cultural context.
3c) Abbagnano 2000 História da Filosofia, vol. I,II,III,IV, Lisboa ;1981, História da Pedagogia, vol. 10,11,12 13, Lisboa; Soveral, E 2001 Educação para a era tecnológica, Lisboa; 1993, Educação e Cultura, Lisboa; Avanzini, Guy 1975 A Pedagogia no Século XX, vol. I,II, Lisboa; Carvalho, Adalberto 1992 A Educação como Projecto Antropológico, Santa Maria da Feira.
4. Compulsory.
5. Cristiana de Soveral e Paszkiewicz.
6. 3h/week (2 practical + 1 theoretical); 1st semester;2nd year
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.0.

1. Learning and Educational Psychology - 1191
2. Learning Theories. Educational Implications of Learning Theories. Motivation and its Implications to Education. Maturity and its Implications to Education. Social Conditioning. The Problem of Retention and Forgetting. The Problem of Transfer.
3a) No prerequisite
3b) To provide students with a comprehensive picture of some of the major educational psychological theories and issues and to develop their implications for the teaching and learning process.
3c) Alberto, PA & Troutman, AC 2003 Applied Behavior Analysis for Teachers. 6th ed. New Jersey: Merrill Prentice Hall; Bigge, ML & Shermis, SS 1999 Learning Theories for Teachers. 6th ed. New York: Longman; Driscoll, MP 2000 Psychology of Learning for Instruction. 2nd ed. Boston: Allyn and Bacon.
4. Compulsory.
5. Rosangela Bertelli.
6. 5h/week; 2 nd semester; 2 nd year.
7. Lectures and Practical Classes. 2/3 of practical classes required.
8. In accordance with the University’s Regulations, two written tests or a final exam 100%.
9. No.
10. 5.0.

1. Phonetic and Morphology of Portuguese - 0307
2. Contents: Human language and phonetic universe of communication. Distinction of phonetic and phonology. Different theories of phonetic. Parts of phonetic. Theories of phonology. Portuguese phonologic systems. Flexional and derivational morphology. Morphologic classes and morphologic analyses of Portuguese. Formation of words. Linguistic variation and phonetic, phonology and morphology.
3a) No prerequisite.
3b) To acquire knowledge of Portuguese language; to know methods of linguistic analyses on phonetic, phonology and morphology levels; to accede techniques of practical analyses from pragmatic linguistic situations, to learn how to develop didactic units on phonetic, phonology and morphology levels.
3c) Barbosa, JM 1994 Introdução ao Estudo da Fonologia e Morfologia do Português, Coimbra, Almedina; Coseriu, E 1986 Introduction a la Linguistica, 2ª ed., Madrid, Gredos; Faria, Hub (org.) 1996 Introdução à Linguística Geral e Portuguesa, Lisboa, Ed. Caminho; Martins, MRD 1988 Ouvir Falar – Introdução à Fonética do Português, Lisboa, Ed. Caminho; Mateus, MHM 1998 Fonética, Fonologia e Morfologia do Português, Lisboa, U. A; Vilela, Mário 1979 Estruturas lexicais do Português, Coimbra, Almedina.
4. Compulsory.
5. Rui Dias Guimarães.
6. 4h/week; annual; 2nd year
7. Theorical and practical classes. Maps. Notes. Exercises on phonetic, phonology and morphology.
8. Constraint: attendance to 2/3 of practical classes. According to the rules, 2 periodic tests (each 50%) or a test and investigation, or a final exam 100%.
9. No.
10. 9.0.

1. Portuguese Literature I - 0308
2. Some authors of 19th and 20th century Portuguese Literature: Almeida Garrett, Camilo Castelo Branco, Eça de Queirós, Fernando Pessoa e Miguel Torga.
3a) To know the Portuguese Language.
3b) To bring students to an understanding of the 19th and 20th century Portuguese Literature.
3c) Buescu, Helena Carvalhão 1997 Dicionário do Romantismo Literáro Português (Coord.), Lisboa, Caminho; Coelho, Jacinto do Prado 1973 (Dir.), Dicionário da Literatura Portuguesa, Porto, Livraria Figueirinhas; Machado, Álvaro Manuel 1996 (Org. e Dir.), Dicionário de Literatura Portuguesa Lisboa, Presença; Saraiva, António José and Lopes, Óscar 1985 História da Literatura Portuguesa, 13ª edição, corrigida e actualizada, Porto, Porto Editora.
4. Compulsory.
5. Assunção Morais Monteiro.
6. 4h/ week; Annual; 2nd year.
7. Theorical and practical classes.
8. Constraint: attendance to 2/3 of practical classes. According to the Rules, 2 periodic tests (each 50%) or a final exam 100%.
9. No.
10. 9.0.

1. French II - 0309
2. Analysis of diverse documents (audio and written); debates on current issues; the construction and coherence of a text; written production (business letter, comment, synthesis, text expression, writing up a report from a meeting, etc.), basic advice for translation.
3a) No prerequisite.
3b) Develop the oral and written capacities in the French language.
3c) Boularès, M and Frérot, JL 1997 La Grammaire Progressive du Français – Clé International ; Cicurel, F 1991 Communiquer en français – Paris Didier; Grabner, C 1981 Écrire pour qui faire ? – Paris Didier.
4. Compulsory.
5. Manuel Falcão.
6. 5h/week; annual; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam.
9. French.
10. 10.0.

1. French Literature I - 0310
2. A xx century French Literaturee thematic approach related to the sudy of Time: time as a main character (Proust); the time of suspicion in the context of the the surrealist adventure and the time of the absurd (Camus, Becket, Ionesco); the post-war debate (Malraux and Sartre); the project period: ciné-roman andnouveau roman (Butor, Robbe-Grillet, Duras) and the time of the present staging (Jean Pierre Sarrazac and Richard Demarcy).
3a) No prerequisite.
3b) Meeting new aesthetic and literary manifestations; setting the basis for a comparative analysis between the literary work and its philosophical,artistic, cultural and political contextualization; acquiring a new literary and e civilizational competence necessay to the student's future career as a teacher; developing the student's taste for reading; developing research methods and techniques.
3c) AA.VV 1988 Vitalité et contradiction de l'avant -garde. J. Corti, Paris; A.VV 1990 La Littérature Française - Histoire et Perspectives. PUL, Lyon; AA.VV 1997 "Où va la littérature française?" in La Quinzaine Littéraire, nº 711 et 712; Abastado, Claude 1986 Introduction au Surréalisme. Bordas, Paris; Cassagne, Albert 1997 La théorie de l'art pour l'art. Seyssel; Clébert, Jean-Paul 1996 Dictionnaire du Surréalisme. Paris; Forest, Philippe 1995 Histoire de Tel Quel (1960-1982). Fiction & Cie, Seuil, Paris; Kauffman, Vincent 1997 Poétique des groupes littéraires (avant-gardes 1920-1970) Paris; Picon, G 1988 Panorama de la nouvelle littérature française. Tel Gallimard, Paris; Tadié, Jean-Yves 1990 Le roman au XXème siècle. Les Dossiers Belfond, Paris.
4. Compulsory.
5. Anabela Dinis Branco de Oliveira.
6. 4h/week; annual; 2nd year.
7. Theoretical and practical classes.
8. An essay supervised by the teacher (100%) or a final examination (100%).
9. French.
10. 9.0.

1. Latin II - 0311
2. The language system: historic and practical phonetics; morphology; syntax; lexicon. Notions of latin metrical. The text: reading, translation and linguistic and stylistic analysis of selected texts from Plautus, Cicero, Sallust, Virgil, Ovid ; translation of short texts from Portuguese into Latin. Civilization and Culture: Roman history, mythology, theatre, philosophy, the Virgil's works as epochal's cultural synthesis.
3a) No prerequisite.
3b) To consolidate knowledges of the phonetics, the morphology, the syntax and the lexicon. To acquire solid knowledges of the roman civilization and culture..To become aware of the structure of the Latin language and its role in the development of the Portuguese language and, in addition, of the other Romance languages.
3c) Gaffiot, F 1993 Dictionaire Latin-Français, Paris, Hachete ; Torrinha, Francisco Dicionário Latim-Português, 2ª ed., Porto, Domingos Barreira; Bayet, Jean 1965 Littérature Latine, Paris, Armand Colin ; Ernout, A 1974 Morphologie Historique du Latin, 3ª ed., Paris, Klincksieck ; Ernout , A and Thomas, F 1953 Syntaxe Latine, 2ª ed., Paris, Klincksieck; Grimal, Pierre 1968 A Civilização Romana, Lisboa, Edições 70; Monteil, Pierre 1986 Éléments de Phonétique et de Morphologie du Latin, Paris, Nathan; Niedermann, M 1953 Phonétique historique du Latin, 4ª ed., Paris, Klincksieck ; Paratore, E 1987 História da Literatura Latina, Trad. de Manuel Losa, Lisboa, Fundação Calouste Gulbenkian; Pereira, Maria Helena da Rocha 1989 História da Cultura Clássica, Vol. II/Cultura Romana, 2ª ed., Lisboa, Fund. Calouste Gulbenkian.
4. Compulsory.
5. Joaquim da Costa Almeida.
6. 3h/week; annual; 2nd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam – 100%.
9. No.
10. 7.0.

1. Brazilian Literature - 1192
2. From the roots of Brazilian literaturwe, romanticism and the affirmation of a nation , up to modern poetry: a process of discovery.
3a) No prerequisite.
3b) To give learners a diacronic perspective of the most significant Brazilian literary expression not only in its artistic writing but also in its historical and cultural contexts. To allow and stimulate the development of students'reading skills, aesthetics enjoyement and critical analysis of literary texts of different periods.
3c) Bosi, Alfredo 1992 História Concisa da Literatura Brasileira, São Paulo, Cultrix; Candido, António and Castelo, José Aderaldo – Presença da Literatura Brasileira, 3 vols, S.Paulo, Difusão Europeia do Livro; Castelo, José Aderaldo 1999 – A Literatura Brasileira, 5 vlos, S.Paulo, Cultrix; Moisés, Massaud 1984, 85, 86,1989 – A literatura Brasileira atrvés dos seus textos, S.Paulo, Cultrix; idem – História da Literatura Brasileira, 5 vols; Picchio, Luciana Stegagno 1997 – História da Literatura Brasileira, Rio de Janeiro, Ed, Nova Aguilar.
4. Compulsory.
5. Torre, Elisa Gomes da.
6. 3h/week (1 theoretical + 2 pratical); Annual; 2nd year.
7. Lectures and pratical classes.
8. Two written tests or a final written exam.
9. No.
10. 7.0.

3rd year

1. School Organization and Administration - 0191
2. Education Planning and Administration. Socio-historical and organizational construction of the school. The new configuration of Portuguese educational administration. The school as institution and organization. The new autonomy regime and organizational strategies of the teaching/learning process. Autonomy, planning and organization of live in schools.
3a) No prerequisite.
3b) To analyse and understand the educational administration reform process. To Know and understand the school social-organizational functioning. Knowing and understanding the importance organizational structures in the development of autonomy and quality of the education.
3c) Afonso, N 1995 A Reforma de Administração Escolar. Lisboa: IIE; Barroso, J.1977 Autonomia e Gestão das Escolas. Lisboa: Ed. Do ME; Lima, LC 1996 Construindo Modelos de Gestão Escolar. Lisboa: IIE; Marques, R 1997 Professores, Família e Projecto Educativo. Porto: Ed. Asa; Santiago, R A 1997 A escola representada pelos alunos, pais e professores. Aveiro: Ed. da UA.
4. Compulsory.
5. Jorge Gomes.
6. 1h/lecture + 1h/practical classes; 1st semester; Third Year.
7. Documentation (text, graphics, flowcharts) exploration and questioning. Curricular and pedagogic management analysis and simulation practices.
8. Periodic examination: written test (65%) and investigation paper (35%) Final exam (100%)
9. No.
10. 2.0

1. Curriculum Development - 0436
2. Nature and scope of curriculum studies. Some educational key concepts and terms. The concept of curriculum. The process of curriculum development. Basic components of a curriculum. Course design and instructional planning. Planning the evaluation of school learning.
3a) Although it is suitable for students with no prior specific knowledge, students enrolling in the course must have good, university level, reading and writing skills and a broad cultural background.
3b) After completing this course students should be able to: define a coherent and adequate framework for curriculum inquiry; understand the teacher's role in curriculum development; interpret the main official documents that shape the Portuguese Basic and Secondary School System; analyse syllabus of Mathematics for Basic and Secondary Portuguese Schools; plan and organize course units and evaluative activities.
3c) D'hainaut, Louis 1980 Educação - dos fins aos objectivos. Coimbra: Livraria Almedina; Domingos, AM et al. 1984 Uma forma de estruturar o ensino aprendizagem. 2ª edição. Lisboa: Livros Horizonte; Messick, RG, Paixão, L and Bastos, LR 1980 Currículo: Análise e Debate. Rio de Janeiro: Zahar Editores; Stenhouse, Lawrence 1986 An Introduction To Curriculum Research And Development. Londres: Heinemann; Zabalza, M A 2000 Planificação e Desenvolvimento Curricular na Escola. Porto: Edições Asa.
4. Compulsory.
5. José João Pinhanços de Bianchi and Maria de Fátima Campos Assunção.
6. 3 H/Week (TP); 2nd Semester; 3rd Year.
7. Lectures and pratical classes.
8. Final writen exam and practical work.
9. No.
10. 3.0.

1. Educational Technologies - 0221
2. Historical and conceptual introduction to Instructional Technology. Learning theories: their impact on the instructional process. The Instructional design paradigm. Stages of the ID process. Instructional media: instructional purpose and production techniques. The New Technologies of Instruction.
3a) No prerequiste.
3b) To know the diverse Educational Technology traditions, their concepts and theoretical foundations. To be able to use the instructional design process to design an instructional plan. To be familiar with the main kinds of instructional media, with an emphasis on the new information technologies.
3c) Gagné, RM 1987.Instructional Technology: Foundations . (Ed.) Hillsdale,NJ: LEA; R. Heinich, R, Molenda, M, Russell, J & Smaldino S 1998 Instructional Media and Technologies for Learning (6th ed.). Prentice Hall.
4. Compulsory.
5. José Costa Pinto
6. 3h/week; 2nd semester; 3th year
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory
8. According to University Regulations. 1 written test (60%) and two practical assignments (40%).
9. No.
10. 3.0.

1. Syntax and Semantics of the Portuguese Language - 0312
2. Historical approach of syntax; sentence grammar; text grammar.
3a) No prerequisite.
3b) To prepare students to teach the Portuguese language at an intermediate level in secondary schools, enabling them through detailed discussions and reflection to acquire a sound knowledge of the ways the language operates.
3c) Vilela, Mário 1999 Gramática de Valências: Teoria e Aplicação, Almedina, Coimbra; Vilela, Mário 1996 Gramática da Língua Portuguesa, Almedina, Coimbra; Fonseca, Joaquim 1993 Estudo de Sintaxe-Semântica e Pragmática do Português, Porto Editora, Porto.
4. Compulsory.
5. Carlos Assunção; Gonçalo Fernandes.
6. 4h / week (2 practical + 2 theoretical); Annual; 3th year.
7. Lectures and practical classes.
8. One written test at the end of each semester and / or final written examination.
9. No.
10. 9.0.

1. Portuguese Literature II - 0313
2. Portugal in the 16th century – its social, cultural, historical and literary background;.; Classicism period: Sá de Miranda ; Luís de Camões ; Frei Agostinho da Cruz
3a) No prerequisite.
3b) To sensitize students for the relevance of the portuguese literature (clasical and baroc periods); to analyse some representative texts; to develop students critical capacity.
3c) Camões , Luís de , Rimas(pref. J. Costa Pimpão) 1983 Coimbra, Atlântida. Miranda, Sá de, Obras Completas , s./d. Lisboa, Sá da Costa; Cruz , Frei Agostinho de Poesias (int. e pref. de Mendes dos Remédios, 1918 Lisboa; Cruz, Frei Agostinho da Poesias (int. e pref. de Mendes dos Remédios, 1918 Lisboa; Valverde, José F Camões, 1983 Coimbra, Almedina; Earle,T. 1995 Tema e Imagem na Poesia de Sá de Miranda, Lisboa, Inova.
4. Compulsory.
5. Maria Luísa Castro Soares
6. 4 hours/week; annual; 3th year.
7. Two hours per week is theoretical-practical classe and two hours per week are pratical classes.
8. Two Written tests or final exam.
9. No.
10. 9.0.

1. French III - 0314
2. Oral comprehension (authentic radio programs), reading comprehension (to analyse texts with arguments), oral works (debates on polemic subjects), written works (to write organized texts with arguments), grammar (all the rules of grammar), translation.
3a) No prerequisite.
3b) To improve, to perfect and to deepen speaking, listening, reading and writting skills to enable the students to understand and use grammar rules. To develop criticism, analisis and reflexion.
3c) Portine, H 1983 L'argumentation écrite: expression et communication, Paris, Hachette; Loiseau, R 1976 Grammaire Française, FLE, Paris, Hachette; Abbadie, C, Chovelon, B and Morsel, M-H 1994 L'Expres-sion Française Écrite et Orale, 5è éd., PUG, Grenoble; Baril, D and Guillet, J 1992 Techniques de l'Expression Écrite et Orale, éd. Sirey.
4. Compulsory.
5. Rosinha de Castro Mamede
6. 4h/week; annual; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of these classes.
8. 2 written tests (50%) + 1 oral test (50%) or a final exam: 1 written test (50%) + 1 oral test (50%) for students who obtain 8,5/20 in the written exam.
9. French.
10. 10.0.

1. French Literature II - 0315
2. Romantic poetry: general contextualisation; the liberation of writing; major trends in romantic poetry. Baudelaire's Les Fleurs du mal: in search of a new beauty; symbolic language and the expression of "universelle analogie"; the concepts of "spleen" and "idéal". Balzac and the fictional reproduction of the world; the purposes of Comédie humaine: to describe and to explain the reality; Le Père Goriot: fictional creation and dramatic meaning. Flaubert and L'Education sentimentale: educating towards failure; new ways of building up narrative; the "focalisation".
3a) No prerequisite.
3b) To make the students familiar with the main literary trends of the French 19.th century. To improve their abilities on reading and analysing poetic and narrative texts.
3c) Millet, C (org.) 1994 L'esthétique romantique en France - Une anthologie. Pocket ; Richard, J-P 1971 Etudes sur le romantisme. Le Seuil ; Friedrich, H 1976 Structures de la poésie moderne. Denoël ; Rincé, D 1984 Baudelaire et la modernité poétique. Puf ; Ambriére, M 1968 Balzac et la recherche de l'absolu. Hachette ; Duchet and Neefs 1982 Balzac. L'invention du roman. Belfond.
4. Compulsory.
5. Luísa Benvinda Pereira Álvares.
6. 4 hrs per week; annual; 3.rd year.
7. Lectures and practical classes.
8. 2 written tests or a final exam.
9. No.
10. 9.0.

1. French Culture - 0316
2. The French Revolution (1789-1799), "le Front Populaire", Resistance Movement, Liberation, May 1968.
3a) No prerequisite.
3b) Make a comparative analysis of the chain of events which led up to the revolutionary movements of the 18th and 20th centuries, analyse the social, political and ideological transformations which resulted from these movements, reflect upon the dialogue between History and Art, establish a relationship between the France of the past and the France of today.
3c) Archives de France, 1998 Des États Généraux au 18 Brumaire-La Révolution à travers les archives, La Documentation Française; Baynac, J 1978 Mai retrouvé, Laffont; Chevallier, JJ and Conac, G 1991 Histoire des Institutions et des Régimes Politiques de la France de 1789 à nos jours, Dalloz, Paris;
Didier, B 1988 La Littérature et la Révolution Française, PUF, Que Sais-je?.
4. Compulsory.
5. Rosinha de Castro Mamede.
6. 4h/week; annual; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. 2 written tests or a final exam.
9. French.
10. 9.0.

