STUDY GUIDE 2018/2019
UNIVERSITY OF PÉCS
FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY

COURSES OFFERED IN ENGLISH:

UNIVERSITY OF PÉCS
FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY
COURSES OFFERED IN FOREIGN LANGUAGES

A. ARCHITECTURE

Course title: Digital Architecture1. EPE030ANEM
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: This subject aims to provide an introduction to the use of computers in architectural design. are introduced to the theory behind Computer Aided Design software and their practical use through the following topics: geometric construction and 3D modelling using architectural CAD software, application of materials and textures to the design components, preparation of explanatory and 3D images, phase drawings and animations, export of vector and pixel-graphic datafiles for image processing and editing programs, insertion of processed data and other digital images and texts into CAD drawings, preparation of presentation material. This subject includes an architectural design project in the practical part (marked with a **P**) where students can develop their architectural skills.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr. HALADA Miklós

Course title: Digital Architecture 2.EPE031ANEM
Language of instruction: English
Form of teaching: pracice
Form of assessment: semester mark
Course description: Students' experience of CAD systems is expanded through this practical based course in the application of computers in the field of architecture and design. The course is made up of units including the following topics: modelling building construction details using CAAD software, preparation of plans presenting engineering components and spatial illustrative figures, attaching engineering specifications and descriptions to components and the entire model, selecting and sorting existing geometric and assigned data, processing data and attaching the results to drawings using word processing and spreadsheet programs.
By the end of the semester students will be familiar with CAAD systems to a level which will enable them to complete their engineering design project. This subject includes an architectural design project in the practical part (marked with a **P**) where students can develop their architectural skills.
Class hours/week: 2
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr. HALADA Miklós

Course title: Descriptive Geometry 1. EPE132ANEM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: : The objective of this subject is to teach students the fundamentals of descriptive geometry, giving them practical skills through following topics; characteristics of the science, geometrical construction, theoretical sciences, basics of symbolic logic, geometrical transformation, projection representation, simple statements, representation of space structures, relations, the Monge system, universal existence, the fit, section, distance and angle of space structures.
In addition to these topics students will study the basic concepts of set theory, finite and infinite sets, representation of geometrical bodies, the basics of geometry, principles of axonometry, the theory of parallelism and axiom, distance and angles in normal and oblique axonometry, classification of two-dimensional figures,

regular geometrical bodies, index number representation (I section - fit, II distance - angle, III projective geometry), ideal space structures, second-order curves, surfaces and the construction of flat slab floors.This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).

Class hours/week: 2 L, 2 P
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr. VÖRÖS László

Course title: Descriptive Geometry 2. EPE132ANEM

Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The objective of this subject is to teach students engineering representation skills and the construction of various curved surfaces using representation techniques learnt in Descriptive Geometry I.
Topics covered by this subject are as follows: points of intersection and plane sections of plane-sided geometric bodies, contour and points of intersection of curved surfaces, plane sections of curved surfaces, intersection of plane-sided shapes, intersection of curved surfaces, architectural applications (cupolas, vaults, spiral staircases), architectural applications in axonometry, construction of shadows (Monge and axonometric), systems of central mapping, representation of space structures, central images of plane-sided bodies, central images of curved surfaces, construction of shadows in central mapping.
Students attending this course will become acquainted with the geometric properties of all complex second-order surfaces and through learning how to construct their contours, shadow and sections, students perception of space and construction skills are improved and it also helps them understand the aspects (benefits in terms of form, structure or statics) of architectural application. Students will be able to construct views, sections, contours and shades of objects of their own design. This knowledge is required so that they can practically use the curved surfaces of computer representation in CAD systems. This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 1 L, 2 P
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr. VÖRÖS László

Course title: Mathematics B/1. EPE075ANEM

Language of instruction: English
Form of teaching: lecture
Form of assessment: exam
Course description: This lecture and practical based course aims to give architecture students a solid mathematics basis through covering the following topics: sets of numbers (natural, whole, rational and real numbers); vectors and operations with vectors, scalar and vector products and their applications; sets and operations with sets; projections; definition of functions; presentation of functions; polinoms; rational-fractional functions; algebraic functions; sequences of real numbers (definition of monotonity, limitedness, convergence and divergence); limit value and continuity of functions; types of discontinuity; definition of tangents; differential calculus of functions in one variable, differential quotients, derivative, relation between differentiability and continuity; rules of derivation, derivatives of algebraic functions; integral calculus: definition of the primitive function and indefinite integral, properties of indefinite integrals, basic integrals, integral processes, definition of the Riemann integral, its geometric and physical meaning, integral function, Newton-Leibniz theory.
Students learn the basics of mathematics enabling them to interpret and understand engineer sciences and through solving elementary tasks they deepen their basic theoretical knowledge in the field of engineering. The material of the practicals matches the requirements of the different specialisations.
Class hours/week: 4
Credits (ECTS): 5
Semester: Fall

Lecturer: Dr. PERJÉSINÉ Dr. Hámori Ildikó

Course title: Mathematics B/2. EPE075ANEM
Language of instruction: English
Form of teaching: lecture
Form of assessment: exam
Course description: This lecture and practical based subject aims to extend students mathematics knowledge and its application to engineering and architecture through the following topics: definition of definite and indefinite integrals, calculus of definite integrals using the Newton-Leibniz theory, application of definite integrals to engineering (architectural) problems, calculation of volume and centres of gravity, analysis of multivariable functions, interpretation and application of partial derivatives, definition, calculus and application of double integrals in authentic practical problems.
Students will also learn about transcendental functions: notable limit values and their derivation, application of differential calculus, Rolle's theorem, Lagrange's mean value theorem, rule of L'Hospital, testing functions, differentials of differentiable functions and their application for fault calculation, tangency of curves, osculating circles, curvature of the plane curve at P0, Taylor-polinoms, integration with replacements, partial integration, special integrals, geometric and engineering applications of definite integrals, improprius integrals, numeric integration, examples with common differential functions, definition of differential equations, their classification and solutions, solution of differential equations of the first and second order, definition of multivariable functions, partial derivatives, gradients, extreme values of the multivariable function, definition of the double integral and its calculus in the standard range. The practical sessions are designed to meet the requirements of the different specialisations.
Class hours/week: 3
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr. PERJÉSINÉ Dr. Hámori Ildikó

Course title: Statics MSE256ANEM
Language of instruction: English
Form of teaching: lecture
Form of assessment: exam
Course description: This course aims at teaching the basics of mechanics and covers the following topics: equilibrium states and conditions of equilibrium; resultant and balance of plane force systems; defining load-bearing structures, their types and loads. This theme is also expanded through the calculation of support reactions, simple hinged structures, loads on structures, calculation of loads, types of structural systems, definition and calculation of internal forces and internal force diagrams, definition of support and internal forces of joint structures, three-joint girders, Gerber girders and compound joint structures. The definition and types of truss is also covered and the forces influencing them.
This subject intends to provide students with knowledge in the basics of mechanics, resultant and balance of plane force systems. An additional objective is to prepare students with a basic knowledge for planning construction structures.
Class hours/week: 4
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr ORBÁN Zoltán

Course title: Architecture I. PMRTENE027A
Language of instruction: English
Form of teaching: lecture
Grading: examination
Requirements: regular class attendance and participation in excursions
Form of assessment: study and a poster
Course description: The architecture of the period preceding modernism. Premodern designers. Vienna, Arts and Crafts, De Stijl, Deutscher Werkbund, Russian constructivism. The Bauhaus school. Walter Gropius, Ludwig Mies van der Rohe. Le Corbusier. American architecture, Frank Lloyd Wright. Alvar Aalto. Weissenhofsiedlung.

