Cracow University of Technology
Courses and Studies in English
Academic Year 2009/2010

Collected and edited by Katarzyna Baron, MA on the basis of information received from CUT faculties
Photographs: Jan Zych, MSc, Eng.

CONTENTS


POLITECHNIKA KRAKOWSKA
PK

OFFICIAL NAME IN POLISH:	**POLITECHNIKA KRAKOWSKA**
Official name in English:	Cracow University of Technology (CUT)
Address:	24 Warszawska Street, 31-155 Cracow, Poland
Webpage:	http://www.pk.edu.pl
Faculties:	Faculty of Architecture Faculty of Physics, Mathematics and Applied Computer Science Faculty of Electrical and Computer Engineering Faculty of Civil Engineering Faculty of Environmental Engineering Faculty of Chemical Engineering and Technology Faculty of Mechanical Engineering
ERASMUS code:	PL KRAKOW03
General description:	The Cracow University of Technology is a national autonomous university with a 63-year academic tradition. It was founded in 1945. In 1975 the University was named after Tadeusz Kościuszko, a Polish and an American national hero, a general and a skilled engineer of fortifications around Cracow and the West Point fortification in the United States. At present, the Cracow University of Technology is composed of 7 Faculties offering 35 degree programmes. 15,000 students are enrolled in undergraduate, graduate, postgraduate and doctoral courses and programmes supervised by 1180 academic teachers including 225 professors. Total number of alumni that graduated from the Cracow University of Technology exceeds 58,000. ***In May 2008 our university was rated by "Newsweek Polska" as the best university in Poland accoriding to employers*** and our alumni find job easily due to their high qualifications. The Faculty of Architecture of the Cracow University of Technology earned accreditation of the Royal Institute of British Architects and the Faculty of Mechanical Engineering is the second largest faculty of its kind in Poland. Different faculty members cooperate with the European Commission serving as experts and also with various companies and research institutes around the world. The University Library is well equipped with hard print and electronic collections. Inter-disciplinary units, art galleries, student clubs, a radio station, a choir and various student organisations are also present. The Cracow University of Technology signed 58 bilateral agreements and 188 Erasmus agreements that allow its students to experience studies abroad not only in countries of the European Union but also in the USA, Canada, Mexico and places as distant as Australia, Japan, Taiwan, Singapore or South Korea. International students are very welcome to our university. They can study at a Bachelor of Science programme, one of 9 Master of Science programmes, a PhD programme or they can choose from more than 130 courses (non degree students) taught in English. Each year a group of students from the USA, Canada and Australia takes opportunity to enrol for the unique Urban Design International Programme offered in English by the Faculty of Architecture. Moreover, a numerous students take English taught preparatory courses for architectural or technical studies connected with an intensive Polish language course at the International Centre for Education of the Cracow University of Technology. The Centre also offers courses of Polish language and culture several times a year for international students who want to learn more about Poland before they commit themselves to undergraduate or graduate studies in the heart of Europe.

Cooperation with the industrial sector has also been developed. On the main campus there operates a Technology Transfer Centre which is one of the biggest Regional Contact Points (of framework programmes) in Poland and the Coordinator of Innovation Relay Centre South Poland. Through the initiative of the University in 1997 a Special Economic Zone and as part of it on the CUT campus – the Cracow Technology Park was created, which became a platform linking the Cracow scientific community to modern industry.

Academic calendar:

Fall Semester: October 1 - end of January; Spring Semester: mid February – end of June;
Exam Sessions: first two weeks of February and last two weeks of June

Registration procedure:

Please refer to http://www.bwm.pk.edu.pl

Health insurance:

Basic medical care is available at a reduced charge at the CUT Medical Centre in Warszawska Street. Responsibility for full insurance lies with the student.

Accommodation:

The Cracow University of Technology has at its disposal about 2200 places in 4 student dormitories on the Czyżyny Campus. International students are offered accommodation in the CUT dormitories.

Sport facilities:

The Physical Education and Recreational Centre at the Cracow University of Technology has its own sports facilities: two gyms, three body building clubs, an aerobics room, sport fields and tennis courts. Besides, the Centre has access to a skating rink and a swimming pool.

Leisure activities:

Students of CUT have a number of possibilities of spending their leisure time actively. The facilities within the university are: Students' Sport Association - University Club, Student Cultural Centre "Kwadrat", "Cantata" Academic Choir of the Cracow University of Technology, "Bawinek" Student Dancing Club, "Gil" Gallery, and "1 Kanonicza Street" Art Gallery and *Dependent Theatre.*

City description:

Cracow is situated about 190 miles south of Warsaw, the capital of Poland, and about 70 miles north of the major skiing resort of Poland - Zakopane. Cracow is the city of culture and tradition, with numerous historic monuments. Its historic City Centre has been included in the UNESCO World Heritage List. The wealth of architectural monuments such as Wawel Castle, St. Mary's Basilica and Wit Stwosz Altar, the biggest Market Place (Rynek Główny) in Europe, the Cloth Hall (Sukiennice), works of art, charm of medieval streets, nooks and corners create the unforgettable, unique atmosphere of the Old Town. Cracow is one of the most important cultural cities in Europe with its famous theatres: the Słowacki Theatre and the Stary Theatre and museums such as the National Museum with great collection of Polish paintings, the Czartoryski Museum with The Lady with the Ermine by Leonardo da Vinci, and many others. Cracow is also one of the oldest academic centres in Europe with over 190,000 students studying at seventeen state universities and colleges.

PROGRAMME TITLE:	**URBAN DESIGN INTERNATIONAL PROGRAMME**
Erasmus subject code:	02.0
Duration:	1 semester (Spring Semester)
ECTS credits:	30 (European system)
Programme description:	The Faculty of Architecture through its International Programme offers an opportunity to study Architecture and Urban Design within the inspiring context of a European City. The full-time semester programme, has been tailored to suit students in Architecture at the 3rd to 5th year level, who wish to broaden their experience studying abroad for one semester. The International Programme has a long tradition, started in 1992. Its major components has been an exchange with the University of Tennessee, United States, from which a group of 15-20 students come each year to spend the Spring Semester in Cracow. Over the last few years the program has been enlarged to accommodate students from various European centres including Turin (Italy), Weimar (Bauhaus), Dresden, Munster, Coburg, Hildesheim, Frankfurt (Germany), Vaasa (Finland), Manchester (United Kingdom) and others, who come to Cracow as a part of the Socrates Exchange programme, and most recently from other universities in the United States. The main component of the programme is Design Studio (15 hours a week) focusing on creating new architecture sited within historic urban context. The project breaks up into three clearly defined stages: Urban Analysis, Urban Design and Architectural Design. The Design Studio is supported by subjects in Theory and History of Architecture, Theory of Urban Design, Drawing, Painting and Sculpture where students can explore issues relevant to their design assignment. Trips through Europe and Poland provide an opportunity to experience first hand the best of the heritage and contemporary architecture of the region. An organized nine-day-study trip to European centres may include: Vienna, Prague, Venice, Florence, Padua, Berlin, etc. A six-day-trip through Poland explores historic towns, castles, palaces, cathedrals, monasteries and other historic structures and landscapes. (Study trips include additional fees). In their free time students are encouraged to visit other places of professional interest both in Poland and in the broader region.
Eligibility/Admission:	3rd to 5th year level architecture students within existing exchange programmes or as fee paying students from other universities
Contact person:	Krzysztof Bojanowski, PhD, Arch., phone #: +48 12 628-31-13 e-mail: kbojanowski@poczta.fm

COURSE TITLE:	**HISTORY OF POLISH ARCHITECTURE - LECTURES**
Institute/Division:	Institute of History of Architecture and Monument Preservation, Chair of History of Polish Architecture and Monument Preservation
Erasmus subject code:	02.9
Number of contact hours:	30
Course duration:	1 semester (Fall or Spring Semester)
ECTS credits:	3
Course description:	This course investigates the theory and practice of Polish architecture from the end of 9th c. till the end of 20th c. based on examples located in Cracow. The students will examine general and local factors of development of architecture. It is intended to provide a understanding of general tendencies and local diversities in history of architecture. By visiting sites in Cracow the students will meet variety of historic architecture in Poland. The field case study method is mostly used for this examination.
Literature:	Miłobędzki, Adam, The Architecture of Poland, MCK Cracow 1994; Ostrowski, Jan, Cracow, Cracow 1982; Zachwatowicz, Jan; Polish Architecture, Warsaw 1967.
Course type:	Field seminars and lectures
Assessment method:	Attendance and the final exam
Prerequisites:	none
Primary target group:	3rd, 4th, and 5th year students in Architecture
Lecturer:	Jacek Czubiński, PhD, Arch.
Contact person:	Jacek Czubiński, PhD, Arch., phone #: +48 12 628-24-16; +48 503 035 289; e-mail: jczubin@usk.pk.edu.pl
Deadline for application:	September 15 February 15

COURSE TITLE:	**PRESERVATION OF MONUMENTS AND REVALORIZATION**
Institute/Division:	Institute of History of Architecture and Monument Preservation, Chair of History of Polish Architecture and Monument Preservation
Course code:	C1-4
Erasmus subject code:	02.9
Number of contact hours:	15 (seminars) + 15 (individual tutoring)
Course duration:	1 semester (Fall)
ECTS credits:	2 + 2
Course description:	Conveying the essential areas of knowledge connected with the problems of monument preservation: the development of European theory and practice; regional particularities of the Polish lands; acquaintance with the methodologies and principles of conservation design and the technologies of preservation work.
Literature:	Readings on theory of monuments preservation methodology and technical aspects.
Course type:	Seminars + individual tutoring
Assessment method:	Attendance and the evaluation of the final submission
Prerequisites:	none
Primary target group:	3rd, 4th, and 5th year students in Architecture
Lecturer:	Andrzej Kadłuczka, Prof., DSc, PhD, Arch. Anna Białasik, PhD, Arch.
Contact person:	Anna Białasik, PhD, Arch., phone #: +48 12 628-24-08; +48 600 312 236; e-mail: bialasik@neostrada.pl
Deadline for application:	September 15
Remarks:	Seminars (2 ECTS) may accompany Design for Conservation in Spring semester

COURSE TITLE:	**DESIGN FOR CONSERVATION**
Institute/Division:	Institute of History of Architecture and Monument Preservation, Chair of History of Polish Architecture and Monument Preservation
Course code:	C3-7
Erasmus subject code:	02.9
Number of contact hours:	105
Course duration:	1 semester (Fall or Spring)
ECTS credits:	7
Course description:	The course task is mastering the skills of: gathering, preparing and using historical materials; designing within the historical fabric of the city; defining the limits of interference in the monument historical structure; adapting and modernizing objects; practical application of preservation theories, techniques and technologies. Final requirements: - historical surveys of buildings and sites; - architectural drawings: plans, sections, elevations in the scales; 1: 100 and 1: 50
Literature:	Readings depend on the design task
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and oral presentation)
Prerequisites:	Preservation of Monuments & Revalorization (available in Fall Semester*)
Primary target group:	3rd, 4th, and 5th year students in Architecture
Lecturer:	Andrzej Kadłuczka, Prof., DSc, PhD, Arch. Anna Białasik, PhD, Arch.,
Contact person:	Anna Białasik, PhD, Arch., phone #: +48 12 628-24-08; +48 600 312 236; e-mail: bialasik@neostrada.pl
Deadline for application:	September 15 February 15
Remarks:	Students who study in Cracow only in Spring Semester may take Preservation of Monuments & Revalorization seminars (2 ECTS credits) accompanying the Design Studio (7 ECTS)

COURSE TITLE:	**PHOTOGRAPHY**
Institute/Division:	Institute of History of Architecture and Monument Preservation
Course code:	A-2
Erasmus subject code:	02.9, 03.0
Number of contact hours:	30
Course duration:	1 semester (available in Fall and Spring semesters)
ECTS credits:	2
Course description:	Practical introduction to photography as well as to digital image processing techniques. Practical application of photography in architectural work. Developing skills in using archive photography as an iconographic element.
Literature:	William J. Mitchell: *The Reconfigured Eye. The digital truth in the post-photographic era*
Course type:	Individual photographic work under supervision and tutorial
Assessment method:	Attendance and evaluation of submitted work
Primary target group:	All level students in Architecture and Landscape Architecture
Lecturer:	Zbigniew Wikłacz, PhD, Arch.
Contact person:	Zbigniew Wikłacz, PhD, Arch., phone #: +48 12 628-24-16 e-mail: wiklacz@pk.edu.pl
Deadline for application:	September 15 for Fall Semester February 15 for Spring Semester

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF RESIDENTIAL BUILDINGS I - THEORY**
Institute/Division:	Institute of Architectural Design, Chair of Housing
Course code:	C3-2-1
Erasmus subject code:	02-1
Number of contact hours:	30
Course duration:	1 semesters (Spring)
ECTS credits:	1
Course description:	The theoretical preparation to the single family residential building and small housing complex design: - architecture – formal ideas and stylistic means (minimal architecture, rational architecture, elementary architecture); examples of architectural solutions; - urban design – building systems, connections with the context, communication, traffic; - tendencies towards composition of single family housing, residences, city villas; - theory of architectural composition; - examples of architectural language: abstraction and architectural meanings, forms, symbols, metaphors; - design in the theory; examples of space definition in architecture, music and painting; - search for architectural form's pretexts.
Literature:	Basic literature on architectural composition and the design; architectural magazines
Course type:	Lectures
Assessment method:	Written exam checking delivered knowledge
Prerequisites:	Chair of Housing
Primary target group:	2nd year students in Architecture
Lecturer:	Dariusz Kozłowski, Prof., DSc, PhD, Arch.
Contact person:	Rafał Zawisza, PhD, Arch., phone #: +48 12 628-20-21
Deadline for application:	February 15

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF RESIDENTIAL BUILDINGS I**
Institute/Division:	Institute of Architectural Design, Chair of Housing
Course code:	C3-2-2
Erasmus subject code:	02- 1
Number of contact hours:	150 (Fall); 150 (Spring)
Course duration:	1 semester (available in Fall and Spring semesters)
ECTS credits:	8 (Fall); 8 (Spring)
Course description:	A two-semester course in architectural and urban design in the field of single family dwelling and small residential complex in a theoretical setting: - the choice and basis of a design concept, design on the basis of an assigned module; - relation between residential spaces, composition of architectural forms; - composition of an architectural setting: small architecture, greenery, design of private and public spaces; - techniques of presentation of a project; - work with architectural models and visualizations; - description: essay on theoretical basis of the chosen concept, technical specification.
Literature:	Basic literature on architectural composition and the design; architectural magazines
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (design work and essay)
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	2nd year students in Architecture
Lecturer:	Dariusz Kozłowski, Prof., DSc, PhD, Arch.
Contact person:	Rafał Zawisza, PhD, Arch., phone #: +48 12 628-20-21
Deadline for application:	September 15 for Fall Semester February 15 for Spring Semester
Remarks:	The design tasks are different in each semester

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF RESIDENTIAL BUILDINGS II - THEORY**
Institute/Division:	Institute of Architectural Design, Chair of Housing
Course code:	C3-3-1
Erasmus subject code:	02-1
Number of contact hours:	15
Course duration:	1 semester (Fall)
ECTS credits:	1
Course description:	The theoretical preparation for the multi-residential buildings complex design: - constitution of architectural forms; - positive and negative space; - design in theory; - theory of the Ideal City – history and idea, design beyond the context, urban context, examples of the city design based on urban and architectural grid; - issues of relations with the city, urban scale; - urban – building system, housing blocks; - private, semi–private and public space; - connections with the setting, communication, greenery; - architecture – formal ideas and stylistic means.
Literature:	Literature on architectural composition and the design of housing architecture; architectural magazines
Course type:	Lectures
Assessment method:	Written exam checking delivered knowledge
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	3rd year students in Architecture
Lecturer:	Dariusz Kozłowski, Prof., DSc, PhD, Arch.
Contact person:	Rafał Zawisza, PhD, Arch., phone #: +48 12 628-20-21
Deadline for application:	September 15

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF RESIDENTIAL BUILDINGS II**
Institute/Division:	Institute of Architectural Design, Chair of Housing
Course code:	C3-3-2
Erasmus subject code:	02-1
Number of contact hours:	90
Course duration:	1 semester (Fall)
ECTS credits:	8
Course description:	The task is to design a residential multifamily building located at the given site, as an element of a model residential complex. The provided site plan presents the legally binding regulation line delimiting the scale of the residential complex, beyond the zone of influence of historic architecture. The exercise encompasses the solution of the entire house and its surroundings, design of a fragment (3 types of flats), solution of an entrance hall and adjacent rooms, and solution of parking facilities. The scope of design presentation encompasses: site plan 1:500, plans of all floors, 1:100, chosen vertical section 1:100; elevations 1:100; vertical section through the external wall 1:20; perspective drawing; isometric drawing; description of an idea and technical description. During the design process students are obliged to collect their own valuable sketches, as well as materials that are their inspirations, in a portfolio.
Literature:	Literature on architectural composition and the design of housing architecture; architectural magazines
Course type:	Individual design work under supervision and tutorial
Assessment method:	Submission of the project on time; Positive evaluation of mid-term design reviews Positive evaluation of drawing tests Systematic work during the semester Submission of the essay on a subject related to the design task
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	3rd year students in Architecture
Lecturer:	Dariusz Kozłowski, Prof., DSc, PhD, Arch.
Contact person:	Rafał Zawisza, PhD, Arch., e-mail: rzawisza@pk.edu.pl, phone #: +48 12 628-24-63
Deadline for application:	September 15 for Fall Semester

COURSE TITLE:	**SPECIAL DESIGN TOPICS. DESIGN STUDIES: THE SEARCH FOR AN ARCHITECTURAL PRETEXT**
Institute/Division:	Institute of Architectural Design, Chair of Housing
Course code:	C4-7
Erasmus subject code:	02-1
Number of contact hours:	60
Course duration:	1 semester (Fall)
ECTS credits:	6
Course description:	Application of a project in an existing area: - theoretical models of thinking; - notation of the project's idea: axonometric view, perspective; - presentation in permanent technique; - essay on theoretical basis of the concept with short technical specification of a building. Preparation to the diploma project: - looking for the “urban motivation” and “architectural pretext” for the subject matter and location of the prospective diploma project, chosen by the student according to his/her individual interests. - theoretical basis of a concept.
Literature:	Literature on architectural composition and the design of housing architecture; architectural magazines
Course type:	Individual design work under supervision and tutorial
Assessment method:	Submission of prepared design and essay
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	5th year students in Architecture
Lecturer:	Dariusz Kozłowski, Prof., DSc, PhD, Arch.
Contact person:	Rafał Zawisza, PhD, Arch., phone #: +48 12 628-20-21
Deadline for application:	September 15 for Fall Semester

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF PUBLIC USE BUILDINGS**
Institute/Division:	Institute of Architectural Design, Division of Public Use Buildings
Course code:	C3-6-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90 (Fall); 90 (Spring)
Course duration:	1 semester (available in Fall and Spring semesters)
ECTS credits:	7
Course description:	The task of the course is mastering the skills of designing complex public use building(s). The detailed design of the object in architectural scales (1: 500, 1: 200, 1: 100, 1: 20) is proceeded by the analysis of a spatial-functional connection with further urban context. An important part of the final submission is 3D re-presentation (study and final models, computer visualization)
Literature:	Basic literature on urban composition and the design of public use buildings; architectural magazines
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, text and graphic presentation)
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Piotr Gajewski, DSc, PhD, Arch.
Contact person:	Piotr Gajewski, DSc, PhD, Arch., phone #: +48 12 628-24-42; e-mail: one@piotrgajewski.pl
Deadline for application:	September 15 for Fall Semester February 15 for Spring Semester
Remarks:	The design tasks are different in each semester

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF SERVICE COMPLEXES**
Institute/Division:	Institute of Architectural Design, Division of Public Use Buildings
Course code:	C3-4-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90
Course duration:	1 semester (Fall)
ECTS credits:	8
Course description:	Project is divided into three subjects. A student elaborates three concept sketch designs re. Service buildings and complexes. Three theoretical variations of a site are a basis for the exercise – on the same spatial layout, however differing in level of urban development (from a freestanding building to an urban infill). Sketch projects in scale 1:200 are elaborated in two first cases (whereby in the first one hand sketches are obligatory; in the second the technique can be chosen). The third stage is based exclusively on studies on a model.
Literature:	- Rob Krier, *Stadtraum* - Camillo Sitte, *City Planning* - Le Corbusier, *Vers une Architecture* - Żórawski Juliusz*, O budowie formy architektonicznej*
Course type:	Individual design work under supervision and tutorial
Assessment method:	The mark is an average of design marks and assessment of their juries.
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	3rd year students in Architecture
Lecturer:	Piotr Gajewski, DSc, PhD, Arch.
Contact person:	Piotr Gajewski, DSc, PhD, Arch., phone #: +48 12 628-24-42; e-mail: one@piotrgajewski.pl
Deadline for application:	September 15

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF SERVICE COMPLEXES**
Institute/Division:	Institute of Architectural Design, Division of Public Use Buildings
Course code:	C3-4-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	Students elaborate the project of a service building on the basis of a real location in a small town in (usually) South Poland, under consideration of the urban and cultural environment. The task encompasses the complex architectural design in scale 1:200, architectural detail 1:20, urban design in scale 1:500 with models and perspective sketches. The course is usually crowned by an exhibition of the best projects that is organized in the town in question.
Literature:	- Rob Krier, *Stadtraum* - Camillo Sitte, *City Planning* - Le Corbusier, *Vers une Architecture* - Żórawski Juliusz*, O budowie formy architektonicznej*
Course type:	Individual design work under supervision and tutorial
Assessment method:	The mark is an average of design marks and assessment of their juries.
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	3rd year students in Architecture
Lecturer:	Piotr Gajewski, DSc, PhD, Arch.
Contact person:	Piotr Gajewski, DSc, PhD, Arch., phone #: +48 12 628-24-42; e-mail: one@piotrgajewski.pl
Deadline for application:	February 15

COURSE TITLE:	**INTRODUCTION TO ARCHITECTURAL AND URBAN DESIGN - THEORY**
Institute/Division:	Institute of Architectural Design, Division of Architectural Composition
Course code:	C3-1-1
Erasmus subject code:	02-1
Number of contact hours:	15 (Fall); 15 (Spring)
Course duration:	1 semester (available in Fall and Spring semesters)
ECTS credits:	2 (Fall); 1 (Spring)
Course description:	The theoretical preparation to the design compositions made out of elementary blocks: - architecture – formal ideas and stylistic means (minimal architecture, rational architecture, elementary architecture), examples of architectural solutions; - constitution of an architectural form; - tendencies in shaping of dwellings, residences, summer houses; - design in the theory; examples of defining architectural space.
Literature:	Basic literature on architectural composition and the design; architectural magazines
Course type:	Lectures
Assessment method:	Written exam checking delivered knowledge
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	1st year students in Architecture
Lecturer:	Maria Misiągiewicz, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Mariusz Twardowski, PhD, Arch., phone #: +48 12 628-20-21
Deadline for application:	September 15 for Fall Semester February 15 for Spring Semester

COURSE TITLE:	**INTRODUCTION TO ARCHITECTURAL AND URBAN DESIGN**
Institute/Division:	Institute of Architectural Design, Division of Architectural Composition
Course code:	C3-1-2
Erasmus subject code:	02-1
Number of contact hours:	120 (Fall); 120 (Spring)
Course duration:	1 semester (available in Fall and Spring semesters)
ECTS credits:	8 (Fall); 8 (Spring)
Course description:	Two-term course in the field of architectural design made of elementary blocks and a dwelling/summer house in a theoretical situation: - defining architectural space; - the choice and grounds for the design conception; - design on an appointed grid; - composition of an architectural form; - relations between residential spaces; - composition of setting: small architecture, greenery, solid and non – solid ground; - work on grid and perspective; - presentation techniques of an architectural project; - description: essay on theoretical grounds for the conception, technical specification.
Literature:	Basic literature on architectural composition and the design; architectural magazines
Course type:	Individual design work under supervision and tutorial
Assessment method:	Submission of prepared design and essay
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	1st year students in Architecture
Lecturer:	Maria Misiągiewicz, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Mariusz Twardowski, PhD, Arch., phone #: +48 12 628-20-21
Deadline for application:	September 15 for Fall Semester February 15 for Spring Semester
Remarks:	The design tasks are different in each semester

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF RESIDENTIAL BUILDINGS II - THEORY**
Institute/Division:	Institute of Architectural Design, Division of Architectural Composition
Course code:	C3-3-1
Erasmus subject code:	02-1
Number of contact hours:	15
Course duration:	1 semester (Fall)
ECTS credits:	1
Course description:	The theoretical preparation for the multi-residential buildings complex design: - constitution of architectural forms; - positive and negative space; design in theory; theory of the Ideal City – history and idea, design beyond the context, urban context, examples of the city design based on urban and architectural grid; - issues of relations with the city, urban scale; - urban – building system, housing blocks; - private, semi–private and public space; - connections with the setting, communication, greenery; - architecture – formal ideas and stylistic means.
Literature:	Literature on architectural composition and the design of housing architecture; architectural magazines
Course type:	Lectures
Assessment method:	Written exam checking delivered knowledge
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	3rd year students in Architecture
Lecturer:	Maria Misiągiewicz, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Mariusz Twardowski, PhD, Arch., phone #: +48 12 628-20-21
Deadline for application:	September 15

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF RESIDENTIAL COMPLEXES II**
Institute/Division:	Institute of Architectural Design, Division of Architectural Composition
Course code:	C3-3-2
Erasmus subject code:	02-1
Number of contact hours:	90
Course duration:	1 semester (Fall)
ECTS credits:	8
Course description:	Course in architectural and urban design of a defined urban residential block: choice and fundamentals of an idea; search for pretexts of an urban form; theory of an ideal city – work with modules and urban grids; relations between residential spaces: urban block, street, squares, private spaces, public spaces, circulation, functional solutions, site development concept, residential building concept, functional programme, structural solutions, presentation techniques, work with renderings and visualisations, preparation of an essay linked to the design task.
Literature:	Literature on architectural composition and the design of housing architecture; architectural magazines
Course type:	Individual design work under supervision and tutorial
Assessment method:	Submission of the project on time; Positive evaluation of mid-term design reviews Positive evaluation of drawing tests Systematic work during the semester Submission of the essay on a subject related to the design task
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	3rd year students in Architecture
Lecturer:	Maria Misiągiewicz, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Mariusz Twardowski, PhD, Arch., phone #: +48 12 628-20-21
Deadline for application:	September 15

COURSE TITLE:	**SPECIAL DESIGN TOPIC: DESIGN STUDIES OF FORM, FUNCTION AND STRUCTURE**
Institute/Division:	Institute of Architectural Design, Division of Architectural Composition
Course code:	C4-7
Erasmus subject code:	02-1
Number of contact hours:	60
Course duration:	1 semester (Fall)
ECTS credits:	6
Course description:	Preparation for the diploma project: - looking for the "urban motivation" and "architecture pretext" for the diploma project theme and setting, chosen by the student according to his/her individual interests; - theoretical grounds of conception with short technical specification of the object; - theoretical studies accompanied by design; - preparation of an example of a project in existing area; - theoretical models of thinking; - notation of the project idea: axonometric view, perspective, project introduction in permanent technique; - essay on theoretical grounds of conception with short technical specification of a building.
Literature:	Literature on the subject of architectural composition and the design of housing architecture; architectural magazines
Course type:	Individual design work under supervision and tutorial
Assessment method:	Submission of prepared design and essay
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	5th year students in Architecture
Lecturer:	Maria Misiągiewicz, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Mariusz Twardowski, PhD, Arch., phone #: +48 12 628 2021
Deadline for application:	September 15

COURSE TITLE:	**NATURALLY SHAPED ARCHITECTURE**
Institute/Division:	Institute of Architectural Design, Division of Environmental Architecture
Course code:	C3-5-2
Erasmus subject code:	02.1
Number of contact hours:	90
Course duration:	1 semester (Fall)
ECTS credits:	8
Course description:	The course is based on solution of a simple building or structure of public use. The design task regards the functional and formal solution, focusing on the role of structure and its formal consequences. Examples of tasks: pedestrian bridge with a small service programme, bank branch, restaurant in park surroundings, small cinema. Site seeing, and/or field trip and research are foreseen. The course aims at introducing students into designing that is understood as an action that is taken in the multidimensional environment (material: natural, built, etc; as well as in the immaterial ones: social and cultural, in an environment of ideas etc.) in various scales (macro, medium, micro). The course also aims at teaching the inclusive attitude towards design. ANU1 focuses on physical environment and on shaping form according to the laws of physics (of Nature). The basic goal of this phase of the course is to enhance the understanding of the role of load bearing elements and of structure in building of the form of a work of architecture, as well as understanding of its relation with the environment.
Literature:	Basic literature on architectural design
Course type:	Individual design work under supervision and tutorial + seminars
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, text and graphic presentation)
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	3rd year students in Architecture
Lecturers:	J. Krzysztof Lenartowicz, Prof., DSc, PhD, Arch.; Piotr Winskowski, PhD, Arch.
Contact person:	J. Krzysztof Lenartowicz, Prof., DSc, PhD, Arch., Phone #: +48 12 628-24-61 or +48 12 628-26-62
Deadline for application:	September 15

COURSE TITLE:	**NATURALLY SHAPED ARCHITECTURE**
Institute/Division:	Institute of Architectural Design, Division of Environmental Architecture
Course code:	C3-5-2
Erasmus subject code:	02.1
Number of contact hours:	90
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	The course is based on solution of a medium size, averagely complicated building of service function – in strict relation to its structure. The design task regards the functional and formal solution, focusing on the role of natural and cultural environment as well as structure and their formal consequences for architecture. Examples of design tasks: recreation and sports centre (multipurpose hall and swimming pool), regional museum, tourist shelter, house of a pilgrim. The course aims at introducing students into designing that is understood as an action that is taken in the multidimensional environment (material: natural, built, etc; as well as in the immaterial ones: social and cultural, in an environment of ideas etc.) in various scales (macro, medium, micro). The course also aims at teaching the inclusive attitude towards design. ANU2 focuses on relations of the designed building with its natural and cultural environment. The basic goal of this phase of the course is to enhance the understanding of relations of a building with the landscape and tradition of its region/environment.
Literature:	Basic literature on architectural design
Course type:	Individual design work under supervision and tutorial + seminars
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, text and graphic presentation)
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	3rd year students in Architecture
Lecturer:	J. Krzysztof Lenartowicz, Prof., DSc, PhD, Arch.; Piotr Winskowski, PhD, Arch.
Contact person:	J. Krzysztof Lenartowicz, Prof., DSc, PhD, Arch., Phone #: +48 12 628-24-61 or +48 12 628-26-62
Deadline for application:	February 15

COURSE TITLE:	**ARCHITECTURE DESIGN OF PUBLIC BUILDINGS-ARCHITECTURE SHAPED IN NATURAL WAY**
Institute/Division:	Institute of Architectural Design, Division of Environmental Architecture
Course code:	C3-5-2
Erasmus subject code:	02.1
Number of contact hours:	90 Fall); 90 (Spring)
Course duration:	1 semester (available in Fall and Spring semesters)
ECTS credits:	8 (Fall); 7 (Spring)
Course description:	The course concerns the social problems of the user (social surroundings). Understanding of the need to design with the future user (participation) is the major aim of this phase. Introduction to passive building and regeneration of post industrial areas and buildings. Proposed subjects are: home for mothers, sports ice hall, hospital ward, public library, interior of the buildings designed by students or given, etc. Required drawings: urban scale – 1:500, diagrams concerning spatial-functional relation of the designed object with the existing cultural and natural environment; architectural scales – 1:200 and 1:100, architectural details – 1:20. 3D representation (study and final models).
Literature:	Basic literature on architectural design
Course type:	Individual design work under supervision and tutorial + seminars
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, text and graphic presentation)
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	4th and 5th year students in Architecture
Lecturer:	J. Krzysztof Lenartowicz, Prof., DSc, PhD, Arch.; Piotr Winskowski, PhD, Arch.
Contact person:	J. Krzysztof Lenartowicz, Prof., DSc, PhD, Arch., Phone #: +48 12 628-24-61 or +48 12 628-26-62
Deadline for application:	September 15 for Fall Semester February 15 for Spring Semester
Remarks:	Design tasks vary in each semester

COURSE TITLE:	**INDUSTRIAL ARCHITECTURAL DESIGN**
Institute/Division:	Institute of Architectural Design, Division of Industrial Architecture Design
Course code:	C3-5-2
Erasmus subject code:	02.1
Number of contact hours:	90 (Fall); 90 (Spring)
Course duration:	1 semester (available in Fall and Spring semesters)
ECTS credits:	8 (Fall); 7 (Spring)
Course description:	The task of the course is architectural solution of industrial functional complex (workplaces) or public use buildings (industrial plant, transportation facilities building or car service station, office building, small hospital, hospital ward or clinic and others – police headquarter, exhibition pavilion or art gallery, etc). One of the selected design problems is always a frame of conditions of current student competition or official awarding contract for public order technical documentation. During the course students elaborate a functional diagram, site plan concept, architectural solution including details, and short drawing/design exercises linked to the design problem.
Literature:	Basic literature on architectural design
Course type:	Individual design work under supervision and tutorial + seminars
Assessment method:	Evaluation of the design exercises (4 exercises per semester) and final submission (process, progress, personal creativity & individual approach, text and graphic presentation)
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	3rd, 4th and 5th year students in Architecture
Lecturer:	Maciej Złowodzki, Assoc. Prof., DSc, PhD, Arch.
Tutor:	Krzysztof Ludwin, PhD, Arch.
Contact person:	Krzysztof Ludwin, PhD, Arch., phone #: +48 12 628-24-48; +48 513 158 199;
Deadline for application:	September 15 for Fall Semester February 15 for Spring Semester
Remarks:	Design tasks vary in each semester

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF MULTIFAMILY HOUSING**
Institute/Division:	Institute of Urban Design, Division of Urban Composition
Course code:	C3-3-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90
Course duration:	1 semester (Fall)
ECTS credits:	8
Course description:	The course programme includes selectd architectural and urban issues related to the shaping of intensive forms of habitat in a city. The subject is a concept of a building or a complex of several buildings of a residential function together the necessary services resulting from the site conditions and a concept of land development. The development which complements the existing urban tissue, is related to a defined urban spatial, functional and cultural context. A design may also concern the problems of the revitalization of some degraded areas and conversion of some post-industrial objects (lofts) to residential functions. A design includes the development of a building lot of c. 1 ha and an urban public space related to the location: hardened pedestrian and vehicular surfaces, car parks, biologically active areas – greenery, small architecture, lighting, drainage. The basis for the definition of the programme for this investment and the definition of its spatial and functional relations with the nearest surroundings is an analysis of the location conditions – the urban analysis. The students can choose one of two locations in an urban context offered in the course. The design includes the preparation of a plan of implementation, an architectural concept of a chosen building and details (technical and material solutions).
Literature:	Basic literature on urban composition and design of residential complexes
Course type:	Design studio - individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and oral presentation)
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Single Family Housing)
Primary target group:	3rd, year architecture students
Lecturer:	Jacek Gyurkovich, Assoc. Prof., DSc, PhD, Arch.; tutors: Mateusz Gyurkovich, PhD, Arch., Anna A. Kantarek, PhD, Arch., Wojciech Wicher, PhD, Arch.
Contact person:	Wojciech Wicher, PhD, Arch.; phone #: +48 12 628 24 28; e-mail: wwicher@usk.pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**URBAN DESIGN OF CITY CENTRES**
Institute/Division:	Institute of Urban Design, Division of Urban Composition
Course code:	C3-3-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	The course is devoted to the problems of delimiting and shaping selected urban areas which – on account of their location in the spatial structure of cities – play or could play an important role as centres of service and public functions. Public spaces play a special role in city centres. Public spaces in a city – squares, streets, municipal parks and beaches, boulevards – are open-access places, remembered from the past and still attracting users with their peculiar climate, attractive for diverse meetings and contacts between city dwellers or newcomers. Places where the life of an urban community goes on. The places of public events, urban rituals. A public space and public buildings form an attractive offer of places for everyday life, a possibility of staying with other people, realizing social behaviours through partnership in urban shows of life. To a large extent, they owe the legibility of the spatial structure of a city to public spaces. The accompanying public buildings – dominants or strong forms – play an important role in the composition of an urban space and have a significant meaning in the shaping of the identity of places and the identification of diverse sequences of the urban tissue. The revitalization of former city centres or the transformation of areas degraded by industry or other users, absorbed as a result of the territorial expansion of cities, is one of the most urgent assignments in most European cities -in Poland as well.
Literature:	Basic literature on the subject of urban composition and design of residential complexes
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and oral presentation)
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Single Family Housing, Architectural and Urban Design – Multifamily Housing)
Primary target group:	3rd, year students in Architecture
Lecturer:	Jacek Gyurkovich, Assoc. Prof., DSc, PhD, Arch.; tutors: Mateusz Gyurkovich, PhD, Arch., Anna A. Kantarek, PhD, Arch., Wojciech Wicher, PhD, Arch.
Contact person:	Anna A. Kantarek, PhD, Arch., phone #: +48 12 628 24 28;
Deadline for application:	February 15

COURSE TITLE:	**URBAN DESIGN OF CITY CENTRES (URBAN RENEWAL)**
Institute/Division:	Institute of Urban Design, Division of Urban Composition
Course code:	C4-2-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	105
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	This one-semester course is focused on the mastering of the design skills covering: - the problems of shaping, renewal and development of the contemporary city; methods of preparing land-use plan for the city as a legal basis for the development of municipal terrains; - methods of forming public spaces from plans to small scale urban and architectural details; methods of preparing zone plans for the renovation of the city central areas; methods of carrying out complex urban inventories. Process sketches and diagrams, plans, sections (scales: 1:10000, 1: 5 000, 1: 2 000, 1: 500)
Literature:	Basic literature on the subject of urban composition and urban renewal
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and oral presentation)
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings)
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Jacek Gyurkovich, Assoc. Prof., DSc, PhD, Arch., tutors: Mateusz Gyurkovich, PhD, Arch., Anna A. Kantarek, PhD, Arch., Wojciech Wicher, PhD, Arch.
Contact person:	Anna A. Kantarek, PhD, Arch.; phone #: +48 12 628-24-28
Deadline for application:	February 15

COURSE TITLE:	**SPECIAL DESIGN TOPIC: URBAN DESIGN**
Institute/Division:	Institute of Urban Design, Division of Urban Composition
Course code:	C4-7
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	60
Course duration:	1 semester (Fall Semester)
ECTS credits:	6
Course description:	Course allows to broaden and improve students' skills and knowledge in the field chosen for the diploma project; it prepares students to elaborate the diploma work on both theoretical and practical level. The choice of the design task and its location depends on the student. Selected questions coming from an urban analysis (which covers urban history of the area, urban inventory, drawing and photographic material) form the first stage of student's work. They become the starting point for the further analysis, such as structure, composition of space, transportation and function which help to formulate possible urban policies for the prepared design. The next stage is to prepare a regulation plan and axon (1:2000) presenting the idea of spatial and functional development of the area considered as a part of a larger existing town structure. An obligatory essay consists of a short description of several examples of urban intervention in city structure with drawings and schemes (prepared at the first stage) and of an idea and technical description of a prepared design.
Literature:	Basic literature on urban composition and urban renewal
Course type:	Design studio organized in a form of group and individual consultations + 2 mid-semester reviews
Assessment method:	Evaluation of the final submission
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Public Use and Residential Buildings, Urban Renewal)
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Jacek Gyurkovich, Assoc. Prof. DSc, PhD, Arch.; tutors: Mateusz Gyurkovich, PhD, Arch., Anna A. Kantarek, PhD, Arch., Wojciech Wicher, PhD, Arch.
Contact person:	Mateusz Gyurkovich, PhD, Arch.; phone #: +48 12 628-24-28; e-mail: mgyurkovich@o2.pl
Deadline for application:	September 15