4th year

1. History of the Portuguese Language - 0318
2. The scientific statute of Historical Linguistics. From the constitution of the Historical-Comparative method to the Historical Sociolinguistics. Renewing of Historical Linguistics in the present time. From Latin to Old Portuguese. The Old Portuguese. From the Classical Portuguese to Modern Portuguese.
3a) Portuguese phonetics and morphology knowledge, Portuguese syntax and semantics and latin knowledge.
3b) To inform students about the scientific statute of Historical Linguistics, to enable students to perceive the methological journey from the constitution of the Historical-Comparative method to the Sociolinguistics, to instruct students about the Historical Linguistics renewing in the present time, to provide students with a historical dimension of Linguistics phenomena in the Portuguese Language
3c) Camlong, André 1991Tratamento estatístico-lexical de Os Lusíadas. Informática & Educação. Revista do Pólo da Universidade do Minho do Projecto MINERVA. Braga: Pólo da Universidade do Minho do Projecto Minerva. 1 (Março de 1991) 43-62; Cunha, António Geraldo da 1989 Dicionário Etimológico Nova Fronteira da Língua Portuguesa. 2.ª edição. Rio de Janeiro: Editora Nova Fronteira; Maia, CA 1995 Sociolinguística histórica e periodização linguística. Braga: Centro de Estudos Humanísticos da Universidade do Minho. Diacrítica 10 (1995) 3-30; Teyssier, Paul 1982 História da Língua Portuguesa. 1.ª edição portuguesa. Lisboa: Sá da Costa Editora, Tradução de Celso Cunha.
4. Compulsory.
5. Maria Olinda Rodrigues Santana.
6. 4h/week (2 practical + 2 theoretical)/ annual / 4th year.
7. Lectures and practical classes.
8. According to “Normas Pedagógicas”, in order to obtain classification, one needs to attend to two-thirds of all practical lessons. 2 written tests at the end of each semester or final examination.
9. No.
10. 9.0.

1. Literary Theory - 0322
2. The place of Literary Theory within the area of Literary Studies; Literary History; Literary Criticism; Comparative Literature; Cultural Studies; The literary canon; From the notion of influence to the notion of intertextuality; reception and reader-response theories – the school of Konstanz; Literary Hermeneutics – Paul Ricoeur.
3a) Noprerequisite.
3b) It provides a comprehensive study of modern literary theory and its relationship to the other disciplines and areas of knowledge in a world dominated by the technologies of the audiovisual.
3c) Barthes, Roland 1986 The Rustle of Language. New York: Hill and Wang; Bakhtin, M 1981 The Dialogic Imagination. Austin: University of Texas Press; Balsey, Catherine 1980 Critical Practice. New York: Methuen; Bloom, Harold 1995 The Western Canon. London: MacMillan; Hutcheon, Linda 1988 A Poetics of Postmodernism. New york: Routledge; Iser, Wolfgang 1978 The Act of Reading London: The JHUP; Jauss, HJ 1978 Pour une esthétique de la reception. Paris : Gallimard ; Ricoeur, Paul 2000 Teoria da Interpretação. Lisboa: edições 70; Silva, Victor Manuel Aguiar 1990 Teoria da Literatura. Coimbra: Almedina.
4. Compulsory.
5. Laura Fernanda Bulger.
6. 4 hours/week (2 Theoretical + 2 Practical); Annual; 4th year.
7. Lectures and tutorials.
8. Constraint: attendance of 2/3 of practical classes; According to the rules: 2 periodic tests or a final exam plus a commentary on a literary work.
9. No.
10. 9.0.

1. French IV - 1269
2. The study of phonetics, phonology and syntactics. Traduction of the various texts. Analysis of the various linguistic aspects through written and spoken texts in the various fields of human sciences : philosophy, sociology, economy, history, etc.
3a) No mprerequisite.
3b) To develop linguistic knowledge and competence through further linguistic study and the acquisition of socio-cognitive structures. Language as a tool. To be able to function in and reflect on the language as a necessity for a cultural-linguistic competence of any teacher.
3c) Wijnands P 1993 Dictionnaire des identités culturelles de la francophonie, Paris, CILF ; Guiraud P 1967 Structures étymologiques du lexique français, Paris, Larousse ; Guillaume G 1985.1992 Les leçons de linguistique de Gustave Guillaume, Presses de Laval et Presses Universitaires de Lille.
4. Compulsory.
5. Natália Amarante.
6. 4h/week; annual; 4th year.
7. Lectures and practical classes. Attendance in 2/3 of these classes.
8. 2 spoken and written exercices in 2 tests or final exam.
9. French.
10. 10.0.

1. Portuguese Didactics - 1270
2. The changes in the Portuguese Class (PC). From the rhetorical classicism to the PC. The teaching of grammar and lexicon, composition and textual analysis. The teaching of the texts: literary, scholastic, journalistic and administrative. Treatment of an integral opus. Speaking to groups: oral expression. Planification and evaluation in the PC.
3a) No prerequisite.
3b) To acquire knowledges of language and literature didactics; to know methods of teaching the language; to learn how to build and develop didactic units in the classroom; to create academic activities, regarding listening and speaking, reading and writing; to accede techniques of teaching communication in the classroom.
3c) Genouvrier, E and Peytard, J 1974 Linguística e Ensino do Português, Coimbra, Livraria Almedina; Rei, J and Esteves, A 1998 Escola e o Ensino das Línguas, Porto Porto Editora; Bredella, Lothar 1989 Introdução à Didáctica da Literatura, Lisboa, Publicações D. Quixote; Celce-Murcia, M and Hilles, Sh 1988 Techniques and Resources Teaching Grammar, Oxford, Oxford University Press.
4. Compulsory.
5. J. Esteves Rei.
6. 4 h/week; annual; 4th year.
7. Maps. Notes. Planification and evaluation building exercises, vocabulary exercises, grammar exercises, written and orals analysis.
8. Continuous assessement or final exam.
9. No.
10. 9.0.

1. French Didactics - 1271
2. To introduce students, as prospective French as Foreign Language (FFL) teachers to: the study of the general principles of Foreign Language Teaching (FLT); the analysis of the evolution of FLT and its most recent approaches and methods; the building up, selection and use of teaching aids; the analysis and evaluation of currently used FFL course-books in the Portuguese Secondary Schools; the study and understanding of the problems related to teaching planning and evaluation and the building up and use of various types of tests for classroom purposes.
3a) No prerequisite.
3b) Fundamental concepts and principles of language teaching. Evolution, recent approaches and methods of FLT. Language functions and communicative activities. Analysis and evaluation of course-books. Teaching planning and evaluation.
3c) Besse, Henri 1985 Méthodes et Pratiques des Manuels de Langue, Paris, Didier/Credif; Bolton, S 1987 Évaluation de la compétence communicative en langue étrangère, Paris, Hatier-Credif; Galisson, R 1980 D'hier à aujourd'hui la didactique générale des langues étrangères. Du structuralisme au fonction- nalisme, Paris, Clé international; Kramsch, Claire 1984 Interaction et discours dans la classe de langue, Paris, Hatier-Credif; Moirand, S 1982 Enseigner à communiquer en langue étrangère, Paris, Hachette; Stern, HH 1984 Fundamental Concepts of Language Teaching, Oxford, Oxford University Press;
Widdowson, HG 1991Une approche communicative de l'enseignement des langues, Paris, Credif-Hatier/Didier.
4. Obligatory.
5. Jose Manuel C. Belo
6. 4h/ Week; annual; 4th year.
7. Lectures and pratical classes.
8. Formal written end-of-semester test and/or a final exam 100%.
9. No.
10. 9.0.

1. French Literature III - 0321
2. The “siècle d’or” of French drama: general contextualisation of the century, between baroque and classicism; from the “théâtre irrégulier” to the great classical patterns; three examples: Corneille’s L’illusion comique, Molière’s Dom Juan, Racine’s Andromaque. The Enlightment Age: the philosopher’s role; aesthetic thought between reason and emotion; the importance of narrative prose; two examples: Voltaire’s “conte philosophique”, Rousseau’s Les rêveries du promeneur solitaire.
3a) No prerequisite.
3b) To make the students familiar with the main literary trends of the French 17.th and 18.th centuries. To improve their abilities on reading and analysing dramatic and narrative texts.
3c) Adam, A 1970 Le théâtre classique. PUF ; Tapié, V-L 1980 Baroque et classicisme. Livre de Poche ; Guicharnaud, J 1963 Molière. Une aventure théâtrale. Gallimard ; Roubine, J-J 1971 Lectures de Racine. Armand Colin ; Naves, R. 1969 Voltaire, l’homme et l’oeuvre. Hatier ; Starobinski, J 1971 Jean-Jacques Rousseau, la transparence et l’obstacle. Gallimard.
4. Optional.
5. Luísa Benvinda Pereira Álvares.
6. 3 hrs per week; annual; 4.th year.
7. Lectures and practical classes.
8. 2 written tests or a final exam.
9. No.
10. 8.0.

1. Portuguese Literature III - 0319
2. The affirmation and the process of development of the Portuguese medieval literary prose in its romanesque (Demanda Do Santo Graal), historiographical (Livro de Linhagens de D.Pedro), hagiographical (Conto de Amaro), expressions and courtesan doctrine (Leal Conselheiro); Fernão Lopes and the art of narrating History.
3a) No prerequisite.
3b) To develop an awwareness of different literary expressions of medieval Portuguese prose. To allçow and stimulate the development of students' reading skills, aesthetic enjoyement and critical analysis of the written medieval literary text.
3c) Amado, T 1991 Fernão Lopes, contador da História, Lisboa, Ed. Estampa; Auerbach, E 1969 Lenguaje Literário y publico en la Baja Latinidad y en la Edad Media (esp.), Barcelono, Ed.Seix Barral; Ctalan, D 1962 De Alfonso X al Conde de Barcelos, Madrid, Ed.Gredos; Curtius, e 1965 European Litterature and the Latin Middle Ages (trad. Ingl), New York; Graf, Arturo 1978 Mitti, leggende e superstizioni nel Médio Evo, Milano, Arnaldo Forni, 1980; Grundiss der Romanischen Litteraturen dês Mittelalters, t.IV et t. XI, Heidelberg; Lucas, Maria Clara de Almeida 1968 A literatura visionária na Idade Média, Lisboa; Martins, Mário 1956 Estudos de Literatura Medieval, Braga, Livraria Cruz; Mattoso, José 1988 A nobreza medieval portuguesa, Lisboa, Ed.Estampa; Typologie dês sources du Moyen Age Occidental, Brepols; Rebelo, Luís de Sousa 1983 A concepção de poder em Fernão Lopes, Lisboa, Livros Horizonte; Rodrigues Lapa 1940 Dom Duarte e os pensadores da Casa de Avis, Lisboa, idem 1981 Lições de Literatura Portuguesa III, 10ª ed Revist, Coimbra Editora; Zumthor, Paul 1972 Essai de Poétique Médiévale, Paris, ed. Seuil.
4. Optional.
5. Torre, Elisa Gomes da
6. 3h/week (1,5 theoretical + 1,5 pratical), annual; 4th year.
7. Lectures and pratical classes.
8. Two written tests or a final written exam.
9. No.
10. 8.0.

5th year

1. Portuguese Seminar - 1854
2.Teacher profile. Lecturing. Educational system. School. Classroom. Educational research/educational project.
3a) No prerequisite.
3b) To know the basics of teacher training: three main functions: cognitive, educational and control. To consolidate learning outcomes. To analyse and discuss practices, methods and educational policies. To share experiences. To support fellow colleagues. To know different educational practices. To search for topics, methods and materials and solve problems.
3c) Portine, H 1983 L'argumentation écrite: expression et communication, Paris, Hachette; Loiseau, R 1976 Grammaire Française, FLE, Paris, Hachette; Abbadie, C, Chovelon, B and Morsel, M-H 1994 L'Expres-sion Française Écrite et Orale, 5è éd., PUG, Grenoble; Baril, D and Guillet, J 1992 Techniques de l'Expression Écrite et Orale, éd. Sirey
4. Compulsory.
5. Carlos Assunção; José Esteves Rei; Fernando Moreira.
6. 2 h/week; annual; 5th year
7. Seminar work.
8. Written work (50%), presentation of the written work (10%); professional training file (10%); final report (15%); attitudes (15%).
9. No.
10. 10.0.

1. French Seminar - 1854
2.Teacher profile. Lecturing. Educational system. School. Classroom. Educational research/educational project.
3a) Noprerequisite.
3b) To know the basics of teacher training: three main functions: cognitive, educational and control. To consolidate learning outcomes. To analyse and discuss practices, methods and educational policies. To share experiences. To support fellow colleagues. To know different educational practices. To search for topics, methods and materials and solve problems.
3c) Besse, Henri 1985 Méthodes et Pratiques des Manuels de Langue, Paris, Didier/Credif; Bolton, S 1987 Évaluation de la compétence communicative en langue étrangère, Paris, Hatier-Credif; Galisson, R 1980 D'hier à aujourd'hui la didactique générale des langues étrangères. Du structuralisme au fonction- nalisme, Paris, Clé international; Kramsch, Claire 1984 Interaction et discours dans la classe de langue, Paris, Hatier-Credif; Moirand, S 1982 Enseigner à communiquer en langue étrangère, Paris, Hachette; Stern, HH 1984 Fundamental Concepts of Language Teaching, Oxford, Oxford University Press;
Widdowson, HG 1991 Une approche communicative de l'enseignement des langues, Paris, Credif-Hatier/Didier.
4. Compulsory.
5. Teresa Margarida Capela; Manuel Falcão dos Santos.
6. 2h/ Week; annual; 5th year.
7. Seminar work.
8. Written work (50%), presentation of the written work (10%); professional training file (10%); final report (15%); attitudes (15%).
9. No.
10. 10.0.

Portuguese/English Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Sociology of Education	4.0	History of Education	4.0
	English I	5.0	English I	5.0
	Intoduction to Linguistic Studies	4.5	Intoduction to Linguistic Studies	4.5
	Introduction to Literary Studies	3.5	Introduction to Literary Studies	3.5
	Communicating Skills in Portuguese	5.0	Communicating Skills in Portuguese	5.0
	Latin I	3.5	Latin I	3.5
	Portuguese Culture	4.5	Portuguese Culture	4.5
	Total	30.0	Total	30.0
2nd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Educational Philosophy	7.0	Learning and Education Psycology	7.0
	English III	5.0	English III	5.0
	English Literature I	4.5	English Literature I	4.5
	Phonetic and Morphology of Portuguese	4.5	Phonetic and Morphology of Portuguese	4.5
	Portuguese Literature I	4.5	Portuguese Literature I	4.5
	English Culture	4.5	English Culture	4.5
	Total	30.0	Total	30.0
3rd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	School Organization and Administration	2.0	Educational Technologies	2.0
	Curriculum Development	3.0	Curriculum Development	3.0
	Option I (Portuguese/English)	3.0	Option I (Portuguese/English)	3.0
	English Literature II	4.5	English Literature II	4.5
	Syntax and Semantics of the Portuguese	4.5	Syntax and Semantics of the Portuguese	4.5
	Language	5.0	Language	5.0
	Portuguese Literature II	4.5	Portuguese Literature II	4.5
	English III	4.5	English III	4.5
	North American Literature		North American Literature	
	Total	31.0	Total	29.0
4th YEAR	1st Semester	ECTS	2nd Semester	ECTS
	History of the Portuguese Language	4.5	History of the Portuguese Language	4.5
	Literary Theory	5.0	Literary Theory	5.0
	Didactics of the Portuguese I and II	4.5	Didactics of the Portuguese I and II	4.5
	English IV (Language and Linguistics)	5.0	English IV (Language and Linguistics)	5.0
	English Didactics	4.5	English Didactics	4.5
	Portuguese Literature III or English Literature III	5.0	Portuguese Literature III or English Literature III	5.0
	Option I	3.0	Option I	3.0
	Total	30.0	Total	30.

Total of credits: 300

1st year

1. Sociology of Education - 0190
2. Education, society and Sociology of Education. Education and sociologic perspectives. Society, education, development and social mobility. Society and function of the educational organization.
3a) No prerequisite.
3b) To know and question about the main concepts and levels of sociologic analysis of education; contribute to a sociologic reflection of the teaching - pedagogic process.
3c) Arroteia, JC 1991 Análise social da educação. Leiria: Roble Ed.; Azevedo, J 1994 Avenidas da liberdade - Reflexões sobre a Política Educativa. Porto: Ed. Asa; Pinto, CA 1995 Sociologia da Escola. Lisboa: McGrawHill; Santos, BS A Crítica da razão indolente. Porto: Apontamento.
4. Compulsory.
5. Jorge Gomes.
6. 4h/week; (2/lecture + 2/practical classes);1st semester; 1st year.
7. Questioning and/or reformulation of social organizational concepts and practices.
8. Continuous evaluation: written test (60%) and investigation paper (40%); or Final exam (100%).
9.
10. 5.0.

1. History of Education - 0206
2. To introduce students to the pedagogical ideas and fundamental educative practice and to recognize the pedagogical innovations in different epochs.
3a) No prerequisite.
3b) Introduction to the study of History of Education: basic concepts, the education in Greece, Roman, Middle Ages, Renaissance, Modern and Present Times. History of portuguese schooling.
3c) Bowe, J 1972 A History of Western Education (vol. I-III). London: Methuen § Co. Ltd.;
Mialaret, G and Vial, J (coord.) 1981 Histoire Mondiale de l´Education (vol. I-IV) Paris PUF; Unesco (Org. Delors, J) 1996 Educação , um tesouro a descobrir. Rio Tinto Ed. ASA.
4. Compulsory.
5. Manuel Barroso Magalhães.
6. 2 h/week; semestral; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. continuous evaluation or final exam.
9. No.
10. 4.0.0

1. English I - 0156
2. Various grammatical structures: passive voice, verb forms and tenses, indirect speech, inversion of the subject, conditionals, prepositions, and pronouns amongst others. Writing skills: letter writing, articles and CVs. Vocabulary: dictionary work, idiomatic expressions, idioms, phrasal verbs, spelling and note-taking amongst others. Phonetics: alphabet, transcription, intonation and stress function.
3a) No prerequisite.
3b) To revise and consolidate students' diverse experiences of English. To correct basic mistakes in grammar, spelling and punctuation. To focus on the following skills: reading, listening, speaking and writing.
3c) Hewings, M Advanced Grammar In Use; Cambridge; McCarthy, M English vocabulary In Use – Advanced; Cambridge; Swan, M Practical English Usage, Oxford; Vince, M Advanced Language Practice, Heinemann.
4. Compulsory.
5.
6. 5hours/week; annual; 1st year.
7. Lectures and practical classes. Attendance in two thirds of classes is compulsory.
8. Two written tests and two interviews.
9. Teaching language: English.
10. 10.0.

1. Introduction to Linguistic Studies - 0273
2. Theoretical introduction to the basic principles of Linguistics as science of language. Introduction to the most important areas of linguistic description/analysis (Phonetics, Phonology, Morphology, Syntax, Semantics and Pragmatics).
3a) No prerequisite.
3b) To bring students to an understanding of the complexity of verbal human language and its properties; to encourage the application of theoretical and manipulative basic concepts to the scientific study of verbal language; to provide relevant information about crucial aspects of modern investigation in linguistics; to encourage the awareness of the knowledge of language and research work in linguistics.
3c) Faria, Isabel Hub et al 1996 Introdução à Linguística Geral e Portuguesa, Lisboa, Caminho; Saussure, Ferdinand de 1979 Cours de Linguistique Générale, éd. critique de Tullio de Mauro, Paris, Payot; Fromkin, Victoria and Rodman, Robert 1983 An Introduction to Language, New York, Holt, Rinehart and Winston.
4. Compulsory
5. António Moreno.
6. 4h/week; annual; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam.
9. No.
10. 9.0.