Class hours/week: 2
Semester: Fall
Credits (ECTS): 2
Lecturer: Dr MOLNÁR Tamás

Course title: Architecture 1. MA PMRTENE100A
Language of instruction: English, German
Form of teaching: lecture
Grading: examination
Requirements: regular class attendance and participation in excursions
Course description: Course content includes excerpts on design theory from the history of modernist architecture in Hungary; contemporary architecture; second part of the world history of modern architecture; discussion of trends; architects and theories; arts related to architecture and techniques for architectural analysis of buildings.
Class hours/week: 2
Semester: Fall
Credits (ECTS): 2
Lecturer: Dr MOLNÁR Tamás.,

Course title: Architecture 2. MA PMRTENE101A
Language of instruction: English, German
Form of teaching: lecture
Grading: examination
Requirements: regular class attendance and participation in excursions
Course description: Course content includes excerpts on the signs of crisis in modernism; modernism 2 and contemporary architecture in Southern Europe; modernism 2 and contemporary architecture in France; modernism 2 and contemporary architecture in Great Britain; modernism 2 and contemporary architecture in German speaking countries; modernism 2 and contemporary architecture in Northern Europe; modernism 2 and contemporary architecture in the US; Japanese architecture; postmodernism; deconstructionism; neo-modernism; regionalism; analogous architecture.
Minimum number of students: 3
Class hours/week: 2
Semester: Fall
Credits (ECTS): 2
Lecturer: Dr MOLNÁR Tamás

Course title: Art History 1. PMRTENE070A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The objective of the course is to present the periods of art history from the ancient times to the Renaissance and provide students with basic knowledge of the specified eras.
Class hours/week: 2 + 2
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr SISA József

Course title: Art History 2. PMRTENE071A
Language of instruction: English
Form of teaching: lecture
Form of assessment: exam

Course description: The history of European art in the 16th, 17th and 18th centuries. Artistic centres of the Baroque and Rococo eras. Classicism. Acquisition of the basics of art history, improvement of aesthetic standards and visual memory.
Class hours/week: 2
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr. SISA József

Course title: Art History 3. PMRTENE072A
Language of instruction: English
Form of teaching: lecture
Form of assessment: examination
Course description: The history of European art in the 19th century. Style pluralism, the appearance of modernism. Historicizing approach. The concept of industrial arts, all-artistic endeavours. Fine arts and industrial arts of the turn of century. Acquisition of the basics of art history, improvement of aesthetic standards and visual memory.
Class hours/week: 2
Credits (ECTS): 2
Field of Sciences: architects, designers, urbanist
Semester: Fall
Lecturer: Dr MOLNÁR Tamás

Course title: Lectures on Art History EPE349ANEM
Language of instruction: English
Form of teaching: lecture
Form of assessment: examination
Course description: This course forms a basis for the history and theory of architecture, which summarises historical events in monumental architecture in both Eastern and Western ancient cultures, and describe characteristics of architecture. It covers the following topics: the concepts of the history of architecture, megalithic architecture in Europe, architecture of Ancient Egypt, the Necropolis, the centre of the Ancient Empire and the architecture of pyramids, architectural remains of the New Empire, the culture and architectural remains of Crete and Mycenae, Greek culture, archaic, classical and Greek art, the Etruscan culture and its influence on the art of Rome, architecture in the Roman Empire, technical achievements and engineering architecture in the Roman Empire, Early Christian architectural remains in Rome and Ravenna and the cultural influence of the Byzantium age.
Through studying palaces, churches and temples, tombs, houses, public buildings and urban planning of antiquity, students can gain an insight into the evolution of spatial design and functional relationships in architecture and the history of structural and technical development.
Class hours/week: 2
Credits (ECTS): 3
Field of Sciences: architects, urban designers, civil engineers, interior designers, designers
Semester: Spring
Lecturer: Dr MOLNÁR Tamás

Course title: Lectures on History of Architecture 1. EPE065ANEM
Language of instruction: English
Form of teaching: lecture
Form of assessment: examination
Course description: This subject is a follow up course in the history and theory of architecture, and summarises ancient Christian events and architecture in the Middle Ages based on monumental architecture. The objective of the subject is to present the mainstreams of development, the evolution of medieval architecture and intends to improve knowledge of theoretical and historical aspects of architecture. Aesthetic standards and awareness

are improved through the following topics: spread of Christianity, sacred and profane architecture in the Middle Ages, outstanding architectural monuments of Romanticism and Gothicism in Europe and Hungary.
Through presenting the main spiritual movements and social changes in Europe, and their influence on architectural approach through characteristic buildings and sculptor's studios, students discover the concept of architecture and the different types of drawings characteristic of this era.
Class hours/week: 2
Credits (ECTS): 3
Field of Sciences: architects, urban designers, civil engineers, interior designers, designers
Semester: Fall
Lecturer: Dr MOLNÁR Tamás

Course title: Lectures on History of Architecture 1. EPE066ANEM
Language of instruction: English
Form of teaching: lecture
Form of assessment: examination
Course description: The purpose of this course is to outline the main streams of development throughout the ages and to interpret them adopting present concepts of architecture. In lectures, the theoretical and historical relations of architecture are investigated from a general historical, artistic, architectural and, on occasion, structural aspect. Architecture of the bourgeois society, which developed in the course of changes in history, is analysed based on the historicism of the 19th century and events of the turn of century. Thus, early antecedents of present architectural trends and the value of the existing architectural environment are revealed.
The following topic are covered in the lectures: architecture theory in the Renaissance, outstanding architects and new characteristic buildings of the era; architecture of the Contra-Reformation and Roman baroque; manor-house and garden architecture of French baroque; sacred and profane architecture in Hungary in the 17th and 18th centuries; characteristic pursuits of classicism; architecture of the French revolution; ambitions in urban planning; Hungarian classicism; historicism and its forms in European architecture; engineering architecture in the 19th century; the arts and crafts movement; secession workshops in Europe, Ödön Lechner and the issue of national formal language, secession architecture in Hungary.
Class hours/week: 2
Credits (ECTS): 3
Field of Sciences: architects, urban designers, civil engineers, interior designers, designers
Semester: Spring
Lecturer: Dr MOLNÁR Tamás