COURSE TITLE:	**INTRODUCTION TO ARCHITECTURAL AND URBAN DESIGN**
Institute/Division:	Institute of Urban Design, Chair of Housing Environment
Course code:	C3-1-2
Erasmus subject code:	02.0, 02.5
Number of contact hours:	120
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	Course goals: This one-semester course is focused on two subjects: the urban composition in urban interiors and on creation of sustainable environment. Students make two projects: Part I: urban composition – project of chosen public or semi-public space (square, street) in scales: 1:1000, 1:500, 1:200/250. Diagrams, sketches, plans, sections, axonometric views, 3D presentation. Part II: Architecture and Nature – project of sustainable environment based on the rules of sustainable design (idea of housing environment) in scales: 1:250. Model, diagrams, plans, sections, details of sustainable solutions: e.g. solar energy, saving water etc. Students have a possibility to master the methods of designing work from context analysis, the outline of an idea, through putting a conception, urban and architectural solutions, to the presentation and jury of a project.
Literature:	J. Wines, 2000. *Green Architecture*. Taschen; B. i R. Vale, 1991. *Green Architecture*. Bulfinch Press; M. Ruano, 2001. *Ökologischer Städtebau*. Karl Kramer Verlag; H. Castle, 2003. Architectural Design. 2003/4; *Living Spaces. Ecological Building and Design.* 1999. Könemann; T. Copplestone, 1998. *Frank Lloyd Wright.* Arkady.
Course type:	Design studio
Assessment method:	Review and evaluation of completed exercises and design assignments
Prerequisites:	Design studio, basic knowledge on the historical and contemporary architecture, basic skills of drawing
Primary target group:	1st and 2nd year students in Architecture
Lecturer:	Grażyna Schneider-Skalska, DSc, PhD, Arch.
Contact person:	Grażyna Schneider-Skalska, DSc, PhD, Arch., Phone #: +48 12 628-31-04; e-mail: gscheid@pk.edu.pl
Deadline for application:	February 15

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN : RESIDENTIAL INFILL IN THE URBAN FABRIC**
Institute/Division:	Institute of Urban Design, Chair of Urban Renewal and Development
Course code:	C3-3-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90
Course duration:	1 semester (Fall)
ECTS credits:	8
Course description:	The course teaches the method of architectural and urban design of multi-family residential building (or buildings) in the context of a site in the urban fabric including their functional and spatial relations. The course aims at: Presenting the fundamental problems of housing design; Developing the ability to solve more complex design problems by applying the method of analysis and synthesis; Further development of professional vocabulary comprising expressions, principles and ideas; Improving the ability to make use of professional literature, broadening the previously acquired knowledge and skills through developing the ability observe, perceive, create and express the architectural message.
Literature:	Basic literature on urban composition and design of residential complexes
Course type:	Design studio - individual design work under supervision and tutorial
Assessment method:	Participation in the course and design – reviews; evaluation of the completed project, jury; class involvement, general attitude. Scope of the project: architectural project with the urban context 1:100 (plans, cross-sections, elevations), construction detail 1:20, model 1:100, project description (3000 words), freehand drawing-perspective of the building in the urban context.
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Single Family Housing)
Primary target group:	3rd year students in Architecture
Lecturer:	Andrzej Wyżykowski, Full Prof., DSc, PhD, Arch.; tutors: Małgorzata Mizia, PhD, Arch , Krzysztof Kwiatkowski PhD, Arch.,
Contact person:	Małgorzata Mizia, PhD, Arch.; phone #: +48 12 628 24 34; e-mail: mmizia@o2.pl
Deadline for application:	September 15

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN OF RESIDENTIAL COMPLEXES II**
Institute/Division:	Institute of Urban Design, Chair of Urban Renewal and Development
Course code:	C3-3-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90
Course duration:	1 semester (Fall)
ECTS credits:	8
Course description:	The design task is the urban and architectural design concept of a multi-family residential complex of an infill type in the urban context – along with the service buildings and the development o the surroundings. The design method is based upon studies of composition functional and spatial relations of the context: analysis of the existing fabric, transportation and circulation systems as well as the context of nature. Pro-ecological solutions are preferred (energy-saving and sustainable design). To master the design skills in the above field, thus respecting: - the principles of the legible composition in the context of the existing urban fabric, public space, individual site conditions, climate (built and natural environment) and tradition of the site - proper choice of the programme, structure of residential architecture, principles of scale, internal and external connections, aesthetics and further criteria of evaluation (sustainability) To develop the skills of presentation of own design To develop the skills of using the literature as well as comparative and case studies.
Literature:	Basic literature on urban composition and design of residential complexes
Course type:	Design studio - individual design work under supervision and tutorial
Assessment method:	evaluation of the student's creative activity, design reviews, jury, completed exercises and projects.
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Single Family Housing)
Primary target group:	3rd year students in Architecture
Lecturer:	Stanisława Wehle-Strzelecka, DSc, PhD, Arch.
Contact person:	Stanisława Wehle-Strzelecka, DSc, PhD, Arch ;phone #: +48 12 628 24 34;
Deadline for application:	September 15

COURSE TITLE:	**URBAN DESIGN : CENTRES AND CENTRAL AREAS**
Institute/Division:	Institute of Urban Design, Chair of Urban Renewal and Development
Course code:	C3-3-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	Designing task addressed to the third year students is to prepare an urban concept design of the chosen area within the central area of Cracow. The design should provide a solution for an urban regeneration of the chosen area, including structural and functional aspects. It should also try to fill in empty areas (lots) within existing structures, providing new value in harmony with public spaces both in central and more peripheral areas of Cracow . To practise the knowledge acquired by the student during the previous period of study in the field of urban design and the regeneration of the existing city structure. To implement a new skill upon which a student can clearly and precisely articulate hers/his designing decisions with the strong accent placed upon local spatial conditions, urban composition, functional program and ecological values. To acquire the skill of proper graphic presentation (emphasizing the most important elements) of the design as well as the skill of the proper verbal presentation by taking part in class discussions
Literature:	Basic literature on the subject to be given at the beginning of the course
Course type:	Individual design work under supervision and tutorial
Assessment method:	Participation in the design class Presence at the seminars Mid-semester presentation-review of the project Final public presentation of the project which includes: urban analyses and structure schemes in relation to the city centre (1:5000), urban project and model (1:2000), characteristic part of the proposed urban design (1:500), axonometric view, written description, architectural detail.
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Single Family Housing, Architectural and Urban Design – Multifamily Housing)
Primary target group:	3rd year students in Architecture
Lecturer:	Andrzej Wyżykowski, Full Prof., DSc, PhD, Arch.; tutors: Małgorzata Mizia, PhD, Arch , Krzysztof Kwiatkowski PhD, Arch.,
Contact person:	Małgorzata Mizia, PhD, Arch.; phone #: +48 12 628 24 34; e-mail: mmizia@o2.pl
Deadline for application:	February 15

COURSE TITLE:	**URBAN DESIGN OF CITY CENTRES**
Institute/Division:	Institute of Urban Design, Chair of Urban Renewal and Development
Course code:	C3-3-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	The design task encompasses the elaboration of the urban design concept of development and transformation of the chosen part of Cracow. The site is located in the central, attractive area, with the dominating service function. The design solutions are supposed to enhance the spatial order and harmony, and shall be based upon the programmatic and spatial solutions, conversion and filling the gaps in the existing urban fabric, as well as on redevelopment of the public space, incl. service functions, green areas, recreation and transport. The design method is based upon studies of composition, functional and spatial relations with the context: analysis of the existing fabric, transportation and circulation systems as well as the context of nature and culture. Pro-ecological solutions are preferred (energy-saving and sustainable design).
Literature:	Basic literature on the subject to be given at the beginning of the course
Course type:	Individual design work under supervision and tutorial
Assessment method:	The condition of crediting the course is participation in the classes (design reviews, drawing controls), achieving a positive mark of the course work: presenting a design prepared in accordance with the required form, range and deadline, participation in the jury of the work.
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Single Family Housing, Architectural and Urban Design – Residential Complexes II)
Primary target group:	3rd year students in Architecture
Lecturer:	Stanisława Wehle-Strzelecka, DSc, PhD, Arch.
Contact person:	Stanisława Wehle-Strzelecka, DSc, PhD, Arch ;phone #: +48 12 628 24 34;
Deadline for application:	February 15

COURSE TITLE:	**BUILDING LIVABLE CITIES – LECTURES** **URBAN HOUSING TODAY AND TOMMOROW**
Institute/Division:	Institute of Urban Design, Division of Public Spaces for Movement
Erasmus subject code:	02.0
Number of contact hours:	15
Course duration:	1 semester (Fall)
ECTS credits:	5
Course description:	Lectures are focused on the following themes: - historical development of residential fabric in cities; - different approaches to the housing problems in the 20th century; - residential density and other urban factors allowing evaluation of different housing proposals; - family needs and surface area standards of the apartments; - residential buildings – the typology of access, the typology of layout; - spaces between buildings; - privileged groups in the residential complexes – children, handicapped, elderly people; - current trends in designing of urban multi-family housing – city block or block of flats? - new relations *house - place of work* in cities of information civilization.
Literature:	Basic literature on urban rehabilitation and design of residential complexes: *International Building Exhibition Berlin 1987*, Rizzoli, New York 1986; *International Building Exhibition Berlin 1987*, "Architecture and Urbanism" – Extra Edition, 5/1987; Mozas Javier, Fernandez Per Aurora, Density, New Collective Housing, a+t ediciones, 2004; Schneider Friederike – editor, Floor Plan Manual – Housing, Brikhäuser – Publishers for Architecture, Berlin 2004; + architectural periodicals.
Course type:	Lectures
Assessment method:	Attendance and evaluation of the final submissions (critical essay)
Primary target group:	3rd, 4th and 5th year students in Architecture
Lecturer:	Anna Palej, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Anna Palej, Assoc. Prof., DSc, PhD, Arch., phone #: +48 12 628-31-13; e-mail: annapalej@autocom.pl
Deadline for application:	September 15

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN : URBAN INFILL**
Institute/Division:	Institute of Urban Design, Division of Public Spaces for Movement
Course code:	C3-3-2
Erasmus subject code:	02.0
Number of contact hours:	90
Course duration:	1 semester (Fall)
ECTS credits:	8
Course description:	Individual design work accompanied by introductory lectures, common discussions and students presentations of subsequent stages of concept development. The design task is to solve mixed-use building in central location, complementing the existing street façade. The formulation of the architectural concept is preceded by the detail analysis of urban context helping to determine the proper functional and spatial relation between urban infill and neighbouring buildings and to create comfortable and friendly public spaces making the social contacts easier. The course goal is to broaden students' knowledge on: functional, spatial and usable surface standards of the apartments that are fulfilling diversified needs of a contemporary society; standards related to the equipment of residential buildings and accompanied functions/structures; designing of open spaces adjacent to urban infill – their zoning and social roles; varied ways of establishing the dialogue between the existing structures and newly built objects, technologically advanced contemporary trends related to sustainable design in the scale of an individual building
Literature:	Basic literature on urban rehabilitation and design of residential complexes- to be given at the beginning of the course.
Course type:	Design studio
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and oral presentation)
Prerequisites:	Architectural and urban Design Studio (e.g. Urban Composition, Single Family Housing)
Primary target group:	3rd year students in Architecture
Lecturer:	Anna Palej, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Anna Palej, Assoc. Prof., DSc, PhD, Arch., phone #: +48 12 628-31-13;e-mail: annapalej@autocom.pl
Deadline for application:	September 15

COURSE TITLE:	**URBAN DESIGN THEORY – LECTURES** **BUILDING LIVABLE CITIES II** **URBAN SPACES PUBLIC PLACES**
Institute/Division:	Institute of Urban Design, Division of Public Spaces for Movement
Erasmus subject code:	02.0
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	5
Course description:	Lectures are focused on complex problems of urban design of contemporary city centres. Discussed themes are the following: - contemporary spatial problems of cities and their historical background; - different approaches to urban design in the 20th c.; - historical paradigms and their application in contemporary urban design practice; - urban analysis – chosen concepts; - factors influence high standard of living in cities: quality of public spaces, residential fabric, and green open spaces; - "great streets" and their contemporary role in the city; - "third places"; - presentation of various possibilities, values and chances that develop under the influence of information technology; - future of urban life – utopian visions and image of cities shaped by the new economy; - searching for new urban ethics.
Literature:	Basic literature on the subject of urban design and urban rehabilitation to be given at the beginning of the course.
Course type:	Lectures
Assessment method:	Attendance and evaluation of the final submissions (critical essay or 15 min. PowerPoint presentation)
Primary target group:	3rd, 4th and 5th year students in Architecture
Lecturer:	Anna Palej, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Anna Palej, Assoc. Prof., DSc, PhD, Arch., phone #: +48 12 628-31-13; e-mail: annapalej@autocom.pl
Deadline for application:	February 15

COURSE TITLE:	**URBAN DESIGN OF CITY CENTRES – LECTURES**
Institute/Division:	Institute of Urban Design; Division of Public Spaces for Movement
Course code:	C4-2-1
Erasmus subject code:	02.3
Number of contact hours:	15
Course duration:	1 semester (Spring)
ECTS credits:	3
Course description:	Lectures are focused on problems of contemporary changes of city areas and multi-functional centres design. Discussing this attention was drawn to the issue of communication and interaction as seen through sociological and psychological conditions but in reference to and in association with public space. The lecture topics include: - Spatial surroundings and human psyche - classification of effect conditions; - The way we play' on public space as a stage of everyday life theatre - the role theory and the play theory by Irving Goffman; - Form and meaning in architectural and urban composition - Juliusz Żórawski and Kazimierz Wejchert's theories; - Sense of identity and its importance for cities and regions competitions.
Literature:	Basic literature on urban design and urban renewal
Course type:	Lectures
Assessment method:	Attendance and evaluation of the final submissions (critical essay or 15 min. PowerPoint presentation)
Primary target group:	3 rd & 4th year students in Architecture
Lecturer:	Anna Franta, DSc, PhD, Arch.
Contact person:	Anna Franta, DSc, PhD, Arch.; phone #: +48 12 628-24-70; e-mail: studio_ut@pk.edu.pl
Deadline for application:	February 15

COURSE TITLE:	**URBAN DESIGN OF CITY CENTRES (URBAN RENEWAL)**
Institute/Division:	Institute of Urban Design, Division of Public Spaces for Movement
Course code:	C4-2-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	105
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	This one-semester course includes issues of revitalization of downtown areas and is focused on the mastering of students' knowledge and design skills in: - urban analysis by introduction of adequate tools useful in recognition of existing city structure (values and problems) and helpful in formulating design guidelines, that derive from context; - preparing master plan for the renewal of city central areas presenting an idea of spatial and structural development searching for its sustainability; - creating valuable public spaces through emphasizing proper relationship between public spaces and pieces of architecture as well as balancing both form and meaning to create compositional and interactive quality of space. Process sketches, diagrams, plans, sections, models, 3D visualizations; scales: 1: 5000, 1: 2000, 1: 1000, 1: 500
Literature:	Basic literature on the subject of urban composition and urban renewal
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & approach, graphic and oral presentation)
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings, Public Use Buildings)
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Anna Franta, DSc, PhD, Arch.
Contact person:	Anna Franta, DSc, PhD, Arch.; phone #: +48 12 628-24-70); e-mail: studio_ut@pk.edu.pl
Deadline for application:	February 15

COURSE TITLE:	**URBAN DESIGN OF CITY CENTRES**
Institute/Division:	Institute of Urban Design, Division of Public Spaces for Movement
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	The elaboration of the concept of urban design re. the programmatic and spatial transformations of an important yet degraded central urban area. The work has three phases: 1) introductory seminars presenting the chosen sites; 2) detailed urban design analysis (teamwork, which results are presented and can be compared and assessed in order to facilitate the choice of the site) 3) individual design work: ideas and their design interpretations in the following scales : 1:2000 (concept of relations to the larger context of the area), 1:1000 (detailed concept of revitalisation) and 1: 500 (detail of the proposed public space). To master the fundamentals of the urban design, regarding the following: -principles of composition of legible urban spaces inc. the existing values of the urban fabric - principles of sustainable functional and spatial restructuring - principles of creating of public spaces that enhance the identity of place; - valid legal norms re. design in central urban areas and revitalisation To develop skills in: -team work (urban design analysis as the basis of future design decisions) - individual, creative and responsible design decisions in complicated urban locations
Literature:	Basic literature on the subject of urban composition and urban renewal
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & approach, graphic and oral presentation)
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings, Public Use Buildings)
Primary target group:	3rd year students in Architecture
Lecturer:	Anna Franta, DSc, PhD, Arch.
Contact person:	Anna Franta, DSc, PhD, Arch.; phone #: +48 12 628-24-70; e-mail: studio_ut@pk.edu.pl
Deadline for application:	February 15

COURSE TITLE:	**URBAN DESIGN OF CITY CENTRES**
Institute/Division:	Institute of Urban Design, Division of Public Spaces for Movement
Course code:	C4-2-2
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	105
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	Projects in this course involve issues related to revitalization of downtown areas with specific emphasis on public space design. During the course there are 3 interim presentations and reviews, seminars and panel discussion jury. The first stage of the work is an urban analysis, which covers studies: - on the existing spatial structure – its historic and compositional values, - on the existing public space network with streets and squares on the existing transportation system - on social issues and - on the existing land ownership structure. The analysis is presented on digital maps (1:5000), site visits are documented by report illustrated by photos and sketch drawings and an essay. The next step is an urban design concept for the chosen site within the analyzed area. The design contents and its notation correspond with practices used by the local planning. Presentation of the urban concept consists of plans in 1:2000 and 3D illustrations of urban form. The final stage is aimed at conceptual design of selected public space. Its contents and presentation correspond to a typical site plan.
Literature:	To be given at the beginning of the course
Course type:	Design studio
Assessment method:	Submission of the project, public presentation
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	4th and 5th year students in Architecture
Project Guidance:	Krzysztof Bieda, Prof., DSc, PhD, Arch.
Contact person:	Krzysztof Bieda, Prof., DSc, PhD, Arch.; phone #: +48 12 628-24-29; e-mail: kbieda@usk.pk.edu.pl
Deadline for application:	February 15

COURSE TITLE:	**URBAN DESIGN OF CITY CENTRES**
Institute/Division:	Institute of Urban Design, Division of Public Spaces for Movement
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	90
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	Projects in this course involve issues related to revitalization of downtown areas with specific emphasis on public space design. During the course there are 3 interim presentations and reviews, seminars and panel discussion jury. The first stage of the work is an urban analysis, which covers studies: on the existing spatial structure – its historic and compositional values, the public space network, the existing transportation system, social issues and the existing land ownership structure. The analysis is presented on digital maps (1:5000), site visits are documented by report illustrated by photos and sketch drawings and an essay. The next step is an urban design concept for the chosen site within the analyzed area. The design contents and its notation correspond with practices used by the local planning. Presentation of the urban concept consists of plans in 1:2000 and 3D illustrations of urban form. The final stage is aimed at the conceptual design of a selected public space. Its contents and presentation correspond to a typical site plan. Required are: ground level plan in 1:500 -ground floors of framing structures and open public space arrangement - sections in 1:200; selected facade based on students' research on urban detail aesthetics and a short text explaining the design idea and its evolution. At the end of the semester, the public presentation of the projects gives students the opportunity to explain and discuss their concepts.
Literature:	To be given at the beginning of the course
Course type:	Design studio
Assessment method:	Timely submission of the design project, public presentation
Prerequisites:	Architectural and Urban Design Studio
Primary target group:	3rd year students in Architecture
Project Guidance:	Krzysztof Bieda, Prof., DSc, PhD, Arch.
Contact person:	Krzysztof Bieda, Prof., DSc, PhD, Arch.; phone #: +48 12 628-24-29; e-mail: kbieda@usk.pk.edu.pl
Deadline for application:	February 15

COURSE TITLE:	**URBAN TRANSPORT - THEORY**
Institute/Division:	Institute of Urban Design, Division of Public Spaces for Movement
Course code:	C2-7
Erasmus subject code:	02.3 / 02.6
Number of contact hours:	15 (lectures)
Course duration:	1 semester (Fall)
ECTS credits:	2
Course description:	The course involves lectures on issues related to planning and design of networks and spaces for traffic and circulation in the cities. It deals with basic technical problems of urban transport, composition of relevant urban spaces, and generally interrelations of transport and urban design. The lecture topics include: - transport issues and their role in planning and urban design; - general characteristics of various transportation modes: tram, bus, rapid transit, car, bike, pedestrian movement, dual-mode systems, etc.; - impact of transport technology on urban development and form; - transport development strategies: role of public transport, impact of motorized traffic on urban environment, traffic calming concepts, transport demand management policies; - street networks and street hierarchy in urban areas; - street space composition, street as part of urban public space.
Literature:	T.Pharoah, D.Apel: *Transport Concepts in European Cities* Ashgate, Aldershot, 1995; H. Frey: *Designing the City*, E&FN Spon, Londyn, 1999; P.Calthorpe, W. Fulton: *The Regional City*, Island Press, Washington, 2000; K. Bieda: *Street Space in the City not only for Automobiles* in: Public Space of Contemporary City, Conference Proceedings, Wydawnictwo Politechniki Krakowskiej, Cracow, 2005; B. Niels: *Design in Human Scale*, *or how to make sitters, bikers and drivers meet and feel comfortable*, in: Public Space of Contemporary City, Conference Proceedings, Wydawnictwo Politechniki Krakowskiej, Cracow, 2005.
Course type:	Lectures
Assessment method:	Written test
Primary target group:	3rd year students in Architecture
Lecturer:	Krzysztof Bieda, Prof., DSc, PhD, Arch.
Contact person:	Krzysztof Bieda, Prof., DSc, PhD, Arch., phone #: +48 12 628-24-29; e-mail: kbieda@usk.pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**SPECIAL DESIGN TOPIC: URBAN DESIGN**
Institute/Division:	Institute of Urban Design, Division of Public Spaces for Movement
Course code:	C4-7
Erasmus subject code:	02.1 / 02.3
Number of contact hours:	60
Course duration:	1 semester (Fall Semester)
ECTS credits:	6
Course description:	The course intends to broaden students' knowledge and to perfect their skills in solving design problems in a selected area. The project and the site are determined by the student's interest and his/her supervisor's agreement. It should be thematically related to the diploma project and provide a broader theoretical and urban context. First stage of the project is an urban analysis of the area. It investigates the existing development (through drawing and photographic inventory), building structure, urban composition, present uses and transport system. The outcome of the analysis allows to determine conditions for future development and to formulate design guidelines for the site. In the second stage of the project students outline their urban design concepts. Important design criteria are: urban context, links with the surrounding network of public spaces, contribution of the proposed development to overall urban quality and its environmental impact. In the written component the student presents his/her idea and the project description.
Literature:	Basic literature on the subject of urban design and urban rehabilitation: Kostof Spiro, *The City Shaped*, Thames and Hudson Ltd., London 1991; Girouard Mark, *Cities and People*, Yale University Press, New Haven and London 1985; Jacobs Allan B., *Great Streets*, The MIT Press, Cambridge, London 1995; Trancik Roger, *Finding Lost Space*, Van Nostrand Reinhold, New York 1986; Broadbent Geoffrey, *Emerging Concepts in Urban Space Design*, E & FN Spon, London 1996; Lynch Kevin, *The Image of the City*, The MIT Press, Cambridge 1990; Cullen Gordon, *The Concise Townscape*, The Architectural Press, London 1986; Mitchell William J., *E-topia*, The MIT Press, Cambridge and London 1999; Mitchell William J., *City of Bits*, The MIT Press, Cambridge and London 1999; Carmona Matthew, Heath Tim, Oc Taner, Tiesdell Steve, *Public Places Urban Spaces*, Architectural Press, Oxford 2003; Gehl Jan, *Life Between Buildings*, The Danish Architectural Press, 2010; Palej Anna, *Miasta cywilizacji informacyjnej. Poszukiwanie równowagi pomiędzy światem fizycznym a światem wirtualnym,* Wydawnictwo Politechniki Krakowskiej, Kraków 2004; Franta Anna, *Reżyseria przestrzeni. O doskonaleniu przestrzeni publicznej miasta*, Wydawnictwo Politechniki Krakowskiej, Kraków 2004;

Course type:	Design studio organized in a form of group and individual tutorial, presentations and discussions.
Assessment method:	Evaluation of the final submission
Prerequisites:	Architectural and Urban Design Studio (e.g. Urban Composition, Public Use and Residential Buildings, Urban Renewal)
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Krzysztof Bieda, Prof., DSc, PhD, Arch.; Anna Franta, DSc, PhD, Arch. Anna Palej, Assoc. Prof. DSc, PhD, Arch.
Contact person:	Anna Franta, DSc, PhD, Arch.; phone #: +48 12 628-24-70; e-mail: studio_ut@pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**ARCHITECTURE AND PLANNING IN THE COUNTRYSIDE**
Institute/Division:	Institute of Urban Design, Division of Rural Architecture and Planning
Course code:	C4-1-2
Erasmus subject code:	02.0
Number of contact hours:	105
Course duration:	1 semester (available in Fall and Spring)
ECTS credits:	7
Course description:	A growing interest in the countryside environment as a place to live as well as a place of escape from urban life challenges the architects. That is a reason we try to encourage students to seek new architectural and planning ideas for future development of the village as an alternative to urban living. For the semester work a student may choose the planning project or the architectural project or both of them (the detailed subject and the particular scope of the project are always determined with the participation of the student). The planning project is required as a concept of development of the chosen village in Poland or abroad. The architectural project may be chosen from the following subjects: a countryside housing for farmer and non-farmer families; an ecological farm complex; a social-cultural centre for a small local community (an idea of "contemporary agora"); a hypo therapeutic centre for the handicapped.
Literature:	Basic literature on countryside planning and architecture
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and written presentation)
Prerequisites:	Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings)
Primary target group:	5th year (pre-diploma level) students in Architecture and Landscape Architecture
Lecturer:	Marek Kowicki, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Marek Kowicki, Assoc. Prof., DSc, PhD, Arch., phone #: +48 12 628 24 41; e-mail: kowicki@pk.edu.pl
Deadline for application:	September 15 (Fall Semester); February 15 (Spring Semester)

COURSE TITLE:	**BUILDING CONSTRUCTION SYSTEMS + BUILDING SURVEYING**
Institute/Division:	Institute of Construction Design, Division of General Building Systems and Construction Materials
Erasmus subject code:	02.9
Number of contact hours:	30 + 30
Course duration:	1 semester (available in Fall and Spring Semester)
ECTS credits:	2 + 2
Course description:	The task of this course is to help students to elaborate the alternatives of technical solutions of the most important details of their design work. Basic form of drawings – from freehand conceptual sketches to technical drawings.
Literature:	Basic literature on technical solutions
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission
Prerequisites:	Architectural Studio
Primary target group:	3rd, 4th year students in Architecture
Lecturer:	Wacław Celadyn, Prof. DSc, PhD, Arch. & Robert Marcinkowski, PhD, Arch.
Contact person:	Robert Marcinkowski, PhD, Arch., phone #: +48 12 628-24-59; e-mail: rob500@gazeta.pl
Deadline for application:	September 15 for Fall Semester February 15 for Spring Semester

COURSE TITLE:	**BUILDING STRUCTURES**
Institute/Division:	Institute of Construction Design, Division of Building Techniques
Erasmus subject code:	02.9
Number of contact hours:	30
Course duration:	1 semester (available in Fall and Spring Semester)
ECTS credits:	2+2
Course description:	The task of this course is to help students with their design work with proper solutions combining together building function and construction. Learning about common spaces in public buildings, Polish regulations and requirements. Basic form of drawings – freehand sketches and technical drawings.
Literature:	Basic literature on technical solutions
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission
Prerequisites:	Architectural Studio
Primary target group:	3rd, 4th year students in Architecture
Lecturer:	Andrzej Bojęś, Assoc. Prof., DSc, PhD, Arch., Łukasz Wesołowski, MSc, Arch.
Contact person:	Łukasz Wesołowski, MSc, Arch.; mobile phone **#**: +48 501-023-567, e-mail: lukaszw@pk.edu.pl
Deadline for application:	September 15 for Fall Semester February 15 for Spring Semester

COURSE TITLE:	**URBAN REVITALIZATION**
Institute/Division:	Institute of Urban and Regional Planning and Design
Erasmus subject code:	02.1 / 02.3 / 02.4
Number of contact hours:	15
Course duration:	1 semester (Fall)
ECTS credits:	3
Course description:	The course's goal is to develop the ability to analyze specific project related to urban revitalization strategies in the context of spatial policy documents for a given city. The course traces interrelations between urban decline and public / private strategies, projects and actions taken to revitalize inner cities with particular reference to the post industrial areas and close-to-station areas. Focus is put on urban revitalization projects combined with the redevelopment of city centres in major metropolitan areas in EU. Major issues: Doctrinal and strategic framework for revitalization programs and projects. Case studies of selected "flagship projects". Comparative analysis; assessment criteria. Specific revitalization projects in the city of Cracow at the background of spatial policy documents.
Literature:	1. Bianchini F. and Parkinson M. (eds.), 1993, Cultural Policy and Urban Regeneration: The West European Experience, Manchester University Press, Manchester and New York. 2. Chatterji M., R. Domański, (editors), Urban and Regional Management in Countries in Transition; Polish academy of Sciences, Warsaw, 1996. 3. Lorens P., (editor), Large Scale Urban Developments, Technical University of Gdansk Publishing Gdansk, 2001. 4. Zuziak Z., Managing Historic Cities, International Cultural Centre Cracow, Cracow, 1993.
Course type:	Lectures and seminars
Assessment method:	Attendance and the paper (case study regarded as written exam) presented during the course
Prerequisites:	Basic course on urban design and planning
Primary target group:	4th and 5th year students in Architecture and Urban Planning
Lecturer:	Zbigniew Zuziak, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Zbigniew Zuziak, Assoc. Prof., DSc, PhD, Arch., e-mail: a5-institute@pk.edu.pl or zzuziak@nsnet.pl
Deadline for application:	September 15

COURSE TITLE:	**SPATIAL PLANNING**
Institute/Division:	Institute of City and Regional Design; Division of Physical Planning and Environmental Protection
Course code:	C4 -4
Erasmus subject code:	02.1 / 02.3 / 02.4
Number of contact hours:	120
Course duration:	1 semester (Fall)
ECTS credits:	7
Course description:	Crucial tasks of the projects are: - Defining characteristic features of spatial and functional structure of small town including its structural relations with regional context and defining basic elements of developmental conditions of this town. - Interpreting (in synthetic form) main features of the student's concept for the development of selected town focusing on spatial elements of its structure. - Defining basic elements of spatial layout of the future development designed on selected fragment of urban area and presenting this concept in a way, which would convince a potential client that a project proposal is attractive enough to be implemented. - Clear description (text) of developmental conditions of the town and convincing description in text proposed design solutions compatible with these conditions.
Literature:	Basic literature on physical planning
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and written presentation) defend own project proposals in front of the class
Prerequisites:	Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings)
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Zbigniew Zuziak, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Zbigniew Zuziak, Assoc. Prof., DSc, PhD, Arch., e-mail: a5-institute@pk.edu.pl or zzuziak@nsnet.pl
Deadline for application:	September 15

COURSE TITLE:	**URBAN DESIGN OF CITY CENTRES**
Institute/Division:	Institute of City and Regional Design; Division of Physical Planning and Environmental Protection
Course code:	C4-2-2
Erasmus subject code:	02.1 / 02.3 / 02.4
Number of contact hours:	105
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	Students are expected to outline a concept of a future development for selected urban area presenting a clear vision in which new masses creating urban space will be harmoniously integrated with existing values of urban structure. The concept should be based on the analysis of the following elements / factors: - The role of selected area in the whole town and spatial values of the designated area; - Functional and spatial / visual relations of the area selected for development with surrounding urban fabric. The following tasks are particularly important as design criteria for assessing the student's project: - Creating new aesthetic values such as attractive public spaces and the composition of masses enriching the skyline of the town; - Ensuring appropriate functional relations respectively to the programmed uses of space; - Defining the character of newly designed architecture so that it could be regarded as a creative interpretation of urban context.
Literature:	Basic literature on the subject of urban design
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and written presentation)
Prerequisites:	Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings)
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Zbigniew Zuziak, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Zbigniew Zuziak, Assoc. Prof., DSc, PhD, Arch., e-mail: a5-institute@pk.edu.pl or zzuziak@nsnet.pl
Deadline for application:	February 15

COURSE TITLE:	**URBAN DESIGN OF THE REDEVELOPMENT OF A PART OF A CITY WITH PREVALENT SERVICE FUNCTION**
Institute/Division:	Institute of City and Regional Design; Division of Physical Planning and Environmental Protection
Erasmus subject code:	02.1 / 02.3 / 02.4
Number of contact hours:	90
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	The semester work has to result in a concept design in an urban-architectural scale, presenting a legible vision of development of a selected part of a town – against the broader context. The scope of the context is delimited individually, according to the logic of spatial and functional relations. The definition of these relations is one of the tasks of the project. The main tasks are: - To create new compositional values and esp. to create attractive public spaces and arrangement of masses that enrich the skyline; - To provide proper functional relations – adequate to the spatial programme - To define – generally – the character of architecture of the designer complex in order to enhance the genius loci.
Literature:	Basic literature on the subject of urban design
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and written presentation)
Prerequisites:	Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings)
Primary target group:	3rd year students in Architecture
Lecturer:	Zbigniew Zuziak, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Zbigniew Zuziak, Assoc. Prof., DSc, PhD, Arch., e-mail: a5-institute@pk.edu.pl or zzuziak@nsnet.pl
Deadline for application:	February 15

COURSE TITLE:	**SPECIAL DESIGN TOPICS: URBAN AND ENVIRONMENTAL PROTECTION**
Institute/Division:	Institute of City and Regional Design; Division of Physical Planning and Environmental Protection
Course code:	C4-7
Erasmus subject code:	02.1 / 02.3 / 02.4
Number of contact hours:	60
Course duration:	1 semester (Fall)
ECTS credits:	6
Course description:	The student can choose his/her project theme from the following thematic groups: - Redevelopment/regeneration of the inner city area and urban revitalization strategies with particular reference to the "close-to-station-areas" and the network of public spaces related to "the architecture of travel"; - Projects for spatial development of the areas related to heritage trails and significant tourist areas in Southern Poland; - Spatial development of selected urban area in the context of development guidance, derived structural spatial development plans (mainly the projects that can be regarded as potential "flagship projects"). Tasks: - Defining the problem and its contexts; - Inspirations (artistic, from plastic art, literature and music) and interpretation of site /place specific values; - Working out individual project design methodology; - Vision of possible spatial solutions and its artistic interpretation.
Literature:	Basic literature on urban design
Course type:	Individual design work under supervision and tutorial
Assessment method:	Individual presentation for a tutor
Prerequisites:	Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings)
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Zbigniew Zuziak, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Zbigniew Zuziak, Assoc. Prof., DSc, PhD, Arch., e-mail: a5-institute@pk.edu.pl or zzuziak@nsnet.pl
Deadline for application:	September 15

COURSE TITLE:	**SPATIAL PLANNING**
Institute/Division:	Institute of City and Regional Design; Division of Regional Planning
Course code:	C4 -4
Erasmus subject code:	02.1 / 02.3 / 02.4
Number of contact hours:	120
Course duration:	1 semester (Fall)
ECTS credits:	7
Course description:	Design work concerns development of the city spatial plan on a given land-surveying plan, with information worked out and gathered during vacation inventory practice in the chosen town or city. On the base of land use inventory, city's space quality evaluation and other information students work on: - synthesis of conditions of city development, - diagnose stressing natural, environmental, cultural and social conflicts, - the basis of variations of directions and possibilities of the future city development, following the evaluation of variations and choosing optimal solutions students work on: - city local spatial plan design – the basic drawing, including explanation of: - principles of crystallization of city grid – composition scheme, - principles of the city traffic and transport solutions and urban, infrastructure elements - scheme, - principles of plan achievement - scheme - general description, text regarding problems solving, needs and local communities' aspirations.
Literature:	Basic literature on physical planning
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and written presentation)
Prerequisites:	Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings)
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Elżbieta Węcławowicz-Bilska, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Elżbieta Węcławowicz-Bilska, Assoc. Prof., DSc, PhD, Arch., Phone #: +48 12 628-24-66; e-mail; eweclaw@poczta.onet.pl
Deadline for application:	September 15

COURSE TITLE:	**URBAN DESIGN OF CITY CENTRES**
Institute/Division:	Institute of City and Regional Design; Division of Regional Planning
Course code:	C4-2-2
Erasmus subject code:	02.1 / 02.3 / 02.4
Number of contact hours:	105
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	Students work on design concerning functional and compositional rebuilding of the chosen part of the city to upgrade city's functional and compositional values as well as quality of living standard in the city. On the provided land-surveying plan, (1:2000 or 1:1000) with convenience of the student's own evaluation of the quality of cityscape and functional connections, students continue to work on: - synthesis of conditions of the chosen area against the background of the city; - design of chosen area, including functional and architectural concept, drawings, working model; - layout (1:500) of the chosen part of the city showing urban detail solutions, and urban design and architectural concept – (plans, sections, sketches, perspectives); - description of design stages completed during the semester.
Literature:	Basic literature on the subject of urban design
Course type:	Individual design work under supervision and tutorial
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic and written presentation)
Prerequisites:	Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings)
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Elżbieta Węcławowicz-Bilska, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Elżbieta Węcławowicz-Bilska, Assoc. Prof., DSc, PhD, Arch., Phone #: +48 12 628-24-66; e-mail; eweclaw@poczta.onet.pl
Deadline for application:	February 15

COURSE TITLE:	**URBAN DESIGN OF SERVICE AREAS**
Institute/Division:	Institute of City and Regional Design; Division of Regional Planning
Erasmus subject code:	02.1 / 02.3 / 02.4
Number of contact hours:	90
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	Within the frame of the course the students elaborate the design of a functional and compositional rebuilding of a part of a city in order to raise its functional value as well as the quality of life. On the basis of the provided land-surveying maps scale 1:2000 or 1:1000 , the use survey, own assessment of the quality of an urban space and spatial and functional regional connections (and other materials) for a selected town the students are expected to prepare: - synthesis of conditions of the area in question against the background of a city and thence to propose - The programmatic and spatial concept of the designed area in the scale of the provided map along with the sketches and working model , followed by: - A solution of a chosen part (1:500) with principles of solutions of an urban design detail and architectural –urban design solutions (plans, sections, sketches, perspectives) - The essay describing the consecutive parts of the project (elaborated parallelly to the design work).
Literature:	Basic literature on the subject of urban design
Course type:	Individual design work under supervision and tutorial
Assessment method:	Passing of the obligatory three design reviews, two drawing controls, elaboration of a design project and its jury.
Prerequisites:	Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings)
Primary target group:	3RD year students in Architecture
Lecturer:	Elżbieta Węcławowicz-Bilska, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Elżbieta Węcławowicz-Bilska, Assoc. Prof., DSc, PhD, Arch., Phone #: +48 12 628-24-66; e-mail; eweclaw@poczta.onet.pl
Deadline for application:	February 15

COURSE TITLE:	**SPECIAL DESIGN TOPICS: TOWN, SPATIAL AND REGIONAL PLANNING, HEALTH RESORTS PLANNING**
Institute/Division:	Institute of City and Regional Design; Division of Regional Planning
Course code:	C4-7
Erasmus subject code:	02.1 / 02.3 / 02.4
Number of contact hours:	60
Course duration:	1 semester (Fall)
ECTS credits:	6
Course description:	Each student can choose the subject of project from the following group of selected issues: - Recreation and spa areas in metropolis, cities and towns; - Existing and new spas and health resorts; - Redevelopment areas in centres of big and medium cities; - Spatial development of heritage and natural values areas specially in regions of South Poland. Course focuses on practical problems occurring in design process in the disciplines of urban design, spatial planning, regional planning, tourist, leisure, spa and resort planning; each design is preceded by the definition of natural, cultural and social aspects. Individual preliminary studies are based on limited area regional scale or local plan design.
Literature:	Basic literature on urban design and on the chosen subject
Course type:	Individual design work under supervision and tutorial
Assessment method:	Execution of design and its public defence
Prerequisites:	Urban Design Studio (e.g. Urban Composition, Residential Neighbourhoods, Residential Buildings)
Primary target group:	4th and 5th year students in Architecture
Lecturer:	Elżbieta Węcławowicz-Bilska, Assoc. Prof., DSc, PhD, Arch.
Contact person:	Elżbieta Węcławowicz-Bilska, Assoc. Prof., DSc, PhD, Arch., phone #: +48 12 628-24-66; e-mail; eweclaw@poczta.onet.pl
Deadline for application:	September 15