1. Introduction to Literary Studies - 0274
2. The literary studies: ambit and subject of study. Literature as an institution. The literary production. The literary communication. Literary text and archtextuality. Questions of literary periods.
3a) No prerequisite.
3b) To understand how literature works. To acquire competence in the field of textual analysis.
3c) Eco, Umberto 1983 Leitura do Texto Literário, Lisboa, Presença; Fokkema, DW and Kunne-Ibsch, Elrud 1977 Theories of literature in the twentieth century, London, C. Hurst Company; REIS, Carlos 1995 O Conhecimento da Literatura, Coimbra Almedina. Silva, VM Aguiar 1991 Teoria da Literatura, 8ª ed. Coimbra, Almedina.
4. Compulsory.
5. Henriqueta Maria Gonçalves.
6. 4h/week; annual; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam – 100%.
9. No.
10. 9.0.

1. Communicating Skills in Portuguese - 0304
2. Theoretical and practical approaches to grammar (morphologic, syntactic and semantic levels), text and argumentation in Portuguese Language.
3a) No prerequisite.
3b) Development of metalinguistic (analysis) and linguistic (practical) knowledge in written and spoken communication in Portuguese Language.
3c) Cunha, C and Cintra, LFL 1984 Nova Gramática do Português Contemporâneo. Lisboa: Edições João Sá da Costa; Lapa, MR 1984 (11ª ed.) Estilística da Língua Portuguesa. Coimbra: Coimbra Editora; Weston, A 1992 (2ª ed). A Rulebook for Arguments. Indianapolis: Hackett. Trad. de Desidério M 1996 A Arte de Argumentar 4. Compulsory
5. António Moren
6. 3h/week; annual; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Two written tests or final exam 100%.
9. No.
10. 7.0.

1. Latin I - 0306
2. The linguistic place of Latin: Latin as a member of the Indo-European family of languages; periods and types of Latin; the Romance languages. The language system: historical and practical phonetics; morphology; syntax; lexicon. The text: reading, translation and linguistic and stylistic analysis of selected texts from Julius Caesar, Cicero, Catullus, Pliny the Young, Martial, Suetonius; translation of short texts from Portuguese into Latin.
3a) No prerequisite.
3b) To acquire the essential rules of the phonetics, the morphology and the syntax and the basic vocabulary through selected texts from Latin literature. To find out in the chosen texts the meaning of some essential notions of the Latin civilization and culture..To become aware of the structure of the Latin language and its role in the development of the Portuguese language and, in addition, of the other Romance languages.
3c) Gaffiot, F 1993 Dictionaire Latin-Français, Paris, Hachete; Torrinha, F Dicionário Latim-Português, 2ª ed., Porto; Domingos Barreira; Bayet, Jean 1965 Littérature Latine, Paris, Armand Colin; Ernout, A 1974 Morphologie Historique du Latin, 3ª ed., Paris, Klincksieck; Ernout, A and Thomas, F 1953 Syntaxe Latine, 2ª ed., Paris, Klincksieck; Monteil, Pierre 1986 Éléments de Phonétique et de Morphologie du Latin, Paris, Nathan; Niedermann, M 1953 Phonétique historique du Latin, 4ª ed., Paris, Klincksieck; Paratore, E 1987 História da Literatura Latina, Trad. de Manuel Losa, Lisboa, Fundação Calouste Gulbenkian.
4. Compulsory.
5. Joaquim da Costa Almeida.
6. 3h/week; annual; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam – 100%.
9. No.
10. 7.0.

1. Portuguese Culture - 1190
2. The concept of culture; culture as synthesis. The institutional forms of culture – from the monastery to the university. The travel as a cultural phenomenon (XV – XVIIth century). The travel or the exploration of cultural contrasts (XVIII-XIXth century). Eça de Queirós or the travelling laudation.
3a) Knowledge of Portuguese language.
3b) To ponder over the concept of culture taking in consideration its' transdisciplinary character; To identify the university as na institution of culture; to identify travels as a cultural phenomenon; to analyse the importance of travelling as a form of exploring cultural contrats.
3c) AA/VV 1997 História da Universidade em Portugal; AA/VV 1996 Uma História da Universidade na Europa; Almeida, DL de Cartas; Andrade, AB de 1965 Vernei e a cultura do seu tempo; Beckford, W Diário; Bernardino, Teresa 1986 Sociedade e Atitudes Mentais em Portugal (1777-1810), Lisboa, INCM; Cidade, H 1963 A literatura portuguesa e a expansão ultramarina; DIAS, SS 1998 Os Descobrimentos e a problemática cultural do século XVI, Lisboa, Editorial Presença; Moreira, F 2000 Filinto Elísio – o exílio ou o regresso impossível; Quéiros, Eça de A cidade e as serras.
4. Cumpulsory.
5. Fernando Alberto Torres Moreira.
6. 4h/week; Annual;1st year.
7. Theorical and practical classes.
8. Constraint: attendance to 2/3 of practical classes. According to University Regulations, 2 periodic tests (each 50%) or a final exam (100%).
9. No.
10. 9.0.

2nd year

1. Educational Philosophy - 0220
2. Philosophy and educational issues. The methods used in philosophical analysis (Cartesian doubt; Hegelian dialectics; Husserl´s phenomenology; philosophical hermeneutic) The educational process and the onto-anthropological . Representations of the different philosophical models and their consequent educational processes in Portuguese philosophy.
3a) No prerequisite.
3b) To develop philosophical exercise skills which simultaneously implies the hermeneutic, critical and reflexive skills. The systematic study of some fundamental issues of Educational Philosophy: the systematic dimension mainly focuses on the strategic element of the philosophical argument and the foundations of demonstration; its critical dimension leads to the acknowledgement and justification of each position in itself and to the comprehension of its historical-cultural context.
3c) Abbagnano 2000 História da Filosofia, vol. I,II,III,IV, Lisboa ; Abbagnano 1981 História da Pedagogia, vol. 10,11,12 13, Lisboa. Soveral, Eduardo 2001 Educação para a era tecnológica, Lisboa; 1993, Educação e Cultura, Lisboa; Avanzini, Guy 1975 A Pedagogia no Século XX, vol. I,II, Lisboa;
Carvalho, Adalberto 1992 A Educação como Projecto Antropológico, Santa Maria da Feira.
4. Compulsory.
5. Cristiana de Soveral e Paszkiewicz.
6. 3h/week; (2 practical + 1 theoretical); 1st semester ; 2nd year.
7. Lectures and practical classes.
8. Final written exam and practical work.
9. No.
10. 4.

1. Learning and Educational Psychology - 1191
2. Learning Theories. Educational Implications of Learning Theories. Motivation and its Implications to Education. Maturity and its Implications to Education. Social Conditioning. The Problem of Retention and Forgetting. The Problem of Transfer.
3a) No prerequisite.
3b) To provide students with a comprehensive picture of some of the major educational psychological theories and issues and to develop their implications for the teaching and learning process.
3c) Alberto, PA and Troutman, AC 2003 Applied Behavior Analysis for Teachers. 6th ed. New Jersey: Merrill Prentice Hall; Bigge, ML and Shermis, SS 1999 Learning Theories for Teachers. 6th ed. New York: Longman; Driscoll, MP 2000 Psychology of Learning for Instruction. 2nd ed. Boston: Allyn and Bacon.
4. Compulsory.
5. Rosangela Bertelli.
6. 5h/week; semestral; 2nd year.
7. Lectures and Practical Classes. 2/3 of practical classes required.
8. In accordance with the University's Regulations, two written tests or a final exam 100%.
9. No.
10. 7.0.

1. English II - 0147
2. To consolidate the students' knowledge acquired in English I; to ensure that students are confident in their use of English at an advanced level; to further develop the following skills: reading, writing, listening and speaking; to provide background information concerning contemporary cultural issues throughout the English speaking world.
3a) No prerequisite.
3b) To provide practice in the following areas: grammar, vocabulary (including idioms and set expressions), phonetics (including intonation, rhythm in sentences and compound words), writing (production of various and different types of writing) and speaking (including debating and speech presentation).
3c) Coursebook to be set at the beginning of the academic year; Side, R Longman Language Activator; Turton, N Grammar and vocabulary for Cambridge Advanced and Proficiency, Longman; Heinemann, CR et al. ABC of Common Grammatical Errors; CUP; RJ Exploring Grammar in Context; Hogen, S The Process of Composition, Longman; Sound Advantage, Longman (set of 4 cassettes) a more comprehensive reading list to be delivered to students at the beginning of the academic year.
4. Compulsory.
5. Maria Augusta Pinheiro.
6. 5 hours/week anual; 2nd year.
7. Practical classes. Attendance in 2/3 of all classes is compulsory.
8. According to University regulations and criteria for continuous assessment: 4 written tests; 2 interviews; class work, homework and extended essay or project 100%.
9. Yes. English.
10. 10.0.

1. English Literature I - 0291
2. Approaching English poetry: Theme, Tone, Diction, Imagery, Rhythm, Structure, Rhymes and Sound Effects. English Romanticism and canonical English romantic poets: William Blake, William Wordsworth, Samuel Taylor Coleridge, John Keats, Lord Byron, Percy Bysshe Shelley.
3a) Basic understanding of the functioning of the literary idiom and basic knowledge of British cultural history.
3b) To achieve a cultured and literary understanding of the functioning of the poetic idiom and to understand its variations in the historical context of the English romanticism.
3c) Bygrave Stephen (ed.) 1996 Romantic Writings. London, New York: Routledge and Open University; Day, Aidan 1996 Romanticism. London, New York: Routledge; Hobsbaum, Philp 1996 Metre, Rhythm and Verse Form. London, New York: Routledge; Montgomery, Martin et al. 1992 Ways of Reading.. Advanced Reading Skills for Students of English Literature. London, New York: Routledge 2000, Wu, Duncan (ed) 1994 Romanticism. An Anthology. Oxford and Cambridge: Blackwell.
4. Compulsory.
5. José Eduardo Reis.
6. 4h/week; annual; 2nd year.
7. Lectures and Practical Classes.
8. Two written tests or a final exam 100%.
9. No, but possible in English.
10. 10.

1. Phonetic and Morphology of Portuguese - 0307
2. Contents: Human language and phonetic universe of communication. Distinction of phonetic and phonology. Different theories of phonetic. Parts of phonetic. Theories of phonology. Portuguese phonologic systems. Flexional and derivational morphology. Morphologic classes and morphologic analyses of Portuguese. Formation of words. Linguistic variation and phonetic, phonology and morphology.
3a) No prerequisites.
3b) Objectivs: To acquire knowledge of Portuguese language; to know methods of linguistic analyses on phonetic, phonology and morphology levels; to accede techniques of practical analyses from pragmatic linguistic situations, to learn how to develop didactic units on phonetic, phonology and morphology levels.
3c) Barbosa, JM 1994 Introdução ao Estudo da Fonologia e Morfologia do Português, Coimbra Almedina; Coseriu, E 1986 Introduction a la Linguistica, 2ª ed., Madrid, Gredos; Faria, Hub (org) 1996 Introdução à Linguística Geral e Portuguesa, Lisboa, Ed. Caminho; Martins, MRD 1988 Ouvir Falar – Introdução à Fonética do Português, Lisboa, Ed. Caminho; Mateus, MHM 1998 Fonética, Fonologia e Morfologia do Português, Lisboa, U. A; Vilela, M 1979 Estruturas lexicais do Português, Coimbra, Almedina.
4. Compulsory.
5. Rui Dias Guimarães.
6. 4h/week; anual; 2nd year.
7. Theorical and practical classes. Maps. Notes. Exercises on phonetic, phonology and morphology.
8. Constraint: attendance to 2/3 of practical classes. According to the rules, 2 periodic tests (each 50%) or a test and investigation, or a final exam 100%.
9. No.
10. 9.0.

1. Literatura Portuguesa I - 0308
2. Some authors of 19th and 20th century Portuguese Literature: Almeida Garrett, Camilo Castelo Branco, Eça de Queirós, Fernando Pessoa e Miguel Torga.
3a) To know the Portuguese Language.
3b) To bring students to an understanding of the 19th and 20th century Portuguese Literature.
3c) Buescu, HC 1997 Dicionário do Romantismo Literáro Português (Coord.), Lisboa, Caminho;
Coelho, JP 1973 (Dir.), Dicionário da Literatura Portuguesa, Porto, Livraria Figueirinhas;
Machado, ÁM 1996 (Org. e Dir.), Dicionário de Literatura Portuguesa Lisboa, Presença;
Saraiva, AJ and Lopes, Ó 1985 História da Literatura Portuguesa, 13ª edição, corrigida e actualizada, Porto, Porto Editora.
4. Compulsory.
5. Assunção Morais Monteiro
6. 4h/week; anual; 2nd year.
7. Theorical and practical classes.
8 Constraint: attendance to 2/3 of practical classe According to the Rules, 2 periodic tests (each 50%) or a final exam 100%.
9. No.
10. 9.0.

3rd year

1. School Organization and Administration - 0191
2. Education Planning and Administration. Socio-historical and organizational construction of the school. The new configuration of Portuguese educational administration. The school as institution and organization. The new autonomy regime and organizational strategies of the teaching/learning process. Autonomy, planning and organization of live in schools.
3a) No prerequisite.
3b) To analyse and understand the educational administration reform process. To Know and understand the school social-organizational functioning. Knowing and understanding the importance organizational structures in the development of autonomy and quality of the education.
3c) Afonso, N 1995 A Reforma de Administração Escolar. Lisboa: IIE; Barroso, J 1977 Autonomia e Gestão das Escolas. Lisboa: Ed. Do ME; Lima, LC 1996 Construindo Modelos de Gestão Escolar. Lisboa: IIE; Marques, R 1997 Professores, Família e Projecto Educativo. Porto: Ed. Asa; Santiago, RA 1997 A escola representada pelos alunos, pais e professores. Aveiro: Ed.da UA.
4. Compulsory.
5. Jorge Gomes.
6. 2h/week; (1h/lecture + 1h/practical classes); 1st semester; 3rd Year.
7. Documentation (text, graphics, flowcharts) exploration and questioning. Curricular and pedagogic management analysis and simulation practices.
8. Periodic examination: written test (65%) and investigation paper (35%)Final exam (100%).
9.
10. 2.0.

1. Curriculum Development -0436
2. Nature and scope of curriculum studies. Some educational key concepts and terms. The concept of curriculum. The process of curriculum development. Basic components of a curriculum. Course design and instructional planning. Planning the evaluation of school learning.
3a) Although it is suitable for students with no prior specific knowledge, students enrolling in the course must have good, university level, reading and writing skills and a broad cultural background.
3b) After completing this course students should be able to: define a coherent and adequate framework for curriculum inquiry; understand the teacher's role in curriculum development; interpret the main official documents that shape the Portuguese Basic and Secondary School System; analyse syllabus of Mathematics for Basic and Secondary Portuguese Schools; plan and organize course units and evaluative activities.
3c) D'hainaut, Louis 1980 Educação - dos fins aos objectivos. Coimbra Livraria Almedina; Domingos, AM et al.1984 Uma forma de estruturar o ensino aprendizagem. 2ª edição. Lisboa: Livros Horizonte; Messick, RG, Paixão, Lyra and Bastos, Lília da Rocha 1980 Currículo: Análise e Debate. Rio de Janeiro: Zahar Editores; Stenhouse, Lawrence 1986 An Introduction To Curriculum Research and Development. Londres: Heinemann; Zabalza, Miguel A 2000 Planificação e Desenvolvimento Curricular na Escola. Porto: Edições Asa.
4. Compulsory.
5. José João Pinhanços de Bianchi and Maria de Fátima Campos Assunção.
6. 3 h/week (TP); 2nd Semester; 3rd Year.
7. Lectures and pratical classes.
8. Final writen exam and practical work.
9. No
10. 3.0.

1. Educational Technologies - 0221
2. Historical and conceptual introduction to Instructional Technology. Learning theories: their impact on the instructional process. The Instructional design paradigm. Stages of the ID process. Instructional media: instructional purpose and production techniques. The New Technologies of Instruction.
3a) No prerequisite.
3b) To know the diverse Educational Technology traditions, their concepts and theoretical foundations. To be able to use the instructional design process to design an instructional plan. To be familiar with the main kinds of instructional media, with an emphasis on the new information technologies.
3c) Gagné; RM (ed.) 1987 Instructional Technology: Foundations .Hillsdale,NJ: LEA; Heinich, R, Molenda, M, Russell, J and Smaldino, S 1998 Instructional Media and Technologies for Learning (6th ed.). Prentice Hall..
4. Compulsory.
5. José Costa Pinto.
6. 3h/week; 2nd semester; 3rd year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations. 1 written test (60%) and two practical assignments (40%).
9. No.
10. 3.0.

1. English Literature II - 0298
2. Henry V; The Merchant of Venice and The Jew of Malta by Christopher Marlow; lectures will offer a chronological introduction to areas of the cannon, discussed in terms both of genre and of specific plays, and the history of Shakespeare criticism. Discussion will focus on (a) a particular formal aspect of the play issues raised by the play (e.g. gender, religion, politics); particular readings of the play, especially those drawing on recent critical approaches
Macbeth; The Tempest; lectures will offer a chronological introduction to areas of the cannon, discussed in terms both of genre and of specific plays, and the history of Shakespeare criticism. Discussion will focus on a particular formal aspect of the play issues raised by the play, particular readings of the play, especially those drawing on recent critical approaches.
3a) No prerequisite.
3b) This syllabus aims at giving students an awareness of the variety and overall shape of Shakespeare's work through a detailed knowledge of a core-group of two texts, one from each of the two main sub-genres studied this semester (histories and comedies), studied within the context both of others of his plays and also of later criticism.
3c) Barber, CL 1972"Shakespeare's Festive Comedy. A Study of Dramatic Form and its Relation to Social Custom" Princeton, New Jersey: Princeton University Press; Susan 1993 1985 "Shakespearean Tragedy" Houndmills, Basingstoke, Hampshire and London: Macmillan Education Ltd; Gurr, Andrew 1992 "The Shakespearen Stage 1574 – 1642" Cambridge, New York, Port Chester, Melbourne, Sydney: Cambridge University Press; Serôdio, Maria Helena 1996 "William Shakespeare A Sedução dos Sentidos". Lisboa: Edições Cosmos; Dollimore, Jonathan and Sinfield, Alan 1995 "Political Shakespeare".Manchester University Press; Vickers, Brian 1994 "Appropriating Shakespeare". Yale University Press; Tillyard,, EMW 1985 "Shakespeare's Problem Plays". Penguin.
4. Compulsory.
5.
6. 4h/week; (2 practical + 2 theoretical); 3rd year.
7. Lectures and practical classes.
8. One written test at the end of each semester (minimum score: 10 out of twenty) or final written exam
9. No.
10. 9.0.

1. Syntax and Semantics of the Portuguese Language - 0312
2. Historical approach of syntax; sentence grammar; text grammar.
3a) No prerequisite.
3b) To prepare students to teach the Portuguese language at an intermediate level in secondary schools, enabling them through detailed discussions and reflection to acquire a sound knowledge of the ways the language operates.
3c) Vilela, M 1999 Gramática de Valências: Teoria e Aplicação, Almedina, Coimbra; Vilela, M 1996 Gramática da Língua Portuguesa, Almedina, Coimbra; Fonseca, J 1993 Estudo de Sintaxe-Semântica e Pragmática do Português, Porto Editora, Porto.
4. Compulsory.
5. Carlos Assunção; Manuel Gonçalo Sá Fernandes.
6. 4h/week; (2 practical + 2 theoretical); anual; 3rd year.
7. Lectures and practical classes.
8. One written test at the end of each semester and / or final written examination.
9. No.
10. 9.0.