Course title: Theory of Architecture PMRTENE007A
Language of instruction: English
Form of teaching: lecture
Form of assessment: exam
Course description: This subject expands on previously taught material and deals with the theory and history of architecture. Students are introduced to the evolution of international and Hungarian architecture, where trends are presented and analysed and the theory of architectural ideology and approach is examined in the 20th century, especially theory dealing with modernism and contemporary architecture. Through these studies, which give students a strong theoretical base, students are expected to develop and expand on their own personal perception of architecture and architectural design.
Class hours/week: 2
Credits (ECTS): 3
Semester: Fall
Lecturer: Prof. Dr. BACHMANN Bálint

Course title: Architectural Drawing 1 MSc. PMRTENE118A
Language of instruction: English
Form of teaching: practice

Form of assessment: exam
Course description: During the course, students deal with the rules of representing built space and practise the observational representation of external and internal spaces. In accordance with the design course, they are introduced to the specific technique of creating 3D designs and practise drawing methods which gives them a more diverse means to represent built space. This subject includes an architectural design project in the practical part (marked with a P) where students can develop their architectural skills.
Class hours/week: 3
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr NÉMETH Pál

Course title: Architectural Drawing 2 MSc. PMRTENE118A
Language of instruction: English
Form of teaching: practice
Form of assessment: exam
Course description: This is a continuation of the material covered in Architectural Drawing 1. In accordance with the design courses, students are introduced to the specific technique of creating 3D designs and, through increasingly complex tasks, they practise drawing methods which enables them to represent built space in a more diverse way. This subject includes an architectural design project in the practical part (marked with a P) where students can develop their architectural skills.
Class hours/week: 3
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr NÉMETH Pál

Course title: Architectural Drawing 3 MSc. PMRTENE119A
Language of instruction: English
Form of teaching: practice
Form of assessment: exam
Course description: Through practical tasks, students are inspired to acquire free-hand drawing skills concentrating on the application and regularities of different perspective systems. As a basic activity, students familiarise themselves with figure drawing, acquire conventional graphic techniques and apply a wide range of drawing methods in order to develop their visual culture and extend their tool range. As a supplementary task, students are given tasks which help develop their perception of space, combination skills and creativity. This subject includes an architectural design project in the practical part (marked with a P) where students can develop their architectural skills.
Class hours/week: 3
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr NÉMETH Pál

Course title: Architectural Drawing 1. EPE345ANEM
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: This practical based course enables students to acquire skills in free-hand drawing, laying special emphasis on familiarizing themselves with the use of different perspective systems and introducing them to their regularities. As a basic objective, students are expected to cope with drawing models, acquire basic

drawing techniques as well as apply different drawing methods in order to develop their visual form capabilities and use of tools. As a supplementary activity, students are provided with tasks which are suitable for improving and developing their spatial vision, combination skills and creativity.
Utilising the knowledge obtained during the courses of Basics of the Fine Arts I, II as well as of Space and Object Representation I, II, students deal only with the regularities of representing built space. During the course students familiarize themselves with the modelled representation of exterior and inner spaces. In accordance with their design programme, students are introduced to the characteristics of preparing drafts and drawing methods with which built space can be expressed.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can develop their architectural skills.
Class hours/week: 2
Credits (ECTS): 3
Field of Sciences: architects, designers, urbanist
Semester: Fall
Lecturer: Dr. BACHMANN Erzsébet

Course title: Architectural Drawing 2. EPE346ANEM
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: This practical based course enables students to acquire skills in free-hand drawing, laying special emphasis on familiarizing themselves with the use of different perspective systems and introducing them to their regularities. As a basic objective, students are expected to cope with drawing models, acquire basic drawing techniques as well as apply different drawing methods in order to develop their visual form capabilities and use of tools. As a supplementary activity, students are provided with tasks which are suitable for improving and developing their spatial vision, combination skills and creativity.
In addition to learning the basics of colour theory, students are expected to use a wide range of drawing techniques (e.g. pencil, crayon, ink and wash drawings) to express spatial arrangement and shadow effects.
The course is the continuation of Architectural Drawing I. In accordance with their design programme and through more and more complex tasks, students are introduced to the process of preparing drafts and using drawing methods with which built space can be expressed.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can develop their architectural skills.
Class hours/week: 2
Credits (ECTS): 3
Field of Sciences: architects, designers, urbanist
Semester: Spring
Lecturer: Dr. BACHMANN Erzsébet

Course title: Architectural Drawing 3. EPE347ANEM
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: Through practical tasks, students are inspired to acquire free-hand drawing skills concentrating on the application and regularities of different perspective systems. As a basic activity, students familiarise themselves with figure drawing, acquire conventional graphic techniques and apply a wide range of drawing methods in order to develop their visual culture and extend their tool range. As a supplementary task, students are given tasks which help develop their perception of space, combination skills and creativity.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can develop their architectural skills.
Class hours/week: 2
Credits (ECTS): 3
Field of Sciences: architects, designers, urbanist
Semester: Fall

Lecturer: Dr. BACHMANN Erzsébet

Course title: Architectural Drawing 4 PMRTENE015A
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: This practical based course gives students further experience in free-hand drawing building upon what they have previously learned in the previous Architectural Drawing classes. As a basic objective, students are expected to cope with drawing models, develop their basic drawing techniques as well as apply different drawing methods in order to develop their visual form capabilities and use of tools. As a supplementary activity, students learn how to draw from imagination, how to represent internal and external spaces of architectural components and are given supplementary tasks for improving their spatial vision, combination skills and creativity. This subject includes an architectural design project in the practical part (marked with a P) where students can develop their architectural skills. **Class hours/week:** 3
Credits (ECTS): 3
Semester: Fall
Lecturer: Dr NÉMETH Pál

Course title: Architectural Graphics PMRTENE106A
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: The aim of the course is to help students master architectural graphic representation skills and to enable them to use a wide variety of graphic representation techniques so that they will be able to choose techniques which are best adapted to particular design tasks.
Course content includes traditional architectural graphic representation techniques, various graphic and technical representation methods and the complex use of architectural graphic representation methods. Techniques include traditional ones (graphite) and modern computer generated graphics, with line-drawing, textured, plastic and photorealistic representation modes.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can develop their architectural skills.
Class hours/week: 2
Credits (ECTS): 2
Field of Sciences: architects, designers, urbanist
Semester: Fall
Lecturer: Dr. BACHMANN Erzsébet