COURSE TITLE:	**REGIONAL PLANNING**
Institute/Division:	Institute of cities and regions design; Regional Planning and Environmental Protection
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	Subjects of lectures: basic notions and issues in regional planning, types of regions and their identification; objective and scope of regional planning, European integration issues, European regional cooperation in the scope of regional planning, new types of urbanization at regional scale: technopolises, basic issues in regional development in Poland, regional-scale designs and implementations of urban agglomerations, areas undergoing urbanisation processes, recreational areas, and specially protected areas, in Poland and in the world; contribution of Polish architects and city planners to the development of European regional planning theory and practice; regional technical infrastructure hubs, systems and lines, motorways; water management Large-group written and visual project/design concerning: – selected studies at a regional scale plus diagnosing the current state of development in the region covered by the plan (individual work) – initial concept for managing conflict or problem areas (group work). As a rule, every student begins with the unassisted performance of the component task, and finishes with the group project.
Literature:	1. Benko G., *Geografia technopolii* , Warszawa 1993 2. Maillat D., *Globalizacja, terytorialne systemy produkcyjne i środowiska innowacyjne* ,Kraków 2002 *3.* Pencakowska W., Węcławowicz- Bilska E., *Problemy dziedzictwa kulturowego w planowaniu regionalnym,* Teka KUiA o/PAN w Krakowie t. XXIV r. 1990 s. 37-46 4. Węcławowicz Bilska E., *Przestrzeń Polski. Przemiany z końcem XX wieku* [w:] kwartalnik Architektury i Urbanistyki PAN t. XLVI z. 2/2001 5. Węcławowicz Bilska E., *Uwarunkowania regionów i możliwości zwiększenia ich atrakcyjności* [w:] *Konkurencyjność miast i regionów jako problem planowania przestrzennego w perspektywie integracji z Unią Europejską* (red. E. Węclawowicz-Bilska, Z. Zuziak) Kraków 2003
Course type:	Field lectures and seminars
Assessment method:	Final test and oral exam
Primary target group:	5th year students in Architecture
Lecturer:	Elżbieta Węcławowicz-BIlska, Assoc. Prof., PhD, DSC, Arch.
Contact person:	Elżbieta Wecławowicz-Bilska, Assoc. Prof., phone #: +48 12 628 24 66, e-mail: eweclaw@poczta.onet.pl
Deadline for application:	September 15

COURSE TITLE:	**ECOLOGY AND ENVIRONMENTAL PROTECTION**
Institute/Division:	Institute of cities and regions design; Regional Planning and Environmental Protection
Number of contact hours:	30
Course duration:	1 semester
ECTS credit:	3
Course description:	Lectures present knowledge on the activities aimed at balancing the development, being the basis for shaping the conditions of human life in urbanised areas. The questions presented concern the connections between the manner of managing space with environmental quality, the manner of limiting the impacts of improper management of natural resources, methodology of assessing the environmental impact of a development (EIA), and the influence of the idea of conservation of the natural environment on the shaping of planning and architectural assumptions. The seminars deal with learning the influence of various development activity on the transformations of individual components of the environment and ways of countering them. Students learn the methods of analysing the environment and identification of determinants of the ecological & physical geographic type, and are given an opportunity to consider the environmental impact of individual developments in specific locations The subjects and manners of conducting the seminars change every year. The classes conducted should bring about the ability to assess the influence of planning and implementation activities on the existing environment, and methods of balancing development through protection of the values and rational asset management.
Literature:	*1. Człowiek Środowisko Zagrożenia* pod. red. J. Zwoździak; Wrocław 2002 *2. Klimat miasta Vademecum urbanisty.* / red. J.Lewińska /, Kraków 1991 *3. Kompendium wiedzy o ekologii* /red.J. Strzałko, T. Mosso-Pietraszewska/, Warszawa 2003 *4.* Ryńska Elżbieta D. *Środowiskowe uwarunkowania procesu inwestycyjnego* Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2006 *5.* Wehle- Strzelecka Stanisława: *Architektura słoneczna w zrównoważonym środowisku mieszkaniowym;* Monografia 312, wyd. Politechnika Krakowska
Course type:	Field lectures and seminars
Assessment method:	Final test and oral exam
Primary target group:	5th year students in Architecture
Lecturer:	Elżbieta Węcławowicz-BIlska, Assoc. Prof., PhD, DSc, Arch.
Contact person:	Elżbieta Wecławowicz-Bilska, Assoc. Prof., phone #: +48 12 628 24 66, e-mail: eweclaw@poczta.onet.pl
Deadline for application:	September 15

COURSE TITLE:	**CAD TECHNIQUES**
Institute/Division:	Division of Descriptive Geometry, Technical Drawing and Engineering Graphics
Number of contact hours:	30
Course duration:	1 semester (Fall or Spring Semester)
ECTS credits:	4
Course description:	Application of Computer Aided Design methods and techniques into practice. Includes techniques for creating 2D vector (AutoCAD) and raster (Photoshop use to create designs and layouts) graphics and 3D drawings, which are directly related to the real-world architectural structures. New concepts of 3D architectural design and modelling with AutoCAD, Architectural Desktop, ArchiCAD, CADwork, 3dsMax applications. Introduction of modern tools (Drawing Board) and methods(Graphisoft Virtual Building Solution for Teamwork) into design process: starting from a 3D modelling, through visualisation, animation and Virtual Reality into technical layouts, cross sections and dimensioning creation.
Literature:	Basic literature on Graphics, CAD, Geometry and Technical Drawing
Course type:	Computer laboratory: individual design works
Assessment method:	Evaluation of all assigned works
Prerequisites:	Basic knowledge on the architectural designing, basic skills of the computer
Primary target group:	All level students in Architecture and Landscape Architecture
Lecturer:	Marek Cyunel, MSc, Arch.
Contact person:	Marek Cyunel, MSc, Arch. ; phone #: +48 12 628 29 92 or +48 602 678 044; e-mail: mcyunel@usk.pk.edu.pl
Deadline for application:	September 15 February 15

COURSE TITLE:	**FREEHAND DRAWING AND PAINTING - STILL LIFE STUDIES**
Institute/Division:	Independent Division of Freehand Drawing, Painting and Sculpture
Erasmus subject code:	02.9
Number of contact hours:	48
Course duration:	1 semester (Spring Semester)
ECTS credits:	3
Course description:	The task of the course is forming observational skills (including a sense of proportion, forms, the effects of light in space, sensitivity to beauty), improving artistic expression, rapid formal synthesis and recording spatial images through sketching. Drawing tasks: - studio: still-life, furniture arrangements, interior simulations, architectural details, stain-glass, classical sculpture, masses; - outdoor: monuments and contemporary architectural objects.
Literature:	Maria J. Żychowska: *Współczesne witraże polskie;* - Jan Bruzda: *Szkice perspektywiczne w architekturze;* - Research work carried by Andrzej Białkiewicz
Course type:	Individual drawing and painting under supervision and tutorial
Assessment method:	Evaluation of all assigned works (progress, personal creativity & individual approach)
Prerequisites:	none
Primary target group:	All level students in Architecture and Landscape Architecture
Lecturer:	Maria J. Żychowska, Assoc. Prof., DSc, PhD, Arch., Andrzej Białkiewicz, DSc, PhD, Arch.
Contact person:	Maria J. Żychowska, Assoc. Prof., DSc, PhD, Arch., Phone #: +48 12 628 24 38 or +48 12 637 24 36; e-mail: pazychow@cyf-kr.edu.pl
Deadline for application:	February 15

COURSE TITLE:	**SCULPTURE**
Institute/Division:	Independent Division of Freehand Drawing, Painting and Sculpture
Course code:	B5-2
Erasmus subject code:	03.1
Number of contact hours:	15
Course duration:	1 semester (Fall and Spring)
ECTS credits:	1
Course description:	The course goal is to acquaint students with the principles of creating spatial compositions and the development of imagination and manual abilities. Lectures – sculpture in architecture: location, spatial composition, information about materials and artistic techniques in architecture. Tutorials – forming spatial compositions: idea, proportions, contrast, direction, dynamics, relationship with the surrounding and light.
Literature:	
Course type:	Individual sculpture work under supervision and tutorial
Assessment method:	Evaluation of 6 spatial compositions (progress, personal creativity & individual approach)
Primary target group:	All levels students in Architecture and Landscape Architecture
Lecturer:	Stefan Dousa, Prof. of Art
Contact person:	Maria J. Żychowska, Assoc. Prof., DSc, PhD, Arch., phone #: +48 12 628 24 38 or +48 12 637 24 36; e-mail: pazychow@cyf-kr.edu.pl
Deadline for application:	September 15 for Fall Semester February 15 for Spring Semester

COURSE TITLE:	**FREEHAND DRAWING AND COMPOSITION**
Institute/Division:	Independent Division of Freehand Drawing, Painting and Sculpture
Course code:	B5-1
Erasmus subject code:	02.9
Number of contact hours:	30
Course duration:	1 semester (Fall Semester or Spring Semester)
ECTS credits:	2
Course description:	The task of the course is to develop additional experience and skills in constructing problems from the viewpoint of the variety of ways of studying and creating reality. The course contains painting and graphic exercises regarding the development of: spatial imagination; skills in using diagrams and artistic symbols; awareness of the variety of artistic means for expressing different concepts.
Course type:	Individual drawings in different techniques under supervision and tutorial
Assessment method:	Evaluation of all assigned works (progress, personal creativity & individual approach)
Prerequisites:	Basics of freehand drawing and composition
Primary target group:	All levels students in Architecture and Landscape Architecture
Lecturer:	Ewa Gołogórska-Kucia, Prof. of Art
Contact person:	Ewa Gołogórska-Kucia, Prof. of Art, Maria J. Żychowska, Assoc. Prof., DSc, PhD, Arch., phone #: +48 12 628 24 38 or +48 12 637 24 36; e-mail: pazychow@cyf-kr.edu.pl
Deadline for application:	September 15 February 15

COURSE TITLE:	**ARCHITECTURAL PERPECTIVE DRAWINGS**
Institute/Division:	Independent Division of Freehand Drawing, Painting and Sculpture
Number of contact hours:	30
Course duration:	1 semester (Fall)
ECTS credits:	2
Course description:	Using the image in perspective to presentation of architectural historical and contemporary phenomena and own designs. All work in one technique: ink. Generally, the goal is the formation of artistic imagination through freehand drawing. Particularly: forming sketching skills , using quick, synthetic drawings to note different problems in order to unlimited expressing and illustrating demanded tasks and own ideas, also developing skills of presenting spatial creations and shaping space.
Literature:	*7 bram do Krakowa. Znak jako początek przestrzeni,* praca zb., Kraków 2001. Alberti L. B., *Ksiąg dziesięć o sztuce budowania,* Warszawa 1960 Bartel K., *Perspektywa Malarska*, Warszawa 1958 Białkiewicz A., *Rola rysunku w warsztacie architekta. Szkoła krakowska w kontekście dokonań wybranych uczelni europejskich i polskich,* Kraków 2004. Bruzda J., *Szkice perspektywiczne,* Kraków 1998, Gajewski P., *Zapisy myśli o przestrzeni,* Kraków 2001. Lupton E., *Design Writing Research: Deconstruction*, www.elupton.com Misiągiewicz M., *Między ideą a rzeczywistością. Rysowane obrazy architektury, [w:] Prace polskich architektów na tle kierunków twórczych w architekturze i urbanistyce w latach 1945-1995*, t. IV, WA PK Kraków 1994. Misiągiewicz M., *O prezentacji idei architektonicznej*, Kraków 2003. Monestiroli A., *Osiem definicji architektury [w:] Definiowanie Przestrzeni Architektonicznej. Architektura jako sztuka,* Kraków 2004, sS.105-115
Course type:	Individual drawings in different techniques under supervision and tutorial
Assessment method:	A set of all works should be completed and presented
Prerequisites:	Basics of freehand drawing and composition
Primary target group:	All levels students in Architecture and Landscape Architecture
Lecturer:	Maria J. Żychowska, Assoc. Prof., DSc, PhD, Arch.,
Contact person:	Maria J. Żychowska, Assoc. Prof., DSc, PhD, Arch., phone #: +48 12 628 24 38 or +48 12 637 24 36; e-mail: pazychow@cyf-kr.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**FREEHAND DRAWING- PAINTING AND COMPOSITION**
Institute/Division:	Independent Division of Freehand Drawing, Painting and Sculpture
Number of contact hours:	30
Course duration:	1 semester (Fall)
ECTS credits:	1
Course description:	Painting and composition. Studies in painting based on a still life, from a simple composition of a limited range of colours to more elaborate compositions that require free interpretation – under condition of retaining of compositional values. Design of a painting composition, architectural painting for a chosen building, colour scheme for an elevation. Contexts, painting, architecture. Open air studies of chosen historic buildings of Old Cracow. Techniques: tempera, acryl, watercolours and collage. To develop sensitivity to beauty, colour and light, skill of building compositions based upon observation and imagination. Integration of arts – phenomena in architectural space and their solutions. To develop skills of searching for a concept (sketches in chosen techniques) – colour scheme for an elevation, with application of computer techniques.
Literature:	1. Maria Rzepińska; „Historia koloru” 2. Michał Mrugalski; „Teoria barw Różewicza” 3. Gerhard Zeugner; „Barwa i człowiek”
Course type:	Individual drawings in different techniques under supervision and tutorial
Assessment method:	A set of all works should be completed and presented
Prerequisites:	Basics of freehand drawing and composition
Primary target group:	All levels students in Architecture and Landscape Architecture
Lecturer:	Iwona Zuziak, Adjunct Prof. of 2nd degree, M.Art, M.Arch.
Contact person:	Maria J. Żychowska, Assoc. Prof., DSc, PhD, Arch., phone #: +48 12 628 24 38 or +48 12 637 24 36; e-mail: pazychow@cyf-kr.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**FREEHAND DRAWING- PAINTING AND COMPOSITION**
Institute/Division:	Independent Division of Freehand Drawing, Painting and Sculpture
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	1
Course description:	Practical exercise during so called laboratories and student's own homework; individual corrections. Works in various painting and graphic techniques. Developing of composition skills, spatial imagination and enhancing skills in solving of design tasks in various conventions related to fine arts. Education in fine arts and artistic techniques. Studies in observation of reality and enhancing of skill of choosing of adequate and coherent mode of notation and depiction of a given problem.
Literature:	*Kubiści,* Guilaume Apollinaire, WL, Kraków 1959 *Słownik kierunków, ruchów i kluczowych pojęć sztuki drugiej połowy XX wieku,* Marcin Giżycki, słowo\ obraz\ terytoria, Gdańsk 2002 *Nowoczesność od czasu postmodernizmu,* Dick Higgins, słowo\ obraz\ terytoria, Gdańsk 2000 *O sztuce nowej i najnowszej*, Piotr Krakowski, PWN, 1981 *Futuryzm,* Giovanni Lista, Arkady, Warszawa 2002 *Ikonosfera*, Mieczysław Porębski, PIW, Warszawa 1972 Kubizm, , Mieczysław Porębski, wprowadzenie do sztuki XX wieku, PWN, Warszawa 1968 *O pochodzeniu formy w sztuce*, Herbert Read, PIW, 1973 *Teoria widzenia,* Władysław Strzemiński, WL, Kraków 1969 *Wybór pism estetycznych,* Władysław Strzemiński, Universitas, Kraków 2006 *Martwa natura*, Charles Sterling, WA i F i PWN, Warszawa 1998 *Awangardowe marginesy,* Andrzej Turowski, Instytut Kultury, Warszawa 1998 *Budowniczowie świata,* Andrzej Turowski, Universitas, Kraków 2000
Course type:	Individual drawings in different techniques under supervision and tutorial
Assessment method:	Submission of a complete set of works ; final mark is the average of all marks.
Prerequisites:	Basics of freehand drawing and composition
Primary target group:	All levels students in Architecture and Landscape Architecture
Lecturer:	Ewa Gołogórska-Kucia, Prof. of Art
Contact person:	Ewa Gołogórska-Kucia, Prof. of Art, Maria J. Żychowska, Assoc. Prof., DSc, PhD, Arch., phone #: +48 12 628 24 38 or +48 12 637 24 36; e-mail: pazychow@cyf-kr.edu.pl
Deadline for application:	February 15

COURSE TITLE:	**INTEGRATED DESIGN STUDIO – COMPOSITION OF LANDSCAPE ENCLOSURE**
Institute/Division:	Institute of Landscape Architecture
Erasmus subject code:	02.5
Number of contact hours:	105
Course duration:	1 semester (Fall)
ECTS credits:	8
Course description:	The semester cycle is divided into four sequential tasks according to different grade of enclosure readability. 1. "Subjective enclosure" – "trace" of abstract enclosure, monochromatic central composition; 2. "Substantial enclosure" – longitudinal composition, in contrasted colours; 3. The "objective enclosure" – composition of wide enclosure with a counterpoint inside; 4. "Nesting of enclosure" – an enclosure inside the enclosure or with an annex and a block, unrestricted layout and multicoloured material. Students present the following elements within each task: views, sections and elevations of the given composition. Presentation is completed with models, perspective sketches and coloured pictures taken from the real landscapes treated as inspirations. Obligatory part of students' work is a description prepared in the form of dialogue, monologue or essay.
Literature:	Piotr Patoczka, "Ściany" i "bramy" w krajobrazie, Kraków PK 2000; Piotr Patoczka, Uwagi o rysowaniu wnętrz krajobrazowych, Kraków PK 1999; Aleksander Böhm, Wnętrze" w kompozycji krajobrazu: wybrane elementy genezy analizy porównawczej i zastosowań pojęcia, Kraków PK 2004; Simon Bell, Elements of visual design in the landscape, E & FN Spon London 1993; John L. Motloch, Introduction to landscape design, New York 2001; Yoshinobu Ashihara, Exterior design in architecture, New York 1970;
Course type:	Design studio
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic presentation)
Primary target group:	Students in 1st semester of graduate studies in Landscape Architecture
Lecturer:	Piotr Patoczka, PhD, DSc, Arch.
Contact person:	Jadwiga Gancarz, MSc, Arch., phone #: +48 12 628 2477; e-mail: jgancarz@op.pl
Deadline for application:	September 15

COURSE TITLE:	**INTEGRATED DESIGN STUDIO – PRIVATE GARDEN**
Institute/Division:	Institute of Landscape Architecture
Erasmus subject code:	02.5
Number of contact hours:	105
Course duration:	1 semester (Spring)
ECTS credits:	8
Course description:	The design of layout and arrangement of private garden at a detached house or multifamily house backyard. During the semester students prepare 5 sequential parts of design: - a fence with wicket and gate (scale 1: 50, 1: 20) , details (1:10, 1:5, 1:2); - a refuse heap (scale 1: 50, 1: 20), details (1:10, 1:5, 1:2); - pavements for pedestrian and cars (scale 1: 50, 1: 20), details (1:10, 1:5, 1:2); - a small garden pond or a storm-water tank (scale 1: 50, 1: 20), details (1:10, 1:5, 1:2); - a site plan with a special consideration of landform and vegetation - spring and autumn colour version (scale 1: 50). The project is integrated with other courses e.g. building construction, CAD, plant material and freehand drawing.
Literature:	John Brookes, Wielka księga ogrodów. Sztuka zakładania i pielęnacji. Warszawa Wiedza i Życie, 2001; Terence Conran, Dan Pearson, Nowoczesne ogrody, Warszawa Arkady 2000; *Katalog roślin II - drzewa, krzewy, byliny polecane przez Związek Szkółkarzy Polskich,* Agencja Promocji Zieleni, Warszawa 2003; Zdzisław Mączeński, Poradnik budowlany dla architektów, Warszawa, all editions; Zygmunt Mieszkowski Elementy projektowania architektonicznego, Kraków, all editions; Time-saver standards for landscape architecture: design and construction, coedit. Charles W. Harris, New York 1988; Magazines – in English - Landscape Architecture, Topos, in Polish – Ogrody, Murator.
Course type:	Design studio
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic presentation)
Prerequisites:	Basics of freehand drawing
Primary target group:	Students in 2nd semester of graduate studies in Landscape Architecture
Lecturer:	Agata Zachariasz, PhD, Arch.
Contact person:	Izabela Sykta, MSc, Arch., phone #: +48 12 628-24-92; e-mail: isykta@pk.edu.pl
Deadline for application:	February 1

COURSE TITLE:	**INTEGRATED DESIGN STUDIO – URBAN PUBLIC SPACE (STREET & SQUARE)**
Institute/Division:	Institute of Landscape Architecture
Erasmus subject code:	02.5
Number of contact hours:	105
Course duration:	1 semester (Fall)
ECTS credits:	9
Course description:	The topic of design is an urban enclosure: a square, city street in their broader context respecting composition and visual relations with other neighbouring enclosures: - General concept of square or street composition within their context (scale 1:500), inventory of the present state, planting plan and management, preliminary design - plans and axonometric view; - Underground passage with green lid construction (scale 1:500 and 1:200, plans and sections, with details); - Square design (scale 1:200), paving and plastering, street furniture (scale 1:20 or 1:10), specification of plants; - Detail design (optional) - bus shelter, kiosk, statue, fountain (scale 1:50 or 1:20) plans, sections, views and perspective drawings.
Literature:	*Katalog roślin II - drzewa, krzewy, byliny polecane przez Związek Szkółkarzy Polskich,* Agencja Promocji Zieleni, Warszawa 2003; Time-saver standards for landscape architecture: design and construction, co-edit. Charles W. Harris, New York 1988; Gordon Cullen, The Concise Townscape, London 1977.
Course type:	Design studio
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic presentation)
Prerequisites:	Basics of freehand drawing (axonometric and perspectives sketches)
Primary target group:	Students in 3rd semester of graduate studies in Landscape Architecture
Lecturer:	Krystyna Dąbrowska Budziło, PhD, DSc, Arch.
Contact person:	Anna Skrzyńska, MSc, Arch., phone #: +48 12 628-24-91; e-mail: anna.skrzynska@gazeta.pl
Deadline for application:	September 15

COURSE TITLE:	**INTEGRATED DESIGN STUDIO – REVALORIZATION OF HISTORIC GARDENS**
Institute/Division:	Institute of Landscape Architecture
Erasmus subject code:	02.5
Number of contact hours:	105
Course duration:	1 semester (Spring)
ECTS credits:	9
Course description:	The topic of design is a monastic complex. During the semester students prepare 5 sequential parts of design: - Analysis of accessibility of monastic enclosures and their spatial context; - Historic studies - phases of spatial development; - Function of a shrine; - Revalorization of (*viridarium*) *hortus conclusus* (the Middle Ages), monastic garden (the Renaissance), "Paradise Courtyard" (the Baroque); - Garden architecture.
Literature:	Wilfried Koch, *Style w architekturze*, Warszawa 1996 David Watkin, *Historia architektury zachodniej*, Warszawa 2001; Janusz Bogdanowski [z zespołem], *Kompozycja i planowanie w architekturze krajobrazu*, Kraków 1976; Krystyna Dąbrowska-Budziło, *Treść krajobrazu kulturowego w jego kształtowaniu i ochronie*, Kraków 2002; Gerard Ciołek, *Ogrody polskie* [uzup. Janusz Bogdanowski, Warszawa 1978; Longin Majdecki, *Historia ogrodów,* Warszawa 1978; Longin Majdecki, *Ochrona i konserwacja zabytkowych założeń ogrodowych,* Warszawa 1993; Aleksander Böhm, Agata Zachariasz, *Architektura krajobrazu i sztuka ogrodowa : ilustrowany słownik angielsko-polski, Landscape architecture and art of gardening : the illustrated English-Polish dictionary*. Vol. 1. a-d , Warszawa 1997, Vol. 2. e-j, Warszawa 2000, Vol 3. k-q Warszawa 2005; Marek Siewniak i Anna Mitkowska, *Tezaurus sztuki ogrodowej,* Warszawa 1998; Janusz Bogdanowski, *Polskie ogrody ozdobne*, Warszawa 2000; Penelope Hobhouse, *Historia ogrodów*, Warszawa 2005; A. Mitkowska [z zesp.], *Model postępowania konserwator-skiego dla zdewastowanych założeń ogrodowych...,* Warszawa 1994, „Studia i Materiały. Ogrody" 2 (8), Ośrodek Ochrony Zabytkowego Krajobrazu; Edmund Małachowicz, *Ochrona środowiska kulturowego*, Wrocław 1982 [wyd. 1, Politechnika Wrocławska]; [wyd. 2, Warszawa 1988, PWN]; *Współczesne problemy ochrony krajobrazu*, red. Marek Kucharczyk, Lublin 2004; Magazines: in German: „Garden und Landschaft", in English:„Landscape Architecture",in Polish: „Ogrody, ogródki, zieleńce", miesięcznik.
Course type:	Design studio
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic presentation)

Prerequisites:	General history of art, basic plant material, technical documentation, basics of hand drawing (axonometric and perspectives sketches)
Primary target group:	Students in 4th semester of graduate studies in Landscape Architecture
Lecturer:	Anna Mitkowska, Prof., PhD, DSc, Arch.
Contact person:	Katarzyna Hodor, MSc, Arch., phone #: +48 12 628-24-64; e-mail: kasiahodor@interia.pl
Deadline for application:	February 1

COURSE TITLE:	**INTEGRATED DESIGN STUDIO – PUBLIC PARK**
Institute/Division:	Institute of Landscape Architecture
Erasmus subject code:	02.5
Number of contact hours:	105
Course duration:	1 semester (Fall)
ECTS credits:	11
Course description:	The topic of design is an urban public park. Its program is formed by the students as the result of stake holders; analysis and public participation planning workshop. The task consists of: - design of park composition and plants management (scale 1:500), axonometric drawings showing spring and autumn planting colours; - project of a garden architecture - pavilion, gazebo, orangery, open air stage or performance area, bridge or other elements (scale 1:100, plans, sections, views, perspectives and details); - a display garden (scale 1:100) with the specification of plants, working drawings for planting plan - e.g. perennial beds, flower beds, hedges, climbers (1:20, 1:10), plans, sections if necessary, colour perspectives; - elements of garden architecture – e.g. stairs, ramps, lamps and memorial and information tablets. Set of technical drawings (plans sections, views and perspectives) in suitable scale (1:50, 1:20, 1:10); - review and summarizing of the project, often a public exhibition showing the results.
Literature:	John Brookes, Wielka księga ogrodów. Sztuka zakładania i pielęnacji, wyd: Wiedza i Życie, 2001; Władysław Bugała Drzewa i krzewy, Warszawa Państwowe Wydawnictwo Rolnicze i Leśne, 2000; Encyklopedia kompozycji ogrodowych, Galaktyka Warszawa 2004; Katalog bylin polecanych przez Związek Szkółkarzy Polskich, Agencja Promocji Zieleni, Warszawa 2003; Katalog roślin II - drzewa, krzewy, byliny polecane przez Związek Szkółkarzy Polskich**,** Agencja Promocji Zieleni, Warszawa 2003; Ernst Neufert, Podręcznik projektowania architektoniczno-budowlanego, kontynuacja Peter Neufert pielęgnacji zespół...; tł. z niem. Stanisław Gawroński, Warszawa (all editions); Andrew Wilson, Ogrody. Projekty, realizacje, Warszawa Arkady 2005; Time-saver standards for landscape architecture: design and construction, co-edit. Charles W. Harris, New York 1988; Magazines - in English: Landscape Architecture, Topos.
Course type:	Design studio
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic presentation)
Prerequisites:	Basic plant material, technical documentation, design studio
Primary target group:	Students in 5th semester of graduate studies in Landscape Architecture
Lecturer:	Krystyna Pawłowska, Assoc. Prof., PhD, DSc, Arch.
Contact person:	Anna Skrzyńska, MSc, Arch., phone #: 48 12 628-24-91; e-mail: anna.skrzynska@gazeta.pl
Deadline for application:	September 15

COURSE TITLE:	**INTEGRATED DESIGN STUDIO – POST-INDUSTRIAL AREAS**
Institute/Division:	Institute of Landscape Architecture
Erasmus subject code:	02.5
Number of contact hours:	105
Course duration:	1 semester (Spring)
ECTS credits:	9
Course description:	The course task consists of: - Study of landscape enclosures for the chosen post-industrial area; - Preliminary design of master plan for post-industrial park; - A concept design of a part of a park; - A bird's-eye view of master plan conception; - Presentation techniques of design concept.
Literature:	Time-saver standards for landscape architecture: design and construction, co-edit. Charles W. Harris, New York 1988; Magazines – in English - Topos, in Polish – Murator.
Course type:	Design studio
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic presentation)
Prerequisites:	Basic plant material, technical documentation, design studio
Primary target group:	Students in 6th semester of graduate studies in Landscape Architecture
Lecturer:	Krzysztof Wielgus, PhD, Arch.
Contact person:	Urszula Forczek-Brataniec, PhD, Arch., phone #: +48 12 628-24-65; e-mail urszulafb@intria.pl
Deadline for application:	February 1

COURSE TITLE:	**INTEGRATED DESIGN STUDIO – COMPOSITION IN OPEN LANDSCAPE**
Institute/Division:	Institute of Landscape Architecture
Erasmus subject code:	02.5
Number of contact hours:	105
Course duration:	1 semester (Fall)
ECTS credits:	10
Course description:	The topic of design is an open-air recreation centre in an attractive natural place. Approximate size of a location is 5-10 ha,. The term is divided into two basic periods: - Analysis and diagnosis concerning an existing state and framework for a future development (SWOT, 3-D visualization); - Design of architectural composition in open landscape, (parkitecture, outdoor activities places, sports areas and facilities), including an earth-work, integrated with a green factor.
Literature:	Basic literature recommended. Reading on theory and practice of landscape analysis and evaluation, as well as on landscape design – using both natural and artificial materials. Partly available in Libraries: of the Cracow University of Technology and of the Institute of Landscape Architecture. Books: Amidon Jane, 2003. *Radical Landscapes. Reinventing Outdoor Space.* Thames & Hudson. London; Beazley Elisabeth, Desmond Thomas, 1969. *Designed for Recreation. A practical Handbook for providing Leisure Lacilities in the Countryside*. Faber and Faber. London; Colvin Brenda, 1973. *Land and Landscape. Evolution, design and Control.* Murray. London – Beccles; *Foundations for Visual Project Analysis,* 1986. Smardon Richard C., Palmer James F., Felleman John P., Ed. John Wiley & Sons Inc. New York – Chichester – Brisbane – Toronto – Singapore; Halprin Lawrence, 1973. *Creative Processes in the Human Environment;* Magnus Dieter, 1992. *Kunst & Natur Landschaften.* Goethe Institut - Deutsche UNESCO Kommission. Bonn – Mainz – München; Neufert Ernst, 1995. *Podręcznik projektowania architektoniczno – budowlanego.* Arkady. Warszawa; *Nowa jakość krajobrazu: Ekologia – Kultura – Technika,* 2004. Chmielewski Tadeusz, Ed. Polska Akademia Nauk. Warszawa – Lublin; Simon Jacques, 1974. *Amenagement des espaces libres, 300 plans, 500 croquis.* Espaces Verts. Saint-Michel-sur-Orge; Simonds John Ormsbee, 1961. *Landscape Architecture, the shaping of man's natural environment.* F.W. Dodge Corporation. New York; *Urządzenia sportowe,* 1982. Wirszyłło Romuald, Ed. Arkady. Warszawa; *Urządzenia turystyczne*, 1973. Mokrzyński Jerzy, Ed. Arkady. Warszawa; Wines James, 2000. *Green Architecture*. Taschen. Köln. Magazines: In German: *Garten+Landschaft.* Zeitschrift für Landschafts-architektur. Callwey. München. In English: *Topos.*
Course type:	Design studio

Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic presentation)
Prerequisites:	Basic plant material, technical documentation, design studio
Primary target group:	Students in 7th semester of graduate studies in Landscape Architecture
Lecturer:	Wojciech Kosiński, Assoc. Prof., PhD, DSc, Arch.
Contact person:	Paweł Byrski, MSc, Eng., +48 12 628-25-65;
Deadline for application:	September 15

COURSE TITLE:	**INTEGRATED DESIGN STUDIO – PHYSICAL PLANNING (LANDSCAPE ASPECTS IN SPATIAL PLANNING)**
Institute/Division:	Institute of Landscape Architecture
Erasmus subject code:	02.5
Number of contact hours:	105
Course duration:	1 semester (Spring)
ECTS credits:	10
Course description:	The course subject is a project of a master plan of a given area within Cracow territory, with a special consideration of landscape aspects and open space systems. - Topic 1. Detailed studies conducted in branch teams concerning relief, vegetation cover, hydrology, visual and composition aspects, history of place and previous plans, technical infrastructure, present and future land use and land property structure. The studies are based on: Atlas of Cracow (1988), Cracow Master Plan (1994), Cracow Current Condition and Physical Development Study (2003) and others, e.g. information obtained in district councils (scale 1:5000, 1:10000). - Topic 2. Inventory of existing state of area, visual analysis and assessment (scale 1:5000, 1:2000). - Topic 3. SWOT analysis. - Topic 4. Project of the area master plan including panoramic views and design of new landmarks – text and plan (scale 1:5000, 1:2000).
Literature:	Aleksander Böhm. Planowanie przestrzenne dla architektów krajobrazu, Kraków PK 2006; Marek Czerwieniec, Janina Lewińska, Zieleń w mieście, Warszawa 1996; Andrzej Jędraszko, Zagospodarowanie przestrzenne w Polsce: drogi i bezdroża regulacji ustawowych, Warszawa: Unia Metropolii Polskich; Kryspinów : Wydawnictwo Platan, 2005; Władysław Korzeniewski, Nowe warunki techniczno-budowlane 2003 : z omówieniem i 90 rysunkami Władysława Korzeniewskiego, Warszawa 2003; Izabela Mironowicz, Technika zapisu planistycznego, Kraków 2005; Barbara Orzeszek-Gajewska, Kształtowanie terenów zieleni w miastach, Warszawa 1984; Simon Bell, Elements of visual design in the landscape, E & FN Spon London 1993; Kevin Lynch, Image of the City, all editions; David Gosling, Maryculter, w: Teka Komisji Urbanistyki i Architektury, T.XI (1977) s. 63-72; John L. Motloch, Introduction to landscape design, New York 2001; Christopher Alexander [et al.]A pattern language : towns, buildings, construction. Vol. 2, all editions; Magazines - In English: Topos, Landscape Research, Landscape and Urban Planning; in Polish: Urbanista
Course type:	Design studio
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic presentation)
Prerequisites:	Basics of urban design and spatial planning

Primary target group:	Students in 8th semester of graduate studies in Landscape Architecture
Lecturer:	Aleksander Böhm, Full Prof., DSc, PhD, Arch.
Contact person:	Izabela Sykta, MSc, Arch., phone #: +48 12 628-24-92; e-mail: isykta@pk.edu.pl
Deadline for application:	February 1

COURSE TITLE:	**INTEGRATED DESIGN STUDIO – SPATIAL PLANNING – PLANS OF PROTECTION**
Institute/Division:	Institute of Landscape Architecture
Erasmus subject code:	02.5
Number of contact hours:	105
Course duration:	1 semester (Fall)
ECTS credits:	10
Course description:	The topic of design is protection plan for national park, landscape park, nature reserve or cultural park. The semester cycle is divided into five sequential tasks as follows: - Operate of landscape values; - Nature reserve, part of national park or landscape park, park of culture, nature – landscape complex, object listed in UNESCO World Heritage; - Landscape of chosen area and analysis of basic materials; - A study of visual values; - Card index of the landscape standards A – plate and text of protection plan B – the guidelines for spatial management and administration of site
Literature:	Instrukcja tworzenia parków kulturowych – http://www.kobidz.pl/app/site.php5/Show/330.html; Kształtowanie krajobrazu a ochrona przyrody / wybór z 4-tomowej pracy zbiorowej w jęz. niem. pod red. Konrada Buchwalda, Wolfganga Engelhardta, uzup. pracami pol. aut. ; przekł. i oprac. pod red. Zygmunta Obmińskiego ; przekł. Eugeniusz Bernadzki, Stanisław Kasprzyk, Bogusław Lebelt ; oprac. Andrzej Samuel Kostrowicki [et al.], Warszawa : Państ. Wydaw. Rolnicze i Leśne, 1975; Zbigniew Myczkowski, Krajobraz wyrazem tożsamości w wybranych obszarach chronionych w Polsce, Kraków 1998, second edition Kraków PK, 2003; Krystyna Pawłowska, Idea swojskości miasta, Kraków PK, 2001; Krystyna Dąbrowska-Budziło, Treść krajobrazu kulturowego w jego kształtowaniu i ochronie, Kraków PK 2002; Magazines: In English - Landscape Research, in Polish - Aura, Wiadomości Konserwatorskie
Course type:	Design studio
Assessment method:	Evaluation of the final submission (process, progress, personal creativity & individual approach, graphic presentation)
Prerequisites:	Basics of spatial planning, basics of landscape analysis
Primary target group:	Students in 9th semester of graduate studies in Landscape Architecture
Lecturer:	Zbigniew Myczkowski, Assoc. Prof., PhD, DSc, Arch.
Contact person:	Urszula Forczek-Brataniec, PhD, Arch., phone #: +48 12 628-24-65; e-mail urszulafb@interia.pl
Deadline for application:	September 15

COURSE TITLE:	**REGIONAL PLANNING**
Institute/Division:	Institute of cities and regions design; Regional Planning and Environmental Protection
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	Subjects of lectures: basic notions and issues in regional planning, types of regions and their identification; objective and scope of regional planning, European integration issues, European regional cooperation in the scope of regional planning, new types of urbanization at regional scale: technopolises, basic issues in regional development in Poland, regional-scale designs and implementations of urban agglomerations, areas undergoing urbanisation processes, recreational areas, and specially protected areas, in Poland and in the world; contribution of Polish architects and city planners to the development of European regional planning theory and practice; regional technical infrastructure hubs, systems and lines, motorways; water management Large-group written and visual project/design concerning: – selected studies at a regional scale plus diagnosing the current state of development in the region covered by the plan (individual work) – initial concept for managing conflict or problem areas (group work). As a rule, every student begins with the unassisted performance of the component task, and finishes with the group project.
Literature:	Benko G., *Geografia technopolii* , Warszawa 1993 6. Maillat D., *Globalizacja, terytorialne systemy produkcyjne i środowiska innowacyjne* ,Kraków 2002 *7.* Pencakowska W., Węcławowicz- Bilska E., *Problemy dziedzictwa kulturowego w planowaniu regionalnym,* Teka KUiA o/PAN w Krakowie t. XXIV r. 1990 s. 37-46 8. Węcławowicz Bilska E., *Przestrzeń Polski. Przemiany z końcem XX wieku* [w:] kwartalnik Architektury i Urbanistyki PAN t. XLVI z. 2/2001 9. Węcławowicz Bilska E., *Uwarunkowania regionów i możliwości zwiększenia ich atrakcyjności* [w:] *Konkurencyjność miast i regionów jako problem planowania przestrzennego w perspektywie integracji z Unią Europejską* (red. E. Węclawowicz-Bilska, Z. Zuziak) Kraków 2003
Course type:	Field lectures and seminars
Assessment method:	Final test and oral exam
Primary target group:	5th year students in Architecture
Lecturer:	Elżbieta Węcławowicz-BIlska, Prof., PhD, DSC, Arch.
Contact person:	Elżbieta Wecławowicz-Bilska, Prof., phone #: +48 12 628 24 66, e-mail: eweclaw@poczta.onet.pl
Deadline for application:	May 30

TYPE & FIELD OF STUDIES: MSc in CIVIL ENGINEERING

PROGRAM TITLE: ROAD ENGINEERING

Erasmus subject code:	06.4
Duration:	part-time study – 4 semesters (beginning in October)
ECTS credits:	4 x 30
Program description:	Program (prepared individually) will depend on realized program of BSc studies
Eligibility/Admission:	BSc degree in Civil Engineering
Fees:	4 x 3 000 Euro
Contact person:	Prof. Andrzej Rudnicki, tel. +48 12 628 20 28 e-mail: ar@transys.wil.pk.edu.pl
Application procedures & deadlines:	– deadline for application – May 15 – notification of preliminary acceptance – May 31 – payment of tuition for the first semester – June 30 – either final notification of acceptance or refund of the payment if the number of candidates is less than 15 – tuition payment due dates for each following semester is January 31 or August 31 – for the list of required documents and other details see http://www.bwm.pk.edu.pl
Remarks:	Offered program (example): Applied Mathematics. Engineering Mechanics. Structural Design. Physical Planning. Road Materials. Road and Street Design. Road Pavement Design. Transportation Planning. Traffic Engineering. Computer Science in Road Engineering. Environmental Protection in Road Engineering. Bridges Design. Railway Engineering. Urban Public Transport. Transport Economics. Selected Subjects. Diploma Seminar.

TYPE & FIELD OF STUDIES: MSc in CIVIL ENGINEERING

PROGRAM TITLE: COMPUTATIONAL ENGINEERING

Erasmus subject code: 06.4

Duration: 3 semesters (beginning in March)

ECTS credits: 3 x 30

Program description: Besides the courses typically taught at civil engineering graduate studies, like Mechanics of Materials and Structures, Advanced Reinforced Concrete Design, Advanced Steel Design, we offer courses focusing on computer aided engineering. These special courses include: Computer Aided Design, Numerical Methods, Finite Element Method, Algorithms and Data Structures, Selected Topics in Computer Sciences, Computer Graphics, Linear and Nonlinear Programming, Introduction to Artificial Intelligence.