1. Portuguese Literature II - 0313
2. Portugal in the 16th century – its social, cultural, historical and literary background; Classicism period: Sá de Miranda; Luís de Camões Frei Agostinho da Cruz
3a) No prerequisite.
3b) To sensitize students for the relevance of the portuguese literature (clasical and baroc periods); to analyse some representative texts; to develop students critical capacity.
3c) Camões, Luís de (pref. J. Costa Pimpão) 1983 Rimas,Coimbra, Atlântida; Miranda, Sá de, Obras Completas. s./d. Lisboa, Sá da Costa; Cruz, Frei Agostinho de (int. e pref. de Mendes dos Remédios) 1918 Poesias. Lisboa; Valverde, JF Camões, 1983 Coimbra, Almedina; Earle,T 1995 Tema e Imagem na Poesia de Sá de Miranda, Lisboa, Inova.
4. Compulsory.
5. Maria Luísa Castro Soares
6. 4 hours/week; annual; 3rd year.
7. Two hours per week is theoretical-practical classe and two hours per week are pratical classes.
8. Two Written tests or final exam.
9. No.
10. 9.0.

1. English III - 0330
2. Various grammatical structures: passive voice, verb forms and tenses, indirect speech, inversion of the subject, conditionals, prepositions, and pronouns amongst others. Writing skills: letter writing, articles and CVs. Vocabulary: dictionary work, idiomatic expressions, idioms, phrasal verbs, spelling and note-taking amongst others. Phonetics: alphabet, transcription, intonation and stress function.
3a) No prerequisite.
3b) To revise and consolidate students' diverse experiences of English. To correct basic mistakes in grammar, spelling and punctuation.
3c) Hewings, M Advanced Grammar In Use; Cambridge; McCarthy, M English vocabulary In Use – Advanced; Cambridge; Swan, M Practical English Usage; Oxford;
Vince, M Advanced Language Practice, Heinemann.
4. Compulsory.
5.
6. 4hours/week; annual; 3rd year.
7. Lectures and practical classes. Attendance in two thirds of classes is compulsory.
8. Two written tests and two interviews.
9. Teaching language: English.
10. 10.

1. North American Literature - 0332
2. Representations of Nature in Nineteenth and Twentieth Century North American Literature:
Nature is a concept that has evolved, remaining, nonetheless, a significant source of mythic renovation and reinvention in a country so concerned with the natural world.
3a) No prerequisite..
3b) This syllabus aims to give the students an overview of representative American literary texts that have at its core the symbolic meaning of nature.
3c) Buell, Lawrence 1995 The Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture. Cambridge, Massachusetts: Harvard university Press; Campbell, Neil and Alaisdair Kean 1997 American Cultural Studies: An Introduction to American Culture. London and New York: Routledge; Davidson, Cathy, Wagner-Martin, Linda, eds, 1995 The Oxford Book of Women's Writing in the United States. New York: Oxford univ. Press; Elliott, Emory, ed., 1988 Columbia Literary History of the United States. New york: Columbia Univ. Press; Greenspan, Ezra, ed., 1999 The Cambridge Companion to Walt Whitman. Cambridge: Cambridge University Press; Miller, Cristianne 1987 Emily Dickinson: A Poet's Grammar. Cambridge: Harvard University press; Nash, Roderick 1973 Wilderness and the American Mind. New Haven: Yale Univ. press.
4. Compulsory.
5. Isabel Alves.
6. 4h/week; annual; 2nd year.
7. Lectures and Practical Classes.
8. Two written tests or a final exam 100%.
9. No, but possible in English.
10. 9.

4th year

1. History of the Portuguese Language - 318
2. The scientific statute of Historical Linguistics. From the constitution of the Historical-Comparative method to the Historical Sociolinguistics. Renewing of Historical Linguistics in the present time. From Latin to Old Portuguese. The Old Portuguese. From the Classical Portuguese to Modern Portuguese.
3a) Portuguese phonetics and morphology knowledge, Portuguese syntax and semantics and latin knowledge.
3b) to inform students about the scientific statute of Historical Linguistics, to enable students to perceive the methological journey from the constitution of the Historical-Comparative method to the Sociolinguistics, to instruct students about the Historical Linguistics renewing in the present time, to provide students with a historical dimension of Linguistics phenomena in the Portuguese Language
3c) Camlong, André 1991 Tratamento estatístico-lexical de Os Lusíadas. Informática & Educação. Revista do Pólo da Universidade do Minho do Projecto MINERVA. Braga: Pólo da Universidade do Minho do Projecto Minerva 43-62pp.; Cunha, António Geraldo da 1989 Dicionário Etimológico Nova Fronteira da Língua Portuguesa. 2.ª edição. Rio de Janeiro: Editora Nova Fronteira; Maia, Clarinda de Azevedo 1995 Sociolinguística histórica e periodização linguística. Braga: Centro de Estudos Humanísticos da Universidade do Minho. Diacrítica 10 3-30pp.; Teyssier, Paul 1982 História da Língua Portuguesa. 1.ª edição portuguesa. Lisboa: Sá da Costa Editora, Tradução de Celso Cunha.
4. Compulsory.
5. Maria Olinda Rodrigues Santana.
6. 4h/week;(2 practical + 2 theoretical); anual; 4th year.
7. Lectures and practical classes.
8. According to “Normas Pedagógicas”, in order to obtain classification, one needs to attend to two-thirds of all practical lessons. 2 written tests at the end of each semester or final examination.
9. No.
10. 9.0.

1. Literary Theory -0322
2. The place of Literary Theory within the area of Literary Studies; Literary History; Literary Criticism; Comparative Literature; Cultural Studies; The literary canon; From the notion of influence to the notion of intertextuality; reception and reader-response theories – the school of Konstanz; Literary Hermeneutics Paul Ricoeur.
3a) No prerequisite.
3b) It provides a comprehensive study of modern literary theory and its relationship to the other disciplines and areas of knowledge in a world dominated by the technologies of the audiovisual.
3c) Barthes, Roland (1986). The Rustle of Language. New York: Hill and Wang; Bakhtin, M. (1981). The Dialogic Imagination. Austin: University of Texas Press; Balsey, Catherine (1980). Critical Practice. New York: Methuen; Bloom, Harold (1995). The Western Canon. London: MacMillan; Hutcheon, Linda (1988). A Poetics of Postmodernism. New york: Routledge; Iser, Wolfgang (1978). The Act of Reading London: The JHUP; Jauss, H.J. (1978). Pour une esthétique de la reception. Paris : Gallimard ; Ricoeur, Paul (2000). Teoria da Interpretação. Lisboa: edições 70; Silva, Victor Manuel Aguiar (1990). Teoria da Literatura. Coimbra: Almedina.
4. Compulsory.
5. Laura Fernanda Bulger.
6. 4 hours/week; annual; 4th year.
7. Lectures and tutorials.
8. Constraint: attendance of 2/3 of practical classes; According to the rules: 2 periodic tests or a final exam plus a commentary on a literary work.
9. No.
10. 8.0.

1. Didactics of the Portuguese I and II - 1270
2. The changes in the Portuguese Class (PC). From the rhetorical classicism to the PC. The teaching of grammar and lexicon, composition and textual analysis. The teaching of the texts: literary, scholastic, journalistic and administrative. Treatment of an integral opus. Speaking to groups: oral expression. Planification and evaluation in the PC.
3a) No prerequisites.
3b) To acquire knowledges of language and literature didactics; to know methods of teaching the language; to learn how to build and develop didactic units in the classroom; to create academic activities, regarding listening and speaking, reading and writing; to accede techniques of teaching communication in the classroom.
3c) Genouvrier, E and Peytard, J 1974 Linguística e Ensino do Português, Coimbra, Livraria Almedina; Rei, JE 1998 A Escola e o Ensino das Línguas, Porto Porto Editor; Bredella, Lothar 1989 Introdução à Didáctica da Literatura, Lisboa, Publicações D. Quixote; Celce-Murcia, M and Hilles, Sh 1988 Techniques and Resources Teaching Grammar, Oxford, Oxford University Press.
4. Compulsory.
5. J. Esteves Rei.
6. 4 hours/week; annual; 4th year.
7. Maps. Notes. Planification and evaluation building exercises, vocabulary exercises, grammar exercises, written and orals analysis.
8. Continuous assessement or final exam.
9. No.
10. 9.0.

1. English IV (Language and linguistics) - 1276
2. Improving spoken and writing skills. Introduction Practice in oral presentations, Analysis of different text types for written composition and summary. Introduction to Applied Linguistics. Practice in peer teaching.
3a) No prerequisite.
3) To provide practice at an advanced level in presentation skills. To gain insights into written discourse and provide practice in advanced writing. To provide practice in spoken and teaching skills.
3c) Stephens, Mary 1992 Practise Advanced Writing, Longman; Grellet, F 1996 Writing for Advanced Learners of English. Cambridge University Press; Cook, Guy 2003 Applied Linguistics. Oxford University Press; Cook, Guy 1995 Principles and Practice in Applied Linguistics. Oxford University Press.
4. Compulsory
5. David Shaw
6. 4 hours/ week; anual; 4th year.
7. Practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University regulations, 2 written tests and peer teaching or a final exam 100%.
9. Yes. English.
10. 10.0.

1. English Didactics - 1277
2. Methodology/Didactics of Foreign Languages (FL). Shorth history of the processes, approaches and methods of FL teaching (19th and 20th centuries) – historical, linguistic and psychopedagogical foundations. Current issues in FL teaching. Grammar: its teaching and learning. The culture and literature of the FL. The syllabus. Planning. Performing. Assessing. Manuals and other aids in teaching and learning FL.
3a) No prrequisite.
3b) Students should know, analyse and characterize the most relevant methods and approaches of FL teaching. They should also know, analyse and understand some methods and techniques of grammar, culture and literature teaching in the FL classroom. To know, analyse and characterize some types of FL syllabuses. To know some taxonomies of educational objectives taxonomies and perform unit and leçon planning. To know the theoretical bases, conceive and develop assessment and testing materials. To analyse manuais, to conceive and develop teaching aids.
3c) Howatt, APR 1984 A History of English Language Teaching. Oxford/New York: Oxford University Press; McLaughlin, B 1988 Theories of Second Language Learning. London: Edward Arnold; Oxford, RL 1980 Language Learning Strategies. Rowley: Newbury House; Stern, HH 1984 Fundamental Concepts of Language Teaching. Oxford: Oxford University Press.
4. Compulsory.
5. José Manuel Belo; Idalina Gonçalves.
6. 4 h/week; annual; 4th year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. According to University Regulations, 2 written tests or a final exam 100%.
9. No.
10. 9.0.

1. English Literature III - 0302
2. English Fictional Narrative: from Romanticism to Modernism.
3a) No prerequisite.
3b) The main purpose of this course is to analyse the transformations of the English novel between 1816 and 1916; Students will discuss texts by Jane Austen, Thomas Hardy, Joseph Conrad and James Joyce. To develop skills in analysing narrative texts.
3c) Bradbury; Malcolm and McFarlane, James 1976 eds. Modernism. Harmondsworth: Penguin; Butler, Christopher 1994 Early Modernism: Literature, Music and Painting in Europe 1900-1916. Oxford: Clarendon; Ford, Boris 1982 ed. From Dickens to Hardy. The Pelican Guide to English Literature. Vol. 6. Harmondsworth: Penguin; Forster, EM 1974 Aspects of the Novel. 1927. London: Edward Arnold; Gilbert, SM and Gubar, Susan 1984 The Madwoman in the Attic: The Woman Writer and the Nineteenth Century Literary Imagination. 1979. New Haven and London: Yale UP; Graham, Kenneth 1988 Indirections of the Novel: James, Conrad and Forster. Cambridge: Cambridge UP, Series. London: Longman; Hewitt, Douglas 1992 English Fiction of the Early Modern Period 1890-1940. New York: Longman; Kettle, Arnold1985 An Introduction to the English Novel. London: Hutchinson; Orr, John 1987 The Making of the Twentieth-Century Novel: Lawrence, Joyce, Faulkner and Beyond. London: Macmillan; Schwarz, Daniel1995 The Transformation of the English Novel 1890-1930: Studies in Hardy, Conrad, Joyce, Lawrence, Forster and Woolf. London: MacMillan.
4. Optional.
5. Isabel Alves.
6. 3h/week; anual; 4rd year.
7. Lectures and Practical Classes.
8. Two written tests or a final exam 100%.
9. No, but possible in English.
10. 9.0.

1. Portuguese Litterature III - 0319
2. The affirmation and the process of development of the Portuguese medieval literary prose in its romanesque (Demanda Do Santo Graal), historiographical (Livro de Linhagens de D.Pedro), hagiographical (Conto de Amaro), expressions and courtesan doctrine (Leal Conselheiro); Fernão Lopes and the art of narrating History.
3a) No prerequisite.
3b) To develop an awwareness of different literary expressions of medieval Portuguese prose. To allçow and stimulate the development of students' reading skills, aesthetic enjoyement and critical analysis of the written medieval literary text.
3c) Amado, Teresa 1991 Fernão Lopes, contador da História, Lisboa, Ed. Estampa; Auerbach, Erich 1969 Lenguaje Literário y publico en la Baja Latinidad y en la Edad Media (esp.), Barcelono, Ed.Seix Barral; Ctalan, Diego 1962 De Alfonso X al Conde de Barcelos, Madrid, Ed.Gredos; Curtius, e 1965 European Litterature and the Latin Middle Ages (trad. Ingl), New York; (Giulia Lanciani e Giuseppe Tavani coord. E org.) , Lisboa, Ed. Caminho, 1993 Dicionário de Literatura Medieval Galega e Portuguesa; Graf, Arturo 1980 Mitti, leggende e superstizioni nel Médio Evo, Milano, Arnaldo Forni; 1978 Grundiss der Romanischen Litteraturen dês Mittelalters, t.IV et t. XI, Heidelberg; Lucas, Maria Clara de Almeida 1986 A literatura visionária na Idade Média, Lisboa; Martins, Mário 1956 Estudos de Literatura Medieval, Braga, Livraria Cruz; Mattoso, José 1988 A nobreza medieval portuguesa, Lisboa, Ed.Estampa; Rebelo,Luís de Sousa1983 Typologie dês sources du Moyen Age Occidental, Brepols; A concepção de poder em Fernão Lopes, Lisboa, Livros Horizonte; Rodrigues, Lapa 1940 Dom Duarte e os pensadores da Casa de Avis, Lisboa; Rodrigues, Lapa 1981 Lições de Literatura Portuguesa III, 10ª ed Revist, Coimbra Editora; Zumthor, Paul 1972 Essai de Poétique Médiévale, Paris, ed. Seuil.
4. Optional.
5. Torre, Elisa Gomes da
6. 3h/week; annual; 4th year.
7. Lectures and pratical classes.
8. Two written tests or a final written exam.
9. No.
10. 9

Economics Degree

Programme of Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	Introduction to Economics I	6.0	Introduction to Economics II	6.0
	Techniques for Economic Analysis	6.0	Introduction to Social Sciences	6.0
	Economic Theory in Retrospective	4.0	Economic and Social History of the 20th Century	4.0
	Mathematic Applied to Economic I	4.0	Mathematics Applied to Economics	6.0
	Introduction to Low	4.0	Economics and Commercial Law	4.0
	Study, Communication and Work Techniques	4.0	Informatics for Economists and Managers	6.0
	Mathematics (recommended)		Introduction to Finance and Accounting (recommended)	
	Total	28.0	Total	32.0
2nd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Macroeconomics I	6.0	Macroeconomics II	6.0
	Microeconomics I	6.0	Microeconomics II	6.0
	Accounting I	6.0	Accounting II	6.0
	Statistics fot Economists	6.0	Basic Econometrics	6.0
	Monetary and Finance Economics	4.0	Analytical Accounting I	6.0
	Intermediate English (recommended)		English for Economists and Managers	2.0
	Total	28.0	Total	32.0
3rd YEAR	1st Semester	ECTS	2nd Semester	ECTS
	Economics of the Imperfect Markets	6.0	Labour Economics	6.0
	Regulation and Political Economy	6.0	Portuguese Economy in the Context of the European and World Economy	6.0
	International Economics	6.0	Public Choice Economics	6.0
	Applied Econometrics	6.0	Techniques for Decision Making	6.0
	Global and Political Economy	6.0	Economics Development: Theory and Policies	6.0
	Total	30.0	Total	30.0

	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	Economic Development: Theory and Art	6.0	Project	30.0
	Option A / International Economics and Development			
	International Monetary System Economics	6.0		
	Urban and Regional Economics	6.0		
	Environment Economics	6.0		
	Analysis of Programs and Projects Economics	6.0		
	Economic Growth and Cycles	6.0		
	Option B / Quantitative Methods			
	Economic Theory and Quantitative Methods	6.0		
	Economics of Information and Uncertainty	6.0		
	Multivariate Statistics	6.0		
	Game Theory	6.0		
	Tme Series Analysis	6.0		
	Option C / Financial Economics and Accounting			
	Analysis Accounting II	6.0		
	Fiscal Structure of the Firm	6.0		
	Investment Analysis and Financial Risk	6.0		
	Auditing	6.0		
	Strategic Management	6.0		
	Financial Management	6.0		
	Total (1 Annual + 4 Options)	30.0	Total	30.0

Total of credits: 240

1st year

1. Introduction to Economics I – 2018.
2. General introduction to economic science, fundamental problems of economics. Macroeconomy: Price and production fluctuations; Money, Interest rates and deficits, Wages, Rents and Profits: Income distribution, Equity and Efficiency: State Intervention. Economic Growth and International Trade.
3a) No pre-requisites.
3b) The objective of this course is to provide students with concepts of economic theory which will allow them to benefit from the courses in Macroeconomics.
The main objective is not to give a general overview of Economics (which will necessarily be superficial) but to teach the basic concepts and the framework of Economic Science.
3c) Lipsey, RG Christal, KA 1995 *An Introduction to Positive Economics* 8th Ed; Oxford University Press, Oxford; Samuelson, PA Nordhaus, WD 1992 *Economics.*14th Edition, McGraw-Hill Book Company, NY.
4. Compulsory.
5. Francisco Diniz; Lina Sofia.
6. 4,5h/week (TP); 1st semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam.
9. No.
10. 6.0.

1. Techniques for Economic Analysis – 2019.
2. Definitions. Regimes of capitalization. Types of Interests. Rates. Annuities. Mortgage of loans. The Products/Financial Instruments of short term. Presentation of data. Measured of localization: Mean, medium and mode. Measures of dispersion, asymmetric and bias.
3a) No pre-requisites.
3b) To supply to the pupils some basic instruments of support to the economic analysis.
3c) C Cadilhe, Miguel 1994 *Matemática Financeira Aplicada*, Edições Asa, Porto; Canadas, Natália 1998 *A Matemática do financiamento e das aplicações de Capital*, Plátano Editora, Lisboa; Chaves Cristina, Maciel Elisabete, Guimarães Paulo, Ribeiro José Carlos 2000 *Instrumentos estatísticos de apoio à economia: conceitos básicos*, McGraw-Hill, Lisboa; Murteira, Bento JF 1993 *Análise exploratória de dados – Estatística Descritiva*, McGraw – Hill, Lisboa.
4. Compulsory.
5. Rui Madeira.
6. 4,5 hours/week; 1º semester; 1º year.
7. Lecture, discussion with the pupils.
8. Written test individual.
9. No.
10. 6.0.