Course title: Building Constructions 1. EPE108ANEM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: examination
Course description: This subject intends to teach the following topics: requirements of building constructions; history of wall structures; walls built from small bricks, general rules of brick joints; modern masonry materials, skeleton ceramics, partition walls; lintels for openings of load-bearing wall structures, discharge of loads; masonry lintels, stone arches, reinforced concrete joists; requirements and planning aspects of stairs, interior stairs, structural solutions for radial stairs, interior stairs made of reinforced concrete, metal and wood, stair structures of residential and public buildings, structural design of monolithic reinforced concrete stairs, stair structures made of stone and cast stone, pre-fabricated stair structures, entrance stairs, terrain stairs.
In addition students will be introduced to the regulations and requirements of flat floor structures, wooden ceiling structures, ceiling structures with steel beams, pre-fabricated reinforced concrete ceiling structures, the relationship between reinforced concrete beams and their lining, structural design of ring beams, monolithic

reinforced concrete ceilings, floor coverings, structural breakthroughs in ceiling structures, curved ceiling structures, the historical development, types and structural design of vaults.
This course provides a sound basis for students to improve their construction and structural design skills, through both the theory based lectures and through the practical element of the course, where students are introduced to the construction process of a residential building.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 3 L, 4 P
Credits (ECTS): 7
Field of Sciences: architects, civil engineer, urbanistic
Semester: Spring
Lecturer: Dr. HALADA Miklós

Course title: Building Constructions 2. EPE110ANEM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: examination
Course description: The primary intention of this subject is to teach students the following theoretical topics: drawing representation of roof structures, wooden roof structures and joinery, Chevron roof structures, vacant and collar beam roof structures, purlin roof structures, roof structures with one, two and multiple support members, roof structure with slanted support members, purlin roofs with struts, mansard roof structures, hipped roof structures, carpenter joints, suspended roof structures, structural solutions for building in attics, damp-proofing requirements and their materials (bitumen and plastic layers), structural requirements of damp-proofing against soil moisture, horizontal and vertical wall insulation, horizontal floor insulation, insulation of footings, waterproofing against ground water, constructional solutions for structures penetrating insulation and connecting structures, types and requirements of foundations, systematisation and rules of flat foundations, production of continuous footings, roofing, imbricate roof structures, tough roofing systems, tile roofing, concrete roof tiles, slate roofs, wooden and thatched roofs, boarded roofs, flashing and guttering, breakthroughs in roofing, metal plates, chimneys and gravitational ventilation.
The topics listed above serve as a basic theoretical knowledge for students and are complimented by practical sessions where students work through the design of a residential building.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 3 L, 4 P
Credits (ECTS): 7
Field of Sciences: architects, civil engineer, urbanistic
Semester: Fall
Lecturer: Dr. HALADA Miklós

Course title: Building Constructions 3. EPE099ANEM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This course expands students' knowledge from what they learned in previous Building Constructions courses and covers the following topics: design and construction of monolith reinforced frame constructions; pile foundations; reinforced concrete frame stairs; expansion joints; methods of waterproofing and damp-proofing, traditional and modern waterproofing techniques (felt, sprayed, insulation coating etc.), materials of waterproofing and their application; utilised roofs, roofs open to pedestrian traffic, terraces, parking roofs and roofs with vegetation; internal structures for enclosing space, dry wall systems; mounted constructions, suspended ceilings and mounted floors, internal surfacing, floors and internal coverings; cavity walls design, external wall claddings; historic development of windows and doors; anatomy of windows and doors, glazing, physical installation aspects; traditional and modern windows and doors from wood, metal and

plastic; skylights; shading. This subject includes an architectural design project in the practical part (marked with a P) where students can practice and further develop the content of the lectures (marked with an L).
Class hours/week: 3+4
Credits (ECTS): 7
Semester: Spring
Lecturer: Dr ZOLTÁN Erzsébet

Course title: Building Constructions 4. PMRESNE140A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This subject aims to increase students knowledge of building constructions through lectures and practicals covering the following topics: wall and frame constructions applying various materials and technologies; load-bearing, spaceenclosing and partitioning structures and the principles of selecting and designing such structures; framework from prefabricated reinforced concrete, UNIVÁZ, BVM-TIP; framework for reinforced pre-stressed concrete: IMS; steel framework; multi-storeyed timber framework; construction aspects of deep foundations; waterproofing and dampproofing; underground insulation (bitumen, plastic and volume); damp-proofing walls; waterproofing against groundwater; external wall glazing (service walls, curtain walls, climate external walls, point mounted glass walls); glass roofs; mounted coverings for external walls (brick, stone and metal); other external wall coverings; metal plate (titanium zinc) roofs; suspended ceilings; basic construction rules, design principles and application possibilities. This subject includes an architectural design project in the practical part (marked with a P) where students can practice and further develop the content of the lectures (marked with an L).
Class hours/week: 3+4
Credits (ECTS): 7
Semester: Fall
Lecturer: Dr ZOLTÁN Erzsébet

Course title: Building Construction 5. PMRESNE041A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This subject presents the methodology of structural design through the following lectures introducing students to wall and frame construction: systematization of halls and their load-bearing structures, the design and construction principles of components, framework, roof structures and external walls of prefabricated reinforced concrete halls; framework, external walls and roof structures of steel-framed halls; framework of timber-framed halls; skylighting.
Class hours/week: 2 + 4
Credits (ECTS): 7
Semester: Spring
Lecturer: Dr KISTELEGDI István jr.

Course title: Design Studio 1 EPE311ANEM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: This course serves as an introduction to the home environment and gives students a theoretical and practical basis for designing residential buildings. To achieve this, lectures are given in the following topics: arrangement of space in a house, fixtures in a house, suitable floor plan layout of spaces, external appearance of the building (familiarisation with an emphasis on the deviations and differences

depending on sitting arrangements), service requirements, types of residential building, and the history of residential buildings.
In their semester assignment, students present the problems arising from mass formation and the sitting arrangements of buildings and during the practical sessions they prepare models and are taught techniques and tools of representation (drawing tools, methods and tools for modelling).
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 1 L, 3 P
Credits (ECTS): 5
Field of Sciences: architects, civil engineer, urbanistic, designers
Semester: Spring
Lecturer: Dr MEDVEGY Gabriella, medvegygabriella@pmmik.pte.hu

Course title: Design Studio 2 EPE312ANEM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: This course introduces to the students the theory and professional elements of architecture and reveals the general correlation necessary for further studies. The lectures and practicals cover the methods of site arrangement and building types applied to them together with their specific requirements, and a historic development of building types with an analysis of practically applied solutions.
The main objectives of practicals in this semester is to have students practice the basics of housing design, to develop their skills in problem identification and decision-making, to improve their architectural skills and to teach them how to get an overview over a range of housing designs. Students prepare several assignments in the course of the semester. The subject covers design problems of the main types of residential buildings (detached houses, semi and terraced housing, blocks of flats) and experience is gained through the practical component in architectural planning, deepening the fundamentals of designing residential buildings. Problems sensing skills are developed through a specified task on designing residential buildings. To assist with representation, techniques are taught including model construction.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 1 L, 3 P
Credits (ECTS): 5
Field of Sciences: architects, civil engineers, urban designers, designers
Semester: Fall
Lecturer: Dr MEDVEGY Gabriella