Eligibility/Admission: BSc degree in Civil Engineering

Fees: 3 x 3 000 Euro

Contact person: Witold Cecot, Ph.D. D.Sc., tel. +48 12 628 2167
e-mail: plcecot@cyf-kr.edu.pl

Application procedures & deadlines:

- deadline for application – May 15
- notification of preliminary acceptance – May 31
- payment of tuition for the first semester – June 30
- either final notification of acceptance or refund of the payment if the number of candidates is less than 15
- tuition payment due dates for each following semester is January 31 or August 31
- for the list of required documents and other details see http://www.bwm.pk.edu.pl

Remarks: Students lacking required level of knowledge in the areas listed under Program Description may attend preparatory course during the preliminary semester (beginning in October, application deadline June 30).

COURSE TITLE:	**ARCHITECTURAL AND URBAN DESIGN**
Institute/Division:	Institute of Building Materials and Structures
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	This one semester course is an introduction to contemporary architectural design dedicated for Civil Engineers and other non-architectural designers. It is aimed to help Engineers to learn and use a common language for future cooperation with Architect. It also introduces a humanistic element to mostly technical education of Engineers. During lecture phase of this course, participants will acquire general principles of architectural and urban design together with main definitions and concepts. Participants will learn, base on analysis of historical and contemporary projects, how to create designs with common identity of a Form, Function and Construction During studio design phase of this course, participants will create conceptual design of a small to medium size building located on predefined land. Exact size and type of building will be linked to participant own specialization or interest. It could be a detached single family house, a hotel with parking and recreational area, an exhibition centre over river bank, restaurant, highway service area (MOP), an multi-storey car park, car showroom with service, a train station or bank in a medium size city or many other subjects. Each participant will create a detailed design of a building and it's surroundings in urban scale (1:1000 or 1:500) and architectural scales (1:200 or 1:100). Final design will be preceded by the analysis of building close spatial context and connections to existing road structure. Final design can be also reported as a scale model.
Literature:	Basic literature on architectural and urban design, with specific literature linked to particular building type.
Course type:	Lectures and design studio
Assessment method:	Attendance to lectures and evaluation of final design
Prerequisites:	Knowledge of general building constructions. Basic drawing skills.
Primary target group:	3rd and 4th year students in Civil Engineering
Lecturer:	Andrzej K. Kłosak, Ph.D. Arch.
Contact person:	Andrzej K. Kłosak, Ph.D. Arch..; phone #: +48 12 628 21 49; e-mail: andrzej.klosak@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**BUILDING ACOUSTICS**
Institute/Division:	Institute of Building Materials and Structures
Erasmus subject code:	06.4
Number of contact hours:	45
Course duration:	1 semester
ECTS credits:	4
Course description:	This one semester course is focused on fundamental building acoustics issues. It introduce participants to acoustical theories and practical methods in building acoustics, including room acoustic and sound insulation, and thereby gives a background for designing and supervising building projects with a satisfactory level of acoustical comfort. This means that the building should be designed and constructed in a way that external and internal noise is eliminated. And also that the room geometry and internal room surfaces should be designed to optimise the acoustical conditions according to the function of room. This course also enables the participants to evaluate possible solutions to typical noise problems in the area of room acoustics, sound insulation or environmental noise. Content: Basic concepts and units in building acoustics; Human hearing mechanism; Reflection and absorption of sound; Transmission of sound in buildings; Air-borne sound insulation; Impact sound insulation; Sound insulation from external noise sources; Flanking sound transmission; Acoustical characteristics of traditional and modern partition systems; Building acoustics standards; Types of sound absorbing materials - panel, resonance and porous absorbers; The insulation of buildings from external noise; Reverberation time; Design of rooms for speech; Design of rooms for music; Design of rooms for multi-purpose.
Literature:	H. Kuttruff, 1991. Room acoustics. Elsevier Applied Science; F. Makeawa, P.Lord, 1993. Environmental and architectural acoustics. E&FN Spon; M. Barron, 1993. Auditorium acoustics and architectural design. E&FN Spon
Course type:	Lectures, exercises and laboratory measurements
Assessment method:	Attendance and evaluation of completed exercises
Prerequisites:	Knowledge of building construction, materials and structures, basic knowledge of mathematics and physics.
Primary target group:	3rd, 4th and 5th year students in Civil Engineering or in Architecture
Lecturer:	Andrzej K. Kłosak, Ph.D. Arch.
Contact person:	Andrzej K. Kłosak, Ph.D. Arch.; e-mail: andrzej.klosak@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**BUILDING CHEMISTRY**
Institute/Division:	Institute of Building Materials and Structures, Chair of Building Materials and Structure Protection
Number of contact hours:	30
Curse duration:	1 term (Spring)
ECTS credits:	3
Course description:	This one-term course focuses on six different subjects: chemical reactions and basic chemistry rules, properties of colloids, analysis of water used for preparing concrete mix, corrosion of concrete and steel, characteristics of building binders and their properties, basic properties of polymers and their application in building industry.
Literature:	R. Chang, "General Chemistry", Random House, New York. 86 A. M. Neville, "Properties of Concrete", 4th Edition, 1996. "Lea's Chemistry of Cement and Concrete", Fourth Edition. Edited by Peter C. Hewlett. 1998. H.F.W. Taylor, "Cement Chemistry", 2nd Edition
Course type:	Laboratory
Assessment method:	Six tests concerning each individual subject.
Primary target group:	1st year students in Civil Engineering
Lecturer:	Aleksander Kozak, Ph.D., Tomasz Zdeb M.Sc.
Contact persons:	Aleksander Kozak Ph.D. , Tomasz Zdeb M.Sc. Phone: +48 12 628-23- 69 e-mail: akozak@imikb.wil.pk.edu.pl tzdeb@imikb.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**BUILDING MATERIALS**
Institute/Division:	Institute of Building Materials and Structures, Chair of Building Materials and Structure Protection
Number of contact hours:	lecture (15 hrs), tutorial (15 hrs), laboratory (15 hrs).
Curse duration:	1 semester
ECTS credits:	3
Course description:	This one-term course focuses on: 1. presentation of production, properties and application of construction materials (stone, ceramics, timber), thermal and water insulation materials as well as mineral binders (lime, plaster, cement), 2. discussion on durability of building materials with regard to the effect of environment on properties of materials, 3. testing of mechanical properties (compressive, tensile, flexible, shear strength, abrasion, hardness) and physical properties of building materials according to the newest National and European Standards.
Literature:	Ashby M., Jones D.R.H.: Engineering Materials 1: An Introduction to Properties, Applications and Design, Elsevier, 2005; Ashby M., Jones D.R.H.: Engineering Materials 2: An Introduction to Microstructures, Processing and Design, Elsevier, 2006; Bull J.: Durability of Materials and Structures in Building and Civil Engineering, Whittles Publishing, 2006; Jacobs J., Kilduff T.: Engineering Materials Technology. Structures, Processing, Properties and Selection, Prentice Hall Publishing, 2005; Shackelford J.F.: Introduction to Materials Science for Engineers, Prentice Hall Publishing, 2004; Timings R.L.: Engineering Materials, Vol.1, Longman, 1998; Timings R.L.: Engineering Materials, Vol.2, Longman, 2000.
Course type:	Lecture, Tutorial, Laboratory
Assessment method:	Midterm, Final exam, Lab reports
Primary target group:	1st year students in Civil Engineering
Lecturer:	Emilia Luchter-Marchewka, M.Sc., Teresa Zych, D.Sc.
Contact persons:	Emilia Luchter-Marchewka, M.Sc., Teresa Zych, D.Sc. Phone: +48 12 628-21-55, e-mail: tzych@imikb.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**BUILDING THERMAL PHYSICS I**
Institute/Division:	Institute of Building Materials and Structures
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ETCS credits:	3
Course description:	Course covers the problems of energy and moisture transfer in building materials and components. The basic heat transfer phenomena, convection, radiation and conduction, are introduced to describe the heat losses through building shell and estimate its required insulation features. Building material humidity is described by means of moisture sorption, diffusion and capillary pull-up. Heat and moisture transport influence the building structure design especially in case of the multilayered walls and roofs. Non-stationary heat flow is connected with building thermal stability of the building shell. The thermal comfort concept and parameters that describe the conditions in building interior are discussed. Laboratory: measurement of temperature, humidity, heat flow, thermal comfort, climatic chamber, 2D heat flow computer calculations.
Literature:	Basic literature on building physics principles may be used
Course type:	Lectures, classes and laboratory
Assessment method:	Final test
Prerequisites:	Physics and building engineering
Primary target group:	3rd year students in Civil Engineering or in Architecture
Lecturer:	Tomasz Kisilewicz, PhD
Contact person:	Tomasz Kisilewicz, PhD, phone #: +48 12 628 2306, e-mail: tkisilew@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**BUILDING THERMAL PHYSICS II**
Institute/Division:	Institute of Building Materials and Structures
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ETCS credits:	3
Course description:	Course covers the problems of energy and moisture transfer in building materials and components. The basic heat transfer phenomena, convection, radiation and conduction, are introduced to describe the heat losses through building shell and estimate its required insulation features. Building material humidity is described by means of moisture sorption, diffusion and capillary pull-up. Heat and moisture transport influence the building structure design especially in case of the multilayered walls and roofs. Non-stationary heat flow is connected with building thermal stability of the building shell. The thermal comfort concept and parameters that describe the conditions in building interior are discussed. Laboratory: measurement of temperature, humidity, heat flow, thermal comfort, climatic chamber, 2D heat flow computer calculations.
Literature:	Basic literature on building physics principles may be used
Course type:	Lectures, classes and laboratory
Assessment method:	Final test
Prerequisites:	Physics and building engineering
Primary target group:	3rd year students in Civil Engineering or in Architecture
Lecturer:	Tomasz Kisilewicz, PhD
Contact person:	Tomasz Kisilewicz, PhD, phone #: +48 12 628 2306, e-mail: tkisilew@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**CLASSICAL MECHANICS**
Erasmus subject code:	06.4
Number of contact hours:	105
Course duration:	2 semesters
ECTS credits:	9
Course description :	Force systems, reduction of a system of forces, distributed forces, statics of systems of particles and rigid bodies, equilibrium conditions, reactions at supports for statically determined systems, friction, principle of virtual work, kinematics and kinetics of particles and rigid bodies, work and energy, moments of inertia, conservation laws, d'Alembert Principle, Lagrange equations, Hamilton's principle, oscillations, stability analysis, dynamics in non-inertial reference frames.
Literature:	Beer F.P., Johnston E.R., Vector Mechanics for Engineers, McGraw-Hill, 1997 Banach S., Mechanics, Warszawa 1951, Meriam J.L., Kraige L.G., Engineering Mechanics, Vol. 1 Statics, Vol. II Dynamics, 1997 Timoshenko S., Young D.H., Engineering Mechanics, Mc Graw-Hill, 1956 Rao A. V., Dynamics of Particles and Rigid Bodies : A Systematic Approach, Cambridge 2006.
Course type:	Lectures, practical classes
Assesment method:	Short tests, longer term projects, final oral and written exam,
Prerequisities:	Calculus (differentiation, integration), vector analysis, ordinary differential equations.
Primary target group:	Undergraduate students in Civil Engineering
Lecturer:	Dorota Jasińska, Ph.D., Marian Mikołajek, PhD
Contact person:	Dorota Jasińska PhD, phone #: +48 12 628 2341, e-mail: jasinska@limba.wil.pk.edu.pl Marian Mikołajek PhD, phone #: +48 12 6282322, e-mail: mikol@optra.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**CONCRETE STRUCTURES**
Institute/Division:	Institute of Building Materials and Structures
Erasmus Subject Code:	06.4
Number of contact hours:	120
Course duration:	2 semesters (usually Spring + Fall semester)
ECTS credits:	5 + 5
Course description:	The teaching process is focused on the introduction of the fundamentals of RC structures design including procedures of check of every design phase. Moreover, the presentation includes a wide information on the technology as well as on requirements of quality. Several workshop meetings on building sites complete the teaching course. In parallel, practical exercise is carried out which includes a complete design of a typical RC structures (slab, beam, column, foundation, retaining wall).
Literature:	1. Bibliography referring to the design of RC structures 2. Ghali, R. Favre – Concrete structures – stresses and deformations, E&FN Spon
Course type:	Lecture (30h) + design workshop (30h) + practical aspects (30h)
Assessment method:	Exam including verification of theoretical assumptions of design, selection of design steps and technological procedures earlier discussed (70%). Evaluation of the practical design carried out (30%).
Prerequisites:	Mechanics, Structural mechanics, Strength of Materials, Concrete technology, Building materials
Primary target group:	3rd and 4th year students in Civil Engineering
Lecturers:	Piotr Gwoździewicz, PhD and Sylwia Schoenowitz-Żuradzka MSc
Contact person:	Piotr Gwoździewicz, PhD, e-mail: pgwozdzi@imikb.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**CONCRETE STRUCTURES**
Institute/Division:	Institute of Building Materials and Structures
Erasmus Subject Code:	06.4
Number of contact hours:	120
Course duration:	2 semesters (Spring + Fall semester)
ECTS credits:	5 + 5
Course description:	Basis for RC structures design – general requirements, design method, material properties (concrete, reinforcing steel), ULS (bending, shear, torsion, compression) and SLS (deflection, crack control). Structural RC members (slabs, beams, columns, foundations, frames) – design, detailing and particular requirements. Practical examples (design workshops) – static calculation and dimensioning of the typical RC elements (with drawings).
Literature:	1. EN1992-1-1: Eurocode 2: Design of concrete structures – Part 1: General rules and rules for buildings. 2. Structural Concrete – Textbook on Behaviour, Design and Performance. (FIB Bulletins 1,2,3) – vol.1, 2, 3. 3. J. MacGregor, J. Wight: Reinforced concrete – Mechanics and design. Prentice Hall, 2006.
Course type:	Lecture (60 hours) + Design workshop (60 hours)
Assessment method:	The final mark for the course contained two elements (both with the weight of 50%): written exam and completed design exercises.
Prerequisites:	Mechanics, Structural Mechanics, Strength of Materials, Concrete Technology, Building Materials
Primary target group:	3rd and 4th year students in Civil Engineering
Lecturers:	Andrzej Winnicki, PhD and Krzysztof Chudyba, PhD
Contact person:	Andrzej Winnicki, PhD, e-mail: andrzej@dorabella.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**CONCRETE TECHNOLOGY**
Institute/Division:	Institute of Building Materials and Structures, Section of Concrete Technology.
Erasmus subject code:	06.4
Number of contact hours:	45
Course duration:	1 semester
ECTS credits:	4
Course description:	This one-semester course is focused on technology of concrete, which is the most popular building material. The course is divided into two parts: lecture one and class one. Within the confines of lectures students learn about basic concrete ingredients, admixtures and additives as well as concrete itself, their properties, test methods and standard requirements. Students are taught also about design methods (proper selection of type and amount of individual components taking into consideration designed concrete parameters); technology of concrete making and curing; and quality control. Within the confines of the practice part of the course students carry out some laboratory exercises and tests on cement, aggregate, paste, mortar and concrete. Moreover they make two concrete design: the first one by experimental method and the second one by computational method.
Literature:	Basic literature on concrete technology (e.g. Properties of concrete by A.M. Neville) and a few dozen European standards referred to concrete, its ingredients and various testing methods.
Course type:	Lectures, classes, design and laboratory course
Assessment method:	Review and evaluation of completed exercises and design assignments. Testing subject knowledge orally and on paper.
Prerequisites:	Lecture hall, Laboratory, basic knowledge on building materials
Primary target group:	2nd year civil engineering students
Lecturers:	Lucyna Domagała, PhD, DSc. and Maciej Urban, PhD, DSc
Contact person:	Lucyna Domagała, PhD, DSc.; phone #: +48 12 628 2363; e-mail: ldurych@imikb.wil.pk.edu.pl.
Deadline for application:	June 30 or November 30

COURSE TITLE:	**FOUNDATIONS**
Institute/Division:	Civil Engineering/Soil Structure Interaction
Number of contact hours:	30 lectures + 30 projects
Course duration:	1 semester
ECTS credit:	5
Course description:	Definitions, models and types of foundations. Limit states. Partial safety factors (Eurocode 7). Shallow foundations (including design). Deep foundations (especially pile foundations, including design). Excavations and protecting deep excavations. Dewatering of excavations.
Literature:	1. Atkinson J.H., Bransby P.L. (1978): The mechanics of soil. An introduction to critical state soil mechanics. McGHRAW-HILL 2. Head K.H. (1992): Manual of soil laboratory testing. Volume 1, Soil classification and compaction tests. Volume 2, Permeability, shear strength and compressibility tests. Volume 3, Effective stress tests. Second Edition. Halsted Press: an Imprint of JOHN WILEY & SONS, INC. New York – Toronto.
Course type:	Lectures, projects
Assessment method:	Individual evaluation, computer tests
Prerequisites:	Mathematics, Soil mechanics
Primary target group:	3rd year students in Civil Engineering
Lecturer:	Bogumił Wrana, Prof., PhD, DSc
Contact person:	Bogumił Wrana, Prof., PhD, DSc, e-mail: wrana@limba.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**FRACTURE, FATIGUE AND DAMAGE MECHANICS**
Institute/Division:	Civil Engineering/Solid Mechanics
Erasmus subject code:	06.4
Number of contact hours:	90
Course duration:	1 semesters
ECTS credit:	6
Course description:	Fracture of cracked members, Griffith theory, stress concentration, stress intensity factor and material toughness. Criteria for crack propagation, COD method, R-curves. Fatigue of materials – stress-based approach, fatigue crack growth. Time-dependent behavior (creep and fatigue). Basics of damage mechanics, application of damage mechanics to life-time evaluation of structural members.
Literature:	1. N.E.Dowling, Mechanical Behavior of Materials. Engineering Methods for Deformation, Fracture, and Fatigue, Prentice-Hall, 1991, 2. Lemaitre, J. and Chaboche, J.-L., Mechanics of Solid Materials,Cambridge University Press, Cambridge, 1990.
Course type:	Lectures, projects
Assessment method:	Individual evaluation, computer tests
Prerequisites:	Mathematics, Mechanics of Materials, Theory of Elasticity and Viscoplasticity
Primary target group:	2nd year students in Civil Engineering
Lecturers:	Prof. Marcin Chrzanowski and Prof. J.German
Contact person:	Prof. Marcin Chrzanowski, e-mail: mc@limba.wil.pk.edu.pl
Deadline for application:	June 30 or September 30

COURSE TITLE:	**GENERAL BUILDING DESIGN**
Institute/Division:	Institute of Building Materials and Structures
Erasmus subject code:	06.4
Number of contact hours:	45
Course duration:	1 semester
ECTS credits:	4
Course description:	This one semester course is an introduction to building design. It is aimed to help participants to understand basic terms and building technical solutions connected with designing of buildings. General Building Design should be understood as a technical way of protection functional, structural and aesthetical requirements like: 1. protection against forces of natural environment (thermal protection; water and moisture protection; interior microclimate, etc.); 2. protection against noise (external, internal); 3. daylight requirements; 4. ecological and low-energy building design; 5. physical, chemical and biological threats in buildings; 6. allowable loads in buildings; During the course main building elements will be discussed (in parallel to real construction process), like: 1. foundation; 2. partitions; 3. ceilings and floors; 4. stairs and ramps; 5. roofs and roof structures; 6. finishing works. During laboratory classes, participants will learn about issues mentioned above on specific building solutions.
Literature:	Basic literature on general building design.
Course type:	Lectures and laboratory
Assessment method:	Attendance to lectures and evaluation of designs
Primary target group:	1st year students in Civil Engineering / 1st, 2nd or 3rd year students in Information Technology
Lecturer:	Andrzej K. Kłosak, PhD, Arch.
Contact person:	Andrzej K. Kłosak, PhD, Arch.; phone #: +48 12 628 21 49; e-mail: andrzej.klosak@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**INTRODUCTION TO COMPUTATIONAL METHODS**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	The objective of the course is to explain basic concepts of approximate solution of engineering problems. The course outline is as follows: Mathematical modelling. Local and global formulation of boundary value problems. Finite difference method. Variational methods and approximate solutions (Ritz method and weighted residuals). Fundamentals of finite element method (FEM). FEM modelling of bar and frame structures. Solution of two-dimensional elliptic problems of heat flow and continuum mechanics.
Literature:	O. C. Zienkiewicz; R.L.Taylor, "Finite Element Method", Elsevier 2000. Cook, R.D., Finite Element Method for Stress Analysis, J. Wiley & Sons, 1995. Ottosen, N. and Petersson, H., Introduction to the Finite Element Method, Prentice Hall, 1992.
Course type:	Lectures and laboratory
Assessment method:	Laboratory assignments and two tests given in class
Prerequisites:	Numerical methods, continuum mechanics, FEM basics
Primary target group:	Undergraduate students In Engineering
Lecturers:	Jerzy Pamin, Prof. PhD, DSc and Witold Cecot PhD, DSc
Contact person:	Prof. Jerzy Pamin, phone #: +48 12 628 25 48; e-mail: jpamin@L5.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**LOW ENERGY BUILDING DESIGN**
Institute/Division:	Institute of Building Materials and Structures
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ETCS credits:	3
Course description:	Course covers all the aspects of energy saving measures that should be taken to reduce building energy demand like: building lot shape and orientation, building location and orientation, thermal zoning, window features and distribution, thermal mass, passive solar use, thermal bridges, heat recovery etc. Students have a possibility to learn that thinking about energy must be present at the all designing stages, in general concept and in the tiny detail of the building. Standard of European passive house, but also dynamic aspects of energy conservation and storage are presented and discussed. Computer programs, supporting designing process are introduced to enhance the quality of design.
Literature:	E. Mazria, 1978. The Passive Solar Energy Book, Rodale Press Emaus; A.K. Athienitis, M.Santamouris, 2002. Thermal Analysis and Design of Passive Solar Buildings, James & James
Course type:	Lectures, classes and laboratory/computer
Assessment method:	Final test
Prerequisites:	Building Physics
Primary target group:	3rd year students in Civil Engineering or in Architecture
Lecturer:	Tomasz Kisilewicz, PhD
Contact person:	Tomasz Kisilewicz, phone: +48 12 628 2306, e-mail: tkisilew@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**MECHANICS OF MATERIALS**
Institute/Division:	Civil Engineering/Solid Mechanics
Erasmus subject code:	06.4
Number of contact hours:	180
Course duration:	2 semesters
ECTS credit:	5+5
Course description:	Introduction to mechanics of materials. Internal forces: method of sections, definition of internal forces, equivalence of the systems of internal and external forces, functions of resultant internal forces in a bar member – axial force, shear forces, twisting moment, bending moments, relation between distributed load, shear force and bending moment. Basic elasticity: stress, state of stress, principal stresses, equations of equilibrium and static boundary conditions; deformations and strains, compatibility of strains; constitutive equation of linear elasticity (Hooke's law). Elastic potential. Boundary-value problem of linear elasticity – examples of solutions for a prismatic bar: free torsion, tension, pure and simple bending, combined bending-tension and bending–shear problems. Strength and toughness of materials: material effort, strength hypotheses, energy-based criteria of elastic limit states – Huber-Mises-Hencky criterion. Basic concepts of fracture mechanics, strength, fracture and toughness in engineering materials. Buckling of columns: Euler buckling load, effective length, eccentric loads and secant formula. Basics of thin-walled rods theory. Introduction to fatigue and creep of materials and structures. Basics of composite materials.
Literature:	1. N.E.Dowling, Mechanical Behavior of Materials. Engineering Methods for Deformation, Fracture, and Fatigue, Prentice-Hall, 1991, 2. Lemaitre, J. and Chaboche, J.-L., Mechanics of Solid Materials,Cambridge University Press, Cambridge, 1990. 3. J.M. Gere, Mechanics of Materials, Brooks/Cole Thompson Learning, 5th edition, 2001
Course type:	Lectures, projects, laboratory
Assessment method:	Individual evaluation, computer tests
Prerequisites:	Mathematics, Theoretical Mechanics
Primary target group:	2nd year students in Civil Engineering
Lecturers:	Prof. Marcin Chrzanowski, Małgorzata Janus-Michalska, PhD, DSc, Adam Zaborski, PhD, DSc
Contact person:	Prof. Marcin Chrzanowski, e-mail: mc@limba.wil.pk.edu.pl
Deadline for application:	June 30 or September 30

COURSE TITLE:	**PRECAST AND PRESTRESSES CONCRETE STRUCTURES**
Institute/Division:	Institute of Building Materials and Structures
Erasmus Subject Code:	06.4
Number of contact hours:	60
Course duration:	1 semester (usually spring semester)
ECTS credits:	5
Course description:	The teaching process is focused on the introduction of the fundamentals of technology and design of precast concrete structures including especially procedures of check of every work phase. Several details specific for precast structures are widely discussed together with their evaluation methods. Practical exercises carried out in parallel includes a selected part of a design of a typical precast concrete structure. The teaching process is focused on the introduction of the fundamentals of PC structures design including procedures of check of every design phase. Moreover, the presentation includes a wide information on the technology as well as on requirements of quality. Several workshop meetings on building sites complete the teaching course. In parallel, practical exercise is carried out which includes a complete design of a typical PC structure (slab, girder).
Literature:	K. S. Elliot, Multi-Storey Precast Concrete Framed Structures A. Naaman – Prestressed concrete analysis and design, Techno Press 3000 Ann Arbor, MI E. G. Nawy – Prestressed concrete – a fundamental approach, Prentice Hall Intl. A. Ghali, R. Favre – Concrete structures – stresses and deformations, E&FN Spon
Course type:	Lecture (30h) + design workshop (30h)
Assessment method:	Final exam including verification of theoretical assumptions of design for a selected element specific for this type of structures.
Prerequisites:	Mechanics, Structural mechanics, Strength of Materials, Concrete technology, Building materials
Primary target group:	4th year students in Civil Engineering
Lecturers:	Andrzej Seruga Prof., DSc, PhD and Wit Derkowski, PhD
Contact person:	Andrzej Seruga Prof., DSc, PhD, e-mail: aseruga@imikb.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**RAILWAY INFRASTRUCTURE**
Erasmus subject code:	06.4
Number of contact hours:	45
Course duration:	1 semester
ETCS credits:	4
Course description:	Railway in the whole transportation system. Basic elements of railway infrastructure: track and its foundation, bridges, tunnels, power system, control and traffic management system. Design of railway lines, track gradients, curvilinear track sections (cant, cant deficiency, transition curves). Turnouts and crossing. European traffic control and management system, and control and command system. Power supply systems and multimodal traction units. Railway station and its elements. High speed and conventional railway infrastructure. Recent concepts for railway systems and railway infrastructure.
Literature:	Esveld C., Modern railway track, MRT production, Germany, ISBN 90-800324-1-7, 1989; Technical Specification for Interoperability, Infrastructure – Conventional Railway and High Speed European Network (European Commission – Energy and Transport official www pages)
Course type:	15 h – lecture, 30 h - seminar
Assessment method:	exercises and oral exam
Prerequisites:	basic knowledge on transportation engineering
Primary target group:	students in master's programme in Transportation Engineering
Lecturer:	Prof. Włodzimierz Czyczuła and Juliusz Sołkowski, PhD, DSc
Contact person:	Prof. Włodzimierz Czyczuła, e-mail: czyczula@pk.edu.pl or Juliusz Sołkowski, PhD, DSc, e-mail: solkow@transys.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**ROAD DESIGN**
Institute/Division:	Institute of Road and Railway Engineering
Number of contact hours:	60 hours
Course duration:	1 semester
ECTS credit:	5
Course description:	Historical development of roads. Road function (system of classification; functional relationships and categories). Design controls and criteria (design vehicles; driving behaviour models, speed and design; traffic characteristic; factor other than traffic volume, micro - simulation models). Elements of deign (geometric of sight distance; horizontal alignment; determination of design radius; superelevation; transition and compound curves; vertical alignment; vertical curves; alignment coordination in design). Cross section elements (lane widths, shoulders; curbs, sidewalks; drainage channels and sideslopes, traffic barriers). Earthworks operations (embankment and excavation; computing earthworks quantities; mass diagram). Design of drainage and facilities (hydrologic approaches and concepts; open channels, culverts, hydraulic design). Project evaluation. Exercise: geometrical alignment for given section of road.
Literature:	• "Highway Design Handbook", U.S. Department of Transportation Federal Highway Administration, 2001 • "Transportation and traffic engineering Handbook", Institute of Transportation Engineers, Washington 1989 • Traffic and Highway Engineering", Garber N., Hoel L., Pacific Grove 2001
Course type:	Lectures and design exercises
Assessment method:	Evaluation of prepared design for road section. Examination
Primary target group:	Students in Road Engineering
Lecturer:	Andrzej Szarata, PhD, DSc
Contact person:	Andrzej Szarata, PhD, DSc, phone#: + 48 12 628 25 33, e-mail: aszarata@transys,wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**"ROBOT" COMPUTER CODE**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	Application of the Finite Element Method to solve engineering problems, especially oriented on needs of practicing Civil Engineer, using an integrated design environment ("ROBOT"). The student will be step by step acquainted with approach to computer modelling of several engineering structures, i.e. the definition of: 1. geometry (shape and boundary conditions) including the import of geometry description from geometry modelling software, and automatic subdivision of analyzed structure into finite elements, 2. loads (permanent and variable loads according to engineering code) including automatic generation of wind and snow loads, 3. load combinations; solution of a boundary problem using Finite Element Method, in case of linear or nonlinear statics, dynamics or stability, as implemented in the code, and post-processing: 1. dimensioning of structural members and their connections, 2. presentation of results using text and graphical interface of "ROBOT", 3. documenting the project for verification and further reference.
Course type:	Computer laboratory
Assessment method:	Evaluation of the submitted design.
Prerequisites:	Strength of materials, Structural mechanics, Fundamentals of Finite Element Method
Primary target group:	Students in Civil Engineering
Lecturer:	Michał Pazdanowski, PhD
Contact person:	Michał Pazdanowski, phone #: +48 12 628 29 29; e-mail: michal@jinx.l5.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**SOIL MECHANICS**
Institute/Division:	Civil Engineering/Soil Structure Interaction
Number of contact hours:	30 lectures + 30 Laboratory
Course duration:	1 semester
ECTS credit:	5
Course description:	Soil and Rock identification. Soil classification (including geotechnical categories). Nature, physical and mechanical properties of soil. Ground water – appearance and phenomenon connected with it. Properties of dry and saturated soil. Laboratory and in-situ tests. Basic soil models. Bearing capacity of soils and foundations. Allowable pressure. Limit states. Stress distribution in the subsoil (total and effective stresses). Theory of consolidation and rheology of soil. Soil settlements. Slope stability.
Literature:	1. Atkinson J.H., Bransby P.L. (1978): The mechanics of soil. An introduction to critical state soil mechanics. McGHRAW-HILL 2. Head K.H. (1992): Manual of soil laboratory testing. Volume 1, Soil classification and compaction tests. Volume 2, Permeability, shear strength and compressibility tests. Volume 3, Effective stress tests. Second Edition. Halsted Press: an Imprint of JOHN WILEY & SONS, INC. New York – Toronto.
Course type:	Lectures, laboratory
Assessment method:	Individual evaluation, computer tests
Prerequisites:	Mathematics, Mechanics of materials
Primary target group:	2nd year students in Civil Engineering
Lecturer:	Bogumił Wrana, Prof., PhD, DSc
Contact person:	Bogumił Wrana, Prof., PhD, DSc, e-mail: wrana@limba.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**STRUCTURAL MECHANICS**
Erasmus subject area code:	06.4
Number of contact hours:	120
Course duration:	2 semesters
ECTS credits:	5+5
Course description:	• Introduction: function of structure, structural forms, support systems, division of structures: statically determinate and indeterminate structures, structural idealization (model), notation and sign convention. • Reciprocal theorems. Calculations of structural displacements considering unit-load theorem; influence of external loads, temperature and settlement, translation or rotation of supports. • Analysis of statically indeterminate structures. Degree of static indeterminacy. Base of flexibility (force) method, choose of equivalent statically determinate schemes. Canonical equations of the method and their physical interpretation. Calculations of planar (beams, frames, trusses, arches) and space (frames) structures by means of flexibility method considering external loads and influence of temperature and support displacements. Control of calculation results. Simplification in calculations resulting from symmetry of structures. Calculations of displacements in statically indeterminate structures. • Influence lines. • Analysis of statically indeterminate structures by means of stiffness (displacement) method. Degree of kinematical indeterminacy. Canonical equations of the method and their physical interpretation. Structural stiffness matrix. Calculations of planar bar structures by means of stiffness method considering external loads, influence of temperature and support displacements. • Structural instability – utilization stiffness method for calculation of critical forces in elastic beams and frames. • Basic assumptions for structural dynamics. Idealization of structures (models) and damping. Vibrating systems with one and several degrees of freedom – equations of vibrations; natural and forced (harmonic) vibrations; natural frequencies and corresponding mode shapes. • Approximate methods for calculation of natural frequency of structure.
Literature:	lecture notes
Course type:	lectures, practical (classes) and design exercises
Assessment method:	tests, design exercises, written and oral exams
Prerequisites:	knowledge of static and strength materials
Primary target group:	students in undergraduate programme in Civil Engineering
Lecturer:	Taduesz Tatara, Prof., PhD, DSc
Contact person:	Taduesz Tatara, Prof., PhD, DSc, phone #: +4812 6282348, e-mail: ttatara@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**STRUCTURAL MECHANICS**
Erasmus subject code:	06.4
Duration:	2 semesters
ECTS credits:	5+5
Course description:	First semester A. Lectures (30 h) 1. Introduction: principles and basic assumption (2 h) 2. Influence lines in statically determinate structures (4 h) 3. Displacements calculations in statically determinate structures (2 h) 4. Force Method (FM) – general algorithm of the method (2 h) 5. Problems of choosing adequate statically determinate schemes (6 h) 6. Methods of checking of the correctness of solutions (2 h) 7. Utilization of schemes symmetry (2 h) 8. Thermal and geometrical loads (4 h) 9. FM application for arches and 3D structures (6 h) B. Design exercises (30 h) During the design exercises students will carry out the following calculation works: 1. Influence lines for statically determinate beam and truss. 2. Displacements of statically determinate frame. 3. Beam and frame solution using Force Method. Second semester A. Lectures (30 h) 1. Displacement Method (DM) – formulation of the method (6 h) 2. Application of DM method for flat structures (12 h) 3. Fundamentals of structural dynamics (2 h) 4. Free vibrations of bar structures – Force Method (10 h) B. Design exercises 30 h During the design exercises students will carry out the following calculation works: 1. Beam and frame solution using Displacement Method. 2. Calculation of free vibration forms and frequencies for a bar structure.
Contact person:	Ryszard Masłowski, PhD, phone #: +48 12 6282348, e-mail: rmaslows@pk.edu.pl
Deadline:	June 30 or November 30