1. Economic Theory in Retrospective – 2020.
2. The pre-modern discourse: Classical political economy; the marginalist “revolution”; the neoclassical school and its critics; the continuity of the liberal dissidence; Keynesian interventionism and the dream of sustained growth; main issues of orthodox economic theory after the world war; contributions and limitations of the neo-marxist school after the war; the rise of neo-liberalism and the post cold war period; the turn of the century-new paths or dead ends? The XXI century and the future of economic science.
3a) No pre-requisites.
3b) At the end of semester students will be able to achieve a good understanding of the history of economic theory.
3c) Blaug, Mark 1989 *História do Pensamento Económico*, 2 volumes, Lisboa, Publicações Dom Quixote; Blaug, Mark 1994 *A Metodologia da Economia*, Lisboa, Gradiva; Neves, João Cesar das 2001 *Princípios da economia política*, Lisboa, Editorial Verbo, Colecção Economia; Saby, Bernard e Saby, Dominique 1997 *As Grandes Teorias Económicas*, Lisboa, Edições Asa; Schumpeter, Josef 1996 *Ensaios: Empresários, Inovação, Ciclos de Negócio e Evolução do Capitalismo*, Oeiras, Celta Editora; Stoffaës, Christian 1987 *A Crise da economia mundial*, Lisboa, Dom Quixote.
4. Compulsory.
5. Chris Gerry; Patrícia António; Maria José Gomes.
6. 3 Hours/week; 1st semester; 1st year.
7. Seminar Lectures.
8. 2 Reading Sheets and a Mini-test.
9. No.
10. 4.0.

1. Mathematic Applied to Economics I – 2021.
2. Functions of one variable: implicit and inverse functions; some special functions. Limits of functions and continuity: classification of discontinuity. Derivatives: higher order derivatives; implicit differentiation. Antiderivatives: techniques of integration. Rolle’s theorem, Lagrange’s theorem and Cauchy’s theorem. L’Hopital’s rule. Taylor's formula . Integration: the definite integral. Applications of Integration. Improper Integrals.
3a) High-school Mathematical Analysis.
3b) To give to the Animal Production students a preparation in concepts and standard techniques so that they can overcome certain problems that arise in their area.
3c) Carvalho e Silva, Jaime 1994 *Princípios de Análise Matemática Aplicada*, McGraw Hill, Lisboa; Swokowski, Earl. W 1979 *Calculus with Analytic Geometry*, 1st Vol. Weberand Schmidt. Apostol; Tom, M 1967 *Calculus*, 1st Vol. Wiley International Edition. LT Magalhães, 1985 *Álgebra Linear como Introdução à Matemática Aplicada*, Texto editora.
4. Compulsory.
5. Pedro Barroso Magalhães.
6. 3h/week (3TP); 1st semester; 1st year.
7. Lectures and practical classes.Attendance in 2/3 of practical classes is compulsory.
8. Final written exam.
9. No.
10. 4.0.

1. Introductory to Law – 0373.
2. Objective and Subjective Law; The relationship between juridical and the subject, object, juriditial fact and collateral; The basic legal institutions; The idea of legal credit, the context, the factors that give rise to their creation and specially contracts and collateral.
3a) No prerequisites.
3b) The unit attempts to make students aware of fundamental concepts of law and contracts, in order to familiarize them in the respective methodology and language.
3c) Mendes, JC 1994 *Introdução ao Estudo do Direito*, Pedro Ferreira. Ascensão, JO 1998 *Direito Comercial, Parte Geral* Vol. 1, Lisboa. Cardoso, JP 1992 *Noções de Direito Comercial*, Rei dos Livros.
4. Compulsory.
5. Margarida Correia de Matos.
6. 3 h/week; 1st. semester; 1st year.
7. Lectures classes.
8. 1 written test or a final exam – 100%.
9. No.
10. 4.0.

1. Introduction to Economics II – 2022.
2. Fundamental problems of economics. Microeconomy: Supply, Demand, Prices and Markets.
3a) No prerequisites.
3b) The objective of this course is to provide students with concepts of economic theory which will allow them to benefit from the courses in Microeconomics.
The main objective is not to give a general overview of Economics (which will necessarily be superficial) but to teach the basic concepts and the framework of Economic Science.
3c) Lipsey, RG Christal, KA 1995 *An Introduction to Positive Economics* 8th Ed; Oxford University Press, Oxford; Samuelson, PA Nordhaus, WD 1992 *Economics.*14 th Edition, McGraw-Hill Book Company, NY.
4. Compulsory.
5. Francisco Diniz.
6. 4,5h/week (TP); 1st year, 2nd semester.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam.
9. No.
10. 6.0.

1. Introduction to Social Sciences – 0365.
2. General Principles and Criteria in the definition of Science as a way of knowing; The specificity of the knowledge in the Social Sciences: principles and criteria. The Social Sciences as social construction and complex institution. The use of Social Sciences: Common sense, technical/applied and critical/technical knowledge, decision and moral values in Social Sciences. The expert, the professional and the social division of knowledge.
3a) No pre-requisites.
3b) To identify the characteristics of Science, to discriminate between Science and other forms of knowledge, to understand the specificity of the Social Sciences by comparison with the Physical-natural Sciences and its objectivity. To understand the variables that unifies and differentiates the scientific, professional and social uses of science. To implement the scientific knowledge identifying processes methodologies and procedures.
3c) Pinto, José Madureira e Silva Augusto Santos (orgs.), 1997 *Metodologia das Ciências Sociais*. Porto, Afrontamento; Santos, Boaventura, S 1987 *Um discurso sobre as Ciências*. Porto, Afrontamento, pp. 5-33; Walerstein, Emmanuel *et al.* 1996 *Para abrir as ciências sociais*, Lisboa, Europa -América. Caria, Telmo H. 2002 *O uso do conhecimento: os professores e os outros*, Análise Social, nº164, pp.805-831.
4. Compulsory.
5. Telmo H. Caria.
6. 4,5h/week (3X1, 5h); 2nd semester; 1st year.
7. Theoretical and practical classes.
8. Final Examination and empirical work.
9. No.
10. 6.0.

1. Economic and Social History of the 20th century – 2023.
2. (1) Industrial waves: techno-economic cycles (2) Intellectual waves: economic thinking cycle. Multidimensional politic (3) Geoeconomics - the changing of making and power centres
3a) No pre-requisites.
3b) Dimensioning the rehabilitation of the economy in the long run, of the cycle school - in a process of revaluation of the economic history and thinking
3c) Healey, Nigel M 1997 *A Doutrina Económica da Nova Europa: da Comunidade à União*, Lisboa, Instituto Piaget; Friedman, Thomas L 2000 *Compreender a Globalização*, Lisboa, Quetzal Editores; Stoffäes, Christian 1987 *A Crise da Economia Mundial*, Lisboa, Dom Quixote.
4. Compulsory.
5. Maria José Lopes Gomes.
6. 3h/week; 2nd semester; 1 st year.
7. Lectures and practical classes; workshops.
8. Choice between two methods: (1) periodic evaluation: written test 65%) and project team work (35%); (2) final exam (100%).
9. No.
10. 4.0.

1. Mathematic Applied to Economics II – 2024.
2. Sequences of real numbers: bounded and monotonic sequences. Series: series with nonnegative terms: comparison tests, the integral test, the ratio and root tests; absolute convergence - alternating series. Power series: expansion of functions; differentiation and integration of power series. Matrices and Systems of Linear Equations. Determinants and Systems of Linear Equations. General Vector Spaces. Eigenvalues and Eigenvectors.
3a) High-school Mathematical Analysis.
3b) To give to the Animal Production students a preparation in concepts and standard techniques so that they can overcome certain problems that arise in their area.
3c) Carvalho e Silva, Jaime, 1994 *Princípios de Análise Matemática Aplicada*, McGraw Hill, Lisboa; Swokowski, Earl. W 1979 *Calculus with Analytic Geometry*, 1st Vol., Weberand Schmidt; Apostol, Tom M *Calculus* 1967 1st Vol., Wiley International Edition; L.T. Magalhães, 1985 *Álgebra Linear como Introdução à Matemática Aplicada*, Texto editora.
4. Compulsory.
5. Graça Soares.
6. 4h 30m/week (4,5TP); 2nd semester; 1st year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam
9. No.
10. 6.0.

1. Economics and Commercial Law – 2025.
2. Introductory Economic law; the legal commercial community; commercial law; price regulation.
The idea of legal credit, the context, the factors that give rise to their creation and specially contracts and collateral.
3a) No prerequisites.
3b) the unit attempts to give the student theoretical/practical knowledge of trading law, analysing the European dimension for Portuguese economy and cooperative relations between firms.
3c) Santos, AC Gonçalves, ME Marques, MM 2001 *Direito Económico* Almedina; Ascensão, JO 1998 *Direito Comercial*, Parte Geral" vol. 1, Lisboa; Cardoso, JP 1992 *Noções de Direito Comercial*, Rei dos Livros.
4. Compulsory.
5. Margarida Correia de Matos.
6. 3 h/week; semestral; 1st year.
7. Lectures classes.
8. 1 written test or a final exam – 100%.
9. No.
10. 4.0.

2nd year

1. Macroeconomics I – 2027.
2. (1) What is Macroeconomics? (2) The National Accounts: characterization of the Portuguese Account System; study economic aspects of the agents aggregation, operations; and tables (3) Intertemporal budget constraints of the economic agents (private and public sector) and of the Nation (4) Consumption (5) Investment.
3a) No prerequisites.
3b) Our central objective is that students will acquire solid foundations about basic macroeconomics and broaden their knowledge about topics such as demand of the private sector, by one perspective based upon "new macroeconomics", constructed on strong microeconomic foundations, stressing the intertemporal aspects and rational expectations.
3c) Burda, Michael and Charkles Wyplosz 2001 *Macroeconomics - A European Text*. Oxford University Press, 3th Edition; Dornbusch Rudiger, Stanley Fischer e Richard Startz 1998 *Macroeconomia*. Editora McGraw-Hill Lda., Lisboa, 7ª edição; Santos, Jorge *et al.* 2002 *Macroeconomia - Exercícios e Teoria*. Colecção Schaum, Editora McGraw-Hill de Portugal, 2 ª Edição.
4. Compulsory.
5. Leonida Correia.
6. 4,5 hours/week; 1st semester; 2nd year.
7. Theoretical-practical classes (4,5 TP).
8. Test or final examination.
9. No.
10. 6.0.

1. Microeconomics I – 2026.
2. The market and prices. Consumer theory. Intertemporal choice. Uncertainty. Production and cost theory. The objective of profit maximisation. Perfect competition. Monopoly. Monopolistic competition. Factor markets. The specific case of the labour market.
3a) No pre-requisites.
3b) To present concepts, tools and methods used in the formalisation and rigorous analysis of the economic behaviour of market participants (consumers and firms), as well as the equilibrium mechanisms operating in competitive and monopolistic markets.
3c) Varian, Hal R 1999 *Intermediate Microeconomics – A Modern Approach*, Fifth Edition, WW Norton & Company, 5th Edition; Binger, Brian R. and Elizabeth Hoffman, 1998 *Microeconomics with Calculus*, Second Edition, Addison-Wesley.
4. Compulsory.
5. João Rebelo.
6. 4,5 h/week; 1st semester; 2nd year.
7. Theoretical- practical classes.
8. Written tests or final exam.
9. No.
10. 6.0.

1. Accounting I – 2028.
2. Introduction to the theory and practice of company accounting: assets and liabilities, wealth transactions, income statements, result determination, value added tax, tax benefits; revenue cycle. Detailed study of a general accounting plan: Portuguese accounting standardization, accounting principles the POC. The international normalization process: IASB and FASB context
3a) No pre-requisites.
3b) At the end of semester students will be able to achieve gain a general understanding of financial and tax accounting according to national standards and law.
3c) Bento, J *et al* 1997 *Plano Oficial de Contabilidade Explicado*, Porto Editora; Borges, A Ferrão, M 1995 *Manual de Casos Práticos de Contabilidade*, Rei dos Livros, Lisboa¸ Borges, A. *et al* 1999 *Elementos de Contabilidade Geral*, Rei dos Livros, Lisboa¸ Costa, C Alves, Correia G 1996 *Contabilidade Financeira*, Rei dos Livros, Lisboa.
4. Compulsory.
5. Carlos Machado Santos; Carmem Leal.
6. 4,5 Hours/week; 1st semester; 2nd year.
7. Lectures.
8. Written examination.
9. The answer will be given in face of each particular case.
10. 6.0.

1. Statistics for Economists – 0566.
2. Introduction to the theory of probabilities. Random variables. Bi-dimensional random variables. Random distributions. Fundamental theorems. Mathematical statistics.
3a) High-School Mathematics.
3b) To provide the basic concepts of probability and statistics useful to engineers.
3c) Walpole, Ronald E e Raymond H Myers 1993 *Probability and Statistics for Engineers and Scientists*. Prentice Hall International Inc., 5th Edition, 766 p. ISBN:0024242012.; Zar, Jerrold H 1993 *Biostatistical Analysis*. Prentice Hall International Inc., 3th Edition, ISBN:0130845426.; Dagnelis, P 1973 *Théorie et Méthodes Statistiques.* Les Presses Agronomiques de Gembloux, 2éme Edition, Vols. I et II.
4. Compulsory.
5. Fátima Ferreira.
6. 4,5h/week (4,5TP); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Final written exam.
9. No.
10. 6.0.

1. Monetary and Finance Economics – 2029.
2. (1) Definition and functions of money; (2) monetary instruments (3) demand of money theory; (4) supply of money: financial institutions; overlook and functioning of monetary system (5) interest rates: formation on interest rates; relation with price level; (6) money and inflation (7) financial markets: organization and functioning; evaluation of the financial assets; politics of wallet formation.
3a) No pre-requisites.
3b) To analyze the mechanisms of functioning of the monetary and finance system, the decision to look to currency and the process of monetary creation. Analyze the relations between the changeable taxes of interest, currency and inflation. To introduce the basic principles of the financial decision and the methods of evaluation of the financial assets.
3c) Fonseca, J. A. Soares da, 1997 *Moeda e crédito*, Coimbra, FEUC. Hadjimichalakis, M 1995 *Contemporary money: banking and financial markets*, New York, Irwin/McGrawHill.
4. Compulsory.
5. Patrícia Martins.
6. 3 Hours/week; 1st semester; 2nd year.
7. Lectures and practical classes.
8. Two final exams.
9. No.
10. 4.0.

1. Microeconomics II – 2030.
2. Models of oligopolistic markets and behaviour. General equilibrium and welfare. Market failures: externalities, public goods and information asymmetries.
3a) No pre-requisites.
3b) To present concepts, tools and methods used in the formalisation and rigorous analysis of the market structure with strategic interdependence, general equilibrium, welfare and market failures.
3c) Varian, Hal R 1999 *Intermediate Microeconomics –A Modern Approach*, Fifth Edition, WW Norton & Company, 5th Edition.; Binger, Brian R. and Elizabeth Hoffman, 1998 *Microeconomics with Calculus*, Second Edition, Addison-Wesley.
4. Compulsory.
5. João Rebelo.
6. 4,5 h/week; 2nd semester; 2nd year.
7. Theoretical- practical classes.
8. Written tests or final exam.
9. No.
10. 6.0.

1. Macroeconomics II – 2031.
2. (1) Introduction; (2) labor markets and equilibrium unemployment (3) equilibrium output and growth (4) the real exchange rate; (5) the supply and demand for money and the monetary policy (6) aggregate demand and output: equilibrium in goods market; integration of the real and monetary sectors (IS-LM model); business cycles and interest rates under fixed and flexible exchange rates; (7) inflation and business cycles: aggregate supply and inflation; aggregate demand and aggregate supply under fixed and flexible exchange rates; how to use the AD-AS framework; (8) the macroeconomic policy: fiscal policy, debt and seignioriage, the limits of demand management, supply-side policies.
3a) No prerequisites.
3b) To study intensively fundamentals topics in macroeconomics, such as inflation and unemployment, economic growth, macroeconomic policy stabilization, interest and exchange rates. Simultaneously, we intend to leave the domain of a closed economy to a more general level (European and International).
3c) Burda Michael and Charkles Wyplosz 2001 *Macroeconomics - A European Text*. Oxford University Press, 3th Ed. Dornbusch Rudiger Stanley Fischer e Richard Startz 1998 *Macroeconomia.* Editora McGraw-Hill Lda., Lisboa, 7ª Ed. Blanchard, Olivier 1997 *Macroeconomics*. Prentice-Hall, Inc., New Jersey. Mankiw N Gregory 2002 *Macroeconomics.* Worth Publishers, New York. Santos, Jorge *et al*. 2002 *Macroeconomia - Exercícios e Teoria*. Colecção Schaum, Editora McGraw-Hill de Portugal, 2ª Ed.
4. Compulsory.
5. Leonida Correia; Patrícia Martins.
6. 4,5 hours/week; 2nd semester; 2nd year.
7. Theoretical-practical classes (4,5 TP).
8. Test or final examination.
9. No.
10. 6.0.

1. Accounting II – 2032.
2. Review of Accounting I. Depreciations, stock evaluation, inventory, investments. Annual financial statements. Balance sheet and income statement: further elements of financial reporting.
3a) No pre-requisites are required.
3b) At the end of semester students will be able to prepare, read and understand the basic elements of financial statements.
3c) Bento, J *et al* 1997 *Plano Oficial de Contabilidade Explicado*, Porto Editora; Borges, A Ferrão, M 1995 *Manual de Casos Práticos de Contabilidade*, Rei dos Livros, Lisboa¸ Borges, A. *et al* 1999 *Elementos de Contabilidade Geral*, Rei dos Livros, Lisboa¸ Costa, C Alves, Correia G 1996 *Contabilidade Financeira*, Rei dos Livros, Lisboa.
4. Compulsory.
5. Carlos Machado Santos; Carmem Leal.
6. 4,5 Hours/week; 2nd semester; 2nd year.
7. Lectures.
8. Written examination.
9. The answer will be given in face of each particular case.
10. 6.0.

1. Basic Econometrics – 0379.
2. Single Equation Regression models. Two-variable regression analysis: basic ideas. The estimation: The method of ordinary least squares. Functional forms of regression models. Multiple regression analysis: the estimation, statistic inference. Relaxing the assumptions of the classical model.
3a) No pre-requisites.
3b) To teach basic econometric concepts and to explain quantitative methods to analyse the economic relations.
3c) Griffiths, WE Hill RC and Judge, GG 1993 *Learning and Practicing Econometrics* John Wiley & Sons, Inc., New York; Gujarati, DN 1988 *Basic Econometrics*, 2nd edition, McGraw-Hill; Gujarati, DN 1997 *Econometría*, 3ª edición, McGraw-Hill; Johnston, J e DiNardo, J 1997 *Métodos Econométricos*, 4ª edição, McGraw-Hill.
4. Compulsory.
5. Lina Sofia Lourenço.
6. 4 hours/week; 2nd semester; 2nd year.
7. Theoretical and practical classes (2T/2P).
8. Final exam.
9. No.
10. 6.0.

1. Analytical Accounting I – 2033.
2. Introduction and development of analytical accountancy concepts. The Analytical Model. The production. The Costs. Allocating general costs of the firm. The methods to calculate the effective costs.
3a) No pre-requisites.
3b) At the end of the semester, the students will be able to determine the unit costs of the transformed product.
3c) Caiado, António Campos Pires *Contabilidade Analítica: Um Instrumento para Gestão* Editora Rei dos Livros, Lisboa; Courtois, Guy *Compreender a Contabilidade Analítica* Editora Prisma; Margerin, Jacques e Ausset, Gerard *Contabilidade Analítica: Um Instrumento de Gestão* Editora Prisma; Pereira, Carlos Caiado e Vítor Seabra Franco *Contabilidade Analítica* Edição dos autores - docentes do ISCTE, Lisboa.
4. Compulsory.
5. Carlos Machados dos Santos.
6. 4,5 hours/week; 2nd year; 2nd semester.
7. Lecture and practical exercises.
8. Written exam.
9. The answer will be given in face of each particular case.
10. 6.0.