Course title: Design Studio 3 EPE313ANEM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: Building design in this semester concentrates on raising standards of design with an emphasis on integration into the architectural environment and managing cultural and aesthetic values. Students are also introduced to the theoretical issues in environmental design, especially with architectural environment design, and the practical element of the course works through the design problems. This course covers the following topics: developing continuity of design in rows of buildings and empty building sites in urban settings, developing the essentials of residential building design through practical application, developing problem-sensing and decision-making skills in the design process, comprehension skill acquisition, developing architectural expression and independent creative skills, layout of the designed content on ground plans, external appearance of buildings, volume design practice, model construction, representation techniques. This subject includes an architectural design project in the practical part (marked with a P) where students can practice and further develop the content of the lectures (marked with an L).

Class hours/week: 1+3
Credits (ECTS): 5
Semester: Spring
Lecturer: Dr MEDVEGY Gabriella

Course title: Building Design 4. PMRTENE020A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: Students are required to complete design work relating to public buildings and an actual building site. Students are required to submit all their plans documenting their work on the design and are assessed on the following aspects: architectural design, development concept, functionality, volume forming and space composition. For the preliminary and final plans only free-hand graphics can be used. Students are also required to complete a model of the final plan in a material of their choice.
The following aspects of public building design are covered: design work of specified types of public buildings, content programmes, optimal layout of the designed content on the floor plan, external appearance of the building (deviation from residential buildings and emphasis on the differences), volume design practice, methods of representation, and preparation of colour designs.
Class hours/week: 2 + 3
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr HUTTER Ákos

Course title: Building Design 5. PMRTENE121A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This subject teaches students ways of recognising impacts the immediate and wider environment have on building design and, using relevant urban design programmes, finding ways of integrating the building into that programme.
The practical classes focus on the following topics: design of a public building set in the town fabric on the basis of the site plan and programme; floor plans, building volume, design of building structures under the supervision of a consultant, emphasis on the importance of fitting into the environment; acquisition of complex design knowledge. In addition students must prepare concept plans of a specified design task applying the knowledge that they have learnt (aiming at synthesis). Students are also taught how to improve technical techniques for creating high quality presentations and model construction.
Class hours/week: 2 + 3
Credits (ECTS): 5
Semester: Spring
Lecturer: Dr HUTTER Ákos

Course title: Building Services Engineering PMRGENE150A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: This subject introduces students to the field of building services engineering and its relation to other professional fields and covers the following topics: energy consumption of buildings and location of consumption meters; space demand and location of building services equipment and centres; water supply, complete plumbing systems of buildings, cold water, hot water supply, sewerage systems, water use in architectural activities; heating technology, elements of central heating systems, energy saving in central heating; gas supply, role of gas supply and gas use in the energy supply of buildings, gas equipment in buildings, gas fittings and fixtures; renewable energy sources, passive and active utilisation of solar energy; geothermal energy; handling air, cooling and air conditioning systems, loading of rooms, comfort parameters; ventilation, cooling

and heating; electricity supply and networks; electrical appliances in buildings, elements of electric wiring networks of buildings.
Class hours/week: 1 + 1
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr FÜLÖP László

Course title: Complex accessibility PMRESNE001A
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: In daily life, as we maneuver through society, nothing is more important yet taken for granted more often than access. For millions of people with disabilities, the access that most of us take for granted is difficult, impossible, or achievable only with the intervention of a third party. We live in what is considered an independent society, yet independent access to programs, facilities, and employment are not easily achievable by many. Physical access is historically the arbiter of success and the source of opportunity in education, employment, and social freedom. Thus, accessibility is a civil rights issue for many people with disabilities and for our society. This course will provide you with an overview of the principals and guiding documents that support accessible environments.
By completing this course students
- will be able understand the goals of accessible design,
- will learn how to apply at least two principles of accessible design to a project,
- will describe flexible design principles that support accessible spaces,
- will learn how to achieve equal access through integrated design.
Class hours/week: 2
Credits (ECTS): 3
Semester: Spring
Lecturer: Dr KISTELEGDI István

Course title: Construction Management 1. PMKEKNE138A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: Students are introduced to those processes of construction which they will have to face once they are qualified architects. If we accept that construction is an answer to a social or economic problem within the field of construction investment, it is important that students learn about the different aspects of construction projects to solve this question. Management aspects of construction projects, especially in the preparation work, design, execution and operation, are covered through the following topics: definition, content and preparation processes of cost estimates; aids for preparing cost estimates; types and content of standards; standards for working hours, material utilization and machine operating hours; budget preparation, profile plans, measurement calculations; price analysis, essentials of costs, direct and indirect costs; elements and calculation of construction budgets; preliminary and subsequent calculation; tendering, cost planning; budget preparation software; layout of the construction site; content of detailed organizational layout designation; temporary and utility buildings; public utilities and power supply on the construction site; utility buildings and roads; definition and application of production management; production management in the construction industry; elements of construction operations; methods and representation of operation sequences; preparation and content of linear time schedules.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 1 L, 2 P
Credits (ECTS): 2
Semester: Spring

Lecturer: ZAGORÁCZ Márk

Course title: Construction Management 2. PMKEKNE039A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The lectures and practicals of this subject introduce students to those aspects of management which are innovative in assisting construction work and covers the following topics: definition and application of production management in the construction industry; elements of the construction process, their representations and relations; methods of production and construction management, their comparisons and potential applications; essentials of linear and progress chart scheduling, elements and contents of time schedules; methods and conditions for the sequencing of processes, calculating the demand for labour; the influence of money as a resource on construction scheduling; computer aided methods for construction management; types of management methods using flowcharts; essentials of the critical path method (CPM), its principles and preparation process; analysis of flowcharts from logical and chronological points of view.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 1 L, 2 P
Credits (ECTS): 2
Semester: Fall
Lecturer: ZAGORÁCZ Márk

Course title: Construction Management 3. PMKEKNE040A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This subject intends to provide students with the engineering and economic knowledge necessary for responsible participation in a development and investment process and covers the following topics: improvement of networks, essentials and elements of MPM (Metra Potential Method) diagrams; computer aided processes of networks; essentials and application of the continuous production management method and sequence programming; essentials, roles and elements of spatial organization; systems, types and content of organization plans; controlling the construction site, rights and duties of the site manager; technical administration on the construction site; technical supervision and the role of the design foreman in construction.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 1 L, 2 P
Credits (ECTS): 2
Semester: Spring
Lecturer: ZAGORÁCZ Márk

Course title: Construction Materials MSE081ANEM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This lecture and practical based subject intends to provide students with a useful knowledge concerning the fundamentals of construction materials and covers the following topics: chemical, physical and mechanical properties of construction materials; features and application of heat and sound insulation materials; waterproofing materials, bitumen, damp-proof layers, methods for later drying out of wet walls; production, testing and properties of construction ceramics, choice and application of ceramic masonry elements; types of mortar and their testing and properties, application of special mortars in the construction industry; construction with stone and their testing and application; types of timber, structure, physical and mechanical properties of wood, defects in wood and wood protection; metal and reinforced concrete, production, testing and mechanical properties of steel; architectural glass; properties of plastic materials and their application in the construction industry.