COURSE TITLE:	**TECHNICAL DRAWING AND COMPUTER GRAPHICS**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	45
Course duration:	1 semester
ECTS credits:	4
Course description:	Basic concepts of computer aided activities (CAX). Computer graphics – basic ideas, vector and raster graphics. Vector file formats. Graphic modellers (ACIS and Parasolid). Internal organization of a CAD program. Coordinate systems. Two dimensional drawing primitives and operations on such primitives. Text, dimensioning, blocks, hatching. Introduction to spatial modelling. Solids. Solid creation and solid representation. Boolean algebra and solid operations using such algebra. Projections. Projection techniques used with solid modelling. Surfaces and their mathematical descriptions used in computer graphics. L'Hermite, Bezier and B-spline based surfaces. Parametrical surfaces. Visualization: objectives, assumptions and methods. Solid presentation methods, wire frame models, flat, Gouraud and Phong shading, rendering. Raster file formats, colours, colour perception and colour modelling (RGB, CMYK, HSV). Colour palette interpolation and applications of colour modelling. The basics of rendering methods. Rendering algorithms. Texturing.
Reading:	AutoCAD manual
Course type:	Lecture/laboratory
Assessment method:	Evaluation of drawings created ac computer laboratory
Primary target group:	1st year students in Civil Engineering
Lecturer:	Michał Pazdanowski, PhD
Contact person:	Michał Pazdanowski, PhD, phone#: +48 12 628 2929, e-mail: plpazdan@cyf-kr.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**THEORY OF ELASTICITY**
Erasmus subject code	06.4
Number of contact hours:	45
Course duration:	1 semester
ECTS credits:	4
Course description:	Models of deformable bodies (elasticity, plasticity, rheology), Lagrange and Euler descriptions of motion, measures of deformation and stress, kinematics equations, constitutive equations, Lame and Bertrami-Michel equations, plane state of strain and stress, disks and plates, Airy stress function, Lagrange and Castigliano variational principles, approximate methods (Rayleigh-Ritz, finite difference, finite elements).
Literature:	• Fung Y.C., Foundations of Solid Mechanics, Prentice-Hall, 1965 • Eringen A.C., Nonlinear Theory of Continuous Media, McGraw-Hill 1962, • Leipholz H., Theory of Elasticity, Noordhoff, 1974
Course type:	Lecture, practical classes
Assessment method:	short tests, longer term projects, final written and oral exam
Prerequisites:	classical mechanics, vector and tensor analysis, ordinary and partial differential equations
Primary target group:	students in graduate programme in Civil Engineering
Lecturers:	Marian Mikołajek PhD and Dorota Jasińska PhD
Contact person:	Marian Mikołajek PhD, phone #: +48 12 628 2322, e-mail: Mikol@optra.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**TRANSPORTATION PLANNING**
Institute/Division:	Institute of Road and Railway Engineering
Number of contact hours:	45 hours
Course duration:	1 semester
ECTS credit:	4
Course description:	Classification of transport system; aspects of transportation; place of transport system in urban form; kinds of plans for development. Content of transportation study. Analysis of existing state, precondition for transport system development. Motorization hypothesis. Classical procedure with four steps (stadiums) for travel model: travel generation, travel distribution, modal split, traffic assignment among transport networks. Rules for street network development in the scale of the whole town. Transportation planning in residential district. Patterns of street networks in housing estate and criteria of assessment. Exercise: preparing of transportation study for middle size town (selected issues, including traffic macro-simulation in street network).
Literature:	1. "Transportation and traffic engineering Handbook", Institute of Transportation Engineers, Washington 1989 2. Transportation systems engineering: theory and methods", Cascetta E., Kluver – Dordrecht, 2001
Course type:	Lectures and design exercises
Assessment method:	Evaluation of prepared transportation study. Examination
Primary target group:	students in Road Engineering or in Transportation Engineering
Lecturers:	Prof. Andrzej Rudnicki and Andrzej Szarata, PhD, DSc
Contact person:	Andrzej Szarata, PhD, DSc, phone #: + 48 12 628 25 33, e-mail: aszarata@transys.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**ADVANCED COMPUTER GRAPHICS**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	60
Course duration:	1 semester
ECTS credits:	6
Course description:	The aim of this one semester course is a presentation of the selected aspects of advanced computer graphics techniques and tools. In particular this course concentrates on the techniques for visualization of the three-dimensional scientific data sets. The course starts with the recapitulation of the basic facts regarding raster and vector graphics. Then it recalls the description of the 3D geometric transformations including viewing transformations. This is followed by the overview of the role and the techniques for building the visualization pipeline. The three subsequent presentations discuss a description of various objects used in computer graphics including: representation of solids, grids and representation of scientific data sets, NURBS representation of curves and surfaces. On the practical side this course presents advanced visualization tools based on the VTK (The Visualization Toolkit) C++ library. The course explains the principles of programming with VTK and presents certain visualization techniques for the scientific data sets based on unstructured grids. Finally a short introduction to the photo-realistic visualization and Blender program is given. Following the tutorial part, the students will work on individual visualization projects using the VTK library. The project part of this course requires programming skills. After this course the students will understand the architectural principles of modern visualization software, will understand the role of data structures in representing various geometric objects, in particular the unstructured grids. They will be able to create, compile and run VTK programs and to program several basic visualization algorithms.
Literature:	Foley, van Dam, Feiner, Hughes, “Computer Graphics. Principles and Practice”, Schroeder, Martin, Lorensen, “The Visualization Toolkit. An Object-Oriented Approach to 3D Graphics”
Course type:	Tutorial plus individual programming project
Assessment method:	Evaluation of the final project submission
Prerequisites:	Algorithms and Data Structures, Object-Oriented Programming
Lecturer:	Roman Putanowicz, MSc
Contact person:	Roman Putanowicz, MSc, e-mail: putanowr@l5.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**ADVANCED SOIL MECHANICS AND GEOTECHNICAL ENGINEERING**
Institute/Division:	Civil Engineering/Soil Structure Interaction
Number of contact hours:	30 lectures + 30 projects
Course duration:	1 semester
ECTS credit:	4
Course description:	Special Foundations - Diaphragm walls. Retaining structures. Structures of reinforced soil. Ground Improvement Techniques - Surface strengthening (mechanically stabilization, binder sealing), soil replacement, static and dynamic compaction, vibro-systems (vibro-compaction, vibro-replacement), dynamic replacement, micropiles, jet grouting method, deep mixing; vertical wick drains, lightweight fill materials, geotextiles, slope stability: anchoring, nailing. Geotechnical problems in environmental protection. Seismic and para-seismic influences on soil behaviour. Soil-Structure interaction. Numerical soil models.
Literature:	1. Atkinson J.H., Bransby P.L. (1978): The mechanics of soil. An introduction to critical state soil mechanics. McGHRAW-HILL 2. Head K.H. (1992): Manual of soil laboratory testing. Volume 1, Soil classification and compaction tests. Volume 2, Permeability, shear strength and compressibility tests. Volume 3, Effective stress tests. Second Edition. Halsted Press: an Imprint of JOHN WILEY & SONS, INC. New York – Toronto.
Course type:	Lectures, projects
Assessment method:	Individual evaluation, computer tests
Prerequisites:	Mathematics, Soil mechanics
Primary target group:	3rd year students in Civil Engineering
Lecturer:	Bogumił Wrana, Prof., PhD, DSc
Contact person:	Bogumił Wrana, Prof., PhD, DSc, e-mail: wrana@limba.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**APPLICATIONS OF ARTIFICIAL NEURAL NETWORKS**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	This introductory course on artificial neural networks applications will give an overview of basic concepts, techniques, and algorithms in neural networks, beginning with topics such as a linear regression, least-square estimation and ending up with more recent topics such as Bayesian neural networks and Gaussian processes. The course will give the student the basic ideas and intuition behind modern neural networks models and applications in civil engineering as well as a bit more formal understanding of how, why, and when they work. The underlying theme in the course is statistical inference as it provides the foundation for most of the methods covered.
Literature:	C. Bishop, “Neural networks for pattern recognition”, 1995
Course type:	lectures and exercise classes
Assessment method:	problem sets evaluation
Prerequisites:	calculus, linear algebra, statistics
Primary target group:	3rd and 4th year students in Civil Engineering
Lecturer:	Marek Słoński, DSc, PhD
Contact person:	Marek Słoński, DSc, PhD, phone #: +48 12 628 25 49; e-mail: mslonski@l5.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**BASIC COURSE IN COMPUTATIONAL MECHANICS**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	The aim of the course is to present the mathematical foundations, algorithms and selected applications of discretization methods. In particular, different aspects of finite element (FE) modelling are covered. Finite elements for one-, two- and three-dimensional applications are discussed. Fundamental stationary and time dependent problems of mechanics are formulated. Eigen problems of structural stability and free vibrations are derived. The Newmark method of solving the equations of motion is presented. Sources of nonlinearity in mathematical models and FE algorithms for nonlinear problems are discussed. Concepts of alternative discretization methods (finite difference method, boundary element method, meshless methods) are reviewed.
Literature:	O. C. Zienkiewicz; R.L.Taylor, "Finite Element Method", Elsevier 2000. Cook, R.D., Finite Element Method for Stress Analysis, J. Wiley & Sons, 1995. Ottosen, N. and Petersson, H., Introduction to the Finite Element Method, Prentice Hall, 1992
Course type:	Theoretical-computational
Assessment method:	Individual exercises of FEM computations, examination test
Prerequisites:	Passed courses: strength of materials, structural mechanics, fundamentals of FEM
Lecturers:	Jerzy Pamin, Prof. PhD, DSc and Witold Cecot PhD, DSc
Contact person:	Prof. Jerzy Pamin, phone #: +48 12 628 25 48; e-mail: jpamin@l5.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**BOUNDARY ELEMENT METHOD**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	15
Course duration:	1 semester
ECTS credits:	2
Course description:	The objective of the course is to explain the idea, advantages and disadvantages of the boundary element method (BEM). The course outline is as follows. 1. Introduction: examples of discretization by boundary elements, areas of application, integration by parts, fundamental solutions, calculation of singular integrals, basics of the Sobolev Spaces. 2. Boundary integral equations for the Poisson problem, discretization by boundary elements (collocation and variational formulations), computation of solution and flux in the domain. 3. Indirect boundary element method (formulation, discretization, advantages, comparison with the Trefftz method). 4. Direct and indirect BEM for 1D bar problem. 5. Coupling of the BEM and FEM 6. Error analysis and mesh adaptation for the boundary elements. 7. Comparison of FEM, FDM and BEM Students are supposed to prepare 2 short computer programs that make use of the boundary element algorithm. The Matlab environment will be used for that purpose.
Literature:	F. Hartmann, “Introduction to Boundary Elements”, Springer-Verlag, 1990
Course type:	Lectures and laboratory
Assessment method:	Laboratory assignments and two tests given in class
Prerequisites:	Numerical methods, continuum mechanics
Primary target group:	Postgraduate students of engineering
Lecturer:	Witold Cecot, PhD, DSc
Contact person:	Witold Cecot, phone #: +48 12 628 21 67; e-mail: plcecot@cyf-kr.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**COMPUTATIONAL INTELLIGENCE**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	This introductory course on computational intelligence will give an overview of basic concepts, techniques, and algorithms from artificial neural networks, machine learning, fuzzy systems and evolutionary computing. We will begin with topics such as a linear regression, least-square estimation, simple genetic algorithm and ending up with more recent topics such as kernel methods and probabilistic graphical models. The course will give the student the basic ideas and intuition behind modern computational intelligence models and applications in civil engineering as well as a bit more formal understanding of how, why, and when they work. The underlying theme in the course is statistical inference as it provides the foundation for most of the methods covered.
Literature:	C. Bishop, “Machine learning for pattern recognition”, 2006 J-S. Jang et al., “Neuro-fuzzy and soft computing”, 1997
Course type:	lectures and exercise classes
Assessment method:	problem sets evaluation
Prerequisites:	calculus, linear algebra, statistics
Primary target group:	3rd and 4th year students in Civil Engineering
Lecturer:	Marek Słoński, DSc, PhD
Contact person:	Marek Słoński, DSc, PhD, phone #: +48 12 628 25 49; e-mail: mslonski@l5.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**COMPUTATIONAL PLASTICITY AND DAMAGE MODELS WITH APPLICATIONS**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	The course presents theoretical and computational issues listed below: 1. Concepts of plastic flow and damage of materials. 2. Thermodynamic foundations of constitutive models. 3. Yield functions and hardening hypotheses. 4. Damage measures and growth functions. 5. Loading/unloading conditions. 6. Combinations of plasticity and damage. 7. Computational implementation of plasticity and damage models. 8. Consistent linearization of equations. 9. Applications in the simulation of deformation and failure of metals, (reinforced) concrete and soil. 10. Material softening and its consequences
Literature:	- Simo, J.C. and Hughes, T.J.R., Computational Inelasticity. Interdisciplinary Applied Mathematics Vol. 7, Springer-Verlag, New York, 1998. - Jirasek, M. and Bazant, Z.P., Inelastic Analysis of Structures, J. Wiley & Sons, Chichester, 2002. de Borst, R. and Sluys, L.J., - Computational Methods in Non-linear Solid Mechanics, Lecture Notes, Delft University of Technology, Delft 1999.
Course type:	Theoretical-computational
Assessment method:	Individual project of FEM application in structural design, examination test
Prerequisites:	Passed courses: strength of materials, structural mechanics, fundamentals of FEM, computational mechanics
Lecturer:	Jerzy Pamin, PhD, DSc
Contact person:	Jerzy Pamin, PhD, DSc, phone #: +48 12 628 25 48; e-mail: jpamin@l5.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**DESIGNING OF THIN-WALLED STEEL STRUCTURES**
Institute/Division:	Institute of Building Materials and Structures,
Erasmus subject code:	06.4
Number of contact hours:	15
Course duration:	1 semester
ECTS credit:	2
Course description:	The one-semester course is focused on the designing of steel thin-walled structures in which the post-buckling reserve of strength is to be utilized. It concerns steel girders, cold-rolled sections and steel panels. The course is divided info four (4) following topics: 1. Definition of the post-buckling strength reserve and the question of steel structures sensitivity to imperfections (2 hrs) 2. Question of the post-buckling behaviour of steel girders in bending, compression and torsion (experimental investigations, numerical methods of analysis, approaches after codes) (6 hrs) 3. Structural design of thin-walled beams from cold-formed sections, purlin systems, ultimate state criteria for purlins (5 hrs) 4. Ultimate carrying-capacity of steel shell panels (2hrs)
Literature:	1. Marek Piekarczyk, Taking Advantage of Post-Buckling strength in Designing of Steel Structures, Monograph 299, Politechnika Krakowska, Cracow 2004 2. European steel Design Education Programme. ESDEP WG 9, THIN-WALLED CONSTRUCTION, Lectures 91-93.
Course type:	Lectures
Assessment method:	Test
Prerequisites:	Graduation from basic course on Metal Structures
Primary target group:	4th and 5th year students in Civil Engineering
Lecturer:	Marek Piekarczyk, PhD, DSc
Contact person:	Marek Piekarczyk, PhD, DSc, phone #: +48 12 628 2327 or +48 12 628 2324, e-mail: mpiekar@usk.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**FINITE ELEMENT METHOD – ADVANCED TOPICS**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	The objective of the course is to explain certain advanced aspects of the finite element method (FEM). The course outline is as follows. 1. Introduction: basics of the Sobolev Spaces, examples of multi-field formulations, existence and uniqueness of solution, error of numerical modelling. 2. Examples of discretization by mixed FEM, inf-sup condition. 3. Assessment of the approximation error (interpolation, residual, recovery, goal oriented approaches). 4. Mesh adaptation (strategy, examples illustrating various types and techniques of adaptation and convergence improvement). 5. Analysis of selected inelastic problems: formulation, radial return algorithm, elastic-visco-plastic problems. 6. Examples and solutions of geometrically non-linear problems: modelling of contact, large deformations. Students are supposed to prepare 3 short computer programs that make use of the finite element algorithm. The Matlab environment and CALFEM toolbox will be used.
Literature:	O. C. Zienkiewicz; R.L.Taylor, “Finite Element Method”, Elsevier 2000. D. Braess. “Finte Elements, Theory, Fast Solvers, and Applications in Solid Mechanics”, Cambridge University Press, 1997
Course type:	Lectures and laboratory sessions
Assessment method:	Laboratory assignments and two tests given in class
Prerequisites:	Numerical methods, continuum mechanics, FEM basics
Primary target group:	Graduate students in Engineering
Lecturer:	Witold Cecot, PhD, DSc
Contact person:	Witold Cecot, PhD, DSc, phone #: +48 12 628 21 67; e-mail: plcecot@cyf-kr.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**INTRODUCTION TO FINITE ELEMENT CODE - ABAQUS**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	15
Course duration:	1 semester
ECTS credits:	2
Course description:	ABAQUS is belongs to powerful engineering simulation programs, based on the finite element method, which can solve problems ranging from relatively simple linear analyses to the most challenging nonlinear simulations. This one-semester course is focused on giving students guidance in creating engineering structures (solids, shells) in ABAQUS/Standard module, analyzing these models and viewing results. To benefit from this course, some previous exposure to the finite element method is recommended. First part of the course is focused on a simple example, covers the basis of using ABAQUS. By the end of this part students will know the fundamentals of how to prepare a model for an simulation, check the data, run the analysis job, and view the results (the models of the cantilever beam and overhead hoist). The difference between full and reduced integration is discussed. The illustration of numerical problems - hour glassing and shear locking is also done. The following part of the course presents an overview of the main element families. The use of continuum (solid) elements, shell elements, and beam elements is discussed next. The use of three-dimensional, continuum elements to model the connecting lug is shown. The students will be also asked to model the skewed plate, determine the midspan deflection of this structure and assess whether a linear analysis is valid for this problem. The next task will be an identification of the critical members and joints in the cargo crane. This course covers stress/displacement simulations, concerning linear static analyses.
Reading:	“Introduction to ABAQUS Standard”, “ABAQUS User Manual”
Course type:	Laboratory
Assessment method:	Evaluation of the project given by tutor
Prerequisites:	The theory of Finite Element Method
Primary target group:	4th year students in Engineering
Lecturer:	Piotr Mika, PhD
Contact person:	Piotr Mika, PhD, phone #: +48 12 628 25 49, e-mail: plmika@cyfronet.krakow.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**MECHANICS OF COMPOSITES**
Institute/Division:	Civil Engineering/Solid Mechanics
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credit:	3
Course description:	1. Introduction to Composite Materials (characteristics of typical composites materials, basic terminology, manufacture of fiber-reinforced laminates). 2. Constitutive equations for anisotropic materials (compliance and stiffness matrices, engineering constants of single lamina, on-axis and off-axis configurations) 3. Classical theory of laminates (fundamentals of thin plates theory, resultant laminate forces and moments, compliance and stiffness laminate's matrices, thermal stresses and strains). 4. Classification of composite laminates (definitions and terminology, cross-ply and angle-ply laminates, balanced laminates, quasi-isotropic laminates). 5. Strength analysis of laminates (basic strength criteria, laminate strength analysis procedure, thermal and mechanical stress analysis). 6. Micromechanics of composite materials (mechanics of materials approach to stiffness, strength and thermal constants, semi-empirical approach, rule of mixtures, inverse rule of mixtures). 7. Diverse problems of mechanics of composites (fixing of laminate elements, stress concentration induced by holes, fundamentals of fracture mechanics and its application to composite materials).
Literature:	1. Robert M. Jones, Mechanics of Composite Materials, Taylor & Francis; 2 edition, 1998 2. J. German, Fundamentals of Mechanics of Composite Laminates, Wyd. Politechniki Krakowskiej, ISBN 83-903878-4-0 (in Polish), 1996
Course type:	Lectures and exercises
Assessment method:	Individual evaluation
Prerequisites:	Mathematics, Mechanics of Materials, Theory of Elasticity
Primary target group:	4th year students in Civil Engineering
Lecturer:	Janusz German, Prof., PhD, DSc
Contact person:	Janusz German, Prof., PhD, DSc, phone #: +48 12 628 2343, e-mail: jg@limba.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**OPTIMIZATION – THEORY AND PRACTICE**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	The objective of the course is to explain the concepts, capabilities and applicability of optimization. The algorithms presented will be illustrated by solution of numerous examples stemming from mechanics, civil engineering and every day life. The course outline is as follows. 1. Introduction (history, engineering examples, statement and classification of an optimization problems). 2. Classical optimization methods for single- and multivariable unconstrained and constrained objective functions with equality and inequality constraints. 3. Linear programming (formulation, definitions and theorems, simplex algorithm). 4. Quadratic programming in 1D (accelerated step size search methods, Fibonacci and golden section methods, interpolation methods). 5. Unconstrained minimization methods (random search, conjugate gradient, Newton's method). 6. Constrained optimization techniques (random search methods, methods of feasible directions, interior and exterior penalty function methods, augmented Lagrange multiplier, convergence criteria, dynamic programming and discretization, global optimization). 7. Review of various other methods (integer programming, probabilistic programming, multi-objective optimization, genetic algorithms, neural network based optimization, optimization of fuzzy systems). Students are supposed to practice the algorithms presented during lectures in the Matlab environment.
Literature:	S. Rao, “Engineering Optimization - Theory and Practice”, J. Wiley 1996
Course type:	Lectures and laboratory
Assessment method:	Laboratory assignments and two tests given in class
Prerequisites:	Numerical methods, continuum mechanics
Primary target group:	Students in graduate programme in Engineering
Lecturer:	Witold Cecot, PhD, DSc
Contact person:	Witold Cecot, phone #: +48 12 628 21 67, e-mail: plcecot@cyf-kr.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**PRECAST AND PRESTRESSED CONCRETE STRUCTURES**
Institute/Division:	Institute of Building Materials and Structures
Erasmus Subject Code:	06.4
Number of contact hours:	60
Course duration:	1 semester (usually Spring semester)
ECTS credits:	5
Course description:	The teaching process is focused on the introduction of the fundamentals of technology and design of precast concrete structures including especially procedures of check of every work phase. Several details specific for precast structures are widely discussed together with their evaluation methods. Practical exercise carried out in parallel includes a selected part of a design of a typical precast concrete structure. The teaching process is focused on the introduction of the fundamentals of PC structures design including procedures of check of every design phase. Moreover, the presentation includes a wide information on the technology as well as on requirements of quality. Several workshop meetings on building sites complete the teaching course. In parallel, practical exercise is carried out which includes a complete design of a typical PC structure (slab, girder).
Literature:	K. S. Elliot, Multi-Storey Precast Concrete Framed Structures A. Naaman – Prestressed concrete analysis and design, Techno Press 3000 Ann Arbor, MI E. G. Nawy – Prestressed concrete – a fundamental approach, Prentice Hall Intl. A. Ghali, R. Favre – Concrete structures – stresses and deformations, E&FN Spon
Course type:	Lecture (30h) + design workshop (30h)
Assessment method:	Final exam including verification of theoretical assumptions of design for a selected element specific for this type of structures.
Prerequisites:	Mechanics, Structural mechanics, Strength of Materials, Concrete technology, Building materials
Primary target group:	4th year students in Civil Engineering
Lecturers:	Andrzej Seruga Prof., DSc, PhD and Wit Derkowski, PhD
Contact person:	Andrzej Seruga Prof., DSc, PhD, e-mail: aseruga@imikb.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**SOIL-STRUCTURE INTERACTION**
Institute/Division:	Civil Engineering/Soil Structure Interaction
Number of contact hours:	30 lectures + 30 projects
Course duration:	1 semester
ECTS credit:	4
Course description:	Separate analysis of an underground structural system and foundations with subsoil versus more advanced analysis with regard to the soil-structure interaction. Simplified methods: Winkler's model of subsoil – it's drawbacks. Calculation with regard to structure interaction with subsoil modelling by an elastic medium. Elasto-plastic modelling of soils and structural materials: geological media (soils, rocks, concrete masonry). Modelling of soil-structure interaction problems by FEM. Comparison and discussion of sample analysis carried on with different material models for soil and structure materials.
Literature:	1. Atkinson J.H., Bransby P.L. (1978): The mechanics of soil. An introduction to critical state soil mechanics. McGHRAW-HILL 2. Head K.H. (1992): Manual of soil laboratory testing. Volume 1, Soil classification and compaction tests. Volume 2, Permeability, shear strength and compressibility tests. Volume 3, Effective stress tests. Second Edition. Halsted Press: an Imprint of JOHN WILEY & SONS, INC. New York – Toronto.
Course type:	Lectures, projects
Assessment method:	Individual evaluation, computer tests
Prerequisites:	Mathematics, Soil mechanics
Primary target group:	3rd year students in Civil Engineering
Lecturer:	Bogumił Wrana, Prof., PhD, DSc
Contact person:	Bogumił Wrana, Prof., PhD, DSc, e-mail: wrana@limba.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**SPECIAL FOUNDATIONS AND GROUND IMPROVEMENT TECHNIQUES**
Institute/Division:	Civil Engineering/Soil Structure Interaction
Number of contact hours:	30 lectures + 30 projects
Course duration:	1 semester
ECTS credit:	4
Course description:	Special Foundations - Wells and caissons. Diaphragm walls. Retaining structures. Structures of reinforced soil. Ground Improvement Techniques - Surface strengthening (mechanically stabilization, binder sealing), soil replacement, static and dynamic compaction, vibro systems (vibrocompaction, stone columns), grouting, micropiles, jet grouting method, vertical wick drains, lightweight fill materials, geotextiles, slope stability: anchoring, nailing.
Literature:	1. Atkinson J.H., Bransby P.L. (1978): The mechanics of soil. An introduction to critical state soil mechanics. McGHRAW-HILL 2. Head K.H. (1992): Manual of soil laboratory testing. Volume 1, Soil classification and compaction tests. Volume 2, Permeability, shear strength and compressibility tests. Volume 3, Effective stress tests. Second Edition. Halsted Press: an Imprint of JOHN WILEY & SONS, INC. New York – Toronto.
Course type:	Lectures, projects
Assessment method:	Individual evaluation, computer tests
Prerequisites:	Mathematics, Soil mechanics
Primary target group:	3rd year students in Civil Engineering
Lecturer:	Bogumił Wrana, Prof., PhD, DSc
Contact person:	Bogumił Wrana, Prof., PhD, DSc, e-mail: wrana@limba.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**SURFACE STRUCTURES (PLATES AND SHELLS)**
Institute/Division:	Institute for Computational Civil Engineering
Erasmus subject code:	06.4
Number of contact hours:	45
Course duration:	1 semester
ECTS credits:	4
Course description:	The aim of the course is to present the mechanical behaviour of surface structures (panels, plates and shells). Basic definitions and assumptions are presented first. The sets of equations for plates and shells (in particular shells of revolution and shallow shells) are derived, describing relations between displacement, strain and stress fields. For certain cases analytical (exact and approximate) solution methods are used. The finite element (FE) method is presented as the main computational tool especially efficient in the analysis of plates and shells. A survey of FE types is performed. The issues of proper discretization and approximation are discussed together with selected benchmark examples. The results of FE computations are compared with the analytical solutions.
Literature:	O.C. Zienkiewicz, R.L. Taylor, “The finite element method”, McGRAW-HILL, 1991
Course type:	Lectures, exercises, individual design exercises
Assessment method:	Individual design exercise including analytical solutions and FEM computations, examination test
Prerequisites:	Passed courses: strength of materials, structural mechanics, fundamentals of FEM
Lecturer:	A. Stankiewicz, MSc
Contact person:	A. Stankiewicz, MSc, phone #: +48 12 628 25 46; e-mail: A.Stankiewicz@l5.pk.edu.pl or marad@l5.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**TECHNOLOGY OF PREFABRICATION**
Institute/Division:	Institute of Building Materials and Structures, Section of Concrete Technology.
Erasmus subject code:	06.4
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	This course of technology of concrete prefabrication is divided into three parts: class, design and laboratory ones. Class part is focused on brief presentation of assortment of prefabrication units (concrete, reinforced concrete and prestressed ones), their technology of production (e.g. pre-tension prestressed, vibro-pressed, thermal cured etc.) and main standard (EN-13369) requirements. On design part students learn about prefabrication plants and production methods organizing and then they design a production line for two types of large scale units. Laboratory part deals with concrete technology for prefabrication (e.g. lightweight, self-compacting, wet, sand, fly-ash concretes) and small-sized units testing. Students carry out some laboratory exercises (practical designing of some of mentioned above concrete).
Literature:	Basic literature on concrete technology (e.g. Properties of concrete by A.M. Neville) and a few dozen European standards referred to prefabrication units.
Course type:	Classes, design and laboratory course
Assessment method:	Review and evaluation of completed exercises and design assignments. Testing subject knowledge orally and on paper.
Prerequisites:	Classroom with multimedia equipment and small-sized precast units to show, Concrete Technology Laboratory, basic knowledge on building materials (esp. Concrete Technology)
Primary target group:	4th year students in Civil Engineering
Lecturers:	Lucyna Domagała, DSc and Maciej Urban, DSc
Contact person:	Maciej Urban, DSc, phone #: +48 12 628 2363; e-mail: murban@imikb.wil.pk.edu.pl
Deadline for application:	June 30 or November 30

TYPE & FIELD OF STUDIES: BSc in MECHANICS AND MACHINE DESIGN

PROGRAM TITLE: MECHANICS AND MACHINE DESIGN

Faculty/Department: Faculty of Mechanical Engineering

Duration: 7 semesters (3.5 academic years)

Erasmus subject code: 06.1

Duration: 7 semesters

ECTS credits: 210

Program description:

Mechanics and Machine Design is the basis engineering course. In modern industry the need for an engineer is constantly growing. The modern engineer after this course will have skills in machine design and technology, based on the solid knowledge of engineering theory such as mechanics, material strength, thermodynamics etc. Also subjects in economical engineering analysis and basic automatics and robotics are within the frame of this course.

The aim of this BSc Programme in Mechanics and Machine Design is to provide the student with a solid engineering basis of modern engineering methods directed towards industrial applications. The programme includes compulsory lectures, tutorials, laboratories and practical exercises in most lectured subjects. The courses are constantly updated to meet modern engineering requirements from the industry. Full list of subjects is given below with training hours and ETCS points.

Program of studies:

A. GENERAL EDUCATION 315h, 14 ECTS

1. Humanistic courses 60h, 4 ECTS
   1.1. Psychology and Sociology of Work 30h, 2 ECTS
   1.2. Economics/ Interpersonal Communication (1 of 2) 30h, 2 ECTS
2. Intellectual Property Rights 15h, 1 ECTS
3. Economics of Enterprises 30h, 3 ECTS
4. Foreign Language 150h, 6 ECTS
5. Physical Training 60h, 0 ECTS

B. BASIC COURSES 660h, 61 ECTS

1. Mathematics 150h, 15 ECTS
2. Physics 60h, 6 ECTS
3. Applied Mechanics, Fluid Mechanics 300h, 28 ECTS
   3.1. Theoretical Mechanics 105h, 10 ECTS
   3.2. Strength of Materials 150h, 13 ECTS
   3.3. Fluid Mechanics 45h, 5 ECTS
4. Information Technology 30h, 2 ECTS
5. Informatics 30h, 2 ECTS
6. Computational Methods for Engineers 30h, 3 ECTS

7. Introduction to FEM and its Engineering Applications 45h, 4 ECTS
8. Work Safety and Ergonomics 15h, 1 ECTS

C. FIELD COURSES 1125h, 92 ECTS

1. Machine Design and Operation, Engin. Graphics 315h, 27 ECTS
   1.1. Machine Design 135h, 10 ECTS
   1.2. Dynamics of Machines 45h, 4 ECTS
   1.3. Operation and Reliability of Machines (basic) 30h, 3 ECTS
   1.4. Engineering Graphics 45h, 4 ECTS
   1.5. Theory of Machines and Mechanisms 30h, 3 ECTS
   1.6. Hydraulic and Pneumatic Drive and Control 30h, 3 ECTS
2. Materials Science 105h, 9 ECTS
   2.1. Basis of Materials Science 30h, 3 ECTS
   2.2. Engineering Materials 75h, 6 ECTS
3. Technology Egineering 240h, 17 ECTS
   3.1. Manufacturing Technology, Proces. of Materials I - 120h, 8 ECTS
   3.2. Manufacturing Technology, Proc. of Materials II – 75h, 6 ECTS
   3.3. Manufacturing Process Planning 45h, 3 ECTS
4. Technical Thermodynamics 90h, 8 ECTS
   4.1. Thermodynamics 60h, 6 ECTS
   4.2. Energy Sources and Conversion Systems 30h, 2 ECTS
5. Electrotechnics and Electronics 75h, 5 ECTS
   5.1. Electrotechnics 45h, 3 ECTS
   5.2. Electronics 30h, 2 ECTS
6. Automatics and Robotics 60h, 6 ECTS
   6.1. Introduction to Automatics 30h, 3 ECTS
   6.2. Industrial Robots and Manipulators 30h, 3 ECTS
7. Metrology and Measurement Systems 60h, 5 ECTS
   7.1. Metrology 30h, 2 ECTS
   7.2. Thermal and Machine Measurement 30h, 3 ECTS
8. Environment Administration and Ecology 60h, 6 ECTS
   8.1. Systems of Environment Administr. and Ecology 30h, 4 ECTS
   8.2. Environment Protection Systems and Facilities 30h, 2 ECTS
9. Optional Subjects (1 of each set 9.1...9.4) 120h, 8 ECTS
   9.1. Biomechanical Engineering 30h, 2 ECTS
      Mechanics of Materials 30h, 2 ECTS
      FEM in Modern Engineering Analysis 30h, 2 ECTS
      Methods of Optimal Design 30h, 2 ECTS
   9.2. Heavy Duty Machines and Transportation Devices 30h, 2 ECTS
      Automobile Vehicles 30h, 2 ECTS
      Railway Transportation Means 30h, 2 ECTS
   9.3. Refrigeration, Air Conditioning and Ventilation 30h, 2 ECTS
      Power Egineering Machinery 30h, 2 ECTS
      Combustion Engines 30h, 2 ECTS
   9.4. Hybrid Manufacturing 30h, 2 ECTS

Coordinate Measurement Systems 30h, 2 ECTS
Applic. of Thermal Analysis Meth. in Technics 30h, 2 ECTS
Industrial Training 4 weeks, 1 ECTS

Eligibility/Admission: Applicants should have earned high school diploma (International Baccalaureate or equivalent)

Tuition fee: 4000 Euro per year

Contact person: Prof. Piotr Cyklis, phone #: +4812 628 35 83;
e-mail: pcyklis@mech.pk.edu.pl

Application procedures & deadlines: Scans of the following documents are to be submitted by persons applying for admission by **31 May**: Application Form (available to be downloaded from www.bwm.pk.edu.pl, high school diploma, Official Transcript, passport (page with the holder's photo), doctor's report (available to be downloaded from www.bwm.pk.edu.pl). Note: Both diploma and Official Transcript are to be officially translated into Polish language. Please send all documents via e-mail to Ms. Kamila Rościszewska at kamir@pk.edu.pl

TYPE & FIELD OF STUDIES: **MSc in MECHANICS AND MACHINE DESIGN**

PROGRAM TITLE: **ADVANCED COMPUTATIONAL MECHANICS**

Faculty/Department: Faculty of Mechanical Engineering, Institute of Applied Mechanics

Duration 4 semesters

Erasmus subject code: 06.1

Duration: 4 semesters (2 academic years)

ECTS credits: 120

Program description:

Advanced Computational Mechanics (ACM) is playing an ever-increasing role in the activities of many international scientific institutions, research and development laboratories as well as technological centres. ACM provides a support for many activities related to science and technologies, including the reliability engineering. The use of computers is now essential in the process of design and structural optimisation. It begins with the proper choice of modern materials and ends up with setting all the parameters of the final complex product.

The aim of this Master Programme in Advanced Computational Mechanics is to provide the student with a solid scientific and technical basis of theoretical and applied mechanics and modern numerical methods. The programme includes compulsory lectures, tutorials, laboratories and practical exercises in computational mechanics. It is thought to equip the students with the set of tools needed in the professional life comprising scientific research, technological development and large European Projects.

Programme of studies:

1st semester
Analytical Mechanics 60h, 6 ECTS
Solid State Physics 30h, 4 ECTS
Mathematical Modelling 30h, 4 ECTS
Materials Science 45h, 5 ECTS
Computer Methods for Eng. 45h, 5 ECTS
Solid Mechanics 60h, 6 ECTS

2nd semester
Modelling of Dynamical Sys. 30h, 4 ECTS
Continuum Damage Mechanics 30h, 3 ECTS
Fluid Mechanics 45h, 5 ECTS
Thermodynamics 45h, 5 ECTS
Stability of Structures 30h, 4 ECTS
Structural Optimisation 30h, 4 ECTS
Reliability of Structures 30h, 3 ECTS

3rd semester
Modelling in Machine Design 60h, 6 ECTS
Modern Structural Materials 30h, 4 ECTS
Integrated Processing Systems 60h, 6 ECTS
Object Oriented Programming 15h, 2 ECTS
Elective Subject 30h, 4 ECTS
Adv. Modelling of Mat. & Struct. 60h, 6 ECTS
Individual Project 90h, 9 ECTS

4th semester

	Large Scale Europ. Projects 15h, 2 ECTS Diploma Seminar 30h, 3 ECTS Diploma Work 180h, 20 ECTS
Eligibility/Admission:	Students who have completed Bachelor Programme in Mechanical Engineering or related field and obtained Bachelor's Degree
Fees:	4000 Euro per year
Contact person:	Prof. Błażej Skoczeń, phone #: +48 12 628 33 84; e-mail: blazej.skoczen@pk.edu.pl
Application procedures & deadlines:	Scans of the following documents are to be submitted by persons applying for admission by **31 May**: - Application Form (available to be downloaded from www.bwm.pk.edu.pl, - high school diploma, - Official Transcript, passport (page with the holder's photo), - doctor's report (available to be downloaded from www.bwm.pk.edu.pl). Note: Both diploma and Official Transcript are to be officially translated into Polish language. Please send all documents via e-mail to Ms. Kamila Rościszewska at kamir@pk.edu.pl

TYPE & FIELD OF STUDIES: **MSc in MECHANICS AND MACHINE DESIGN**

PROGRAMME TITLE: **COMPUTER AIDED DESIGN IN MECHANICAL ENGINEERING**

Faculty/ Department: Faculty of Mechanical Engineering, Institute of Applied Informatics

Duration: 4 semesters

ECTS credits 120

Programme description: This is a MSc course for BSc graduates. It is mainly focused on improving students' skills in application of computer science: CAD, CAM and CAE systems, programming, artificial intelligence, computer networks. Nowadays engineers must be skilled in many fields of computer science. The study gives a professional knowledge which allows our graduates for efficient using of CAD 2D and 3D systems as AutoCad, Intercad, Pro/E, Inventor, Solid Works. The students will be able to carry out computation of structural strength using Pro/Mechanica or Cosmos Works and develop computer programs using Delphi, C++ or Java. They will know how to solve construction problems with the most modern software and automatize their work using programming environments. Our graduates can work in a big sector of engineering industry including machine building, automotive companies, aircraft industry and many others.

Programme of studies:

1st semester
Computer Methods using software Maple 60h, 6 ECTS
CAD 2D systems 60h, 5 ECTS
CAD 3D systems 60h, 5 ECTS
Simulation of drives and control systems 30h, 4 ECTS
Advanced computer networks, 30h, 5 ECTS
Basics of programming 60h, 5 ECTS

2nd semester
Computer graphics 30h, 4 ECTS
Advanced CAD systems 60h, 7 ECTS
FEM systems 60h, 6 ECTS
Object oriented programming 60h, 5 ECTS
Integrated CAD systems: Pro/E, 60h, 5 ECTS
Computer networks 30h, 3 ECTS

3rd semester
Administration and security of information systems 30h, 4 ECTS
Design of mechanisms 75h, 6 ECTS
CFD systems 60h, 6 ECTS
Automation of CAD systems 30h, 4 ECTS
FEM systems – Pro/Mechanica 60h, 6 ECTS
Intelligent systems 45h, 4 ECTS

4th semester
Image analysis 30h, 5 ECTS
Diploma seminar 30h, 5 ECTS
Diploma thesis 20 ECTS

Eligibility / Admission: Students who have completed Bachelor Program in Mechanics and Machine Design or related and who obtained Bachelor's Degree

Tuition fee:	4000 Euro per year
Contact person:	Edward Lisowski, Prof. DSc, PhD; phone #: +48 12 628 33 51, e-mail: lisowski@mech.pk.edu.pl
Application procedures & deadlines:	Scans of the following documents are to be submitted by persons applying for admission by **31 May**: Application Form (available to be downloaded from www.bwm.pk.edu.pl, bachelor's diploma, Official Transcript, passport (page with the holder's photo), doctor's report (available to be downloaded from www.bwm.pk.edu.pl). Note: Both diploma and Official Transcript are to be officially translated into Polish language. Please send all documents via e-mail to Ms. Kamila Rościszewska at kamir@pk.edu.pl

TYPE and FIELD OF STUDIES: MSc in MECHANICAL SCIENCE

PROGRAMME TITLE: COMBUSTION ENGINES

Faculty / Department: Mechanical Faculty / Institute of Vehicles and Combustion Engines / Combustion Engines Department

Duration: 4 semesters

Programme description: Programme of studies on Combustion Engines Speciality enables development of the engineer's skill in the field of mechanical engineering based on the knowledge obtained formerly and application of that knowledge to the construction, technology, testing and use of combustion engines.
Graduates of this Speciality have ability of apply of the basic knowledge to solve the technical problems concerned combustion engines of different types and size as well as turbine and jet turbine engines. They obtain also the basic knowledge in the domain of combustion engines testing with use of up-to-date special measurement equipment and advanced computer techniques. Our graduates are familiar with contemporary trends of engine development with particular respect to environment protection requirements. They possess knowledge in the range of technology of new fuels and operation materials. Obtained knowledge and preparation enables getting a job in almost all enterprises connected with machines building and exploitation and particularly in the engine industry – R&D institutes, firms or companies using combustion engines, motor transport companies, diagnostic and service stations and many others.

Programme of studies:

1st semester
Piston Engines Theory 30h, 3 ECTS
Fuels and Greases 15h, 2 ECTS
Turbine Engines 30h, 3 ECTS

2nd semester
Piston Engines Theory 15h, 2 ECTS
Piston Engines Construction 30h, 2 ECTS
Turbine Engines 30h, 3 ECTS
Piston Engines Laboratory 30h, 2 ECTS
Turbine Engines Laboratory 15h, 2 ECTS
Fuel Supply and Equipment of Combustion Engines 30h, 2 ECTS
Power Transmission Systems with Combustion Engine 30h, 2 ECTS
Ecology of Combustion Engines 30h, 3 ECTS

3rd semester
Piston Engines Construction 30h, 2 ECTS
Piston Engines Laboratory 45h, 3 ECTS
Fuel Supply and Equipment of Combustion Engines 30h, 2 ECTS
Technology of Combustion Engines 45h, 2 ECTS
Exploitation of Combustion Engines 45h, 3 ECTS
Ecology of Combustion Engines 15h, 2 ECTS
Electronic Equipment of Combustion Engines 15h, 1 ECTS
Optional Subject I – 30h, 1 ECTS

4th semester
Optional Subject II – 30h, 1 ECTS
Diploma Seminar 30h, 3 ECTS
Diploma Thesis 20 ECTS

	OPTIONAL SUBJECTS: Alternative Sources of Vehicle Drive 15h/30h Combustion Processes in Combustion Engines 15h/30h Charging of Combustion Engines 15h/30h Electronic Control Systems in Combustion Engines Investigation 15h/30h
Eligibility / Admission:	Students who have completed Bachelor Program in Mechanical Science and who earned Bachelor degree
Tuition fee:	4000 Euro per year
Contact person:	Marek Brzeżański, DSc, DEng.; phone #: +48 12 628 35 44; e-mail: mbrzez@usk.pk.edu.pl Jerzy Dutczak, DEng.; phone #: +48 12 628 35 34; e-mail: jdutczak@usk.pk.edu.pl
Application procedures & deadlines:	Scans of the following documents are to be submitted by persons applying for admission by **31 May**: Application Form (available to be downloaded from www.bwm.pk.edu.pl, bachelor's diploma, Official Transcript, passport (page with the holder's photo), doctor's report (available to be downloaded from www.bwm.pk.edu.pl). Note: Both diploma and Official Transcript are to be officially translated into Polish language. Please send all documents via e-mail to Ms. Kamila Rościszewska at kamir@pk.edu.pl

TYPE & FIELD OF STUDIES: **MSc in MECHANICAL ENGINEERING**

PROGRAM TITLE: **THERMAL POWER SYSTEMS AND INSTALLATIONS**

Faculty/Department: Faculty of Mechanical Engineering, Institute of Process and Power Engineering

Erasmus subject code: 06.9

Duration: 4 semesters

ECTS credits: 105

Program description:

The graduates of Thermal Power Systems and Installation Studies obtain higher education in the field of power engineering, construction of power machines and installations, transmission and distribution of thermal and electric energy. Students acquire an extensive knowledge in the field of heating engineering. They acquire necessary skills to design and operate large thermal-electric power stations and a knowledge in the field of design, construction and operation of individual heating installations. Graduates can carry out process and strength calculations and design power machinery such as steam and gas boilers, electrical generators, pumps, fans, steam and water pipelines.

During their studies, students acquire practical skills in power machines design and numerical modeling using commercially available software CAD (Computer aid design), FEM (Finite Element Method) and CFD (Computational Fluid Dynamics).

The graduates also become the specialists in the field of renewable resources utilization such as water energy, biomass combustion, solar, wind and geothermal energy, and fuel cells. They are well prepared in the field of nuclear engineering and dissipated energy resources: combustion engine- generator, gas turbine-generator.

Students of “the Thermal Power Systems and Installation” studies acquire the knowledge in the field of the design and operation of the environment protection systems and installations in power engineering.