3rd year

1. Economics of the Imperfect Markets – 2034.
2. Paradigm of the structure, behaviour and performance. The power of the market and collusion. Barriers to the entrance. Mergers and acquisitions: vertical and horizontal integration. Public politics of competition and regulation.
3a) Good knowledge on Microeconomics.
3b) One intends that the pupils are capable to develop and apply usable models in the analysis of the structure, behaviour and performance of the economic organizations inserted in imperfect markets.
3c) Cabral, Luis 1994 *Economia Industrial*, Mc-Graw Hill; Clark, Roger 1985 *Industrial Economics*, Oxford; Scherer e Ross 1990 *Industrial Market Structure and Economic Performance*, Boston; Appointments of the professor.
4. Compulsory.
5. Manuel Joaquim Teixeira.
6. 4,5 h/week; 1st semester; 3rd year.
7. Theoretician-practical classes.
8. Final written exam.9. No.
10. 6.0.

1. Regulation and Political Economy – 2035.
2. Part I - Introduction to the study of regulation and political economy. Part II – principal targets: (1) economic growth; (2) employment; (3) price stability; (4) external balance; Part III – Instruments: (1) short-term economic policy (monetary policy, exchange policy, fiscal policy and income policy); (2) long-term economic policy (policy of regulation and competition).
3a)
3b) To explain the main economic concepts that give support to decisions of political authorities. But we take in consideration the actual context of Portuguese political economy inside monetary economic union.
3c) Loureiro João; 1999 *Euro: Análise Macroeconómica*, Vida Económica; Pinto António Mendonça; 1999 *Política Económica*, Principia.
4. Compulsory.
5. Patrícia Martins.
6. 4,5 Hours/week; 1st semester; 3rd year.
7. Lectures and practical classes.
8. Two tests or final exam.
9. No.
10. 6.0.

1. International Economics – 0586.
2. (1) Introduction. (2) Theories of international trade. (3) International trade policy. (4) Economic Integration. (5) Multinational firms and foreign investment (6) Portugal: international economic relations
3a) No pre-requisites.
3b) The main objective is to study international trade in the context of economic theory and as an important factor in the actual economies.
3c) Markusen, JR *et al* 1995 *International Trade: Theory and Evidence*. McGraw-Hill; Appleyard, D and Field, AJ 1998 *International Economics*. McGraw-Hill, 3rd. edition; Chacholiades, M 1990 *International Economics*. McGraw-Hill, New York; Hill, CWL 2001 *International Economics: Competing in the Global Market Pace*, Postscript. Irwin McGraw-Hill, 3rd. Edition; Krugman P and M Obstfeld 2000 *Economia Internacional*. Makron Books, 4ª edição.
4. Compulsory.
5. Sofia Helena Gouveia.
6. 4,5 hours/week; 1st semester; 3rd year.
7. Theoretical-practical classes (4,5 TP).
8. Continuous valuation (1test + 1 written work) or final examination.
9. No.
10. 6.0.

1. Applied Econometrics – 0587.
2. Regression models and instrumental variables. Panel data models. Limited dependent variable models (logit and probit). Simultaneous equation models. Time series models. Undertaking an empirical project.
3a) No pre-requisites.
3b) Estimation and analyses the results of micro and macroeconomics models.
3c) Johnston J and J DiNardo, 1997 *Econometric Methods*, McGraw-Hill, 4th Edition; Wooldridge, J M *Introductory Econometrics* – A Modern Approach, 2E, Thomson South-Western.
4. Compulsory.
5. João Rebelo.
6. 4,5 h/week; 1st semester; 3rd year.
7. Theoretical- practical classes.
8. On (50%) and test (50%) or exam at the end of the semester.
9. No.
10. 6.0.

1. Global and Political Economics – 2036.
2. Characterisation, definition and reasoning: when e how the globalisation process started? What are the causes for international economic growth? The experiences of post world war. Globalisation and competitivity. Case studies.
3a) No pre-requisites.
3b) To present/discuss the origins, the causes and the theoretical models, as well as the consequences, of the actual process of global economic integration, with special emphasis on its specific impact on the chain filière and on organisation forms of firms, territories and socio-economic groups.
3c) Boyer, Robert e Drache, Daniel (1997) (org). *Estados contra Mercados: os limites da globalização,* Lisboa, Instituto Piaget, Série Económica e Política.
Dofffus, Olivier (1998). *A Mundialização*, Lisboa, Publicações Europa-América, Série de Estudos e Documentos.
Fortuna, Carlos (1997). *Cidade, Cultura e Globalização*, Oeiras, Celta.
Healy, Nigel M. (1997) (org.). A Doutrina Económica da Nova Europa: da Comunidade à União, Instituto Piaget.
Moreira, Manuel Belo (2001). *Globalização e Agricultura*, Oeiras, Celta.
4. Compulsory.
5. Chris Gerry.
6. 3h/week; 1º semester; 3rd year.
7. Theoretical classes.
8. Participation (15%), Home-works (50%), Written test (35%).
9. No.
10. 6.0.

1. Labour Economics – 0569.
2. (1) The object of Labour Economics (2) Themes and problems of Labour Economics: evidence from European Labour Markets (3) Labour market Theories: the basic microeconomic model (neo-classical); the human capital model; labour market discrimination; job search (4) other theoretical approaches (beyond the market, the wage relation): internal labour markets and dual labour markets; efficiency wages; the insiders-outsiders mechanism; (5) employment policy: the recent debates.
3a) No pre-requisites.
3b) To give the students a complete overview about how the labour markets work, so they can construct an informed opinion about the labour market policy and other topics concerned in this market.
3c) Borjas, George J 2001 *Labor Economics*. McGraw-Hill International Editions (Economics Series), second edition; Ehrenberg, Ronald G and Robert S Smith 2000 *Modern Labor Economics*: *Theory and Public Policy*. Addison Wesley., Lisboa, 7th. Edition; European Communities 2002 *Employment in Europe 2002*. Office for Official Publications at the European Communities, Luxemburgo; McConnel Campbell R 2002 *Contemporary Labor Economics* McGraw-Hill International Editions, 6th. Edition; Rodrigues, Maria João 1988 *O Sistema de Emprego em Portugal, crise e mutações*. Publicações Dom Quixote, Lisboa.
4. Compulsory.
5. Leonida Correia; Sofia Gouveia.
6. 4,5 hours/week; 2nd semester/ 3th year.
7. Theoretical-practical classes (4,5 TP).
8. Test or final examination.
9. No.
10. 6.0.

1. Portuguese Economy in the Context of the European and World Economy – 2037.
2. An overall historical review of the Portuguese Economy (XX and XXI centuries); historical, political and institutional aspects of European Integration: the European Union; Portuguese Economy in the context of European and World Economy; the productive structure of the Portuguese Economy.
3a) No pre-requisites.
3b) To present historically the recent facts of Portuguese Economy, using mainly a macro approach, as well as analyse the productive structure of Portuguese Economy (agricultural sector and CAP; industry and services). To contextualize Portuguese Economy in terms of the World and European Economy. The European Union.
3c) Reports and Bulletins (weekly) of Banc de Portugal and INE Statistics; Silva Lopes, José da 1999 *A Economia Portuguesa desde 1960*. Gradiva; Loureiro, João 1999 *EURO – Análise Macroeconómica*. Vida Económica; Mateus, Abel 2001 *Economia Portuguesa desde 1910* Verbo. Sites de Interesse na Internet: Banco de Portugal: www.bportugal.pt Dept. de Estudos do Min. das Finanças: www.dgep.pt Instituto Nacional de Estatística: www.ine.pt Comissão Europeia: www.europa.eu.int Banco Central Europeu: www.ecb.int OCDE: www.oecd.int Fundo Monetário Internacional: www.imf.org
4. Recommended.
5. José Caldas.
6. 4.5 hours /week; 2nd semester; 3rd year.
7. Theoretical and practical classes.
8. Two midterms.
9. None.
10. 6.0.

1. Public Choice Economics – 0570.
2. Introduction. The size and the growth of the public sector. The market failures in resource allocation and the role of government. Redistribution of income. Government Budget. Topics of public finance.
3a) No pre-requisites.
3b) To study the role of government in the national economy; market failures in resource allocation and the role of government.
3c) Barbosa, A Pinto 1998 *Economia Pública*. McGraw-Hill; Ribeiro, J Teixeira 1984 *Lições de Finanças Públicas*. Coimbra Editora; Cullis J e P Jones 1992 *Public Finance and Public Choice*. McGraw-Hill; Musgrave e Musgrave 1989 *Public Finance in Theory and Pratice*.
4. Compulsory.
5. Sofia Gouveia; José Vaz Caldas.
6. 4.5 hours/week; 2nd semester; 3rd year.
7. Theoretical-practical classes (4.5 TP).
8. Midterm (or alternatively a comprehensive final written exam).
9. No.
10. 6.0.

1. Techniques for Decision Making – 2038.
2. Mathematical programming: Optimization problems. Optimization of linear problems. Problem Formulation. Canonical form of linear programming. Fundamental concepts. Duality and Sensitivity analysis in Linear Programming (economic interpretation). 2. Special types of linear programming problems: The transportation problems; Goal programming. 3. Inventory models. 4. Waiting Lines. 5. Chains of Events: Markov analysis.
3a) No prerequisites.
3b) It is sought with this course to give a perspective of the role that mathematical models can represent in the process of decision making, within the methodological frame of Operations Research. Independently of the context, mathematical models of Operations Research can play important parts in the decision making, introducing objectivity elements, systemic inclusion and scientific foundation, contributing to increase the effectiveness and efficiency of the decisions' processes and to improve the quality and foundation of the adopted solutions.
3c) Gallagher, CA Hugh J W 1980 *Quantitative Methods for Business Decisions*, International Student Editions - McGraw-Hill; Tavares LV Oliveira, RC Themido, IH e Correia, FN 1996 *Investigação Operacional*, McGraw-Hill.
4. Compulsory.
5. Maria José Rainho.
6. 4,5 hours/week (TP); 2nd semester; 3rd year.
7. Lectures and practical applications.
8. Final written exam.
9. No.
10. 6.0.

1. Economic Development: Theory and Policies - 0568.
2. The importance of Economic Growth and Development. Economic Growth and Development through History. The evolution of growth models: from Adam Smith to Harrod – Domar. Solow's Neoclassic Growth Model. Economic Growth and Development and Population Growth. Savings, Financial Markets and Economic Growth and Development. Education, Human capital and Economic Growth and Development. Institutions and Economic Growth and Development Costs of Economic Growth and Development. Are there limits to Economic Growth and Development?. The future of Economic Growth and Development
3a) No prerequisites.
3b) Introduction to economic Growth and development. Growth theory provides an unifying theoretical framework within which the many diverse issues common to development economics are discussed in a logical, consistent manner. .One of the assumption is the view that economic growth and development is a process that has common characteristics no matter where and when it occurs. Therefore the opting for both historical and a global perspective.
3c) Van den Berg, Hendrik 2001 Economic Growth and development – An analysis of our Greatest Economic Achievements and our Most Exciting Challenges. MacGraw- Hill, International Edition, Singapore.
4. Compulsory.
5. Francisco Diniz; Patrícia Martins.
6. 3 h/week (TP); 2nd semester; 3rd year.
7. Lectures classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam.
9. No.
10. 6.0.

4th year

1. Economic Theory: The State of the Art – 2039.
2. (1)The economic analysis of cooperative organizations; (2) the evaluation of the contribution of interpersonal relations upon entrepreneurial success; (3) the analysis of the role of institutions on economic development; (4) the effects of the main macro-economic entities on the regularity/dimension of economic cycles; (5) the behavior of individual investors and institutions on the exchange market; (6) the analysis of risk and revenue on financial markets; (7) the characteristics of trade-offs between economic and environmental sustainability through multi-aims programming; the value of the historical patrimony under the perspective of a "double public good"; (9) technical efficiency and productivity growth of Portuguese firms e; (10) the debate over the correlation between global economic integration and macroeconomic performance.
3a) No pre-requisites.
3b) At the end of semester students will have updated their theoretical knowledge in general, and in particular the capability of identifying the analytical means necessary to the resolution of economic problems.
3c) Since this is a seminar the bibliographical references will be given as it goes.
4. Compulsory.
5. Chris Gerry; Patrícia António.
6. 4,5 Hours/week; 1st semester; 4th year.
7. Seminar Lectures.
8. Essay.
9. No.
10. 6.0.

Optional Courses

A – International Economics and Development

1. International Monetary System Economics – 2040.
2. (1) The exchange market: essential concepts (exchange rate; long-run premium; *spread*; arbitrage; (2) Exchange rate regimes: the gold standard; Bretton Woods (3) capital flows and adjustment mechanisms: fixed exchange rates and flexible exchange rates (4) money and the international payments and the International Monetary System; (5) the european monetary integration: monetary and exchange policy.
3a) No pre-requisites.
3b) The central objective is to study exchange markets and the mechanisms that determine the exchange parity. We intend provide the main elements relevant to the understanding the recent developments in the International Monetary System, in particular, in the European Monetary System, based, essentially, in the monetary and exchange policies
3c) Chacholiades M 1990 *International Economics*. McGraw-Hill. Chaccholiades M 1978 *International Monetary Economics and Policy*. McGraw-Hill Etheier, WJ 1995 *Modern International Economics*. Norton.
4. Optional course unit.
5. Leonida Amaral Tomás Correia.
6. 4,5 hours/week; 1st semester; 4th year.
7. Theoretical-practical classes (4,5 TP).
8. Final examination.
9. No.
10. 6.0.

1. Urban and Regional Economics – 2042.
2. Industrial Location : The location of the Firma in theory; The Spatial distribution of activities; The spatial Structure of the Urban Economy; Regional Specialization, Trade and Multiplier analysis; Regional and Inter-regional labor market analysis; Regional Growth, Factor allocation and Balance of Payments. Urban and regional economic policy analysis.
3b) The objective of this course is to provide an integrate approach to urban and regional economics by and appreciation of the relationships between economics and spatial analysis.
3c) Polèse, M 1998 *Economia Urbana e Regional*, APDR Coimbra; Armstrong H Taylor J 1985 *Regional Economics and Policy*, Philip Allan Ed. NY; McCann., P 2001 *Urban and Regional Economics*, Oxford University Press.
4. Obrigatória.
5. Compulsory.
6. Francisco Diniz.
7. 4,5h/week (TP); 1st semester; 4th year.
8. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory. Final written exam
9. No.
10. 6.0.

1. Environmental Economics – 2050.
2. Market mechanism and natural resources management. Economic efficiency and internalisation of environmental costs and benefits. Optimal level for environmental quality. Solutions for its implementation. Case Theorem: Applicability conditions. Pigouvian tax. Baumol-Oates model. Social choice and property rights definition over natural resources and environmental quality. Environmental policy: goals, principles and instruments. Instruments for pollution control: legislative vs. economic instruments. Valuation of environmental costs and benefits. Theoretical background and valuation methods and techniques. Cost-Benefit analysis for environmental policies and projects with environmental impacts. Inter-temporal discount and intergenerational justice. European Union environmental policy: goals, principles and main instruments. Global environmental problems and management instruments. Sustainable Development: theory and practice. Environmental sustainability and economic efficiency.
3a) No pre-requisites.
3b) Supply concepts and tools for economic analysis of environmental problems and to introduce the main solutions for promoting an efficient allocation for natural resources. Provide information about Union European environmental policy and some global environmental regulation instruments. Apply theoretical concepts to empirical problems and develop abilities to construct solutions for actual environmental problems.
3c) Field B 1997 *Environmental Economics: An Introduction*. McGraw-Hill International Editions; Hanley N and Spash, C 1993 *Cost-Benefit Analysis and the Environment*. Edward Elgar Publishing Limited; Aldershot. Kolstad, C 2000 *Environmental Economics*. Oxford University Press New York e Oxford. 1995 *Economia de los Recursos Naturales y del Medio Ambiente* (Spanish translation); Celeste Editions, Madrid. Different authors 1995 *Principles of Environmental and Resource Economics*; Folmer H Gabel H and Opschoor H (Editors). Edward Elgar Publishing Limited, United Kingdom.
4. Optional.
5. Lívia Madureira.
6. 4,5h/week (TP); 1st semester; 4th year.
7. Lectures and practical classes.
8. Written essay with oral discussion (50%); written exam (50%).
9. No.
10. 6.0.

1. Analysis of Programs and Projects Economics – 2041.
2. Concept of Project. Project classification. Fundamental concepts for projects evaluation. Approaches of projects evaluation in an optical one financial. Interaction between the investment decision and the financing decision.
3a) No prerequisites.
3b) The objective of the discipline is that the students possess the fundamental theoretical concepts to analyze and to study the projects managerial and economics. To try the students to apply in the practice, through a work, the theoretical knowledge.
3c) Barros Carlos 1990 Decisões de Investimento e financiamento de projectos. Edições Sílabo. Cebola, António 2000 Elaboração e análise de Projectos de investimento. 1ª Edição. Edições Sílabo.
4. Optional.
5. Júlia Fragoso da Fonseca.
6. 4,5h (TP)/week; 1st semester; 4th year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes in compulsory.
8. Final Exam; Work; Reading records and presence in the classes.
9. No.
10. 6.0.

1. Economic Growth and Cycles – 2042.
2. Growth and cycles economic theories overview from a classic perspective to the most recent one.20th century economic cycles typification in order to understand 1) Economic growth processes as an endogenous one; 2) Economic cycle's models dependent and independent of external influences.
3a) Enlarge the understanding of the economic growth process and the cyvles theory. Anlyse the experience of small and open economies such as Portugal.
3b)
3c) Das Satya P 1993 New perspectives on business cycles: an analysis of inequality and heterogeneity Aldershot, Edward Elgar BP 330.3 Das; Gabisch Gunter; Hans-Walter Lorenz, 1989 Business cycle theory: a survey of methods and concepts, Berlin, Springer-Verlag.
5. Francisco Diniz.
6. 4,5h/week (TP); 1st semester; 4th year.
7. Lectures and practical classes. Attendance in 2/3 of practical classes is compulsory.
8. Final written exam.
9. No.
10. 6.0.

B – Quantitative Methods

1. Economic Theory and Quantitative Methods – 2044.
2. Models of economic time series. Specification, estimation and analysis of a vector autoregression models. Microeconometric models of discrete and ordered choices and count data.
3a) No pre-requisites.
3b) Estimation and analyses the results of micro and macroeconomics models.
3c) Johnston J And J DiNardo 1997 *Econometric Methods*, McGraw-Hill 4th Edition; Wooldridge JM *Introductory Econometrics – A Modern Approach,* 2E, Thomson South-Western.
4. Compulsory.
5. João Rebelo.
6. 4,5 h/week; 1st semester; 4th year.
7. Theoretical- practical classes.
8. Written essays with oral discussion (50%) and test (50%) or exam at the end of the semester.
9. No.
10. 6.0.

1. Economics of Information and Uncertainty – 2045.
2. The elements of the problem. Expected utility. The risk. Uncertainty and contingents assets. The choices of economic agents under uncertainty. The agency theory. The moral hazard problem. The adverse selection. Signalling.
3a) No pre-requisites.
3b) Apply models under situations of uncertainty and asymmetric information.
3c) Macho Stadler Inés e D Pérez-Castrilo, 1997 *An Introduction to the Economics of Information*, Oxford University Press; Wolfstetter Elmar 1999 *Topics in Microeconomics*, Cambridge University Press.
4. Compulsory.
5. João Rebelo.
6. 4,5 h/week; 1st semester; 4th year.
7. Theoretical- practical classes.
8. Written essays with oral discussion (50%) and test (50%) or exam at the end of the semester.
9. No.
10. 6.0.