Through the examination of "changes in materials", chemical and physical processes can be examined, and by studying corrosion, degradation and compatibility of materials we can find the means to minimise damage or protect against degradation. Students also learn to classify the ever expanding range of construction materials, analyse the dangers originating from environmental changes and explain application directives and their boundary conditions.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 2 L, 2 P
Credits (ECTS): 3
Semester: Fall
Lecturer: BALOGH Tamás

Course title: Construction Technology 1. MSE060ANEM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: examination
Course description: This subject introduces students to the characteristics of the construction industry, the relationship between construction technology and the related scientific fields, the key processes behind construction preparation and subsurface construction works related to surface construction. It also covers the basic principals of planning, managing and controlling construction works, beginning with the take-over of a construction site, preparatory works and demolition works. Other topics covered include: earthworks, marking out the working site, preparation of foundations, machinery management, earthworks machinery, quality control measures such as SWOT analysis and its role in quality assurance, foundations, damp-proofing and waterproofing, construction of vertically walled load-bearing structures and construction of slabs from prefabricated components.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 1 L, 1 P
Credits (ECTS): 2
Field of Sciences: architects, civil engineers
Semester: Spring
Lecturer: ZAGORÁCZ Márk

Course title: Construction Technology 2. PMREKNE005A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: Construction processes of in-situ casting and pre-cast reinforced concrete structures are presented in the course, and the processes involved with concrete technology and finishing concrete structures. In particular the following topics are covered: classification of machinery in the construction industry; allocation of machinery operating hours; performance documentation in practice, machinery logbooks, expenses for machinery, compulsory reports for machinery; elements in concreting chains, their operation and applications; preparation of conventional formworks; preparation of steel reinforcing and concreting processes; mortar machine technology and tools; exterior and interior plastering; floor tiling with conventional and modern techniques; application of cranes and elevators in the construction industry; relations between building services engineering works and master builder works; dry construction systems; preparation of roofing and flashing; house painting and floor laying; steel and timber structures.
This course aims to give students a basis for planning, managing and controlling construction work.
Class hours/week: 1 + 1
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr KONDOR Tamás

Course title: Construction Technology in Practice PMSEKNE500EA-00; LA-01
Language of instruction: English
Form of teaching: lecture, site visiting
Form of assessment: examination
Course description: During the term the students can be prepare to the real construction processes. The main part of the subject is the site visiting, here in Pécs.
On the lectures (marked with an **L**) the teacher will show them the basic of the site planning, the main steps of the construction in practice. On the lectures the students can be prepare to the site visiting: with the showing the site plans, the photos of the workplaces, the specialities of the works.
During the site visiting/practice course (marked with a **P**) the teacher and the students go out to the sites and there the students can meet the leaders of the sites. They can see the planes and the buildings in same time. The teacher choose an exact task for every students.
At the end of the term the student have to make a presentation about their experiences in their own theme.
Class hours/week: 2L, 4P
Credits (ECTS): 2
Field of Sciences: Architect 6th semester
Semester: Spring
Lecturer: Dr. FÜREDI Balázs

Course title: Building Physics 1. – Heat and Humidity Technologies PMREGNE031A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: examination
Course description: The objective of this subject is to summarise the basics of building physics, the energy balance of structures, energy-conscious architecture, passive solar systems and methods of energy design. This subject matter is taught through the following topics: basic forms of heat transmission, the heat transmission coefficient, strata boundary temperatures, thermal bridges, ribbed structures, resultant heat transmission coefficient, structures in contact with the ground, non-stationary processes of thermal mass, absorption, phase lag, heat absorption of floors, weather conditions, geometry and energy yields of solar radiation, the greenhouse effect, equivalent heat transmission coefficient of transparent structures, energy balance of structures, building energetics and components of energy balance, requirements, specific heat requirement, methods and processes of energy design and testing, efficiency of heat insulation, energy-conscious architecture and passive solar systems. In addition to energy and buildings, students study about the properties of vapour diffusion in stationary cases, sorption, moisture content of structures, filling-up time, vapour condensation on surfaces, capillary condensation, conditions for fungoid diseases, moisture balance of rooms and factors affecting how we sense temperature and how it is measured and temperature sensing in winter and summer. Because European regulations are getting more strict, buildings must be increasingly more energy efficient. This subject introduces students to methods of achieving energy efficiency and concepts for energy efficient architecture.
Class hours/week: 1+1
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr FÜLÖP László

Course title: Building Physics 2. – Ventilation and Lighting PMREGNE032A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: examination

Course description: The objective of this subject is to teach students about physics relating to natural light, sound and ventilation in the architectural environment and covers the following topics: basic correlations of natural lighting, types of transparent and light reflecting surfaces, the coefficient of natural lighting; characteristics and roles of light source components in the design of natural lighting; requirements for natural lighting; basic principles of acoustics, sound insulation and absorption, noise absorption from air and footsteps, paths of sound transmission, acoustic qualification of structures; natural ventilation; pressure conditions in multi-storied, cellular and various types of buildings; pressure diagrams, lifting power, funnel effects, wind effects. **Class hours/week:** 1+1
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr FÜLÖP László

Course title: Foundation PMRATNE102A
Language of instruction: English
Form of teaching: lecture
Form of assessment: exam
Course description: General geotechnical education starts with an introduction to the geological–engineering aspects of building sites so students can get acquainted with the basic physical, dynamic and water permeability properties of soils. Students learn about the different methods, types and application aspects of foundations, their constructions and construction technologies. They are taught the design principles of flat and deep foundations. They study geotechnical reasons for damage to buildings and possible approaches for reinforcing foundations and strengthening soils. Special emphasis is given to the effect foundations and their loads have on the surrounding soil.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr ORBAN Zoltán

Course title: Geodesy 1. PMRKGNE149A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: examination
Course description: Students are taught the geodesic activities of surveying and marking out the natural and built environment. This assists with the design, construction and operation of engineering projects. Students cover the following aspects of geodesic studies: shape of the Earth, principle of localization on Earth, projection systems, geodetic equipment, methods and equipment for measuring altitude and their applications, methods and equipment for horizontal measurement and their applications, methods to determine base and detail points, multi-angular measurements, orthogonal sub-measurements, tachymetry, basic geodetic calculations, and fundamental photogrammetric operations.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr ORBÁN Zoltán