Programme of studies:

1st semester
Mathematics 45h, 5 ECTS
Numerical method 60h, 6 ECTS
Physics 30h, 3 ECTS
Thermodynamics 45h, 5 ECTS
Material Science 30h, 5 ECTS
Philosophy 30h, 2 ECTS

2nd semester
Strength of materials 45h, 4 ECTS
Fluid Mechanics 60h, 5 ECTS
Heat Transfer 60h, 5 ECTS
Combustion 30h, 3 ECTS
Environment protection 30h, 2 ECTS
Computer Methods for Engineers 30h, 2 ECTS

3rd semester
Analysis, Modeling and Design of Energy Systems 60h, 6 ECTS
Power turbines 45h, 4 ECTS

	Energy Management 30h, 3 ECTS Heat and Power Plants 30h, 5 ECTS Power Boilers 30h, 4 ECTS Heating Engineering 30h, 2 ECTS Renewable Energy Resources 30h, 2 ECTS Individual Project 90h, 9 ECTS *4th semester* Diploma Seminar 30h, 3 ECTS Master Thesis 20 ECTS
Eligibility/Admission:	Students who have completed Bachelor Programme in Mechanical Engineering (or related field) and obtained Bachelor's Degree
Tuition fee:	4000 Euro per year
Contact person:	Jan Taler, Prof. PhD, DSc, phone #: +48 12 628 35 60, e-mail: taler@mech.pk.edu.pl
Application procedures & deadlines:	Scans of the following documents are to be submitted by persons applying for admission by **31 May**: Application Form (available to be downloaded tram www.bwm.pk.edu.pl), bachelor's diploma, Official Transcript, passport (page with the holder's photo), doctor's report (available to be downloaded tram www.bwm.pk.edu.pl). Note: Both diploma and Official Transcript are to be officially translated into Polish language. Please, send all documents via e-mail to Ms. Kamila Rościszewska at kamir@pk.edu.pl

TYPE & FIELD OF STUDIES: MSc in MANAGEMENT AND PRODUCTION ENGINEERING

PROGRAM TITLE: LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Faculty/Department: Faculty of Mechanical Engineering

Duration: 4 semesters

ECTS points: 180

Programme of studies:

A. Human Resources Management, Manager Competencies and Personnel Development, Interpersonal Communication, Selected Problems in Technique and Technology, Modern Structural Materials, Structural strength and durability, Hybrid Systems of Manufacturing, Fundamentals of Manufacturing Processes, Geometrical Product Specification and Measuring Systems, Reverse Engineering, Environmental Preservation and Recycling;

B. Enterprise Management, Business Process Reengineering, Enterprise Information Systems, Virtual Enterprises, e-Business, Integrated Management Systems (ERP, MRP), International Management;

C. Forecasting and Simulation, Forecasting Methods, Simulation of Logistics Systems;

D. Project and Innovation Management, Project Management and Risk Analysis, Market Analysis, Searching for Innovative Solutions, Product Lifecycle Management , Quality Management Systems;

E. Logistics Management, Aided Decision - Making Systems, Artificial Intelligence in Management, Expert systems in Logistics management, Logistics Audit;

F. Logistics Systems and Devices, Auxiliary Transport Devices, Logistics Systems in Enterprises, Regional and International Logistics Systems, Mid-term paper, Graduation seminar;

G. Dissertation

Eligibility: Students who have completed Bachelor Program in Mechanical Engineering or related field and earned Bachelor's Degree

Tuition fee: 4000 EUR per year

Contact person: Prof. Józef Gawlik, DSc, PhD, phone#: +48 12 628 32 46, e-mail: jgawlik@mech.pk.edu.pl

Application procedures & deadlines:

Scans of the following documents are to be submitted by persons applying for admission by **31 May**: Application Form (available to be downloaded tram www.bwm.pk.edu.pl), bachelor's diploma, Official Transcript, passport (page with the holder's photo), doctor's report (available to be downloaded tram www.bwm.pk.edu.pl). Note: Both diploma and Official Transcript are to be officially translated into Polish language. Please, send all documents via e-mail to Ms. Kamila Rościszewska at kamir@pk.edu.pl

TYPE & FIELD OF STUDIES **MSc in TRANSPORTATION**

PROGRAMME TITLE: **TRANSPORTATION MANAGEMENT AND RAILWAY VEHICLE ENGINEERING**

Faculty/Department: Faculty of Mechanical Engineering, Institute of Rail Vehicles

Duration: 3 semesters

ECTS credits: 90

Programme description:

The syllabus of Transportation Management and Railway Vehicle Engineering course meets a growing demand of the international market of transport services. The enrolled students acquire an extensive knowledge in the field of organization, management and operation of modern form of transportation. Special attention is given to the modern railway transportation as well as municipal rail transportation. The acquired competence let the graduates to take part in designing, implementation and also operation management of various transportation systems. It also includes knowledge of transportation systems of large municipal agglomerations, combined transportation and ecological aspects of transportation-environment interaction.
The graduates will gain understanding of the modern management methods, planning and organization of transport infrastructure, maintenance, repair as well as implementation of the modern vehicle renewal strategies.
During the study graduates will become familiar with software tools for computer aided management, operation, reliability monitoring, analysis of machines and vehicle parts wear, etc.
They will be acquainted with methods and resources of prognostic investigations. They will use the modern computer technologies in information systems designing and information processing. They will be able to handle with computerized resources of communication as well as utilize computer simulation methods for transport processes and enterprise modeling.
The gained general skills and knowledge in range of Transportation Management and Railway Vehicle Engineering allow the graduates to work in national and international transportation companies, research and development centers, maintenance, logistics as well as start their own business.

Programme of studies:

1st semester
Applied Mathematics in Transport 30h, 5 ECTS
Control and Management in Transport Systems 45h, 3 ECTS
Transport Systems and Processes Modeling 45h, 2 ECTS
Data Communication Systems in Transport 30h, 4 ECTS
Applied Mechanics 30h, 3 ECTS
FEM in Analysis of Transport Devices 30h, 1 ECTS
Modern Constructional Materials 15h, 4 ECTS
Technical Operation 30h, 2 ECTS
Lubrication Technology 30h, 2 ECTS
Ergonomics and Safety of Vehicles 30h, 2 ECTS
Energy Consumption of Transport Systems 30h, 2 ECTS

2nd semester
Transport System Engineering 30h, 2 ECTS
Optimization of Material Handling and Storage 30h, 4 ECTS
Reliability and Safety of Systems 30h, 4 ECTS
Public Transport Vehicles 30h, 2 ECTS
Transport Vehicle Dynamics 30h, 2 ECTS

Wear Processes in Transport Means 30h, 2 ECTS
Computer Systems in Technical Operation 30h, 2 ECTS
Formal and Institutional Issues in Transport 30h, 2 ECTS
Multimodal Transport Organization and Engineering 30h, 2 ECTS
Transport of Hazardous Materials 30h, 2 ECTS
Econometric Models in Transport 30h, 2 ECTS
Initial Thesis 30h, 5 ECTS

3rd semester
Regeneration and Recycling 30h, 1 ECTS
Technical Operation, Certification and Expertises 45h, 2 ECTS
Drive and Braking of Transport Vehicles 30h, 2 ECTS
Expert Systems in Transport Management 30h, 2 ECTS
Diploma Seminar 30h, 2 ECTS
Master Thesis 20 ECTS

Eligibility/Admission: Students who have completed Bachelor Program in Transportation or related field and who earned Bachelor's Degree

Tuition fee: 4000 Euro per year

Contact person: Grzegorz Zając, PhD; phone #: +48 12 628 33 10, e-mail: gzajac@m8.mech.pk.edu.pl

Application procedures & deadlines: Scans of the following documents are to be submitted by persons applying for admission by **13 February** / **14 July** for a spring or autumn semester: Application Form (available to be downloaded from www.bwm.pk.edu.pl), bachelor's diploma, Official Transcript, passport (page with the holder's photo), doctor's report (available to be downloaded from www.bwm.pk.edu.pl). Note: Both diploma and Official Transcript are to be officially translated into Polish language. Please, send all documents via e-mail to Ms. Kamila Rościszewska at kamir@pk.edu.pl and to Grzegorz Zając, PhD at gzajac@m8.mech.pk.edu.pl

TYPE & FIELD OF STUDIES: **PhD in MECHANICS**
MACHINE DESIGN
MATERIAL ENGINEERING

PROGRAM TITLE: **ADVANCED COMPUTATIONAL MECHANICS**

Faculty/Department: Faculty of Mechanical Engineering

Duration 8 semesters

Erasmus subject code: 06.0
06.1
06.7

ECTS credits: 60

Program description: A PhD degree is the target of most postgraduate students who relish the opportunity to undertake a research project with intellectual, scientific, industrial or commercial challenges. Those from industrial backgrounds may also find it possible to partake in this level of graduate work, which is of particular value to the individuals training and development.

The Ph.D. program is designed to give students a broad and deep understanding of materials science and engineering so that they will have long and fruitful careers as researchers. When a student graduates from our program, he or she will be one of the world's leading experts in the area of their dissertation research, but will also have the intellectual tools needed to move into new research areas as the field grows and develops.

Program of studies: During the four years of the Ph.D. program, students are required to take at least twelve individual courses to learn about particular problems connected with the Ph. D. thesis, attend the weekly seminar and become involved in that research group.

Eligibility/Admission: A student may be admitted to a PhD degree only if an appropriate research environment is available for the duration of the degree. This should include the availability of appropriate academic staff to provide supervision and training, other research-support staff, research facilities and learning resources. Applicants for admission will normally a Masters Degree or equivalent qualification.

Fees: 4000 Euro per year

Contact person: Prof. Aleksander Muc, PhD, DSc, phone #: +48 12 628 33 53;
e-mail: olekmuc@mech.pk.edu.pl

Application procedures & deadlines: Scans of the following documents are to be submitted by persons applying for admission by **31 May**: Application Form (available to be downloaded from www.bwm.pk.edu.pl, master's diploma, Official Transcript, passport (page with the holder's photo), doctor's report (available to be downloaded from www.bwm.pk.edu.pl). Note: Both diploma and Official Transcript are to be officially translated into Polish language. Please send all documents via e-mail to Ms. Kamila Rościszewska at kamir@pk.edu.pl

COURSE TITLE	**ALTERNATIVE POWER SOURCES**
Institute/Division:	Institute of Automobiles and Internal Combustion Engines / Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	2
Course description:	Exploring of future energy sources. Directions of future clean coal technologies with coal gasification. Review of alternative energy sources in powering of vehicles. Renewable and fossil fuels in future power sources in a regard of decreasing of CO2 and other substances. Characteristics of alternative fuels (natural gas, hydrogen, biofuels) in internal combustion engines. Non-conventional power sources: electric drive systems with control devices, present hybrid drive systems and their development in automotive industry, different kinds of fuel cells and their perspective in a future transportation and solar cells as a source of free energy. Fuelling of engines by CNG, LNG, LPG and hydrogen. The wind and sea water energy systems in different world areas. Determination of the future clean and friendly for environment power sources
Literature:	Advanced Vehicle System, Capstone, Chattanooga,2002 Alternative Fuel Data Center, http:/www.afdc.doe.gov Anderson H.K., Electric and Hybrid Vehicles: A 25-year Forecast. Automotive Engineering, No 2, 1996 Braess H., Hydrogen-The Fuel for Future Powertrain Technologies, BMW Group, Munich, 2001 Carracher P., Realistic Application of CNG Fuel in Commercial Road Vehicles, FISITA World Automotive Congress, Paris, 1998
Course type:	Lectures, classes
Assessment:	Final test
Prerequisites:	Mechanical Engineering and Power Engineering Systems
Primary target group:	3rd year students in Mechanical Engineering and Power Engineering
Lecturer:	Wladyslaw Mitianiec, DSc, PhD, Eng.
Contact person:	Wladyslaw Mitianiec, DSc, PhD, Eng., phone #: +48 12 628 3692, e-mail: wmitanie@usk.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**FUEL FEEDING SYSTEMS FOR AN INTERNAL COMBUSTION ENGINES**
Institute/Division:	Institute of Automobiles and Internal Combustion Engines / Faculty of Mechanical Engineering
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	LECTURES: Functional analysis of the fuel feeding system in a combustion system of reciprocating engines. The process of air-fuel mixture formation. The selected issues of mass and energy exchange. Problems of charge transport in the engine inlet duct, inequality of the charge distribution in multi cylinder engine. Carburetors' feeding systems - the required characteristics. Injection fuel systems of SI engines - properties of injection systems. Control algorithms, operating characteristics. Systems of direct fuel injection of SI engines. Systems of fuel injection of CI engines - properties of injection systems. Control algorithms - the required characteristics of fuel dosage. Alternative fuel engines - flexible fuel systems. LABORATORY: Systems and devices for testing of feedings components system. Injection pump test bed characteristics of fuel dosage. The execution of the fuel injection characteristics. Operating characteristics of SI engine on a bio-fuel feeding condition. Visualization of air-fuel mixture formation process for a direct fuel injection. Test of the engine CPU to fuel dosage control.
Literature:	H. Schwarz et al, 1999,"Gasoline-engine management", Robert Bosch GmbH, Automotive Handbook, 1986, 2nd Edition, Bosch, J.C. Guibet, 1999, "Fuels and Engines" , John B. Heywood, 1988,"Internal Combustion Engine Fundamentals"
Course type:	Lectures, classes and test bed laboratory
Assessment method:	Final test
Prerequisites:	Thermodynamic processes and mechanics of internal combustion engines
Primary target group:	3 rd year students in Automotive Engineering (lectures only) undergraduate programme (4 years) leading to the degree equivalent to BSc or 1st year students in Automotive Engineering (full course) graduate programme (1,5 year) leading to the degree equivalent to MSc
Lecturer:	Wojciech MAREK, PhD, DSc
Contact person:	Wojciech MAREK, PhD, phone#: +48 12 6283682, e-mail: wmarek@riad.usk.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**ENGINE THERMAL LOADING**
Institute/Division:	Faculty of Mechanical Engineering, Institute of Cars and IC Engines
Number of contact hours:	15h
Duration:	1 semester
ECTS credits:	15
Course description:	How mechanical engineering and engineering technology responds to the needs of economical, environmental and energy related problems. Students papers and posters through research and instructional programs in mechanical engineering – IC engine theoretical and design problems. The studies are works on the heat transfer processes which take place in IC engines. It process which includes most research data related flame radiation. The calculation methods are illustrated by finite elements method-FEM. The thermal conditions in piston and combustion chamber as well as the heat transfer conditions of the finned surfaces and radiators are analysed in detail. The programme treats the questions of thermal loading in the various component parts and also the modern constructional solutions.
Program of the course:	Knowledge of engineering IC engine 5h, 5 ECTS Head transfer and thermo load of piston 5h, 5 ECTS Modelling and calculation by FEM temperature field of piston 3h, 3 ECTS Modern design of Diesel engine piston 2h, 2 ECTS
Literature:	G.Sitkei,1974.Heat transfer and thermal loading in IC engines J.Jaskólski,B.Bożek,K.Holly,1993.Variance methods for thermo load of elements of IC engine CIMAC London D-74
Course type:	Lectures, test stand and computers laboratory
Assessment method:	Final test
Prerequisites:	Mechanical Engineering-IC Engines course
Primary target group:	3rd year students in Mechanical Engineering
Lecturer:	Jerzy Jaskólski, PhD, DSc, phone#: +48 12 628 3684, e-mail: jaskolsk@usk.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE	**TECHNOLOGY OF CLEAN COMBUSTION**
Institute/Division:	Institute of Automobiles and Internal Combustion Engines / Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	45
Course duration:	1 semester
ECTS credits:	3
Course description:	Theory of combustion process. Processes of ignition, self-ignition and detonation. Theory of flame – flow and thermal parameters. Combustion of gaseous fuels, types of gas combustion. Combustion rates of gaseous fuels and their dependence on thermal conditions. Furnaces and gaseous burners. Combustion process of liquid fuels, injection of liquid fuels, evaporation, oil burners. Combustion of solid fuels particularly of coal. Speed and intensity of coal combustion in layer and in mechanical stokers. Combustion of coal dust, combustion of solid fuels in fluid layer. Fluid boiler systems. Methods of coal cleaning before combustion and methods of reduction of sulphur in furnaces. Combustion technologies in order to reduce nitrogen oxygen by temperature control. Ecological aspects of fuels combustion and exhaust gas emissions. Low emission technologies in power engineering. Design of new low emission coal combustion systems in industry with steam and gas turbines. Coal gasification technology. Reduction of exhaust emission in internal combustion engines by changing the combustion process and by external devices. Measurements of flame parameters at combustion of different fuels. Experiments with reduction of exhaust emission of hydrocarbons, nitrogen oxides, soot and others. Calculations of combustion processes of different fuels, burners, furnaces, combustion rates and others.
Literature:	Chigier W.A.,Energy, Combustion and Environment, New York, McGraw Hill,1981; Jarosiński J., Technology of clean combustion (in polish), WNT Warsaw, 1996 Jarosiński Jozef, Combustion Phenomena: Selected Mechanisms of Flame Formation, Propagation and Extinction, 2008 Carvalhoc, Combustion Technologies for Clean Environment, V.1, CRC, 1985 Smoot L. Douglas, Coal Combustion and Gasification, Springer, 1985
Course type:	Lectures, classes and experimental laboratories
Assessment method:	Final test
Prerequisites:	Combustion Chemistry and Power Engineering Systems
Primary target group:	3rd year students in Mechanical Engineering or in Power Engineering
Lecturer:	Wladyslaw Mitianiec, PhD, DSc
Contact person:	Wladyslaw Mitianiec, PhD, DSc, phone #: +48 12 628 3692, e-mail: wmitanie@usk.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**ANALYSIS, MODELLING AND DESIGN OF ENERGY SYSTEMS**
Institute/Division:	Institute of Process and Power Engineering / Division of Power Engineering
Erasmus subject code:	06.1
Number of contact hours:	60
Course duration:	1 semester
ECTS credits:	6
Course description:	Head-loss representation. Piping networks. Series piping systems. Parallel systems. Hardy Cross method. Generalized Hardy Cross method. Heat exchangers – method of analysis. Shell-and tube heat exchangers. Number of transfer units method. Pumps in series and parallel. Pump system operation. Pump placement to avoid cavitation. Additional system considerations.
Literature:	B.K. Hodge, Robert P. Taylor, *Analysis and design of energy systems*, Prentice-Hall, Inc., Simon & Schuster / A Viacom Company 1999.
Course type:	Lectures, classes and computer laboratory
Assessment method:	Final test
Primary target group:	2nd year students of graduate programme in Mechanical Engineering
Lecturer:	Zima Wiesław, PhD, DSc
Contact person:	Zima Wiesław, PhD, DSc, phone: +48 12 628 3653, e-mail: zima@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**COMPUTER METHODS FOR ENGINEERS**
Institute/Division:	Institute of Process and Power Engineering I Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	45
Course duration:	1 semester
ECTS credits:	2
Course description:	Control Volume Method, calculation of steady state and transient temperature distribution in thick-walled elements of power boilers by Fluent and ANSYS, Finite Element Method, calculation of thermal and total stresses in elements of power plant.
Literature:	J. Taler, P. Duda, Solving Direct and Inverse Heat Conduction Problems, Springer, Berlin Heidelberg 2006. Fluent 6.0, Fluent Inc., Computational Fluid Dynamics Software, Centerra Resource Park, 10 Cavendish Court, Lebanon, NH 03766, USA ANSYS User's Manual. Revision 10.0 A.
Course type:	Lectures, computer laboratory
Assessment method:	Projects and final test
Prerequisites:	Numerical methods
Primary target group:	1st year students in graduate programme in Mechanical Engineering
Lecturer:	Piotr Duda, PhD, DSc
Contact person:	Piotr Duda, PhD, DSc, phone #: +48 126283560, e-mail: pduda@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**ENVIRONMENT PROTECTION**
Institute/Division:	Institute of Process and Power Engineering I Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	2
Course description:	Air Pollution, Green House Effect, Particle Control and Removing (Dust Chambers, Scrubbers, Spray Dryer Absorbers, ESP, Bag Filters), Flue Gas Desulphurization, Flue Gas Denitrification, Combustion Optimization, Waste Water Treatment, Soil and Groundwater Remediation
Literature:	Kitto J.B., Stultz S.T., Steam - Its Generation and Use, Babcock & Wilcox 41Ed., Barberton 2005. Introduction of Japanese Advanced Environmental Equipment, Japan Society of Industrial Machinery Manufacturers 2001 Kurita Handbook of Water Treatment
Course type:	Lectures
Primary target group:	1st year students in graduate programme in Mechanical Engineering
Lecturer:	Tomasz Sobota, PhD, DSc
Contact person:	Tomasz Sobota, PhD, DSc, phone #: +48 126283558, e-mail: tsobota@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**FLUID MECHANICS**
Institute/Division:	Institute of Process and Power Engineering I Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	60
Course duration:	2 semesters
ECTS credits:	5
Course description:	Macroscopic properties of fluids. Kinematics of fluid motion. Eulerian and Lagrangian flow descriptions. Volume and mass rate of flow. The continuity equation. Surface and volume forces. Momentum theorem. Stress and rates of deformation. Constitutive relations. Equations for Newtonian fluids. The Navier – Stokes equations. Dimensional analysis and similitude. Solutions to the steady – state Navier – Stokes equations. The Poiseuille and Couette flows. Inviscid flows. Bernoulli's equation. Application of Bernoulli's equation. Viscous flow in pipes. The boundary layer approximation. The boundary layer equations. Turbulent flows and its modelling. Turbulence models. Flow measurements. Instruments and procedures for measurement of flow rate.
Literature:	B. R. Munson, D. Young, T. Okiishi, Fundamentals of Fluid Mechanics, J. Wiley & Sons, W. P. Graebel, Advanced Fluid Mechanics, Elsevier.
Course type:	Lectures
Assessment method:	Exam
Primary target group:	1st year students in graduate programme in Mechanical Engineering
Lecturer:	Stanisław Walczak, PhD, DSc
Contact person:	Stanisław Walczak, PhD, DSc, phone #: +48 126283270, e-mail: swalczak@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**HEAT AND POWER PLANTS**
Institute/Division:	Institute of Process and Power Engineering I Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	5
Course description:	Steam power plants, Rankine cycle analysis, gas turbines, internal combustion engines, hydraulic turbines, Stirling engines advanced fossil fuel power systems, energy storage, nuclear power, nuclear fusion, solar thermal energy conversion, wind energy conversion.
Literature:	F. Kreith, The CRC Handbook of Mechanical Engineering, CRC 1998 H.B. Lammer and Woodruff, Steam Power Plant Operation, McGraw-Hill, New York 1967
Course type:	Lectures, classes
Assessment method:	Exam
Prerequisites:	Mathematics, Thermodynamics, Heat Transfer
Primary target group:	2nd year students in graduate programme in Mechanical Engineering
Lecturer:	Jan Taler, Prof., PhD, DSc
Contact person:	Jan Taler, Prof., PhD, DSc, phone #: +48 126283560, e-mail: taler@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**HEAT TRANSFER**
Institute/Division:	Institute of Process and Power Engineering I Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	60
Course duration:	1 semester
ECTS credits:	5
Course description:	Steady-state and transient heat conduction, natural and forced convection, convection with phase changes, radiation, heat exchangers, heat transfer analysis and design problems.
Literature:	F. P. Incropera et. al., Fundamentals of Heat and Mass Transfer, John Wiley & Sons 2007. J. Taler, P. Duda, Solving Direct and Inverse Heat Conduction Problems, Springer, Berlin Heidelberg 2006.
Course type:	Lectures, classes, laboratory
Assessment method:	Exam
Prerequisites:	Mathematics
Primary target group:	1st year students in graduate programme in Mechanical Engineering
Lecturer:	Jan Taler, Prof., PhD, DSc
Contact person:	Jan Taler, Prof., PhD, DSc, phone #: +48 126283560, e-mail: taler@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**HEATING ENGINEERING**
Institute/Division:	Institute of Process and Power Engineering / Division of Power Engineering
Erasmus subject code:	06.1
Number of contact hours:	30
Course duration:	1 semestr
ECTS credits:	2
Course description:	Basic heat transfer modes. Hygrothermal performance of building components and building elements - Internal surface temperature to avoid critical surface humidity and interstitial condensation. Heating systems in buildings. Heat transmission in building structures. Method for calculation of the design heat load. Heating and distric heating. Protection of open water heating installations. Protection of closed water heating installations with diaphragm preasure expension vessels. Duct and pipe sizing. Moist air properties. Basic HVAC (Heating, Ventilating and Air Conditioning) systems calculations. Heating or cooling of air. Heating and humidifying air. Adiabatic mixing of two streams of air. Heat recovery systems. Heat pump systems. Steam heating systems.
Literature:	F.C. McQuiston, J.D. Parker, J.D. Spitler, *Heating, Ventilating and Air Conditioning. Analysis and Design*, John Wiley & Sons, USA 2000. R.H. Howell, H.J. Sauer, W.J. Coad, *Principles of Heating, Ventilating and Air Conditioning*, American Society of Heating, Refrigerating and Air-Conditioning Engineers 1998.
Course type:	Lectures and computer laboratory
Assessment method:	Test
Primary target group:	2nd year graduate students in Mechanical Engineering
Lecturer:	Zima Wiesław, PhD, DSc
Contact person:	Zima Wiesław, PhD, DSc, phone: +48 12 628 3653, e-mail: zima@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**NUMERICAL METHODS**
Institute/Division:	Institute of Process and Power Engineering I Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	60
Course duration:	1 semester
ECTS credits:	6
Course description:	Computer numbers, error analysis, conditioning, stability of algorithms, nonlinear equations in one variable, direct and iterative methods for solving systems of linear equations, linear and nonlinear approximation, polynomial interpolation, initial value problems for ordinary differential equations, Finite Difference Method, inverse methods
Literature:	G.Engeln-Mullges, F. Uhling, Numerical Algorithms with Fortran, Springer, Berlin Heidelberg 1996 J. Taler, P. Duda, Solving Direct and Inverse Heat Conduction Problems, Springer, Berlin Heidelberg 2006
Course type:	Lectures, classes, computer laboratory
Assessment method:	Projects and exam
Prerequisites:	Mathematics
Primary target group:	1st year students in graduate programme in Mechanical Engineering
Lecturer:	Piotr Duda, PhD, DSc
Contact person:	Piotr Duda, PhD, DSc, phone #: +48 126283560, e-mail: pduda@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**RENEWABLE ENERGY RESOURCES**
Institute/Division:	Institute of Process and Power Engineering / Division of Power Engineering
Erasmus subject code:	06.1
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	2
Course description:	Current penetration of renewable energy technologies in the marketplace. The energy future and the role of renewable energy. Solar radiation. Power in the wind. Ocean waves. Power in the waves. Water flows and tides. River flows, hydropower and elevated water storage. The power in ocean thermal gradients. Geothermal flows and stored energy. Biological conversion and storage of energy. Photovoltaic conversion. Other energy.
Literature:	Bent Sorensen, *Renewable energy*, Third edition, Elsevier Academic Press, 2004.
Course type:	Lectures, laboratory
Assessment method:	Test
Primary target group:	2nd year students in Thermal Power Systems and Installations
Lecturer:	Grądziel Sławomir, PhD
Contact person:	Grądziel Sławomir, PhD, phone: +48 12 628 3553, e-mail: gradziel@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**POWER BOILERS**
Institute/Division:	Institute of Process and Power Engineering / Division of Power Engineering
Erasmus subject code:	06.1
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	4
Course description:	Fossil fuel boilers for electric power. Fossil fuel boilers for industry and small power. Wood and biomass installations. Pressurized fluidized-bed combustion. Boilers, superheaters and reheaters. Economizers and air heaters. Hot water PC boilers. Boilers with natural circulation. CFB steam boilers. Supercritical steam boilers.
Literature:	S.C.Stultz and J.B.Kitto, *Steam its generation and use*, Babcock and Wilcox a McDermott Company, Barberton, Ohio, USA, 1992.
Course type:	Lectures, classes
Assessment method:	Final test
Primary target group:	2nd year students in Thermal Power Systems and Installations
Lecturer:	Grądziel Sławomir, PhD
Contact person:	Grądziel Sławomir, PhD, phone: +48 12 628 3553, e-mail: gradziel@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**COMBUSTION**
Institute/Division:	Institute of Process and Power Engineering / Division of Power Engineering
Erasmus subject code:	06.1
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	Combustion terminology. Stoichiometry and thermochemistry of reacting system. Sources of chemical energy. Burners and Combustion systems for pulverized coal. Coal gasification. Combustion of solid fuels, carbon and char. Combustion system components.
Literature:	Kalyan Annamalai, Ishwar K. Puri, *Combustion science and engineering*, CRC Press, 2005 Charles E. Baukal, Jr., Vladimir Y. Gershtein, Xianming Li, *Computational Fluid Dynamics in Industrial Combustion*, CRC Press, 2001
Course type:	Lectures
Assessment method:	Test
Primary target group:	2nd year students in undergraduate programme in Thermal Power Systems and Installations
Lecturer:	Grądziel Sławomir, PhD, DSc
Contact person:	Grądziel Sławomir, PhD, DSc, phone: +48 12 628 3653, e-mail: gradziel@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**STRENGTH OF MATERIALS**
Institute/Division:	Institute of Applied Mechanics / Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	45
Course duration:	1 semester
ETCS credits:	4
Course description:	Course comprises following problems: main assumptions; generalised forces in structural members; definitions of stress, displacement and strain; experimental tests of tension and torsion; approximation of tension diagram, physical models of material; conditions of strength, carrying capacity and stability; design of sampling structural members; energy of elastic deformation; Castigliano's theorem; stiffness and compliance matrices; statically undetermined structures; Menabrei's theorem.
Literature:	S.P. Timoshenko, J.M. Gere, Mechanics of materials, Van Nostrad, 1972 M. Życzkowski, Combined loadings in the theory of plasticity, PWN, 1981 J.J. Skrzypek, Plasticity and creep, Begell House, 1993
Course type:	Lectures, classes and laboratory
Assessment method:	Final exam
Prerequisites:	Physics
Primary target group:	Students in graduate programme in Mechanical Engineering
Lecturer:	Artur Ganczarski, PhD, DSc
Contact person:	Artur Ganczarski, PhD, DSc, phone #: +48 12 6283326, e-mail: artur.ganczarski@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**THERMODYNAMICS**
Institute/Division:	Institute of Process and Power Engineering I Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	60
Course duration:	1 semester
ETCS credits:	5
Course description:	State of equilibrium; processes and cycles; forms of energy; properties of pure substances; energy transfer by heat, work and mass; the first law of thermodynamics, the second law of thermodynamics, entropy, power and refrigeration cycles
Literature:	Y.A. Cengel, R.H. Turner, Fundamentals of Thermal-Fluid Sciences, McGraw-Hill Int. Ed. M.C.Potter, C.W.Somerton, Schaum's Outline of Theory and Problems of Thermodynamics for Engineers, McGraw-Hill Inc.
Course type:	Lectures, classes
Assessment method:	Exam
Primary target group:	1st year students in graduate programme in Mechanical Engineering
Lecturer:	Piotr Duda, PhD, DSc
Contact person:	Piotr Duda, PhD, DSc, phone #: +48 126283560, e-mail: pduda@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**POWER TURBINES**
Institute/Division:	Institute of Process and Power Engineering I Faculty of Mechanical Engineering
Erasmus subject code:	06.1
Number of contact hours:	45
Course duration:	1 semester
ETCS credits:	4
Course description:	Steam turbine – Rankine cycle. Turbine characteristics. principle of operation and design. Impulse and reaction steam turbines. Multistage turbine. Governors and Control Systems. Gas turbine, types of gas turbines. Theory of operation. Types of water turbines. Reaction and impulse water turbines. Design and application.
Literature:	Heinz P. Bloch, Murari P. Singh, Steam Turbines, Edition Number 2, McGraw-Hill, 2009. John R. Allen, Joseph A. Bursley, Heat Engines - Steam, Gas, Steam Turbines and Their Auxiliaries. Merchant Books, 2008.
Course type:	Lectures, classes, laboratory
Assessment method:	Final test
Primary target group:	2nd year students in graduate programme in Mechanical Engineering
Lecturer:	Prof. Jan Taler, PhD, DSc
Contact person:	Prof. Jan Taler, PhD, DSc, phone #: +48 126283560, e-mail: taler@mech.pk.edu.pl
Deadline for application:	June 30

COURSE TITLE:	**OBJECT ORIENTED PROGRAMMING**
Institute / Division:	Institute of Applied Computer Science
Number of course hours:	60
Course duration:	2 semesters
ECTS credits	4
Course description:	Advantages of object oriented analysis and design. Object oriented strategies and programming languages. Fundamentals of object oriented programming: classes, objects, class members. Using constructors and destructors. Basic notions and concepts: abstraction, encapsulation, inheritance, polymorphism. Virtual and pure virtual class members, abstract classes. Multiple and multigenerational inheritance. Overloading of operators. Working with templates. Container classes as example of practical using of templates. Elements of software engineering: design and using of UML diagrams and design patterns.
Literature:	G. Booch, The UML User Guide, Addison-Wesley; ISBN 0-201-57168-4 C. Kak Object Oriented Programming, Jon Wiley & Sons, New York 2003 J. Keogh, M. Giannini OOP Demystified, McGraw-Hill Professional, ISBN 0-07-225363-0 T. Budd, Introduction to Object-Oriented Programming, Addison-Wesley, 1991
Course type:	Lectures and projects
Assessment method:	Attendance, final project and test
Primary target group:	1st and 2nd year students in Computer Science programme
Lecturer:	Grzegorz Filo, PhD, DSc
Contact person:	Grzegorz Filo, PhD, DSc, phone#: +48 12 628 33 35, e-mail: filo@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**ENGINEERING GRAPHICS**
Institute / Division:	Institute of Applied Computer Science
Number of course hours:	45
Course duration:	2 semesters
ECTS credits:	3
Course description:	Theoretical base of parametric curves and surfaces notation. Curves in CAD systems. Parametric polynomial curves. Segment of Hermit and Bezier curve. Uniform and non-uniform non-rational B-splines. Properties of base functions in B-splines. Notation of non-uniform rational B-splines: NURBS. The Coons surface. Parametric bi-cubic surfaces. Classes of continuity. Computer programs for creating vector 2D graphics: Autocad, Intercad, DWGEditor. Creating of document templates, basic commands, configuration. Essentials and methodology of creating 2D engineering drawings. First angle projection, views and intersections. Simplified drawings of screw joints, welds etc. Placing designations of tolerances and fittings. Creating of diagrams, schemes and charts.
Literature:	F. E. Giesecke and others, Technical Drawing, Pretience Hall, New York 2006
Course type:	Lectures and projects
Assessment method:	Attendance, projects and test
Primary target group:	2nd year students in Computer Science programme
Lecturer:	Wojciech Czyżycki, PhD, DSc
Contact person:	Wojciech Czyżycki, PhD, DSc, phone #: +48 12 628 36 54, e-mail: czyzycki@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**MODELLING AND VISUALIZATION**
Institute / Division:	Institute of Applied Computer Science
Number of course hours:	60
Course duration:	1 semester
ECTS credits:	4
Course description:	Essentials of solid 3D modelling. Methodology of creating 3D models of parts. Using of sketcher. Steps in design process of 3D solid model. Examples of part models. Creating assemblies. Modelling of helical cut-outs and extrudes. Practice of solid modelling in Autodesk Inventor, Solid Works and Pro/Engineer systems. Visualization of part and assembly models: setting material properties, texturing.
Literature:	E. Lisowski, Modelling geometry of elements, assemblies and kinematics of machines in program Pro/Engineer Wildfire, Bergen 2005
Course type:	Lectures, laboratories and projects
Assessment method:	Attendance, laboratories and final project
Primary target group:	2nd year students in Computer Science programme
Lecturer:	Prof. Edward Lisowski, PhD, DSc
Contact person:	Prof. Edward Lisowski, phone #: +48 12 628 33 35, e-mail: lisowski@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**OBJECT ORIENTED PROGRAMMING**
Institute / Division:	Institute of Applied Computer Science
Number of course hours:	60
Course duration:	1 semester
ECTS credits:	5
Course description:	Advantages of object oriented analysis and design. Object oriented strategies and programming languages. Fundamentals of object oriented programming: classes, objects, class members. Using constructors and destructors. Basic notions and concepts: abstraction, encapsulation, inheritance, polymorphism. Virtual and pure virtual class members, abstract classes. Multiple and multigenerational inheritance. Overloading of operators. Working with templates. Container classes as example of practical using of templates. Elements of software engineering: design and using of UML diagrams and design patterns.
Literature:	G. Booch, The UML User Guide, Addison-Wesley; ISBN 0-201-57168-4 C. Kak Object Oriented Programming, Jon Wiley & Sons, New York 2003 J. Keogh, M. Giannini OOP Demystified, McGraw-Hill Professional, ISBN 0-07-225363-0 T. Budd, Introduction to Object-Oriented Programming, Addison-Wesley, 1991
Course type:	Lectures and projects
Assessment method:	Attendance, final project and test
Primary target group:	1st year students in graduate programme in Computer Aided Design in Mechanical Engineering
Lecturer:	Grzegorz Filo, PhD, DSc
Contact person:	Grzegorz Filo, PhD, DSc, phone #: +48 12 628 33 35, e-mail: filo@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**CAD 2D SYSTEMS**
Institute / Division:	Institute of Applied Computer Science
Number of course hours:	60
Course duration:	1 semester
ECTS credits:	5
Course description:	Essentials of computer engineering 2D graphics. Computer programs for creating vector 2D graphics: Autocad, Intercad, DWGEditor. Creating of document templates, basic commands, configuration. Methodologies of creating 2D engineering drawings. First angle projection, views and intersections. Simplified drawings of screw joints, welds etc. Placing designations of tolerances and fittings. Creating of diagrams, schemes and charts.
Literature:	F. E. Giesecke and others, Technical Drawing, Pretience Hall, New York 2006
Course type:	Lectures and projects
Assessment method:	Attendance, final project and final test
Primary target group:	1st year students in graduate programme in Computer Aided Design in Mechanical Engineering
Lecturer:	Wojciech Czyżycki, PhD, DSc
Contact person:	Wojciech Czyżycki, PhD, DSc, phone #: +48 12 628 36 54, e-mail: czyzycki@mech.pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**CAD 3D SYSTEMS**
Institute / Division:	Faculty of Mechanical Engineering, Institute of Applied Computer Science
Number of course hours:	60
Course duration:	1 semester
ECTS credits:	5
Course description:	Introduction to CAD 3D systems. Essentials of solid 3D modelling. Methodology of creating 3D models of parts. Basic operations: extrusion, cut, chamfer, fillet, shell etc. Using of sketcher. Steps in design process of 3D solid model. Examples of part models. Creating assemblies. Modelling of advanced geometry, as cams, gears, helical cut-outs and extrudes. Practice of solid modelling in Solid Edge, Autodesk Inventor and Solid Works systems.
Literature:	E. Lisowski, Modelling geometry of elements, assemblies and kinematics of machines in program Pro/Engineer Wildfire, Bergen 2005
Course type:	lectures + laboratories + projects
Assessment method:	attendance, passing laboratories, final project
Primary target group:	1st year students in graduate programme in Computer Aided Design in Mechanical Engineering
Lecturer:	Prof. Edward Lisowski, PhD, DSc
Contact person:	Prof. Edward Lisowski, phone #: +48 12 628 33 35, e-mail: lisowski@mech.pk.edu.pl
Deadline for application:	May 31

TYPE & FIELD OF STUDIES/ **MSc IN COMPUTER SCIENCE**

PROGRAMME TITLE: **APPLIED COMPUTER SCIENCE**

Faculty/Department: Faculty of Physics, Mathematics & Applied Computer Science
Institute of Computer Modelling

Duration: 4 semesters

ECTS credits: 120

Programme description: Nowadays the Computer Science is present everywhere in a human life. Computers are commonly used for working, getting and broadcasting of information, data processing, production management, air- sea- and land traffic control, communication, multimedia and etc. People, who are familiar with modern information techniques, who are able to force computers for use all their possibilities, who know how to exploit capabilities of complex computer networks and who are willing to write programs for a new sophisticated applications are wanted for almost all branches of human activity. Our graduates may obtain a professional knowledge in these and many other problems connected with the use of computers. They will be able to work with project management, software engineering, implementation and management of modern informatics' systems. They will be also able to manage of data bases, internet services, computer systems and networks. They will know how to solve problems in these fields, starting from their analysis, building UML models, creation of algorithms and writing suitable software. Our graduates can get a job in big or small business, industry, telecommunication, administration, services, education, multimedia and many other places.