1. Multivariate Statistics - 2046.
2. Characterizing and displaying multivariate data. Multivariate analysis of variance. Multivariate regression. Factor analysis. Correspondence analysis. Cluster analysis.
3a) No pre-requisites.
3b) To provide methods to the formalization and statistical analysis of economic problem characterized by multiple and interrelated variables.
3c) Rencher Alvin C 1995 *Methods of Multivariate Analysis*, John Willey & Sons.
4. Compulsory.
5. João Rebelo.
6. 4,5 h/week; 1st semester; 4th year.
7. Theoretical- practical classes.
8. Written essays with oral discussion (50%) and test (50%) or final exam.
9. No.
10. 6.0.

1. Game Theory – 2047.
2. Introduction. Non-cooperative Game Theory. Static games of complete information. Extensive games with perfect and imperfect information. Expected utility theory. Static games of incomplete information. Dynamic games of incomplete information.
3a) No pre-requisites.
3b) Tools to improve strategic decisions, business/firm management and to evaluate economic policies.
3c) H Bierman & L Fernandez 1998 *Game Theory with Economic Applications* Addison-Wesley; R Gibbons, 1992 *Game Theory for Applied Economists*, Princeton University Press.
4. Optional.
5. Department members.
6. 4.5 hours/week; 1st semester; 4th year.
7. Theoretical-practical classes (4.5 TP).
8. 2 midterms (or alternatively a comprehensive final written exam).
9. No.
10. 6.0.

1. Time Series Analysis – 2048.
2. (1) Introduction (2) Stationary time-series models: ARMA models; stationary restrictions, the autocorrelation function and the partial autocorrelation function; sample autocorrelation; Box-Jenkins model selection; forecast (3) stochastic processes nonstationary: characterisation; unit root tests (4) multiequation time-series models: introduction to VAR analysis; estimation and specification of VAR models; the impulse response function and forecast error variance decomposition , Granger tests; structural VARs, examples of structural decompositions; (5) cointegration and error-correction models: concept; Engle-Granger and Johansen methodologies; examples
3a) No pre-requisites.
3b) The main objective is to introduce some of the recent developments in the time-series econometrics such as the main tools used in the empirical analysis of economic and financial data.
3c) Enders W 1995 *Applied Econometric Time Series*. John Wiley & Sons, Inc., New York; Enders, W 1996 RATS *Handbook for Econometric Time Series*. John Wiley & Sons, Inc. New York; Marques CR 1998 *Modelos Dinâmicos, Raízes Unitárias e Cointegração*. EDINOVA – Edições da Universidade Nova de Lisboa; Amisano G and C Giannini 1997 *Topics in Structural VAR Econometrics*. Springer-Verlag Berlin Heidelberg New York 2nd. Edition.
4. Optional course unit.
5. Leonida Amaral Tomás Correia
6. 4,5 hours/week; 1st semester; 4th year.
7. Theoretical-practical classes (4,5 TP).
8. Final examination.
9. No.
10. 6.0.

C – Financial Economics and Accounting

1. Analytical Accounting II – 2049.
2. Criteria for the effective costs regime. Standard costs regime. The costs and managerial decision making. Concurrent production.
3a) No pre-requisites.
3b) At the end of the semester, the students will be capable of applying the criteria for computing, situational analysis, specifically for production, being the case for concurrent production and the use of costs in the process of making decisions.
3c) Caiado, António Campos Pires *Contabilidade Analítica: Um Instrumento para Gestão*. Editora Rei dos Livros, Lisboa; Courtois Guy *Compreender a Contabilidade Analítica*. Editora Prisma; Margerin, Jacques e Ausset, Gerard *Contabilidade Analítica: Um Instrumento de* Gestão. Editora Prisma; Pereira, Carlos Caiado e Vítor Seabra Franco *Contabilidade Analítica*. Edição dos autores - docentes do ISCTE, Lisboa.
4. Optional.
5. Carlos Machados dos Santos.
6. 4,5 hours/week; 1st semester; 4th year.
7. Lecture and practical exercises.
8. Written exam.
9. The answer will be given in face of each particular case.
10. 6.0.

1. Fiscal Structure of the Firm – 2052.
2. Introduction to the Portuguese fiscal system. Duties of the contributors. Tax on the income of the singular people (IRS). Tax on the income of the collective people (IRC). Value added tax (IVA). Taxes on the ownership. Others taxes and charges. The accounting and the fiscal organization: a critical analysis. The Statute of the Chamber of the Official Technician of Accounts. The Deontological Code of the Official Technician of Accounts.
3a) No pre-requisites.
3b) One intends that the pupils are capable to understand the specific legislation on the Portuguese fiscal system of applying it to the current situations of the companies and to understand the Statute of the Chamber of the Official Technician of Accounts as well as the Deontological Code of the Official Technician of Accounts.
3c) Appointments of the professor. Codes of the diverges types of taxes. Statute of the Chamber of the Official Technician of Accounts.
4. Optional.
5. Manuel Joaquim Teixeira.
6. 4,5 h/week; 1st semester; 4th year.
7. Theoretical-practical classes.
8. Final written exam.
9. No
10. 6.0.

1. Investment Analysis and Financial Risk – 2053.
2. Financial Analysis and Risk Theory. Portofolio Analysis. Investment Decisions and Financial Decisions
3a) No pre-requisites.
3b) The objectives of this course are the following: (a) the students understand the theories required to study firm projects (b) and risk analysis
3c) Barros Carlos 1990 Decisões de Investimento e financiamento de projectos. Edições Sílabo; Cebola António 2000 Elaboração e análise de Projectos de investimento 1ª Edição. Edições Sílabo.
4. Optional.
5. Júlia Fragoso Fonseca.
6. 4,5 h/week; 1st semester; 4th year.
7. Theoretician-practical classes.
8. 1 Midterm; an essay; critical readings and assiduity.
9. No.
10. 6.0.

1. Auditing – 2054.
2. Introduction. Auditing-basic concepts. Principles and Norms of Accounting. Norms of auditing for professional activity. Procedures and tests of auditing. The organisation of an auditing. Internal control. Auditing the financial statements (balance sheet, income statement).
3a) No pre-requisites.
3b) The objective of the course is to teach students in economics the basic tools related with auditing.
3c) Costa Carlos B *Auditoria Financeira*. Editora Rei dos Livros, Lisboa. Costa, Carlos B e Gabriel C Alves *Casos Práticos de Auditoria Financeira* Vislis Ed. Lisboa; Carmichael Douglas R *et al*. *Auditing Concepts and Methods*. McGraw-Hill.
4. Compulsory.
5. Department members.
6. 4.5 hours/week; 1st semester; 4th year.
7. Theoretical-practical classes (4.5 TP).
8. A final comprehensive exam.
9. No.
10. 6.0.

1. Strategic Management – 2089.
2. Introduction to strategic thinking. Strategic Analysis: external environmental and internal analysis; Strategy Formulation: mission and objectives, strategic and development options; Strategy Organization and Implementation: organizational structure, behavioural implementation, evaluation and control.
3a) No pre-requisites.
3b) To provide the concepts and techniques understanding used in enterprise strategic planning elaboration.
3c) Freire Adriano 1999 *Estratégia – Sucesso em Portugal* Editorial Verbo, 5th edition,; Cardoso Luís, 1995 *Gestão Estratégica das Organizações – Ao Encontro do 3º Milénio* Editorial Verbo, 1st edition; Martinet A Ch 1992 *Estratégia*, Edições Silabo, 2nd edition.
4. Compulsory.
5. Mário Sérgio Teixeira
6. 4,5h/week (4,5 TP); 1st semester; 4th year.
7. Lectures and Practical classes, with expositive and case study methods
8. Written essays: 45%; Exam: 45%; Class participation: 10%
9. No.
10. 6.0.

1. Financial Management – 2051.
2. Genesis and historical Evolution of Corporate Finance. Short Term Financial Management. Business Acquisition. Financial Planning Concepts. Programming Models for Investments and Financing. Long Term Financial Management.
3a) Prerequisites are a strong understanding of financial mathematics.
3b) Students are required to understand modern financial methods and techniques and also the respective theoretical framework to understand corporate finance.
3c) Brandão E 2001 *Finanças*. Porto Editora: Porto; Myers S e Brealey R 1998 *Princípios de Finanças Empresariais* Mcgraw-Hill: Lisboa; Weston J e Brigham E 2000 *Fundamentos da Administração Financeira*. Makron Books: São Paulo.
4 Optional.
5. José Maria Andrade; Julia Fragoso
6. 4,5 Hours/week; 1st semester 4th year.
7. Lectures/ Discussion and Exercises.
8. Written examination and course-work.
9. No.
10. 6.0.

Applied Foreign Languages Degree

Programme Studies

	1st Semester	ECTS	2nd Semester	ECTS
1st YEAR	English I (1st Foreign Language)	9.0	English II (1st Foreign Language)	9.0
	French I or German I (2nd Foreign Language)	9.0	French II or German II (2nd Foreign Language)	
	Portuguese Language and Communication I	7.0	Portuguese Language and Communication II	9.0
	Introduction to Computer Practice	5.0	Computers in Organizations	7.0
				5.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
2nd YEAR	English III (1st Foreign Language)	8.0	English IV (1st Foreign Language)	8.0
	French III or German III (2nd Foreign Language)	8.0	French IV or German IV (2nd Foreign Language)	8.0
	Portuguese Language and Communication III		Portuguese Language and Communication IV	
	Economics Society and Development I	7.0	Economics Society and Development II	7.0
	Public Relations	5.0	Administrative and Documentation Techniques	5.0
		2.0		2.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
3rd YEAR	English V (1st Foreign Language)	6.0	English VI (1st Foreign Language)	6.0
	French V or German V (2nd Foreign Language)	6.0	French VI or German VI (2nd Foreign Language) French II or German II or Spanish II (3rd Foreign Language)	6.0
	French I or German I or Spanish I (3rd Foreign Language)	7.0	Portuguese Language and Communication VI	7.0
	Portuguese Language and Communication V	3.0	The European Economy International Organisations and the Business World II	3.0
	The European Economy International Organisations and the Business World I	4.0	Management Marketing and Advertising	4.0
	Management Finance and Organisations	4.0		4.0
	Total	30.0	Total	30.0
	1st Semester	ECTS	2nd Semester	ECTS
4th YEAR	English VII (1st Foreign Language)	6.0	English VIII (1st Foreign Language)	7.0
	French VII or German VII (2nd Foreign Language)	6.0	French VIII or German VIII (2nd Foreign Language)	7.0
	French III or German III or Spanish III (3rd Foreign Language)	6.0	French IV or German IV or Spanish IV (3rd Foreign Language)	7.0
	Organisational Administration and Business Law I	4.0	Organisational Administration and Business Law II	4.0
	Business Comunication	4.0	Specialist Applied Seminar – Options 2 and 4	5.0
	Specialist Applied Seminar – Options 1,3 and 5	4.0		
	Total	30.0	Total	30.0

Total Credits: 240

1st year

1. English I and II (1st Foreign Language) – 1744 - 1747.
2. Students are expected to develop their written and oral skills: Reading comprehension, grammar, vocabulary, oral work, discussion, video and film, writing.
3a) No prerequisites.
3b) This course aims at improving the spoken and written language.
3c) Thompson, AJ & Martinet, AB 1980 *A Practical English Grammar*, Oxford, OUP; Swan, M 1980 *Practical English Usage*, Oxford, OUP.
4. Compulsory.
5. David Peace.
6. 6 h/week; 1st/2nd semesters; 1st year.
7. Theoretical/practical classes.
8. Continuous assessment or final exam.
9. English.
10. 9 + 9.

1. French I and II (2nd Foreign Language) – 1745 - 1748.
2. Students are expected to develop their written and oral skills: Reading comprehension, grammar, vocabulary, oral work, discussion, video and film, writing.
3a) No prerequisites
3b) This course aims at improving the spoken and written language.
3c) Danny, M et al. 1983 Le Français des Relations Internationales, Paris, Hachette.
4. Compulsory.
5. Natália Amarante.
6. 6 h/week; 1st/2nd semesters; 1st year.
7. Theoretical/practical classes.
8. Continuous assessment or final exam.
9. French.
10. 9 + 9.

1. German I e II (2nd Foreign Language) – 1745 - 1748.
2. Students are expected to develop their written and oral skills: Reading comprehension, grammar, vocabulary, oral work, discussion, video and film, writing
3a) No prerequisites.
3b) The course aims at improving the spoken and written language.
3c) Nebe-Rikabi, Ursula 2000 *Fremde Sprache Deutsch, Teile 1/2,* Leipzig, Schubert-Verlag; Kuhne, B 2000 *Grundwissen Deutschland,* München, Iudicum-Verlag; Clamer, F 2001 *Übungsgrammatik für die Grundstufe,* Wiesbaum, Verlag Liebaug-Dartmann.
4. Compulsory.
5. Michael Düring.
6. 6 h/week; 1st/2nd semesters; 1st year.
7. Theoretical/practical classes.
8. Continuous assessment or final exam.
9. German.
10. 9 + 9.

1. Portuguese Language and Communication I and II – 1746 - 1749.
2. Language and communication – concepts and theories; the linguistic system – the codes of the written language and techniques of oral communication and argumentative expression; delivering dynamic presentations.
3a) No prerequisites.
3b) This course aims at the study of the expressive-communication process as a theoretical reflexon and a creative and interpretative textual pratice: 1) Developing the metalinguistic awareness; 2) Improving the performance of the mother-tongue.
3c) Rei, JE 1995 *Curso de Redacção: I. A Frase* e *II. O Texto*, Porto, Porto Editora; Archand, R & Bourbeau, Nicole 1998 *La Communication Éficace. De l'intention aux moyens d'expression*, Bruxelles, De Boeck Université; Weston, A 1996 *A Arte de Argumentar*, Lisboa, Gradiva; Hillman, R 1999 *Delivering Dynamic Presentations*, Boston *et al.* Allyn & Bacon.
4. Compulsory.
5. J. Esteves Rei.
6. 4 h/week (2 theoretical + 2 practical); 1st/2nd semesters; 1st year.
7. Lectures and practical classes.
8. Reports produced during the classes; final examination.
9. No.
10. 7 + 7.

1. Introduction to Computer Practice – 0342.
2. Basic concepts; windows – desktop, program manager, file manager, clipboard, print manager, WinWord, PowerPoint, excel database. Privacy and security of information; using computers.
3a) No prerequisites.
3b) Developing students' knowledge of Word processing and others programs as Excel.
3c) Barrote, A & Lemos, R 1992 *Fundamentos do Windows*; Turley, JL & McGraw-Hill, O 1993 *PCs made Easy*.
4. Compulsory.
5. Leonel Morgado, Pedro Couto.
6. 4 h/week; 1st semester; 1st year.
7. Theoretical/practical classes.
8. One written and, in special cases, oral examinations.
9. No.
10. 5.

1. Computers in Organizations – 1750.
2. Computer and operating systems. General use software; database management systems; information and communication technology; windows environment; word processing; editing; e-mail.
3a) No prerequisites.
3b) Word processing; electronic communication; developing students' knowledge of new information technology.
3c) Morgado, L *et al.* 2002 *Apontamentos de Informática no Ensino - 1-Internet*, Vila Real, UTAD, http://www.utad.pt/~leonelm/ine/Apontamentos%202002-1-Internet.pdf;
Schlein, A *et al.* 2002 *Find It Online: The Complete Guide to Online Research*, *Facts on Demand Press*, BRB Publications, Tempe, Arizona, USA; Alconchel JD 2001 *Microsoft Office XP*, McGraw-Hill de Portugal, Lisboa; Gonçalves, R 2002 *A Gestão, os Sistemas de Informação e a Informação nas Organizações*, http://www.utad.pt/~leonelm/iao/Apresentacoes/GSi.ppt; Gonçalves, R 2002 *Sistemas de Informação nas Organizações*, http://www.utad.pt/~leonelm/iao/Apresentacoes/SI.PPT.
4. Compulsory.
5. Leonel Morgado, Pedro Couto.
6. 4 h/week, 2nd semester; 1st year.
7. Theoretical/practical classes.
8. Final test.
9. No.
10. 5.

2nd year

1. English III and IV (1st Foreign Language) – 1751 - 1756.
2. Students are expected to develop their written and oral skill: reading comprehension, grammar, vocabulary, oral work, discussion, video and film, writing.
3a) No prerequisites.
3b) This course aims at improving the spoken and written language.
3c) Brazil, D 1998 Pronunciation for Advanced Learners of English, Cambridge University Press; Digby, C 1997 Making Sense of Spelling and Pronunciation, Prentice Hall International; Prodomou, L 1999 Grammar and Vocabulary for First Certificate, Longman; Swan, M 1997 Practical English Usage Oxford University Press; Sweeney, S 2000 Business English, Penguin; Watryn-Jones, P 1900 Test your Vocabulary (volumes 1 to 5), Penguin; Watryn-Jones, P 1990 English Idioms, Penguin; Vince, M 1994 First Certificate Language Practice, Heinemann.
4. Compulsory.
5. Stella Guedes Nascimento Aguirre.
6. 5 h/week; 1st/2nd semesters; 2nd year.
7. Theoretical/practical classes.
8. Continuous assessment.
9. English.
10. 8 + 8.

1. French III and IV (2nd Foreign Language) – 1752 - 1757.
2. Students are expected to develop their written and oral skills: Reading comprehension, grammar, vocabulary, oral work, discussion, video and film, writing.
3a) No prerequisites.
3b) This course aims at improving the spoken and written language.
3c) Dany, M et al. 1983 Le Français des Relations Internationales, Paris, Hachette.
4. Compulsory.
5. Manuel Falcão.
6. 5 h/week; 1st/2nd semesters; 2nd year.
7. Theoretical/practical classes.
8. Continuous assessment or final exam.
9. French.
10. 8 + 8.

1. German III e IV (2nd Foreign Language) – 1752 - 1757.
2. Students are expected to develop their written and oral skills: Reading comprehension, grammar, vocabulary, oral work, discussion, video and film, writing
3a) No prerequisites.
3b) The course aims at improving the spoken and written language.
3c) Nebe-Rikabi, Ursula 2000 *Fremde Sprache Deutsch, Teile 1/2,* Leipzig, Schubert-Verlag; Kuhne, B 2000 *Grundwissen Deutschland,* München, Iudicum-Verlag; Clamer, F 2001 *Übungsgrammatik für die Grundstufe,* Wiesbaum, Verlag Liebaug-Dartmann.
4. Compulsory.
5. Michael Düring.
6. 5 h/ week; 1st/2nd semesters; 2nd year.
7. Theoretical/practical classes.
8. Continuous assessment or final exam.
9. German.
10. 8 + 8.

1. Portuguese Language and Communication III and IV – 1753 - 1758.
2. Reading strategies and its problems. Deviation and style – applied study of syntacticstylistics, morpfostylistics and phonostylistics. Literary and cultural communications: its actuality and its main forms in the organizations. Strategies of the public speaking; techniques of conversation.
3a) No prerequisites.
3b) This course aims at the study of the expressive-communication process as a theoretical reflex on and a creative and interpretative textual practice: 1) Developing the metalinguistic awareness; 2) Improving the performance of the mother-tongue.
3c) Serafini, Mª Teresa sd *Saber Estudar e Aprender*; Lapa, MR 1973 *Estilística da Língua Portuguesa*, Lisboa, Seara Nova; Garde-Tamine, J & Pellizza, Marie-Antoinette 1998 *La Contruction du Texte. De la grammaire au style*, Paris, Armand Colin; Silva, VA 1986 *Teoria da Literatura*, Coimbra, Almedina, 7ª ed; Martin, J-C 1999 *Guide de la Communication*, Beaume-les-Dames, Marabout; Caine, D 1999 *El Arte de Conversar*, Barcelona, Roinbook.
4. Compulsory.
5. Manuel Gonçalo Fernandes.
6. 4 h/week (2 theoretical + 2 practical); 1st/2nd semesters; 2nd year.
7. Lectures and practical classes.
8. Students must take a test at the end of the semester.
9. No.
10. 7 + 7.