Course title: Load-Bearing Structures 1. – Reinforced Concrete Structures PMRSTNE029A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The aim of teh course: Provision of basic knowledge in the field of reinforced concrete structures design according to Eurocode 2 standard. Principles of design of reinforced concrete structures. Stress

states of cross-sections. Design methods of reinforced concrete beams, columns and slabs in ultimate and serviceability limit states. Design rules according to Eurocode 2.
Class hours/week: 1+2
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr ORBÁN Zoltán, JUHÁSZ Tamás

Course title: Load-Bearing Structures 2. – Steel structures PMKSTNE150A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This subject aims to provide a theoretical and practical knowledge necessary for the design, production and mounting of steel structures used in engineering and includes the following topics: definition, types and division of steel structures, their advantages and disadvantages; design principles and methodology; Eurocode 3; components of steel bars, basic materials, different joints; constructural design of pre-stressed bars; compressed bars; design of trusses; relationship between the built environment and steel structures; modelling steel materials; design principles; process of planning steel structures; structural bars: classification, structural design, limit states, standard dimensions; bars and beams subject to eccentric tension or compression; bolted, riveted and welded joints: classification, technology and application; design, application and dimensioning of simple structures, latticed and solid-web girders, split-section beams; stability limit states of structural bars, turning out and plate buckling; effects of strength and stability on the behaviour of structural bars, design principles; structural design, behaviour and dimensioning of beam-beam and column-beam joints; classification, application and construction principles of complex steel structures; harmonising the design of steel structures and artistic viewpoints.
To complete the course students must be able to create a technically and aesthetically suitable solution for building with steel structures.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 1+2
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr ORBÁN Zoltán, JUHÁSZ Tamás

Course title: Timber Structures PMRESNE162A
Language of instruction: English
Form of teaching: lecture
Form of assessment: examination
Course description: The objective of the subject is to introduce students to modern timber structures of buildings underlining the special characteristics of wood as an orthotropic material. Students must be able to use the introduced structures in a technically correct way. Wood as a building material and its characteristic features. History of wooden structures. Traditional structures. Engineering joints. Modern, engineered ceilings and floor structures. Glued-laminated timber structures. Wooden buildings, log homes, framing structures, prefabricated structures. Non-load-bearing wooden structures. Manufacturing load-bearing timber structures. Protective treatment of timber structures.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr ORBÁN Zoltán, JUHÁSZ Tamás

Course title: Urban Studies I. PMRURNE130A
Language of instruction: English
Form of teaching: lecture - Grading: The 60% of lessons must be met. Writing tests two times in the Semester, written examination.
Form of assessment: semester mark

Course description: Through a series of practical classes as well as group and individual consultations, students prepare the arrangement plan of a chosen district of a town or a smaller village taking the local regulations and the concepts of settlement development acquired during the preceding semester into consideration. On the basis of the arrangement plan, students prepare the layout plan, of a chosen project. This plan is published and discussed in the group. This subject includes an architectural design project in the practical part (marked with a P) where students can practice and further develop the content of the lectures (marked with an L).
Class hours/week: 1+1
Credits (ECTS): 2
Field of Sciences: architects, urban designers, civil engineers
Semester: Fall
Lecturer: Dr BARACSI Viktória

Course title: Building Constructions 6. PMRESNE142A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: The aim of the course is to give students an overview of the load bearing structures used in building construction, to describe the forces in particular structures and to examine how these structures are used through the analysis of load bearing structures of existing buildings. Students analyse and learn about the relationship between material, structure, function and form. After a brief overview of historical structures, first of all structures with no shear resistance (pressure line shaped structures, rope structures, tents, fabrics), then shell and membrane structures, cold formed curved structures (frames, wall frame systems, sheet frames, halls), and finally box structures (external box structures, internal box structures, complex box structures, tube frame structures) are discussed. Students learn about the works of several architects excelling at structural design (J. Pelikán, L. Kollár, J. Dulánszky, T. Matuscsák, P.L. Nervi, F. Otto, E. Freisinet, S. Calatrava). This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 2 L, 2 P
Credits (ECTS): 4
Field of Sciences: architects, civil engineer, urbanistic
Semester: Fall
Lecturer: Dr. HALADA Miklós

Course title: Building Design 6. PMRTENE022A
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: The subject revises and deepens the previously taught knowledge of architectural design. The task is architecturally exciting: to design a public building of interesting volume design and layout. Students can freely choose their topic of interest with the approval of the head of practical classes. The finished project is presented on posters with a rich architectural content and high quality representation at a scale of 1:100, and with detail drawings at a scale of 1:50 and less, for a suitably sized final model building. Students' acquired knowledge is assessed over the course of the semester.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can develop their architectural skills
Class hours/week: 4
Credits (ECTS): 6
Field of Sciences: architects
Semester: Fall
Lecturer: Dr HUTTER Ákos

Course title: Building Design 7. PMRTENE023A
Language of instruction: English
Form of teaching: practice

Form of assessment: semester mark
Course description: The course assignment to be completed by students with the guidance of the instructor is designing a public building with special emphasis on functional features in a designated multifunctional urban area. Students are required to carry out an urban design analysis and write an essay on successful examples of implemented architectural projects. The design assignment is to be completed using effective graphic tools and an architectural model is also to be presented.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can develop their architectural skills.
Class hours/week: 4
Credits (ECTS): 7
Field of Sciences: architects
Semester: Spring
Lecturer: Dr. HUTTER Ákos

Course title: Complex Design PMRESNE057A
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: The purpose of this course is to introduce students to architectural design from a complex view, that is, covering those parts of the planning process which are supervised by specialised departments. Furthermore, this subject intends to have students practise the design phase related to documentation required for planning permission. During the preparation period, students study existing buildings with similar functions and examples in special scientific literature, and on this basis, they finalize their design project. During the design process, they continuously consult with the appointed or chosen teachers from the Department of Design and Architectural Studies, the Department of Strength of Materials and Load-Bearing Structures, the Department of Building Constructions, the Department of Electrical Networks and the Department of Building Services Engineering as well as with external specialists, if needed. In the course of the Complex Design Project, students finalize the load-bearing, building construction and building services systems of the building and the construction technology. In addition to their final drawings, at the end of the semester they submit their essay which includes preliminary studies, the assessment of the different alternatives, the technical description of the architectural unit and the necessary drafts. Students normally construct a model as well. Their work is evaluated by the different departments with 70% of the total awarded for architectural work and the three co-departments give 30% (=3x10%).
This subject includes an architectural design project in the practical part (marked with a **P**) where students can develop their architectural skills.
Class hours/week: 5
Credits (ECTS): 8
Field of Sciences: architects
Semester: Fall
Lecturer: Dr BACHMANN Bálint

Course title: Design 1. PMRTENE047A
Language of instruction: English
Form of teaching: practice
Grading: mid-Semester grade
Requirements during Semester: class/consulting attendance, assignments completion and submission on time
Form of assessment: semester mark
Course description: The objective of the subject is to introduce students to the design and creation of modern objects as well as acquaint them with the changes in form and materials over the past 50 years. During the lectures students gain an insight into present-day design trends and styles, and learn about the most notable designers. At the start of the semester students are given a topic and, in accordance with the syllabus, they must complete a study+plan+model by the end of the semester.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).