Programme of studies:

1st semester	Hours	ECTS
Knowledge Engineering and Expert Systems	60	6
Computational Geometry	60	4
Software Project Management	60	4
Real-Time Systems	45	5
High Performance Computing	60	6
Computer Methods in Science	60	5
2nd semester		
Distributed Databases	60	6
Network Services Programming	45	6
Modelling of Discrete Processes	45	4
Computer Image Processing	60	6
Cax Systems	60	5
Neural Networks	30	3
3rd semester		
Fuzzy Modelling	45	5
Embedded and Mobile Systems	60	7
Digital and Microprocessor Technology	60	6
Computer Security	60	5
Engineering Ethics	15	1
Team Project	30	6
4th semester		
System Administration	45	5
Diploma Seminar	30	5
Diploma Thesis	0	20

Eligibility/Admission:	Students who have completed Bachelor Program in Computer Science or related field and who earned Bachelor's Degree
Tuition fee:	4000 Euro per year
Contact person:	Andrzej Karafiat, DSc, PhD; phone #: +48 12 628 27 80, e-mail: akaraf@pk.edu.pl
Application procedures & deadlines:	Scans of the following documents are to be submitted by persons applying for admission by **31 May** : Application Form (available to be downloaded from www.bwm.pk.edu.pl), bachelor's diploma, Official Transcript, passport (page with the holder's photo), doctor's report (available to be downloaded from www.bwm.pk.edu.pl). Note: Both diploma and transcript are to be officially translated into Polish language. Please, send all documents via e-mail to Ms. Kamila Rościszewska at kamir@pk.edu.pl

COURSE TITLE:	**OBJECT ORIENTED TECHNIQUES**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F34-OOT
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 15
Course duration:	1 semester
ECTS credits:	6
Course description:	Fundamentals: classes, objects, member data and functions, scope, access, static data and functions. Exception handling. Constness. Function and operator overloading. Constructors, destructors, equality and assignment operators. Genericity - templates, STL. Inheritance - private, public and protected, virtual functions, multiple and virtual inheritance. Software engineering issues: object oriented analysis and design, UML, design patterns.
Literature:	Basic literature on the subject of object oriented techniques
Course type:	Lectures and laboratories
Assessment method:	Attendance, evaluation of small projects, exam
Prerequisites:	programming languages
Primary target group:	3rd and 4th year students in Computer Science
Lecturer:	Krzysztof Banaś, PhD, DSc
Contact person:	Krzysztof Banaś, PhD, DSc, e-mail: kbanas@pk.edu.pl
Deadline for application:	January 15

COURSE TITLE:	**FUNDAMENTALS OF PARALLEL AND DISTRIBUTED PROCESSING**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F34-FPDP
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 30
Course duration:	1 semester
ECTS credits:	5
Course description:	Operating system's foundations: processes, threads, sockets. Parallel programming models - Flynn's taxonomy, PRAM, data parallel programming. Programming shared memory systems: data dependencies and OpenMP specification. Programming distributed memory systems: message passing paradigm, MPI specification, group communication. Parallel speed up and efficiency. Distributed programming - RPC, CORBA. Service oriented architecture and Web Services. Grid architecture
Literature:	Basic literature on the subject of object oriented techniques
Course type:	Lectures and laboratories
Assessment method:	Attendance, evaluation of small projects, exam
Prerequisites:	programming languages, operating systems
Primary target group:	3rd and 4th year students in Computer Science
Lecturer:	Krzysztof Banaś, PhD, DSc
Contact person:	Krzysztof Banaś, PhD, DSc, e-mail: kbanas@pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**HIGH PERFORMANCE COMPUTING**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F34-HPC
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 30
Course duration:	1 semester
ECTS credits:	6
Course description:	Architectures for high performance computing - processors, parallel systems. Classical and parallel optimization. Parallel algorithms for sorting, linear algebra and PDE simulation.
Literature:	Basic literature on the subject of object oriented techniques
Course type:	Lectures and laboratories
Assessment method:	Attendance, evaluation of small projects, exam
Prerequisites:	programming languages
Primary target group:	3rd and 4th year students in Computer Science
Lecturer:	Krzysztof Banaś, PhD, DSc
Contact person:	Krzysztof Banaś, PhD, DSc, e-mail: kbanas@pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**DISTRIBUTED SYSTEMS**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F34-DS
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 15
Course duration:	1 semester
ECTS credits:	6
Course description:	Interprocess communication, RPC, RMI programming models (Java, CORBA, WebSevices), distributed algorithms (mutual exclusion, election, coordination, agreement, etc.), security and fault tolerance, distributed systems for multimedia, mobile devices and HPC.
Literature:	"Distributed Systems", Coulouris et al., Addison 2005
Course type:	Lectures and laboratories
Assessment method:	Attendance, evaluation of small projects, exam
Prerequisites:	programming languages, computer networks
Primary target group:	3rd and 4th year students in Computer Science
Lecturer:	Krzysztof Banaś, PhD, DSc
Contact person:	Krzysztof Banaś, PhD, DSc, e-mail: kbanas@pk.edu.pl
Deadline for application:	January 15

COURSE TITLE:	**ELEMENTS OF ARTIFICIAL INTELLIGENCE**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F32-EAI
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 30
Course duration:	1 semester
ECTS credits:	6
Course description:	Basic concepts of artificial intelligence, PROLOG, Expert Systems, Knowledge Engineering, Fuzzy System, Neural Networks, Genetic Algorithms
Literature:	Basic literature on the subject of artificial intelligence
Course type:	Lectures and laboratories
Assessment method:	Attendance, evaluation of small projects, exam
Prerequisites:	programming languages
Primary target group:	3rd and 4th year students in Computer Science
Lecturer:	Prof. Tadeusz Burczyński, PhD, DSc
Contact person:	Prof. Tadeusz Burczyński, PhD, DSc, e-mail: tburczyn@pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**EVOLUTIONARY ALGORITHMS**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F32-EA
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 30
Course duration:	1 semester
ECTS credits:	6
Course description:	Genetic algorithms, evolutionary strategies, evolutionary programming - representation of individuals, genetic operators, selection mechanisms. Choice of representation. Kinds of variation operators. Applications
Literature:	Basic literature on the subject
Course type:	Lectures and laboratories
Assessment method:	Attendance, evaluation of small projects, exam
Prerequisites:	Programming languages, base of artificial intelligence
Primary target group:	4th year students in Computer Science
Lecturer:	Prof. Tadeusz Burczyński, PhD, DSc
Contact person:	Prof. Tadeusz Burczyński, PhD, DSc, e-mail: tburczyn@pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**NEURAL NETWORKS**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F32-NN
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 30
Course duration:	1 semester
ECTS credits:	6
Course description:	General description of the neural networks. Relations between classical algorithms and neural methods of problem solving. Artificial neural network and human brain. Structure of single artificial neuron. Architectures of neural networks and dependence between complexity of the solved problem and structural complexity of the network. Methods of neural network learning and training. Back propagation and other methods of learning. Self learning of the networks and problem of self-organization. Networks with feedback. Possibilities and limitations of many types of networks.
Literature:	Basic literature on the subject
Course type:	Lectures and laboratories
Assessment method:	Attendance, evaluation of small projects, exam
Prerequisites:	Programming languages, base of artificial intelligence
Primary target group:	4th year students in Computer Science
Lecturer:	Prof. Tadeusz Burczyński, PhD, DSc
Contact person:	Prof. Tadeusz Burczyński, PhD, DSc, e-mail: tburczyn@pk.edu.pl
Deadline for application:	January 15

COURSE TITLE:	**DISCRETE MATHEMATICS**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F31-DM
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 30
Course duration:	1 semester
ECTS credits:	5
Course description:	Graphs. Basic definitions. Eulerian graph, Eulerian circuit, Euler theorem. Fleury's algorithm. Hamiltonian graph, Hamiltonian cycle. Degree of a vertex. Dirac theorem. Directed graphs. Weighted graphs. Dijkstra's algorithm. Trees. Rooted tree, spanning tree, minimum spanning tree. Kruskal's algorithm, Prim's algorithm. Sorting algorithms. Networks and critical paths. Colouring of a graph. Groups of permutations.
Literature:	C.A. Ross, C.R.B. Wright, Discrete Mathematics, Prentice Hall, Englewood Cliffs, N.J. 1988. N.L. Biggs Discrete mathematics, Oxford Univ. Press, Oxford, 2002. E.G. Goodaire, M.M. Parmenter, Discrete Mathematics with Graph Theory, Prentice Hall, Engl. Cliffs, N.J. 2002.
Course type:	Lectures and exercises
Assessment method:	Attendance, ability to solve simple exercises, exam
Primary target group:	1st and 2nd year students in Computer Science
Lecturer:	Andrzej Karafiat, PhD, DSc
Contact person:	Andrzej Karafiat, PhD, DSc, e-mail: akaraf@pk.edu.pl
Deadline for application:	January 15

COURSE TITLE:	**CRYPTOGRAPHY**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F31-C
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 hours/30 hours
Course duration:	1 semester
ECTS credits:	5
Course description:	Integers. Divisibility of integers. Prime numbers. Euclidean algorithm. Factoring into primes. Congruences. Operations modulo. Fermat's Little Theorem. The Chinese Remainder Theorem. Euler function. Fast exponentiation. Finite groups and fields. Element orders. Encryption schemes. Symmetric cryptosystems: substitution ciphers, block ciphers, permutation ciphers. System DES. Public – Key systems: RSA, discrete logarithm. Hash functions. Digital signatures.
Literature:	J.A.Buchmann, Introduction to cryptography, Springer, New York 2000. N.Ferguson, B.Schneier, Practical cryptography, Wiley & Sons, New York 2003. N.Koblitz, A course in number theory and cryptography, Springer, Berlin 1998.
Course type:	Lectures and exercises
Assessment method:	Attendance, ability of solving of simple exercises, exam
Prerequisites:	General algebra
Primary target group:	3rd and 4th year students in Computer Science
Lecturer:	Andrzej Karafiat, PhD, DSc
Contact person:	Andrzej Karafiat, PhD, DSc, e-mail: akaraf@pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**THEORY OF AUTOMATA AND FORMAL LANGUAGES**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F31-TAFL
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 15
Course duration:	1 semester
ECTS credits:	4
Course description:	Examples of languages. Grammars. Language generated by a grammar. Deterministic finite automata (DFA). Regular languages. Nondeterministic finite automata (NFA). Equivalence NFA-DFA. Minimization of DFA. Regular Expression. Equivalence Regular Expression and NFA. Regular Grammars. Properties of Regular Languages. Pumping Lemma. Context-Free (CF) languages. Chomsky normal form. CYK algorithm. NonDeterministic PDAs. Deterministic PDAs. LL(k) grammars. Pumping lemma for CF languages. Closure properties of CF languages. Elements of recursive function theory. Complexity of computation.
Literature	John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Addison-Wesley, 2nd edition - 2001; 3rd edition - 2006.
Course type:	Lectures and exercises
Assessment method:	4 tests
Prerequisites:	Sets, sequences, relations, functions, counting, recurrences, asymptotic notation, linear algebra, directed and undirected graphs, connectivity, proof methods (induction, contradiction), basic data, sorting, searching, graph traversal algorithms
Primary target group:	3rd and 4th year students in Computer Science
Lecturer:	Barbara Borowik, PhD, DSc
Contact person:	Barbara Borowik, PhD, DSc, e-mail: bborowik@pk.edu.pl
Deadline for application:	January 15

COURSE TITLE:	**COMPUTER SYSTEMS ADMINISTRATION**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F31-CSA
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	15 / 30
Course duration:	1 semester
ECTS credits:	4
Course description:	All aspects of configuring and managing an Internet-based server and client with the Linux operating system. Software configuration, installation, upkeep and management; user management, security and data integrity.
Literature:	All notes and references will be given electronically to all students during the lectures.
Course type:	Lectures and exercises
Assessment method:	A few tests (each one will be announced two weeks in advance).
Prerequisites:	Unix/Linux operating system and with computer networks.
Primary target group:	3rd and 4th year students in Computer Science
Lecturer:	Barbara Borowik, PhD, DSc
Contact person:	Barbara Borowik, PhD, DSc, e-mail: bborowik@pk.edu.pl
Deadline for application:	January 15

COURSE TITLE:	**SOFTWARE ENGINEERING**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F33-SE
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 30
Course duration:	1 semester
ECTS credits:	5
Course description:	All aspects of software production process thorough treatment of the development lifecycle, modelling languages (UML), engineering tools, project planning and process management. The course emphasizes object-oriented modelling and programming, explains the use of components and business object and highlights application of architectural design and refactoring.
Literature:	D.Hamlet, J.Maybee, *The Engineering of Software–Technical Foundations for the Individual*, Addison Wesley Longman Inc. 2001, L.Maciaszek, B.Lee Liong, *Practical Software Engineering, A Case Study Approach*, Pearson Education Limited 2005
Course type:	Lectures and laboratories
Assessment method:	A few tests (each one will be announced two weeks in advance), ability of solving of simple exercises, exam.
Prerequisites:	Programming languages, algorithms and data structures, data bases.
Primary target group:	3rd and 4th year students in Computer Science
Lecturer:	Marek Stanuszek, PhD, DSc
Contact person:	Marek Stanuszek, PhD, DSc, e-mail: marek.stanuszek@pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**INFORMATION SYSTEMS IN MANAGEMENT**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F33-ISM
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 15
Course duration:	1 semester
ECTS credits:	4
Course description:	Architecture of Information Integrated Management Systems is delivered. The development of Manufacturing Resource Planning (MRP), Enterprise Resource Planning (ERP) as well as Client Resource Management (CRM) systems is considered on the focus of their application for management processes of Small and Middle Enterprises (SME). The concept of evolution of Real-Time Enterprises is analyzed. Integrated Managed Systems e.g. R/3 SAP, IFS, Impuls BPSC are tested and practiced.
Literature:	All notes and references will be given electronically to all students during the lectures.
Course type:	Lectures and laboratories
Assessment method:	A few tests (each one will be announced two weeks in advance), ability of solving of simple exercises in selected system.
Prerequisites:	Base of software engineering, algorithms and data structures, data bases.
Primary target group:	3rd and 4th year students in Computer Science
Lecturer:	Marek Stanuszek, PhD, DSc
Contact person:	Marek Stanuszek, PhD, DSc, e-mail: marek.stanuszek@pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**COMPUTATIONAL METHODS IN SCIENCE**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F31-CMM
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 15
Course duration:	1 semester
ECTS credits:	5
Course description:	Application of the Finite Element Method to solve problems in solid and fluid mechanics, and wave propagation and scattering problems. Presentation of the mathematical background of the method: variational formulations, the principles of numerical approximation, the convergence analysis. Practical laboratory exercises illustrate solutions of problems in solid and fluid mechanics, wave propagation and scattering problems, as well as tests of convergence of numerical solutions.
Literature:	T. J. R Hughes, The Finite Element Method, Prentice-Hall, Inc. Englewood Cliffs, New Jersey 07632, 1987
Course type:	Lectures and laboratories
Assessment method:	mid-term and final exams, two laboratory projects
Prerequisites:	calculus, linear algebra
Lecturer:	Waldemar Rachowicz, PhD, DSc
Contact person:	Waldemar Rachowicz, PhD, DSc, e-mail: waldek@ices.utexas.edu
Deadline for application:	January 15

COURSE TITLE:	**COMPUTER IMAGE PROCESSING**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F34-CIP
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 30
Course duration:	1 semester
ECTS credits:	6
Course description:	Image acquisition, digital colour models, colour bit depth, raster image standards, geometrical and arithmetical transformations, histogram and operations, image binarization, segmentation, logical operations, image filtering, morphological operations, skeletonization, image compression, face recognition, fractal graphics
Literature:	Basic literature on the image processing and Matlab
Course type:	Lectures and laboratories
Assessment method:	Attendance, tests, exam
Prerequisites:	Fundamentals of programming, Matlab
Primary target group:	4th year students in Computer Science
Lecturer:	Agnieszka Ozimek, PhD, Arch.
Contact person:	Agnieszka Ozimek, PhD, Arch., e-mail: aozimek@pk.edu.pl
Deadline for application:	January 15
Remarks:	Laboratories: Matlab Image processing Toolbox

COURSE TITLE:	**C++ PROGRAMMING**
Institute/Division:	Institute of Computer Modelling
Course code:	F32-C++P
Number of contact hours:	60 (30h lectures + 30h laboratories)
Course duration:	1 semester
ETCS credits:	5
Course description:	The course covers the basics and also more advanced topics of C++ programming language. No prior knowledge about C++ is required. The students learn about the structure of the projects created in C++, the organization of the source files, the compilation and linking processes by using different tools. The course follows the standard C++ without focusing on tools of any specific vendor, however Microsoft Visual Studio is used be students during the laboratories. The students learn the basics of C++ such as loops, flow control, conditional statements, arrays, pointers, etc.. More advanced topics cover memory management, object oriented programming, operator overloading, I/O operations and an introduction to generic programming and Standard Template Library (STL). After the theoretical introduction during the lecture, the students analyse the example programs during the laboratories. They are also required to prepare several projects with an increasing level of difficulty.
Literature:	1. Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley Professional; 3 Edition, 1997 2. Bruce Eckel, Thinking in C++: Introduction to Standard C++, Prentice Hall; 2 Edition, 2000 3. Matthew H. Austern, Generic Programming and the STL: Using and Extending the C++ Standard Template Library, Addison-Wesley Professional Computing Series, 1999
Course type:	Lectures and computer laboratory
Assessment method:	Project and final test
Prerequisites:	Basic programming knowledge in any language, basic computer skills
Primary target group:	3rd year students in Information Sciences / Physics
Lecturer:	Michał Bereta, PhD, Eng.
Contact person:	Michał Bereta, PhD, Eng., phone #: +48 12 628-21-06, e-mail: beretam@torus.uck.pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**SOLVING LARGE FINITE ELEMENT PROBLEMS WITH SYMMETRIC SPARSE MATRICES**
Institute/Division:	F-3, Institute of Computer Modelling
Course code:	F31-SLFEM
Erasmus subject code:	Informatics, Computer Science
Number of contact hours:	30 / 15
Course duration:	1 semester
ECTS credits:	5
Course description:	Sparse direct solvers, reordering algorithms, symbolic factoring, multifrontal technique, iterative solvers, preconditioned conjugate gradient method, incomplete factorization, multilevel preconditioning, aggregation approach, smoothing procedure, generalized partial eigenvalue problem, acceleration of convergence, application of shifts, elements of high-performance computations, peculiarities of programming, experience of application in commercial software.
Literature:	Basic literature on the subject
Course type:	Lectures and exercises
Assessment method:	Attendance, evaluation of small projects, exam
Prerequisites:	programming languages C/C++, course of numerical methods
Primary target group:	3rd and 4th year students in Computer Science programme
Lecturer:	Sergiy Fialko, PhD, DSc
Contact person:	Sergiy Fialko, PhD, DSc, e-mail: sfialko@riad.pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**ENGINEERING ETHICS**
Institute/ Division:	Institute of Economics Sociology and Philosophy
Erasmus subject code:	08.1
Number of contact hours:	15
Course duration:	1 semester
ECTS credits:	1
Course description:	This course introduces the students into the moral aspects of engineering profession and practices. An introduction to morality and ethics. Moral subject, freedom and responsibility Ethical theories: deontological ethics, utilitarianism and ethics of virtue. Engineer's responsibility for public safety and health. Responsibilities to employers and clients. Professional development and virtues. Rights of engineers. Conflicts of interest and whistle-blowing. Engineers as managers; ethical problems at work place. Ethical codes and case studies.
Literature:	Martin, Mike W. Schinzinger, Roland, Ethics in Engineering, The McGraw-Hill Companies, Inc., New York 1996; Stenberg, Elaine, Just Business, Business Ethics in Action, Little, Brown and Company, London 1994
Course type:	Lectures and seminars
Assessment method:	Attendance and final exam
Primary target group:	2nd and 3rd year students
Lecturers:	Marek Pyka, PhD and Jacek Jaśtal PhD
Contact person:	Marek Pyka, PhD, phone #: +48 12 6282483; e-mail: mpyka@pk.edu.pl
Deadline for application:	September 15

COURSE TITLE:	**CALCULUS 1**
Institute/Division:	Institute of Mathematics / Faculty of Physics, Mathematics and Applied Computer Science
Erasmus subject code:	11.1
Number of contact hours:	90
Course duration:	1 semester
ECTS credits:	9
Course description:	Sequences, series of numbers. Functions of one variable. Limits and continuity. Inverse trigonometric functions. Differentiation. Mean value theorems. Learning about functions from derivatives. Indefinite integrals. Methods of integration. Riemann sums, definite integrals and applications.
Literature:	R. L. Finney, Thomas' Calculus, Addison Wesley, Boston, 2001
Course type:	Lectures
Assessment method:	Tests and attendance
Primary target group:	1st year undergraduate students
Lecturer:	Wacław Pielichowski, PhD
Contact person:	Wacław Pielichowski, PhD, phone #: +48 602254779, e-mail:wpielich@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**CALCULUS 2**
Institute/Division:	Institute of Mathematics I Faculty of Physics Mathematics and Applied Computer Science
Erasmus subject code:	11.1
Number of contact hours:	60
Course duration:	1 semester
ECTS credits:	6
Course description:	Review of Calculus 1, Vectors, Linear Algebra and Analytical Geometry. Multivariable Differential Calculus. Multiple Integration. Integrals and Derivatives on Curves.
Literature:	1. Hartley Rogers, Jr., Multivariable Calculus with Vectors. Prentice Hall, 1999 2. Richard E. Williamson, Hale F. Trotter, Multivariable Mathematics, Prentice Hall, 1996
Course type:	Lectures and problem solving sessions
Assessment method:	Tests, homework, attendance
Prerequisites:	Calculus 1. Linear Algebra
Primary target group:	Students in Computer Science
Lecturer:	Katarzyna Pałasińska, PhD
Contact person:	Katarzyna Pałasińska, PhD, phone #: +48 126282928, e-mail: kpalasin@usk.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**DIFFERENTIAL EQUATIONS**
Institute/Division:	Institute of Mathematics I Faculty of Physics, Mathematics and Applied Computer Science
Erasmus subject code:	11.1
Number of contact hours:	60
Course duration:	1 semester
ECTS credits:	6
Course description:	First-order differential equations, initial-value problems. Separable variables, homogeneous equations, exact equations. Linear equations, Bernoulli's equation. Second order equations, initial-value problems. Linear equations, Euler's equation. Power series solutions. Systems of linear differential equations.
Literature:	D. G. Zill, Differential Equations with Boundary-Value Problems, Addison Wesley, Boston, 2001
Course type:	Lectures, classes
Assessment method:	Tests, attendance
Prerequisites:	Calculus 1, Linear Algebra
Primary target group:	2nd year undergraduate students
Lecturer:	Wacław Pielichowski, PhD
Contact person:	Wacław Pielichowski, PhD, phone #: +48 602254779, e-mail:wpielich@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**DISCRETE MATHEMATICS**
Institute/Division:	Institute of Mathematics I Faculty of Physics, Mathematics and Applied Computer Science
Number of contact hours:	60
Course duration:	1 semester
ECTS credits:	6
Course description:	Well Ordering Principle. Principle of Mathematical Induction. Integers. Divisibility. Converting numbers between various bases. Euclidean algorithm. Prime Numbers. Linear Diophantine Equations. Congruence. Congruence Equations. Chinese Remainder Theorem. Solving systems of linear congruence equations. Little Fermat Theorem. Applications coding. RSA. Linear recurrence relations.
Literature:	Goodaire, Paramenter, Discrete Mathematics. Prentice Hall, 1999
Course type:	Lectures and problem solving sessions
Assessment method:	Tests, homework
Prerequisites:	College Algebra
Primary target group:	2nd year students in Computer Science or in Engineering
Lecturer:	Katarzyna Pałasińska, PhD
Contact person:	Katarzyna Pałasińska, PhD, phone #: +48 126282928, e-mail: kpalasin@usk.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**LINEAR ALGEBRA**
Institute/Division:	Institute of Mathematics I Faculty of Physics, Mathematics and Applied Computer Science
Erasmus subject code:	11.1
Number of contact hours:	60
Course duration:	1 semester
ECTS credits:	6
Course description:	Complex numbers. Vector spaces. Maps between spaces. Matrix operations and determinants. Linear systems, Cramer rules, Gauss' method. Cartesian coordinates and vectors in space. Dot and cross products. Lines and planes in space. Eigenvalues and eigenvectors, similarity.
Literature:	1. J. Hefferon, Linear Algebra, Colchester, 2001 2. E. H. Connell, Elements of Abstract and Linear Algebra, Coral Gables, 2001
Course type:	Lectures, classes
Assessment method:	Tests, attendance
Primary target group:	1st year undergraduate students
Lecturer:	Wacław Pielichowski, PhD
Contact person:	Wacław Pielichowski, PhD, phone #: +48 602254779, e-mail:wpielich@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**INTRODUCTION TO MATHEMATICAL FINANCE**
Institute/Division:	Institute of Mathematics, Faculty of Physics, Mathematics and Applied Computer Science
Number of hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	The course provides an elementary introduction to concepts of price and hedge derivative securities. Topics include elements of stochastic analysis: filtrations, martingales, stochastic processes, Brownian motion, Ito formula. The following concepts will be studied in both discrete and continuous time: the change-of-measure technique, hedging, pricing, absence of arbitrage opportunities and the Fundamental Theorem of Asset Pricing. Black – Scholes model will be discussed.
Literature:	N. H. Bingham, R. Kiesel, Risk-Neutral Valuation, Springer-Verlag, London 1998. J. Karatzas, S. E. Shreve, Brownian Motion and Stochastic Calculus, Springer-Verlag, Berlin 1988.
Course type:	Lectures
Assessment method:	Final exam
Prerequisites:	Probability and Statistics
Lecturer:	Margareta Wiciak, PhD
Contact person:	Margareta Wiciak, e-mail: mwiciak@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**MATHEMATICAL FINANCE**
Institute/Division:	Institute of Mathematics, Faculty of Physics, Mathematics and Applied Computer Science
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	3
Course description:	The course provides an elementary introduction to concepts of price and hedge derivative securities (European and American options). Topics include elements of stochastic analysis: filtrations, martingales, stochastic processes, Brownian motion, Ito formula, stopping times, Snell envelope, Girsanov theorem. The following concepts will be studied in both discrete and continuous time: the change-of-measure technique, hedging, pricing, absence of arbitrage opportunities and the Fundamental Theorem of Asset Pricing. Black – Scholes model will be discussed.
Literature:	H. Bingham, R. Kiesel, Risk-Neutral Valuation, Springer-Verlag, London 1998. J. Karatzas, S. E. Shreve, Brownian Motion and Stochastic Calculus, Springer-Verlag, Berlin 1988.
Course type:	Lectures
Assessment method:	Final exam
Prerequisites:	Stochastic processes
Lecturer:	Margareta Wiciak, PhD
Contact person:	Margareta Wiciak, e-mail: mwiciak@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**THEORY OF PROBABILITY**
Institute/Division:	Institute of Mathematics, Faculty of Physics, Mathematics and Applied Computer Science
Number of hours:	60 / 60
Course duration:	2 semesters
ECTS credits:	6 + 6
Course description:	The course provides an elementary introduction to probability theory. Topics include: axioms, basic probability models, product spaces, combinatorics, conditional probability, random variables, distribution functions; expectation and moments; independence, correlation, functions of random variables, laws of large numbers, convergence of random variables, weak convergence, characteristic functions, central limit theorems, conditional expectation.
Literature:	W. Feller, An Introduction to Probability Theory and Its Applications. 3rd ed., New York, Wiley, 1968 M. Capiński, T. Zastawniak, Probability Through Problems, Springer-Verlag, New York 2001
Course type:	Lectures, classes
Assessment method:	Two tests during each semester, mid test, final exam
Prerequisites:	Mathematical Analysis (3 semesters), Complex Analysis
Lecturer:	Margareta Wiciak, PhD
Contact person:	Margareta Wiciak, e-mail: mwiciak@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**PROBABILITY AND STATISTICS**
Institute/Division:	Institute of Mathematics, Faculty of Physics, Mathematics and Applied Computer Science
Number of hours:	30 / 30
Course duration:	1 semester
ECTS credits:	6
Course description:	The course provides an elementary introduction to probability and statistics with applications. Topics include: basic probability models, combinatorics, random variables, discrete and absolutely continuous distributions, law of large numbers, central limit theorems, confidence intervals, statistical estimation and testing.
Literature:	T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons Ltd, 2004 M. Capiński, T. Zastawniak, Probability Through Problems, Springer-Verlag, New York 2001
Course type:	Lectures, classes
Assessment method:	Two tests during the semester, final exam
Prerequisites:	Calculus
Lecturer:	Margareta Wiciak, PhD
Contact person:	Margareta Wiciak, e-mail: mwiciak@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**VARIATIONAL CALCULUS**
Institute/Division:	Institute of Mathematics I Faculty of Physics, Mathematics and Applied Computer Science
Erasmus subject code:	11.1
Number of contact hours:	60
Course duration:	1 semester
ETCS credits:	6
Course description:	Extreme values of functionals. Weak and strong relative extrema. The simplest variational problem. The Euler-Lagrange equation. Variational problems in n unknown functions. Generalization to more than one independent variable. Variational problems with variable endpoints. Isoperimetric problems. A sufficient condition for a weak extremum in the simplest variational problem.
Literature:	H. Sagan, Introduction to the Calculus of Variations, Dover, New York, 1992
Course type:	Lectures, classes
Assessment method:	Tests and attendance
Prerequisites:	Calculus 1, Differential Equations
Primary target group:	Advanced undergraduate students, graduate students
Lecturer:	Wacław Pielichowski, PhD
Contact person:	Wacław Pielichowski, PhD, phone #: +48 602254779, e-mail:wpielich@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**APPLIED PHOTOCHEMISTRY**
Institute/Division:	Institute of Organic Chemistry and Technology
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	2
Course description:	Interaction of light with matter. Basic photochemical reactions. Chemical aspects of B&W and color photography. Photolithography and its applications in electronics. Photopolymerization processes. Modern light sources. Photochromic materials. Chemiluminescence. Fluorescent Probe Technology.
Literature:	N.J. Turro - "Modern Molecular Photochemistry." Selected papers or reviews from scientific literature.
Course type:	Lectures
Assessment method:	Test
Target group:	Students in Chemical Technology
Lecturer:	Roman Popielarz, PhD, DSc
Contact person:	Roman Popielarz, PhD, DSc, phone #: +48 12 628-2124; e-mail: rpopiel@pk.edu.pl

COURSE TITLE:	**CHEMICAL THERMODYNAMICS**
Institute/Division:	Physical Chemistry Division
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	2
Course description:	Basic concepts: system, work, heat, and energy. The First Law, the conservation of energy. Thermochemistry, standard enthalpy changes for chemical and physical processes, Hess's law – state functions, Kirchhoff's law – the temperature dependence of the enthalpy. The Second Law, the direction of spontaneous change, the statistical and thermodynamic definition of entropy, entropy changes accompanying specific processes, the temperature dependence of the entropy. The Third Law, Helmholtz and Gibbs functions, standard molar Gibbs functions, the maximum work, the temperature and pressure dependence of the free energy, the chemical potential, the Gibbs-Duhem equation. The chemical equilibrium, spontaneous chemical reactions, the Gibbs function minimum, the thermodynamic equilibrium constant, the relation between the thermodynamic and the practical equilibrium constants, Le Chatelier's principle – the response of equilibria to pressure and temperature, van't Hoff's isotherm and isobar.
Literature:	P. Atkins, Physical Chemistry, 6th edition. Oxford University Press,1998
Course type:	Lectures
Assessment method:	Attendance and written test
Target group:	3rd year students in Chemical Technology
Lecturer:	Andrzej Włodarczyk, PhD, DSc, Professor of CUT
Contact person:	Andrzej Włodarczyk, PhD, DSc, phone #: +48 12 6282757, e-mail: awlodar@pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**CHEMICAL KINETICS**
Institute/Division:	Physical Chemistry Division
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	2
Course description:	Basic concepts: the rate of reaction, the rate constant, the rate law, the reaction order, the molecularity, the half-life time, the temperature dependence of reaction rates. The Arrhenius equation. The first, second and third–order reactions, reactions approaching equilibrium, consecutive elementary reactions, chain reactions, photochemical reactions. The activated complex theory. Thermodynamic aspects: the entropy and enthalpy of activation. Catalytic activity at surface of solids. Homogeneous and heterogeneous catalysis, autocatalysis. Introduction to biocatalysis – enzymatic reactions.
Literature:	P. Atkins, Physical Chemistry, 6th edition. Oxford University Press,1998
Course type:	Lectures
Assessment method:	Attendance and written test
Target group:	3rd year students in Chemical Engineering
Lecturer:	Andrzej Włodarczyk, PhD, DSc, Professor CUT
Contact person:	Andrzej Włodarczyk, phone: +48 12 6282757, e-mail: awlodar@pk.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**METHODS OF CHROMATOGRAPHY**
Institute/Division:	Division of Analytical Chemistry
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	2
Course description :	Introduction to gas and liquid chromatography, electrophoresis and related differential migration methods. Conventional chromatography, ultra-fast chromatography, multi-dimensional chromatography, micro-chromatographic methods. Modern chromatographic columns, injectors, detection methods. Determination of traces of toxic organic compounds like dioxins, PCB, PAHs etc. The use of chromatographic methods in environmental pollution control, industrial process and emission control, chromatographic methods in medical and forensic analysis.
Literature:	Szczepaniak W., Metody instrumentalne w analizie chemicznej, PWN, ISBN: 978-83-01-14210-0, Wydanie 5 (2008) Witkiewicz Z., Podstawy chromatografii, WNT, ISBN: 83-20430895, Wydanie 4 (2005) Suder P., Silberring J., Spektometria mas, Wydawnictwo Uniwersytetu Jagiellońskiego, ISBN: 83-233-2151-5,(2006). Praca zbiorowa pod red. M. Kamińskiego, Chromatografia Cieczowa, CEEAM Gdańsk, ISBN: 83-919081-5-1, (2004) Heftmann E. Chromatography 6th edition. Fundamentals and applications of chromatography and related differential migration methods. J.Chromatogr. library vol. 69A-B, ISBN: 0-444-51107-5, Elsevier, (2004). Nollet L.M.L. Chromatographic Analysis of the Environment. ISBN: 0-8247-2629-4, Taylor&Francis, (3-rd edition), Ghent, (2006).
Course type:	Lectures, seminar
Assessment method:	Attendance and written test
Primary target group:	3rd year students in Chemical Technology
Lecturer:	Adam Grochowalski, PhD, DSc, Professor of CUT
Contact person:	Adam Grochowalski, PhD, DSc, phone #: +48 12 628 2112; e-mail: agrochow@chemia.pk.edu.pl; www.dioksyny.pl
Deadline for application:	May 31

COURSE TITLE:	**DIOXIN IN ENVIRONMENT AND INDUSTRY**
Institute/Division:	Division of Analytical Chemistry
Number of contact hours:	15
Course duration:	1 semester
ECTS credits:	2
Course description :	Overview: Dioxin problem. Structure of dioxin (polychlorinated dibenzodioxins and dibenzofurans) and related compounds like PCB, HCB and brominated flame retardants (BFR). Industrial and non-industrial dioxin sources. Health risk characterization of dioxin and related compounds. Abatement methods for minimizing of emission dioxin to atmosphere from industrial sources like metallurgy, waste incineration, waste co-firing etc. Dioxin and PCB in food and feedingstuff. Methods for the determination of dioxin and dioxin-like compounds.
Literature:	Grochowalski A. Badania nad oznaczaniem polichlorowanych dibenzodioksyn, dibenzofuranów i polichlorowanych bifenyli. Monografia nr 272, ISSN: 0860-097X. Zeszyty Naukowe Politechniki Krakowskiej, Kraków 2000, (available from lecturer). Schecter A. Dioxins and Health, Wiley Interscience, ISBN: 0-471-43355-1, (2-nd edition) 2003. Liem, A.K.D., Theelen, R.M.C., Dioxins. Chemical Analysis, Exposure and Risk Assessment. Thesis, Utrecht University, The Netherlands, 1997.(available from lecturer). Nollet L.M.L. Chromatographic Analysis of the Environment. ISBN: 0-8247-2629-4, Taylor&Francis, (3-rd edition), Ghent, (2006). Actual literature (e.g. Science direct) on Dioxin.
Course type:	Lectures, seminar
Assessment method:	Attendance and written test
Primary target group:	3rd year students in Chemical Technology
Lecturer:	Adam Grochowalski, PhD, DSc, Professor of CUT
Contact person:	Adam Grochowalski, PhD, DSc, phone #: +48 12 628 2112; e-mail: agrochow@chemia.pk.edu.pl; www.dioksyny.pl
Deadline for application:	May 31

COURSE TITLE:	**SAMPLING AND ANALYSIS OF ENVIRONMENTAL POLLUTANTS**
Institute/Division:	Division of Analytical Chemistry
Number of contact hours:	15
Course duration:	1 semester
ECTS credits:	2
Course description :	Environmental chemical pollutants: classification, distribution, and the methods for the determination. Sampling requirements and methods. Dynamic and passive sampling methods. Gaseous, aqueous and solid samples. Sample pretreatment for instrumental analysis. Drying methods, extraction and matrix removal. SPE, SPME, MEPS and the other micro-extraction techniques for trace organic analysis. Analyte isolation, fractionation and preconcentration. Methods of isotope dilution in trace organic analysis. The use of certified standards for QA/QC. Examples of the determination of Benzo(a)pyrene in potable water, PCB and BETX in contaminated soil.
Literature:	Popek E.P. Sampling and Analysis of Environmental Chemical Pollutants – A Complete Guide. ISBN:0-12-561540-X, Elsevier, Academic Press, Amsterdam, 2003. Namieśnik J. I in. Przygotowanie próbek środowiskowych do analizy. ISBN: 83-204-2482-8, WNT, Warszawa, 2000r. Winefordner J.D. Sample Preparation Techniques in Analytical Chemistry. ISBN: 0-471-32845-6, J.Wiley&Sons, New Jersey, 2003. Pawiliszyn J. Solid Phase Microextraction – Theory and Practice. ISBN: 0-471-19034, Wiley-VCH, New York, 1997.
Course type:	Lectures, demonstrations of particular analysis (PCB, BETX)
Assessment method:	Attendance and written test
Primary target group:	3rd year students in Chemical Technology
Lecturer:	Adam Grochowalski, PhD, DSc, Professor CUT
Contact person:	Adam Grochowalski, PhD, DSc, phone #: +48 12 628 2112; e-mail: agrochow@chemia.pk.edu.pl; www.dioksyny.pl
Deadline for application:	May 31

COURSE TITLE:	**SURFACE ENGINEERING**
Institute/Division:	Institute of Inorganic Chemistry and Technology
Number of contact hours:	25
Course duration:	1 semester
ECTS credits:	2
Course description:	Forms of corrosion (aqueous, atmospheric and molten salt corrosion), introduction to fundamental of corrosion in gases, thermodynamics of gaseous corrosion, kinetics of gaseous corrosion processes, gaseous corrosion mechanisms, , methods of corrosion testing and evaluation, methods of corrosion protection, selection of materials for aggressive environment
Literature:	Kofstad P. High Temperature Corrosion, NACE, 1983; Uhlig H. Corrosion Hand Book, J.Wiley&Sons, 1948; Handbook of Corrosion Data, 2nd ed., ASM International, 1995
Course type:	Lectures (10h), project (15h)
Assessment method:	Attendance and written test
Primary target group:	3rd year students in Chemical Technology
Lecturer:	Prof. Zbigniew Żurek, PhD, DSc
Contact person:	Prof. Zbigniew Żurek, PhD, DSc, phone #: +48 12 628-27-12; e-mail: zzurek@chemia.pk.edu.pl
Deadline for application:	June 1

COURSE TITLE:	**ENVIRONMENT PROTECTION: WATER PROTECTION IN INDUSTRY**
Institute/Division:	Institute of Organic Chemistry and Technology
Number of contact hours:	15 + 60 lab (4*15)
ECTS credits:	5
Course description:	Waste waters in industry. Hydrocarbons in waste water. Waste water treatment units: gravitational separation, filtration, coagulation, (induced air flotation, dissolved air flotation), BIOX. Water reusing in refineries. Water treatment for boilers (steam production).
Lab:	Tests for main parameters of water. Purification processes for oily waste waters: coagulation, flotation (IAF). Phenols in wastewaters.
Literature:	Selected reviews from the scientific literature
Course type:	Lectures and laboratory
Assessment method:	Attendance and tests, lab reports
Lecturer:	Krystyna Porzycka-Semczuk, PhD
Contact person:	Krystyna Porzycka-Semczuk, PhD, phone #: +48 12 628-21-11; e-mail: kporz@pk.edu.pl
Deadline for application:	May 31 (for Fall Semester)