1. Economics, Society and Development I and II – 1754 - 1759.
2. The economic circuit and the measurement of economic activity; the determination of national product; the open economy; the business cycle; the economic role of the state. Notions of microeconomics (theory of the firm: technology, cost minimisation, cost functions). Notions of macroeconomics (closed economy models, open economy models, government intervention, European Union influence on national macroeconomic policy). Development and associated concepts: growth, structural changes, the process of income generation and distribution.
3a) No prerequisites.
3b) To develop students' awareness of economic problems in general, in particular in their social and development contexts.
3c) Stanlake, GF 1993 *Introdução à Economia*, Lisboa, FCG; Sousa Andrade, J 1998 *Introdução à Economia*, Minerva; Scott, MF 1989 *A new view of economic growth*, Claredon Press Osford.
4. Compulsory.
5. Pedro Ferrão.
6. 3 h/week (1 theoretical + 2 practical); 1st/2nd semesters; 2nd year.
7. One hour of theoretical-practical and three hours of practical classes per week.
8. End of semester test/exam.
9. No.
10. 5 + 5.

1. Public Relations – 1755.
2. Origin, history and professional development of public relations (PR); principal functional and management tasks of PR; corporate culture.
3a) No prerequisites.
3b) To develop an understanding of the role of PR in the firm and the nature of the PR profession; to identify how personal and professional strategies for promoting good relationships between individuals, groups and enterprise are developed.
3c) Shazelton, B (ed.) 1989 *Public Relations Theory*, New Jersey, Laurence Erlbaun Associates Inc.; Fortes, WG 1990 P*esquisa institucional: diagnóstico organizacional para relações públicas*, S. Paulo; Loyola; Bruneau IM & Pujos, JF 1992 *Le management des connaissances dans lentreprise, ressources humaines et systèmes d'information*, Paris.
4. Compulsory.
5. Luís Tibério.
6. 3 h/week (1 theoretical + 2 practical); 1st semester; 2nd year.
7. Lectures and practical classes.
8. Project(s) and an end of semester test/exam.
9. No.
10. 2.

1. Administrative and Documentation Techniques – 1760.
2. Introduction to organisation and methods (O&M); the role of O&M in the organisation; organisational structure, administrative work and information flows; commercial texts and others standard documents; information and communication technology; new organisational forms and working practices.
3a) No prerequisites.
3b) To understand the importance of organisational, administrative and working methods and the impact of new organisational forms and working practices on administrative and documentation techniques.
3c) Breadmore, RG 1992 *Organização e Métodos*, Lisboa, Ed. Presença.
4. Compulsory.
5. Pedro Ferrão.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester; 2nd year.
7. Lectures and practical classes.
8. Project(s) and an end of semester test/exam.
9. No.
10. 2.

3rd year

1. English V and VI (1st Foreign Language) – 1761 - 1767.
2. Students are expected to develop their written and oral skills: understanding and analysing texts, writing commercials texts; speaking and writing skills.
3a) No prerequisites.
3b) To enlarge student's knowledge of English with future jobs in view.
3c) Thompson, AJ & Martinet, AB 1980 *A Practical English Grammar*, Oxford, OUP; Swan, M 1980 *Practical English Usage*, Oxford, OUP.
4. Compulsory.
5. Orquídea Ribeiro.
6. 4 h/week; 1st/2nd semesters; 3rd year.
7. Theoretical/practical classes.
8. Continuous assessment or final exam.
9. English.
10. 6 + 6.

1. French V and VI (2nd Foreign Language) – 1762 - 1768.
2. Students are expected to develop their written and oral skills: understanding and analysing texts, writing commercials texts; speaking and writing skills.
3a) No prerequisites.
3b) To enlarge students' knowledge of English with future jobs in view.
3c) Dany, M et al. 1983 Le Français des Relations Internationales, Paris, Hachette.
4. Compulsory.
5. Natália Amarante.
6. 4 h/week; 1st/2nd semesters; 3rd year.
7. Theoretical/practical classes.
8. Continuous assessment or final exam.
9. French.
10. 6 + 6.

1. German V e VI (2nd Foreign Language) – 1762 - 1768.
2. Students are expected to develop their written and oral skills: Reading comprehension, grammar, vocabulary, oral work, discussion, video and film, writing
3a) No prerequisites.
3b) The course aims at improving the spoken and written language.
3c) Nebe-Rikabi, Ursula 2000 *Fremde Sprache Deutsch, Teile 1/2,* Leipzig, Schubert-Verlag; Kuhne, B 2000 *Grundwissen Deutschland,* München, Iudicum-Verlag; Clamer, F 2001 *Übungsgrammatik für die Grundstufe,* Wiesbaum, Verlag Liebaug-Dartmann.
4. Compulsory.
5. Michael Düring.
6. 4 h/week; 1st/2nd semesters; 3rd year.
7. Theoretical/practical classes.
8. Continuous assessment or final exam.
9. German.
10. 6 + 6.

1. Portuguese Language and Communication V and VI – 1764 - 1770.
2. Strategic communication in the organizations; the manager of the communication and its role in the organization; main concepts of propaganda. Non-verbal communication; events organization; speaking face to face and in the media – radio and tv.
3a) No prerequisites.
3b) This course aims at the study of the expressive-communication process as a theoretical reflex on and a creative and interpretative textual practice: 1) Developing the metalinguistic awareness; 2) Improving the performance of the mother-tongue.
3c) Rei, JE 2002 *A Comunicação Estratégica*, Porto, Estratégias Criativas; Pérez, RA 2001 *Estratégias de Comunicação*, Barcelona, Ariel Comunicación; Montgomery, RJ & Strick, SK 1994 *Meetings, conventions and expression, an introduction to the industry*, NY, Van Nostrand Reinhold.
4. Compulsory.
5. Maria da Felicidade Morais.
6. 2 h/week; 1st/2nd semesters; 3rd year.
7. Theoretical/practical classes.
8. Observation of the oral practice and a test at the end of the semester.
9. No.
10. 3 + 3.

1. The European Economy International Organisations and the Business World I and II – 1765 - 1779.
2. Introduction to the theory of economic integration; the structure of the EU; EU economic policies; EU social policies; the role of international organisations; overview of the principal international organisations at the regional and world level. The case of the UN. The internationalisation of companies; specific problems of international companies: investment, financing, production, marketing, human resources and taxation.
3a) No prerequisites.
3b) To understand the basic vocabulary and concepts pertaining to the European economy, the main international institutions and businesses and the links between them.
3c) El-Agraa, AM 1994 *The Economics of the European Community*, NY, Harvester Wheatsheaf; Soares, P 1992 *Maastrich – A Europa e o Futuro*, Publicações Europa – América.
4. Compulsory.
5. Patrícia António.
6. 3 h/week (1 theoretical + 2 practical); 1st/2nd semesters; 3rd year.
7. Lectures and practical classes.
8. Reports; end of semester test/exam.
9. English or French or German.
10. 4 + 4.

1. Management Finance and Organisations – 1766.
2. Managers and organisations, the roles of managers, the evolution of management thought, planning and strategy; leadership, human resource management, management control. Basic principles of financial management; financial analysis: objectives, methods and techniques; short, medium and long term financial instruments; structural funds. The evolution of organisational theory; current economic theories of organisations; bureaucracy.
3a) No prerequisites.
3b) To understand the basic principles of management and the role of the manager in contemporary organisations.
3c) Robbins, SP 1989 *Management*, Houghton Mifflin Company.
4. Compulsory.
5. Carlos Marques.
6. 3 h/week (1 theoretical + 2 practical); 1st semester; 3rd year.
7. Lectures and practical classes.
8. Practical individual/group assignments, end of semester written test/exam.
9. No.
10. 4.

1. Management Marketing and Advertising – 1772.
2. The concept of marketing; designing marketing strategies; marketing mix; product, price, distribution and decision; launching new products and services; marketing campaigns, segmentation and positioning. Social, political and economic aspects of advertising; types of advertising and their links to the media; advertising agencies.
3a) No prerequisites.
3b) To examine, within the basic principles of management, the role of marketing and advertising in contemporary business organisations.
3c) Robbins, SP 1989 *Management*, Houghton Mifflin Company; Lendrevie, J *et al.* 1993 *Mercator. Teoria e Prática do Marketing*, Lisboa, Pub. D. Quixote; Didd, Sally *et al*. 1994 *Marketing – Concepts and Strategies* (2nd European ed.), Houghton State University.
4. Compulsory.
5. Carlos Marques.
6. 3 h/week (1 theoretical + 2 practical); 2nd semester; 3rd year.
7. Lectures and practical classes.
8. Practical assignments, end of semester written test/exam.
9. No.
10. 4.

4th year

1. English VII and VIII (1st Foreign Language) – 1773 - 1778.
2. Introduction to the history, culture and civilisation in English spiking countries in Europe. Presentation and discussion of authentic material (newspapers, documental videos, etc.) concerning diverse issues as political systems, international relationships, social institutions and cultural history.
3a) No prerequisites.
3b) To enlarge students' knowledge of English with future jobs in view.
3c) Thompson, AJ & Martinet, AB 1980 *A Practical English Grammar*, Oxford, OUP; Swan, M 1980 *Practical English Usage*, Oxford, OUP.
4. Compulsory.
5. Paul Driver.
6. 4 h/week; 1st/2nd semesters; 4th year.
7. Theoretical/practical classes.
8. Continuous (active participation in discussions and presentations by the students) plus a written final exam.
9. English.
10. 6 + 7.

1. French VII and VIII (2nd Foreign Language) – 1774 - 1779.
2. Introduction to the history, culture and civilisation of French spiking countries in Europe. Presentation and discussion of authentic material (newspapers, documental videos, etc.) concerning diverse issues as political systems, international relationships, social institutions and cultural history.
3a) No prerequisites.
3b) To enlarge students' knowledge of English with future jobs in view.
3c) Dany, M et al. 1983 Le Français des Relations Internationales, Paris, Hachette.
4. Compulsory.
5. Manuel Falcão.
6. 4 h/week; 1st/2nd semesters; 4th year.
7. Theoretical/practical classes.
8. Continuous (active participation in discussions and presentations by the students) plus a written final exam.
9. French.
10. 6 + 7.

1. German VII e VIII (2nd Foreign Language) – 1774 - 1779.
2. Introduction to the history, culture and civilisation of German speaking countries. Presentation and discussion of authentic material (newspapers, documental videos, etc.) concerning diverses issues as political systems, international relatiosships, social institutions and cultural history.
3a) No prerequisites.
3b) The course aims at improving the spoken and written language.
3c) Nebe-Rikabi, Ursula 2000 *Fremde Sprache Deutsch, Teile 1/2,* Leipzig, Schubert-Verlag; Kuhne, B 2000 *Grundwissen Deutschland,* München, Iudicum-Verlag; Clamer, F 2001 *Übungsgrammatik für die Grundstufe,* Wiesbaum, Verlag Liebaug-Dartmann.
4. Compulsory.
5. Michael Laub.
6. 4 h/week; 1st/2nd semesters; 4th year.
7. Theoretical/practical classes.
8. Continuous assessment or final exam.
9. German.
10. 6 + 7.

1. Organisational Administration and Business Law I – 1776.
2. A review of key elements of administrative science (planning, objectives, innovation, leadership; control; strategic management; information management). Business and similar organisations in their legal context. Fundamental notions of law; the juridical system, norms and their application; sources of the labour law: ILO conventions, European Community law, ordinary laws, collective regulation instruments; the terms of individual labour contracts. Basic concepts of business law (economic, commercial and labour law); contracts in commercial law.
3a) No prerequisites.
3b) To provide an overview of some of the key legal dimensions of business administration.
3c) Machado, JB sd *Introdução ao Direito e ao Discurso Legitimador*, Coimbra, Almedina; Fernandes, M 1996 *Noções Fundamentais de Direito do Trabalho*, I, Coimbra, Almedina; Correia, F 1995 *Direito Comercial*, Lisboa.
4. Compulsory.
5. Pedro Ferrão.
6. 3 h/week (1 theoretical + 2 practical); 1st semester; 4th year.
7. Lectures and practical classes.
8. Written and, in special cases, oral examinations.
9. No.
10. 4.

1. Business Communication – 1777.
2. Concept, theories and models of organisation communication; internal and external communication; process and purposes of business communication; business discourse; presentations and business reports. Structure and characteristics of press and advertising messages.
3a) No prerequisites.
3b) Get an overview of the main issues connected with business communication process.
3c) Bovée, CL & Thill, 1992 *Business communication today*, NY, Mcgraw-Hill; Little, P 1992 *Communication in Business*, Pitman; Fisher, D 1993 *Communication in organisation*, NY, West Publ..
4. Compulsory.
5. J. Esteves Rei.
6. 2 h/week; 1st semester; 4th year.
7. Theoretical/practical classes.
8. Written report and one test/exam.
9. No.
10. 4.

1. Specialist Applied Seminar 1 - Socio-economics of Large Scale, Traditional and Electronic Commerce – 1782.
2. Structures and functions of distribution channels. Malls, commercial centres and hyper-markets; retail commerce in the Portuguese economy; traditional food and non-food commerce; direct marketing; TV sales, telephone marketing and e-commerce.
3a) No prerequisites.
3b) The main objective is to acquaint students with distribution systems and marketing channels.
3c) Phillips, P 2003 *E-business: strategy: text and cases*, London, McGraw-Hill; Strauss, J. *et al.* 2003 *E-marketing*, 3rd ed., Upper Saddle River, NJ: Prentice Hall; O'Malley, L *et al.* 2004 *Exploring direct and customer relationship marketing*, 2nd ed., London: Thomson Learning.
4. Optional.
5. Carlos Marques.
6. 3 h/week; 1st semester; 4th year.
7. Theoretical/practical classes.
8. Written and, in special cases, oral exams.
9. No.
10. 4.

1. Specialist Applied Seminar 3 – Socio-economics of Tourism, Patrimony and Environment – 1784.
2. Interdependence between Tourism, Patrimony and Environment. Some emerging ways of tourism. Cultural tourism. Nature tourism and ecoturism.
3a) No prerequisites.
3b) To approach and illustrate the rise and consolidation of new touristic products related to culture and nature.
3c) Herrero-Prieto, LC (Coord.) 2000 *Turismo cultural. El patrimonio histórico como fuente de riqueza*, Ed. Fundación del Patrimonio Histórico de Castilla y León, Valladolid; Ceballos-Lascurrians, H 1998 *Ecoturismo, Naturaleza y Desarrollo Sostenible*, Ed. Diana, Ciudad de México.
4. Optional.
5. Manuela Ribeiro.
6. 3 h/week; 1st semester; 4th year.
7. Theoretical/practical classes.
8. Written and, in special cases, oral exams.
9. No.
10. 4.

1. Specialist Applied Seminar 5 - Socio-economics of the Leisure and Tourism Industries – 1786.
2. Leisure society and ways of rest, of enjoyment and personal development; progressive reduction of the average time of work a consequent dilation of leisure time; improvement of the average income of individuals and families likeways the leisure industry and tourism industry.
3a) No prerequisites.
3b) To provide insights on the importance and the main contours of leisure and tourism social and economic impact.
3c) Cunha, L. 1997 *Economia e Política do Turismo*, MacGraw-Hill de Portugal, Alfragide; Dumazedier, J. 1973 *Sociologia Empírica do Lazer*, Perspectiva, São Paulo; Cooke, A 1994 *The Economics of Leisure and Sports*, Routledge, London; Lanfant, MF 1978 *Sociologia del Ócio*, Península, Barcelona.
4. Optional.
5. Manuela Ribeiro.
6. 3 h/week; 1st semester; 4th year.
7. Theoretical/practical classes.
8. Written and, in special cases, oral exams.
9. No.
10. 4.

1. Organisational Administration and Business Law II – 1781.
2. A review of key elements of administrative science (planning, objectives, , innovation, leadership; control; strategic management; information management). Business, public and third sector organisations in their legal context. Fundamental notions of law; the juridical system, norms and their application; sources of the labour law: ILO conventions, European Community law, ordinary laws, collective regulation instruments; the terms of individual labour contracts. Basic concepts of business law (economic, commercial and labour law); contracts in commercial law.
3a) No prerequisites.
3b) To provide an overview of some of the key legal dimensions of business administration.
3c) Machado, JB sd *Introdução ao Direito e ao Discurso Legitimador*, Coimbra, Almedina; Fernandes, M 1996 *Noções Fundamentais de Direito do Trabalho*, I, Coimbra, Almedina; Correia, F 1995 *Direito Comercial*, Lisboa.
4. Compulsory.
5. Pedro Ferrão.
6. 4 h/week (1 theoretical + 3 practical); 2nd semester; 4th year.
7. Lectures and practical classes.
8. Written and, in special cases, oral examinations.
9. No.
10. 4.

1. Specialist Applied Seminar 2 - Socio-economics of the Financial Filiere – 1783.
2. Enterprise accounting and taxation, national and community; taxation convergence; European Central Bank; stock markets; the bank in the globalisation era; public expenses and the state budget; financial aspects of modern management in the organisations.
3a) No prerequisites.
3b) To supply to the pupils analytical instruments that allow them to know and to interpret the main links of the chain of value that composes the financial row.
3c) Gomes, NSG 2003 *Manual de Direito Fiscal*, Editora Rei dos Livros, Lisboa; Santos, CF 2000 Contabilidade Financeira, Editora Rei dos Livros, Lisboa; Reichard, BV & Stwart, MV 1998 *Princípios de Finanças Empresariais*, MacGraw Hill, Lisboa; Specific Communitarian Guides/Indications/Norms.
4. Optional.
5. José Maria Andrade.
6. 4 h/week; 2nd semester; 4th year.
7. Theoretical/practical classes.
8. Written and, in special cases, oral exams.
9. No.
10. 5.

1. Specialist Applied Seminar 4. The Economic, Political and Social Challenges of the European Union – 1785.
2. Nominal and real convergence 1993-2001; the creation of the single market and the introduction of the single currency; the challenge of real convergence; governance at the Community level; competition policy; EU enlargement; the Common Agricultural Policy (CAP); poverty, exclusion and social policy; the information society; international co-operation policies; environmental policies; regionalism, sub-nationalism and the affirmation of ethnic and local identities within the EU; defence and foreign policy; relations between the EU and NATO.
3a) No prerequisites.
3b)
3c) Gomes, NSG 2003 *Manual de Direito Fiscal*, Editora Rei dos Livros, Lisboa; Santos, CF 2000 Contabilidade Financeira, Editora Rei dos Livros, Lisboa; Reichard, BV & Stwart, MV 1998 *Princípios de Finanças Empresariais*, MacGraw Hill, Lisboa; Specific Communitarian Guides/Indications/Norms.
4. Optional.
5. Vasco Rebelo.
6. 4 h/week; 2nd semester; 4th year.
7. Theoretical/practical classes.
8. Written and, in special cases, oral exams.
9. No.
10. 5.

Other Considerations

Currently the degree courses in Social Work, Applied Anthropology, Economics, Veterinary Medicine, Forestry, Physical Education and Sports, Applied Foreign Languages, Communications and Multimedia, are being restructured in line with the Bologna Accords. Details of the restructured courses should be available at the beginning of 2004. We would be pleased to provide further details when they become available at web page of UTAD.