COURSE TITLE:	**ENVIRONMENT PROTECTION: AIR PROTECTION IN INDUSTRY**
Institute/Division:	Institute of Organic Chemistry and Technology
Number of contact hours:	15 + 15 calculus
ECTS credits:	2 + 2
Course description:	Sources of waste gases. Tank farms emissions. Utilization or destruction? Flaring: smokeless and non-smokeless flares, steam assisted flares, other smokeless solutions. Mobile and temporary devices.
Calculus:	Calculation of emissions from tank farms (volatile organic liquids and fuels) – from different types of tanks.
Literature:	Selected reviews from the scientific literature, manual for the TANKS program
Course type:	Lectures and calculations
Assessment method:	Attendance and tests
Lecturer:	Krystyna Porzycka-Semczuk, PhD
Contact person:	Krystyna Porzycka-Semczuk, PhD, phone #: +48 12 628-21-11; e-mail: kporz@pk.edu.pl
Deadline for application:	May 31 (for Fall Semester)

COURSE TITLE:	**ENVIRONMENT PROTECTION: SOIL REMEDIATION**
Institute/Division:	Institute of Organic Chemistry and Technology
Number of contact hours:	15
ECTS credits:	2
Course description:	Fundamentals of soil science as applicable to management of hazardous wastes. Soil cleanup technologies: SVE, bioventing, biopiles, MNA, LTTD, land farming, air sparging, biosparging, dual phase extraction, in-situ ground water remediation. How to select the proper method of remediation.
Literature:	Selected reviews from the scientific literature
Course type:	Lectures
Assessment method:	Attendance and tests
Lecturer:	Krystyna Porzycka-Semczuk, PhD
Contact person:	Krystyna Porzycka-Semczuk, PhD, phone #: +48 12 628-21-11; e-mail: kporz@pk.edu.pl
Deadline for application:	May 31 (for Fall Semester)

COURSE TITLE:	**FUNDAMENTALS OF CHEMISTRY**
Institute/Division:	Institute of Organic Chemistry and Technology
Number of contact hours:	15 + 15
ECTS credits:	2 + 2
Course description:	The course contains basic information - its not for chemists, the program covers topics for higher level IB – chemistry or chemistry - levels AS and A2 according to the British education programme. It can be also used as revision for those who made chemistry at secondary school and need some revision before studying chemistry at the university. Part 1 Atomic structure, bonding and periodicity. Foundation physical and inorganic chemistry. Foundation organic chemistry. Part 2 Further physical and organic chemistry Thermodynamics and further inorganic chemistry.
Literature:	Books for chemistry - IB or AS and A2 levels
Course type:	Lectures
Assessment method:	Attendance and tests
Lecturer:	Krystyna Porzycka-Semczuk, PhD
Contact person:	Krystyna Porzycka-Semczuk, PhD, phone #: +48 12 628-21-11; e-mail: kporz@pk.edu.pl
Deadline for application:	May 31 (for Fall Semester), November 30 (for Spring Semester)

COURSE TITLE:	**FUNDAMENTALS OF CHEMISTRY – CALCULATIONS**
Institute/Division:	Institute of Organic Chemistry and Technology C-2
Number of contact hours:	15 + 15
ECTS credits:	2 + 2
Course description:	Part 1 Formulae, equations and oxidation states. Basic calculations involving: formulae and equations, gases, solutions. Thermochemistry. Part 1 Orders of reaction. Chemical equilibria. Acid-base equilibria. Other equilibria. Redox equilibria. Entropy and free energy.
Literature:	Selected materials from the scientific literature
Course type:	Calculations
Assessment method:	Attendance and tests
Lecturer:	Krystyna Porzycka-Semczuk, PhD
Contact person:	Krystyna Porzycka-Semczuk, PhD, phone #: +48 12 628-21-11; e-mail: kporz@pk.edu.pl
Deadline for application:	May 31 (for Fall Semester), November 30 (for Spring Semester)

COURSE TITLE:	**FUNDAMENTALS OF CRUDE OIL PROCESSING**
Institute/Division:	Institute of Organic Chemistry and Technology C-2
Number of contact hours:	15
ECTS credits:	2
Course description:	Units in Hydrocarbon Processing Industry. Refinery feedstocks and their properties (^{o}API gravity, sulphur content, pour point, carbon residue, salt content, Watson characterization factor, nitrogen and metals content, etc.), TBP and ASTM distillation curves. Hydrocarbons' nomenclature.Group composition of petroleum hydrocarbons. Main petroleum products and their properties.
Literature:	Gary J.H., Handwerk G.E. : '*Petroleum Refining. Technology and Economics.'* Marcel Dekker, Inc., New York, Basel, 2001 p. 21-36 and selected materials from the scientific literature
Course type:	Lecture
Assessment method:	Attendance and tests
Lecturer:	Krystyna Porzycka-Semczuk, PhD
Contact person:	Krystyna Porzycka-Semczuk, PhD, phone #: +48 12 628-21-11; e-mail: kporz@pk.edu.pl
Deadline for application:	May 31 (for Fall Semester)

COURSE TITLE:	**COMPOSITE MATERIALS**
Institute/Division:	Chair of Chemistry and Technology of Polymers
Number of hours:	30
Course duration:	2 semesters
ECTS credits:	4
Course description:	Introduction to composite materials. Structure of Materials – Polymers, Ceramics, Metals. Classification Schemes for Multicomponent Polymeric Materials, Additives. Morphology of Multiphase Polymeric Materials. Nanocomposites. Hybrid Materials. Kinetic Processes in Composites. Mechanics of Polymer Composites. Electrical, Magnetic and Optical Properties of Polymeric Composites. Processing and Applications of Polymer Blends and Composites.Conclusions.
Literature:	V.B. John, Introduction to Engineering Materials, Macmillan Press, London 1002. B.T. Astrom, Manufacturing of Polymer Composites, Chapman & Hall, London 1997. S.K. De, Short Fibre-Polymer Composites, CRC, Boca Raton 1996. *Polymer Composites* journal
Course type:	Lectures
Assessment method:	Written examination
Primary target group:	4th year students in Chemical Technology
Lecturer:	Prof. Krzysztof Pielichowski
Contact person:	Prof. Krzysztof Pielichowski, phone #: +48 12 628-27-27; e-mail: kpielich@usk.pk.edu.pl
Deadline for application:	May 31 (for Fall Semester)

COURSE TITLE:	**DEGRADATION AND STABILISATION OF POLYMERS**
Institute/Division:	Chair of Chemistry and Technology of Polymers
Number of hours:	15
Course duration:	1 semester
ECTS credits:	2
Course description:	Introduction, factors influencing the degradation of polymers, mechanisms of degradation, methods of investigations, biodegradation, thermooxidative decompostion, kinetics, thermal decompostion of selected polymers, thermal stabilization of polymers, main groups of stabilizers, synergistic effects, ageing, future outlooks, conclusions.
Literature:	K. Pielichowski, J. Njuguna, Thermal Degradation of Polymeric Materials, Rapra, Shawbury 2005. N.S. Allen and M. Edge, Fundamentals of Polymer Degradation and Stabilisation, Elsevier Applied Science, Cambridge 1992. S.H. Hamid, Handbook of Polymer Degradation, 2nd Edition, Marcel Dekker, New York 2000. *Polymer Degradation and Stability* journal
Course type:	Lectures
Assessment method:	Multiple-choice written test
Primary target group:	5th year students in Chemical Technology
Lecturer:	Prof. Krzysztof Pielichowski
Contact person:	Prof. Krzysztof Pielichowski, phone #: +48 12 628-27-27; e-mail: kpielich@usk.pk.edu.pl
Deadline for application:	May 31 (for Fall Semester)

COURSE TITLE:	**LIQUIDS – MOLECULAR STRUCTURE AND PHYSICOCHEMICAL PROPERTIES**
Institute/Division:	Physical Chemistry Group / Faculty of Chemical Engineering and Technology
Number of contact hours:	15
Course duration:	1 semester
ECTS credits:	2
Course description:	The objective of this course is to give the student an understanding of the physicochemical properties of liquids using the molecular approach and hence to provide the student with the skill to intuitively predict the properties of solvents and solutions knowing the molecular structure of the solvent and solute or alternatively to find or design the right solvent for a defined task. Topics that will be addressed include: intermolecular forces – van der Waals forces, molecular configuration distribution forces, methods of studying the structure of liquids, molecular motion in liquids, structure simulation using molecular mechanics and quantum chemistry methods, role of hydrogen bonding, the structure of water and its unusual properties, the concept of solubility, hydrophobicity, aqueous solutions of hydrocarbons and alcohols, solutions of ions, viscosity –modelling of associating and non-associating fluids, viscosity of solutions, surface tension and interfacial tension.
Literature:	P. Atkins, J. de Paula, Physical Chemistry, 8th Ed., Oxford University Press 2006; J.S. Winn, Physical Chemistry, HarperCollins 2001; R.G. Mortimer, Physical Chemistry, 6th Ed., Academic Press 2008 + original articles
Course type:	Lecture and seminar
Assessment method:	Final test
Prerequisites:	Physics and physical chemistry
Primary target group:	3rd year students in Chemical Technology or in Environmental Engineering
Lecturer:	Stefan Kurek, PhD
Contact person:	Stefan Kurek, PhD, phone #.: +48 12 628 2770, e-mail: skurek@chemia.pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**PHYSICAL POLYMER SCIENCE**
Institute/Division:	Chair of Chemistry and Technology of Polymers
Number of hours:	45
Course duration:	2 semesters
ECTS credits:	5
Course description:	Introduction to polymer science. Macromolecular structure and configuration. Molecular weights. Concentrated solutions and phase separation. The amorphous polymer state, macromolecular dynamics. The crystalline state, crystallisation from the melt, liquid crystalline state. Glass-rubber transition behaviour. Cross-linked polymers, rubber elasticity. Viscoelasticity and rheology. Mechanical and thermal properties of polymers. Polymer surfaces and interfaces. Conclusions.
Literature:	L.H. Sperling, Introduction to Physical Polymer Science, Wiley, New York 2001. H.G. Elias, An Introduction to Polymer Science, VCH, Weinheim 1997. R. J. Young and P. A. Lovell, Introduction to Polymers, Stanley Thornes Ltd., Kingston 1991, reprinted 2000. K. Pielichowski, J. Njuguna, Thermal Degradation of Polymeric Materials, Rapra, Shawbury 2005.
Course type:	Lectures
Assessment method:	Written examination
Primary target group:	3rd year students in Chemical Technology
Lecturer:	Prof. Krzysztof Pielichowski
Contact person:	Krzysztof Pielichowski, phone #: +48 12 628-27-27; e-mail: kpielich@usk.pk.edu.pl
Deadline for application:	November 30 (for Spring Semester)

COURSE TITLE:	**INTRODUCTION TO ENERGY ANALYSIS**
Institute/Division:	Institute of Water Supply and Environmental Engineering, Chair of Environmental Technologies
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The main goals of the course are following: to teach students the principles and practices of quantitative methods for the evaluation of environmental impacts and analysis of carrying capacity of economic development, and interactions of ecological and economical systems. As a result of teaching, students will be able to build the system analysis models, simulate them and analyze the results. The lecture topics include: energy and its hierarchy, environmental production and economic use, energy memory, energy quality, energy transformation, evaluation of environmental resources, energy of states and nations, environmental accounting, principles of system analysis and visualization of a system, evaluating international exchange evaluation of alternatives for development.
Literature:	Odum, H.T.. 1996. " Environmental Accounting". John Wiley &Sons; Odum,H.T., and E.C.Odum. 2000 "Modeling for All Scales". Academic Press. San Diego Also copies of the articles will be provided before some lectures meetings.
Course type:	Lectures, design exercises, laboratory
Assessment method:	Final test (70%), exercises (20%), attendance (10%)
Prerequisites:	Chemistry, biology and ecology
Primary target group:	2nd year students in Environmental Engineering
Lecturer:	Prof. Włodzimierz Wójcik
Contact person:	Prof. Włodzimierz Wójcik, phone #: +48 12 628 21 82; e-mail: wwojcik@pk.edu.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**ONSITE WASTEWATER TREATMENT AND DISPOSAL SYSTEMS**
Institute/Division:	Institute of Water Supply and Environmental Engineering, Chair of Environmental Technologies
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The main goals of the course are following: to teach students understanding of interactions of the ecological systems with the pollutants, and principles of designing, construction and operation of onsite wastewater systems. As a result of teaching, students will be able to design and operate such systems. The lecture topics include: natural and constructed wetlands, mechanisms of wastewater treatment, media characteristics, role of the vegetation , hydrological balance on the wetlands, land treatment of wastewater, slow rate systems, rapid infiltration systems; design criteria, pre-treatment requirements, systems configuration, design procedures and criteria, site evaluation procedures, operation problems.
Literature:	Kadlec R.H. and Knight R.L. ”Treatment wetlands” . Lewis Publishers. Odum,H.T., and E.C.Odum. 2000 "Modeling for All Scales". Academic Press. San Diego. US EPA “Onsite Wastewater Treatment and Disposal Systems. Design Manual”.
Course type:	Lectures, design exercises
Assessment method:	Final test (70%), exercises (20%), attendance (10%)
Prerequisites:	Chemistry, biology and ecology, engineering geology and hydrogeology, fluid mechanics
Primary target group:	3rd year students in Environmental Engineering
Lecturer:	Prof. Włodzimierz Wójcik
Contact person:	Prof. Włodzimierz Wójcik, phone #: +48 12 628 21 82; e-mail: wwojcik@pk.edu.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**COMPUTER METHODS IN WATER ENGINEERING AND GEOTECHNICS**
Institute/Division:	Institute of Geotechnics
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	Knowledge of theoretical basis and practical skills in applying FEM in analysis of problems of water engineering including soil structures. Ability to use Z_Soil FEM code for analysis of static, stability and transient filtration in geotechnical systems. The lectures topics will include: review of matrix notation; mechanics of continuum and filtration – physical basis and boundary value problems in variational and matrix form; basis of finite element method; FE for statics of continuum; finite elements for nonlinear and transient problems; simple soil models; elastoplastic analysis and its finite elements implementation; load capacity and stability analysis in FE; finite elements in transient filtration problem.
Literature:	Zienkiewicz O.C. “Finite element methods”, Z_SOIL.PC User manual, Materials available at the Institute’s web page.
Course type:	Lectures, exercises, laboratory
Assessment method:	Preparation and oral presentation of reports from performed simulation (factor 0,4) Test on lecture content (oriented on practical aspects of considered problems), (factor 0,6)
Prerequisites:	Strength of materials, soil mechanics, numerical methods
Primary target group:	3rd year students in Environmental Engineering
Lecturer:	Aleksander Urbański, PhD
Contact person:	Aleksander Urbański, PhD, phone #: +48 12 628-2823; e-mail: aurbansk@usk.pk.edu.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**HEAT TRANSFER**
Institute/Division:	Institute of Thermal Engineering and Air Protection
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The course is designed to provide the students with understanding of elementary analysis of heat transfer including natural and forced convection, heat transfer through flat plate, fins and thermal radiation. The topics of the lectures will include: fundamental assumption, temperature field, thermal properties, Fourier law; heat transfer equation for unsteady state in solid; simplification of Fourier –Kirchhoff equation, heat transfer under steady state, temperature dependent thermal conductivity, heat transfer though flat plate, pipe, boundary conditions; natural and forced convection; heat transfer with fins; thermal radiation. It is expected that during the course students will acquire the skills needed for calculation of engineering heat transfer problems under steady state conditions.
Literature:	Leitner R., Zacharski J. „Zarys matematyki wyższej", WNT Whitaker S. „Elementary Heat Transfer Analysis", Pergamon Press
Course type:	Lectures, exercises
Assessment method:	Final test
Primary target group:	2nd year students in Environmental Engineering
Lecturer:	Marek Prymon, PhD
Contact person:	Marek Prymon, PhD, phone #: +48 12 628-25-98; e-mail: marek.prymon@quino.kom.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**ENVIRONMENTAL DECISION-MAKING**
Institute/Division:	Institute of Water Supply and Environmental Engineering, Chair of Water Supply, Sewerage and Environmental Monitoring
Erasmus subject code:	06.9 Engineering, Technology
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The main purpose of the course is to give a general knowledge on tools available for incorporating environmental costs and considerations into decision making in industry and in designing, operating and managing municipal water enterprises. The lectures will cover the following topics: tools for decisions screening, categories of environmental impact, qualitative and quantitative information, spread, assessment and pedigree of available environmental data, methods of cost estimation, generation of financial indicators, Life Cycle Assessment as a tool for improving environmental impact of gods, stages of a product life, economical tools in efficient distribution of investments for protection of environment, comparing different products in respect to their environmental impact, idea of a stack market for pollution, simple elements of optimization methods applied to environmental decision making, most current trends in municipal utilities designing methods reducing the impact of urbanization of floods ands urban water quality, Environmental liabilities such as compliance, remediation obligations, fines and penalties, compensations, and payment for natural resource damages.
Literature:	Ciechanowski P., Dąbrowski W., Environmental product Declaration – practical implementation of ISO14025 Technical Report 1st International Conference on Cycle Management, Copenhagen, Sierpień 27-29,2001, 141-144 Helby P., EKO-Energi – a public voluntary programme targeted at Swedish firms with ambitious environmental goals, Journal of Cleaner Production, 2002,10,129-141 Rettergen M.G., Farla J.C.M., Blok K., Do agreements enhance energy efficiency improvement? Analysing the actual outcome of long – term agreements on industrial energy efficiencies improvement in the Netherlands, ibid. 10,2001,153-163
Course type:	Lectures, exercises
Assessment method:	Exercises, final conversation
Primary target group:	2nd year students in Environmental Engineering
Lecturer:	Prof. Wojciech Dąbrowski
Contact person:	Michal Zielina, PhD, phone #: +48 12 628-28-36; e-mail: mziel@vistula.wis.pk.edu.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**WATER AND WASTEWATER PROCESS TECHNOLOGY**
Institute/Division:	Institute of Water Supply and Environmental Engineering, Chair of Environmental Technologies
Erasmus subject code:	06.9 Engineering, Technology
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The module is designed as a tool for understanding the principles of basic technological processes, which are a part of recent advances in water and wastewater treatment as well as others that take place within water and sewer lines. The module broads students' general knowledge on environmental chemistry, introducing, at the same time, some specific biochemical and physical processes occurring in water and wastewater technology. This way, the module sequence comprising: Environmental Chemistry, Unit Processes in Water and Wastewater Treatment Technologies and Water and Wastewater Treatment constitutes an integral unit, focusing on identification, understanding and application of water and wastewater treatment processes. Judging from the previous experiences on module implementation, such approach seems to be the most appropriate way of transfer from the environmental chemistry issues to the water and wastewater treatment problems. Moreover, the students who had finished the module and choose to specialize in other areas will have a sufficient theoretical background to continue their further education in the field of water supply and wastewater treatment.
Literature:	Barrow G. M.: Physical chemistry; Grady C. P. L.: Biological wastewater treatment
Course type:	Lectures, exercises, seminars
Assessment method:	Attendance and the final exam
Primary target group:	3rd year students in Environmental Engineering
Lecturers:	Małgorzata Cimochowicz-Rybicka, PhD and Małgorzata Kryłów, PhD
Contact person:	Małgorzata Cimochowicz-Rybicka, PhD, phone #: +48 12 628 28 65; e-mail: gosia@vistula.wis.pk.edu.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**URBAN RUNOFF CONTROL**
Institute/Division:	Institute of Water (Civil Engineering) and Water, Chair of Water Supply, Sewerage and Environmental Monitoring
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The general aim of the module is to get knowledge of: Influence of urbanization on flood hazard, present strategy of management and detention of storm water in order to compensate the loss of natural retention caused by urbanization, relations between water resources protection and flood protection in urban areas, The choice of protection methods based on rainwater retention in connection with flood threat level and kind of town–planning. Students will gain knowledge to gather by the future engineers abilities covering: assessment of usefulness of technical solutions depending on their protective function and techniques of designing some particular solutions on a local scale as well as practical knowledge of various technologies of rainwater storage.
Literature:	Osman-Akan, Robert J. Houghtalen / Urban hydrology, hydraulics and stormwater quality; J. Willey & Sons: Hoboken 2003; Other books and papers will be delivered by teaching staff at the beginning of module.
Course type:	Lectures, design-type exercises
Assessment method:	Design exercises assesment, final test in writing
Primary target group:	3rd year students in Environmental Engineering (Water)
Lecturers:	Prof. Elżbieta Nachlik and Leszek Lewicki, PhD
Contact person:	Leszek Lewicki PhD, phone # : +48 12 628 21 88, e-mail:leszek.lewicki@iigw.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**MUNICIPAL SOLID WASTE MANAGEMENT**
Institute/Division:	Institute of Heat Engineering and Air Protection
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The students are expected to understand the new approach to municipal wastes collection and handling towards general principle of sustainable development of cities. Student will gain practical knowledge in application of computer programs to perform analysis of municipal waste management. Specific lectures will focus on following issues: integrated waste management and lifecycle inventory, solid waste generation, pre-sorting and waste collection, central sorting, material recycling, biological treatment, thermal treatment, landfilling.
Literature:	White P.R.Franke M., Hindle P. Integrated Solid Waste Management Blackie Academic Professional 1995; Stypka T. ; Municipal Solid Waste Compendium e-book; Other books and papers will be proposedby teaching staff at the beginning of module
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Course type:	Lectures, design exercises
Assessment method:	Design exercises, final test
Primary target group:	3rd year students in Environmental Engineering
Lecturer:	Tomasz Stypka, PhD, Eng
Contact person:	Tomasz Stypka PhD, Eng., phone #: +48 12 628 2860, e-mail: pisz_mi@wp.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**COMPUTER METHODS IN RIVER ENGINEERING**
Institute/Division:	Institute of Water (Civil Engineering) and Water, Chair of Water Supply, Sewerage and Environmental Monitoring
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The students are expected to acquire knowledge about physical basis of open channel flow related processes, general philosophy of numerical modelling and computer methods used in river engineering. After completion of the course, they posses an ability to recognize and define various engineering problems and use an appropriate method/tool for solving them. Practical result will be an ability to use the professional software package HEC-RAS in wide range of engineering applications as well as familiarization with English terminology related to river engineering. Specific lectures will focus on hydraulic structures design problems: physical basis of computations/applied equations, river bed stability and sediment transport issues, review of numerical method used in 1-D modelling, general philosophy of the modelling systems and processes: model area definition and discretization, boundary/initial conditions, computational parameters. Knowledge about model calibration and verification, result analysis and visualisation, accuracy and stability.
Literature:	Reference Manual HEC-RAS, USACE, 2006; User Manual HEC-RAS, USACE, 2006; User Manual MIKE 11, DHI Software, Delft .Other books and papers will be proposed by teaching staff at the beginning of module
Course type:	Lectures, seminars, Design exercises
Assessment method:	Design exercises assesment
Primary target group:	4th year students in Environmental Engineering (Water)
Lecturer:	Prof. Elżbieta Nachlik
Contact person:	Anrdzej Maczałowski PhD, phone #: +48 12 628 21 88, e-mail: andrzej.maczalwoski@iigw.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**MECHANICS IN HYDRAULIC STRUCTURES**
Institute/Division:	Institute of Geotechnics, Chair of Construction
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The students are expected to gain a knowlegde of theoretical basis and practical skills in applying FEM in design and analysis of hydraulic structures (soil and concrete). Ability to use Z_Soil FEM code for static, filtration and heat transfer problems. Lectures and design exercises will focus on computational models in structural statics, filtration and heat transfer , finite elements for nonlinear and transient problems. Students will be able to solve problems related to elasto-plastic analysis in geotechnics and its finite elements implementation also load capacity and stability analysis in FE. Design exercise will lead to practicise computer simulation of an earth dam behavior under for variable water level condition. Evaluation of technical correctness of analyzed system and on computer simulation of temperature and related mechanical effects in massive concrete structure.
Literature:	O.C. Zienkiewicz. Finite element methods; Z_SOIL.PC User manual, Other books and papers will be proposed by teaching staff at the beginning of module
Course type:	Lectures, seminars, design exercises
Assessment method:	raport presentation, final test
Primary target group:	4th year students in Environmental Engineering (Water)
Lecturer:	Aleksander Urbański, Assoc. Professor
Contact person:	Aleksander Urbański, Assoc. Prof., phone #: +48 12 628 2820, e-mail: aurbansk@usk.pk.edu.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**SOIL-STRUCTURE INTERACTION**
Institute/Division:	Institute of Geotechnics, Chair of Construction
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The aim of this module is to get acquainted with numerical modeling of complex engineering structures interacting with soil by taking into account an effect of nonlinear soil behavior, groundwater flow, consolidation and other rheological phenomena The students are expected to broaden their knowledge concerning: simple elasto-plastic models for soils, calibration of constitutive models based on laboratory and field tests, partially saturated soils, effective stress concept by Bishop, modelling of drained/undrained conditions, finite elements for continuum, beams, anchors, membranes and contact interfaces. Both lecture and practical exercise will focus on computer software for modeling soil-structure interaction problems such as: interaction of structure and soil, contact of two deformable bodies in single and two-phase format, modeling of swelling and its influence on internal force distribution in structures. Basic tool will be the program SOIL.PC v7, so students will work on basic principles of construction of discrete models, macromodeling and its conversion to the finite element model, definition of boundary conditions for partially saturated soils, definition of contact Specific lectures will be on structures endangered by mining activity, static and dynamic cases.
Literature:	Lectures prepared by the lecturer available from the web site, Academic version of Z_SOIL.PC downloaded from www.zace.com User manual for Z_SOIL.PC v7 and video tutorials.
Course type:	Lectures, seminars
Assessment method:	Preparation of computer model of diaphgram wall, design of the wall reinforcement and preparation of the report, test exam
Primary target group:	4^{h} year students in Environmental Engineering (Water)
Lecturer:	Andrzej Truty, Associate Professor
Contact person:	Andrzej Truty, Associate Prof., phone #: +48 12 628 2856, e-mail: atruty@venus.wis.pk.edu.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**ALTERNATIVE WATER TREATMENT**
Institute/Division:	Institute of Water Supply and Environmental Engineering, Chair of Environmental Technologies
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	Main aim of the module is to gain both theoretical and practical knowledge regarding unconventional improvement of potable water quality, process sequences, in-situ treatment as well as problems associated with changes of physic-chemical and microbiological quality during water transportation through the network. Unconventional treatment processes being focused on possible application in developing countries will be a secondary aim of the module. This module is especially recommended for those students, who would like to develop their career based on working for European and or UN organization in developing countries, or for Polish construction enterprises being engaged in these countries. Students will obtain theoretical background of these subjects., besides they will gain significant practical abilities regarding application of these technologies. Practical application of these knowledge may be applied in two general ranges: first to be applied locally it will be problems associated with a water quality decrease both raw water (in-situ treatment) and in the network (de crease prediction) , prediction of dissemination of quality deterioration; second – to be applied in developing countries - low cost, low chemical technologies (non-chemical coagulation, solar disinfection) Case study – adjustment of alternative technology to specific conditions. Students will develop then present essays focused on one of general subjects: world-wide problems associated with unconventional water treatment and prediction of deterioration of water quality in a network
Literature:	NAC „Alternatives for Ground Water Cleanup”*;* R.Morris (ed) Health Related Water Microbiology 2002*;* R.Stuetz(ed.) New research in Water and Wastewater, Other books and papers will be proposed by teaching staff at the beginning of module
Course type:	Lectures, seminars
Assessment method:	Presentation of written essay
Primary target group:	4th year students in Environmental Engineering
Lecturer:	Stanislaw Rybicki, PhD, Eng
Contact person:	Stanisław Rybicki, PhD, Eng, phone #: +48 12 628-25-55, e-mail: smrybicki@interia.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**SEWRAGE REAL-TIME MODELLING**
Institute/Division:	Institute of Water Supply and Environmental Engineering, Chair of Water Supply, Sewerage and Environmental Monitoring
Course code:	0053
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	Main aim of the module is to learn principles of nonstationary flow modelling in sewers, on accumulating of pollution in sewerage catchments and they washing out, on average loads of pollution to be potentially realized and partially discharged to the sewerage system, on methods of decreasing the discharge of pollution to storm water sewerage systems. The Storm Water Management Model will be used as an available free domain software suitable for nonstationary flow modeling. Different storm water storage methods will be described and tested in computations. Students will use then present an application of the SWWM model foa a sewerage system of variable rain intensity. Side effect of this module for students of other mother language than English will be broadening professional vocabulary of specialized terms being used in sewerage systems' modeling and design.
Literature:	SWWM model – reference manual. Use of the SWWM model for practical application – by USEPA, all necessary literature will be accessible via web site.
Course type:	Lectures, seminars, computer exercises
Assessment method:	Design exercises/program use, final test
Primary target group:	4th year students in Environmental Engineering
Lecturers:	Prof. Wojciech Dąbrowski and Robert Płoskonka, PhD
Contact person:	Prof. Wojciech Dąbrowski, phone #: +48 12 628-25-51, e-mail: wdabrow@usk.pk.edu.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**ENVIRONMENTAL MANAGEMENT**
Institute/Division:	Institute of Heat Engineering and Air Protection
Number of contact hours:	30
Course duration:	1 semester (Spring)
ECTS credits:	2
Course description:	The main aim of this module is to recognize basic problems related to environmental management and gain knowledge how this problems are being solved. Evaluation of natural environment will also be discussed during lectures. Specific problems discussed during lectures and seminars will cover: Environmental Conflict Management, compartmental approach to EM water, air, waste, energy; Ecosystems Approach to EM (urban-, mountain-, river-environments), Environmental Economics. Project exercise will focus on sustainable development concept and principles and will finalize as joint group project on decision making and the environment – monetary evaluation of the environment.
Literature:	Turner R,K. Pearce D. Batman I. Environmental Economics an Elementary Introduction Harvester Wheatsheaf 1994; Nath B. Hens L., Compton P., Devuyst D. Environmental Management, Vubpress 1993
Course type:	Lectures, design exercises
Assessment method:	Design exercises, final test
Primary target group:	4^{h} year students in Environmental Engineering
Lecturer:	Tomasz Stypka, PhD, Eng.
Contact person:	Tomasz Stypka, PhD, Eng., phone #: +48 12 628 2860, e-mail pisz_mi@wp.pl
Deadline for application:	1st February 2010

COURSE TITLE:	**PRINCIPLES OF ARTIFICIAL INTELLIGENCE**
Institute/Division:	Institute of Telecomputing / Faculty of Electrical and Computer Engineering
Number of contact hours:	30
Course duration:	1 semester
ECTS credits:	6
Course description:	Foundations, problems, and approaches of AI. Design of computer systems that mimic natural systems when solving complex problems. Pattern recognition approaches and visual systems.
Literature:	S. Russell, P. Norvig, “Artificial Intelligence: A Modern Approach”; Ryszard Tadeusiewicz, Tomasz Gąciarz, Barbara Borowik, Bartosz Leper, “Discovery of neural networks properties by means of C# programs”; Goldberg David, “Genetic algorithms in search optimization and machine learning”; T. Ellen, „Artificial Life: Explorer's Kit”;
Course type:	Lectures and project
Assessment method:	Attendance and project
Prerequisites:	C, C++ or other programming language
Primary target group:	Students in Computer Science
Lecturer:	Tomasz Gąciarz, PhD, Eng.
Contact person:	Tomasz Gąciarz, PhD, Eng., phone #: +48 12 628-26-76; e-mail: tga@ pk.edu.pl
Deadline for application:	March 1

COURSE TITLE:	**INTRODUCTION TO MONTE CARLO METHODS**
Faculty/Department:	Faculty of Electrical and Computer Engineering / Institute of Teleinformatics
Number of contact hours:	60
Duration:	1 semester
ECTS credits:	5
Programme description:	The lecture and laboratories are dedicated to the introduction of students into the Monte Carlo world. During the lecture the following will be discussed at length: - foundations of the Monte Carlo integration, - variance reduction methods, - basics of the random and pseudorandom number generation, - testing of the pseudorandom number generators, - construction of the pseudorandom generators for a given probability distribution, - efficiency of the pseudorandom number generation, - application of the random walk methods to the solution of the systems of linear equations and matrix calculations, and differential equations, - application of the Monte Carlo methods in optimisation, interpolation, eigenvalue problems and modelling.
Literature:	R. Y. Rubinstein and D. P. Kroese, Simulation and the Monte Carlo Methods, J. Wiley & Sons Inc., New York, 2008. J. S. Dagpunar, Simulation and Monte Carlo, J. Wiley & Sons Inc., New York, 2008. F. James, Monte Carlo Theory and Practise, Rep. Prog. Phys. 43 (1981) 1145. G. S. Fishman, Monte Carlo: Concepts, Algorithms and Applications, Springer Verlag, New York, 1996 S. Jadach, Practical Guide to Monte Carlo, E-Print Archive: physics/9906056, http://cern.ch/jadach/MCguide
Course type:	Lecture and laboratory
Assessment method:	Attendance to laboratory, small projects and final exam
Prerequisites:	Basics of the software methods and these of the probability theory
Contact person:	J. Chwastowski, PhD, phone #: +48 12 628-26-70, e-mail: Janusz.Chwastowski@ifj.edu.pl
Deadline for application:	May 15

COURSE TITLE:	**DATABASE SYSTEMS**
Faculty/Department:	Faculty of Electrical and Computer Engineering / Institute of Teleinformatics
Number of contact hours:	45
Duration:	1 semester
ECTS credits:	6
Course description:	Course content embraces the basic principles of designing, implementing and maintaining database systems. Design and implementation of simple data base application is also provided. Student learns this material in a context-free way (without referencing any particular DBMS system). In course content we foresee however accomplishment of a project (individual or in the small group) that uses chosen DBMS. Our labs enable choosing Postgres, MS SqlServer 2008 or Oracle.
Literature:	1. Gavin Powell Beginning Database Design, Willey Publishing, Inc. 2006 2. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, Database Systems: The Complete Book, Prentice Hall, 2009 3. Internet materials
Course type:	Lectures, seminars and project
Assessment method:	Test
Prerequisites:	Structural and object programming
Primary target group:	2nd year students in Computer Science
Lecturer :	Prof. Jerzy Dąbkowski
Contact person:	Zbigniew Mrozek, PhD, phone #: +48 12 628 2523, e-mail: pemrozek@cyf-kr.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**COMPUTER GRAPHICS**
Faculty/Department:	Faculty of Electrical and Computer Engineering / Institute of Teleinformatics
Number of contact hours:	45
Duration:	1 semester
ECTS credits:	6
Course description:	Lecture – material encompasses in particular: - Basics of graphics hardware and software. - Algorithms of primitives drawing. - Geometrical transformation in homogeneous coordinates. - Modeling objects of three-dimensional scene. - Languages of scene description. - Modeling of color and textures. - Algorithms of rendering by ray racing and global luminosity methods.
Literature:	James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, Richard L. Phillips Introduction to Computer Graphics, Addison & Wesley 2000; Richard S. Wright Jr., Benjamin Lipchak, OpenGL Superbible, Sams Publishing, 2005; Internet materials
Course type:	Lectures, seminars and project
Assessment method:	Test
Prerequisites:	Structural and object programming
Primary target group:	2nd year students in Computer Science
Lecturer :	Prof. Jerzy Dąbkowski
Contact person:	Zbigniew Mrozek, PhD, phone #: +48 12 628 2523, e-mail: pemrozek@cyf-kr.edu.pl
Deadline for application:	May 31

COURSE TITLE:	**MULTIMEDIA SYSTEMS**
Institute/Division:	Institute of Telecomputing / Faculty of Electrical and Computer Engineering
Erasmus subject code:	11.3
Number of contact hours:	45
Course duration:	1 semester
ETCS credits:	5
Course description:	Course contents: Short history of the subject. Overview of multimedia software tools. Representation of sound, colour, graphics and video as a digital signal. Basics of data compression. Image, sound and video compression standards.
Literature:	Ze-Nian Li, Mark S. Drew: Fundamentals of Multimedia, Prentice Hall, 2004. Khalid Sayood: Introduction to Data Compression Morgan Kaufmann Series in Multimedia Information and Systems, 2005.
Course type:	Lectures, project assignments
Assessment method:	Projects, final test
Prerequisites:	C/C++ Programming
Primary target group:	2nd year students in Computer Science
Lecturer:	Assoc. Prof. Tadeusz Chmaj
Contact person:	Assoc. Prof. Tadeusz Chmaj, phone #: +48 12 628 2673, e-mail: tchmaj@pk.edu.pl
Deadline for application:	June 30 or November 30

COURSE TITLE:	**REAL TIME SYSTEMS**
Institute/Division:	Institute of Telecomputing / Faculty of Electrical and Computer Engineering
Number of contact hours:	60
Duration:	1 semester
ECTS credits:	6
Programme description:	This course comprises lectures (30 hours) and laboratory exercises (30 hours) . The majority of nowadays digital processors is embedded in electronics of various devices. These programmable hardware components require a special programming style: the real time programming. Besides, the embedded microprocessors- mostly microcontrollers, are equipped with numerous peripheral devices, which usually run independent, concurrent processes serviced by processor's interrupt systems. That makes every microcontroller system an ideal playground for study and applications of real time programming. The lecture covers also main subjects of real time operating systems with special emphasis on POSIX requirements and its practical realizations in systems like RT-Linux, ecos etc. The laboratory exercises are devoted to the low level assembly programming with strong temporal relations between a processor and hardware components as well as installation and tests of RT-Linux.
Contact person:	Prof. Piotr Malecki, phone #: +48 12 628 27 70, e-mail: malecki@pk.edu.pl

COURSE TITLE:	**MICROCONTROLLERS AND MICROPROCESSORS**
Institute/Division:	Institute of Telecomputing / Faculty of Electrical and Computer Engineering
Number of contact hours:	60
Duration:	1 semester
ECTS credits:	6
Programme description:	This course comprises lectures (30 hours) and laboratory excursuses (30 hours) . The lecture covers details of the architecture of three types of microcontrollers: the family 51, the AVR 8-bit microcontrollers and the ARM. Main subjects covered in details are: CPU clocking, register and memory structure, internal peripheral devices and interrupt systems. A considerable attention is paid to the assembler programming with a comparative treatment of addressing modes and instruction sets of these architectures. The course ends with an overview of the main tendencies in the 80x86 processor family development as well as with the overview of its assembly programming. The exercises are devoted to learning and mastering an assembly programming with a wide use of peripheral devices and communication interfaces.
Contact person:	Prof. Port Malacca, phone #: +48 12 628 27 70, e-mail: malecki@pk.edu.pl

COURSE TITLE:	**POLISH LANGUAGE COURSE FOR FOREIGNERS**
Duration:	as arranged with candidates
Course description:	This course is for foreigners interested in learning Polish language
Web page:	http://www.educentre.info
Fees:	depend on course duration and number of candidates
Contact person:	Tomasz Jeleński, PhD, DSc, Arch. Phone#: +48 12 648 49 50 or +48 12 649 22 77; e-mail: tjelenski@pk.edu.pl
Application procedures & deadlines:	ongoing application, application form to be sent to Tomasz Jeleński, PhD, DSc, Arch.
Remarks:	Courses at the following levels are available: A1, A2, B1, B2, C1, C2 and Polish language for MSc and PhD candidates

COURSE TITLE:	**PREPARATORY COURSE FOR INTERNATIONAL STUDENTS WISHING TO EARN THEIR BSC OR MSC DEGREE AT POLISH UNIVERSITIES**
Duration:	2 semesters (30 weeks), from 1st October to 30th June
ECTS credits:	44-80 (depending on a type of preparatory course)
Course description:	This course is for international students interested in studies at Polish universities. The course includes Polish language, free hand drawing, mathematics, physics and others
Web page:	http://www.educentre.info
Eligibility/Admission:	Secondary school diploma (for bachelor's preparatory course) or Bachelor's degree (for master's preparatory course)
Fees:	3 200 Euro
Contact person:	Tomasz Jeleński, PhD, DSc, Arch. Phone#: +48 12 648 49 50 or +48 12 649 22 77; e-mail: tjelenski@pk.edu.pl
Application procedures & deadlines:	application to be sent to Tomasz Jeleński, PhD, DSc, Arch. by 15th September each year
Types of preparatory courses offered:	Preparatory course for architecture and fine arts studies Preparatory course for technical studies Preparatory course for economical studies Preparatory course for administrative and business studies
Remarks:	The International Educational Centre is one of the few schools of this type in Poland which has the right to recommend its alumni to university studies without the necessity to take entrance exams (except medical studies).

COURSE TITLE:	**POLISH LANGUAGE COURSE FOR EXCHANGE STUDENTS OF ERASMUS PROGRAMME (30 HRS or 60 HRS)**
Duration:	1 semester (15 weeks)
ECTS credits:	5
Course description:	The programme is designed as introductory course of Polish language for foreigners
Web page:	http://www.educentre.info
Contact person:	Tomasz Jeleński, PhD, DSc, Arch. Phone#: +48 12 648 49 50 or +48 12 649 22 77; e-mail: tjelenski@pk.edu.pl
Application procedures & deadlines:	applications to be sent to the Erasmus Office at the Cracow University of Technology by October 31 or May 30
Remarks:	Level A0 – Survival Polish