Class hours/week: 1+2
Field of Sciences: architects, civil engineers, urban designers, designers, industrial designers
Semester: Spring
Credits (ECTS):3
Lecturer: Dr Szösz Klaudia

Course title: Design Methods I. PMRTENE030A
Language of instruction: English
Form of teaching: lecture
Grading: mid-Semester grade
Form of assessment: examination
Course description: Having acquired a sound knowledge of basic design principles and methods in Design Methods courses students explore a wider context of architectural design methods with special emphasis on social, sociological and settlement structure implications. The aim of the course is to acquaint students with the design principles and methods of historical and contemporary design ateliers. It will enable them to analyse and see architectural objects in the context of the history of architecture and to put architecture in the wider context of urban design and sociology. Students are encouraged to find and combine methods and form concepts for particular design tasks. The main topic of lectures and workshops is the design of residential buildings.
Class hours/week: 2
Field of Sciences: architects, civil engineers, urban designers, designers, industrial designers
Semester: Fall
Credits (ECTS):2
Lecturer: Dr Medvegy Gabriella

Course title: Design Methods 2. PMRTENE031A
Language of instruction: English
Form of teaching: lecture
Grading: mid-Semester grade
Form of assessment: examination
Course description: Having acquired a sound knowledge of basic design principles and methods in Design Methods courses, students explore a wider context of architectural design methods with special emphasis on social, sociological and settlement structure implications. The aim of the course is to acquaint students with the design principles and methods of historical and contemporary design ateliers. It will enable them to analyse and see architectural objects in the context of the history of architecture and to put architecture in the wider context of urban design and sociology. Students are encouraged to find and combine methods and form concepts for particular design tasks.
The main topic of lectures and workshops is the design of public buildings. Hungarian and international architects invited to the workshops analyse their task specific methods through the introduction of their works. Field trips are organised as conditions allow.
Class hours/week: 2
Field of Sciences: architects, civil engineers, urban designers, designers, industrial designers
Semester: Spring
Credits (ECTS):2
Lecturer: Dr Medvegy Gabriella

Course title: Design Methods 3. PMRTENE032A
Language of instruction: English
Form of teaching: lecture
Grading: mid-Semester grade
Form of assessment: examination

Course description: The aim of the course is to introduce students to design principles and methods of contemporary ateliers and to current trends in architectural principles as well as to make them aware of the importance of an interdisciplinary approach in architecture. It will enable them to analyse and see architectural objects in the context of the history of architecture and to put architecture in the wider context of urban design and sociology. Hungarian and international architects, artists, critics and experts operating on the borders of architecture invited to the workshops share their experience about contemporary design principles. The main focus of lectures and workshops is on mapping and analysing contemporary design principles and current trends in modern architecture.
Class hours/week: 2
Field of Sciences: architects, civil engineers, urban designers, designers, industrial designers
Semester: Fall
Credits (ECTS):2
Lecturer: Dr MEDVEGY Gabriella

Course title: Design of Building Structures 1. PMRESNE035A
Language of instruction: English
Form of teaching: lecture, practice
Requirements during Semester: Lectures and seminars are obligatory, project, final note.
Form of assessment: examination
Course description: The objective of this subject for the students is to deepen their knowledge of structural design through solving specific tasks. They are required to establish the connections between individual structures and produce a design which takes them into account. In some of the lessons students work along guided instructions (using the blackboard), while at other times they work individually or as a team. One of the most essential objectives of the subject is to make students learn the preparation process of the structural drawing. In this term we deal with the structure of a medium-scale public building. In addition to schedules, architectural plans and cross-sectional views, the students are required to prepare plans for insulation, façades and false ceilings of a building.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 2+2
Field of Sciences: architects, civil engineers
Semester: Spring
Credits (ECTS): 4
Lecturer: Dr SZTRANYÁK Gergely

Course title: Design of Building Structures 2. PMRESNE036A
Language of instruction: English
Form of teaching: lecture, practice
Requirements during Semester: Lectures and seminars are obligatory, project, final note.
Form of assessment: examination
Course description: The objective of this subject for the students is to deepen their knowledge of structural design through solving specific tasks. They are required to establish the connections between individual structures and produce a design which takes them into account. In some of the lessons students work along guided instructions (using the blackboard), while at other times they work individually or as a team. One of the most essential objectives of the subject is to make students learn the preparation process of the structural drawing. In this term we deal with the structure of a medium-scale public building. In addition to schedules, architectural plans and cross-sectional views, the students are required to prepare plans for insulation, façades and false ceilings of a building.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Class hours/week: 2+2
Field of Sciences: architects, civil engineers
Semester: Fall
Credits (ECTS): 4
Lecturer: Dr. SZTRANYÁK Gergely

Course title: Design of Interior Spaces PMRTENE029A

Language of instruction: English
Form of teaching: practice
Requirements during Semester: Lectures and seminars are obligatory, project, final note.
Form of assessment: examination
Course description: Fundamentals of holistic-ecological architecture. Energy efficient solutions of autochthon and luxurious architecture, taken from architectural history. The Climate Design method offers solutions for buildings which offer more while using less technology. Development of building conceptions: Buildings which create the highest level of comfort while using as little energy as possible. In order to achieve this goal it is necessary to implement a holistic approach to the planning process. Architectural design and technical services must not be treated separately but need to be integrated into a multi-dimensional process to achieve a well-balanced overall system. Ecological organic technologies and sacral geometries. Energy efficient design solutions, possibilities of aesthetic design. Planning of building-skins, conceptions. Energy management. Energetic and building-climatologic considerations. Aspects of architectural design as well as technical and physical aspects will be dealt with in a multidisciplinary manner. By the end of the Semester Climate Designer students will have to become partners for a sustainable planning process. They will be able to holistically advise and design energetically and technically optimised buildings, starting with the concept of a building up to its detailed design. A project assignment is carried out to test the acquired knowledge. The project work deals with the holistic approach towards a concrete building assignment during which singled out special questions can be worked on thoroughly. During the program there are lectures, special seminars and consultations.
Class hours/week: 3
Field of Sciences: architects, industrial designers, designers
Semester: Fall
Credits (ECTS): 3
Lecturer: Dr BORSOS Ágnes

Course title: Ecology in Architecture Basics PMRESNE073A

Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: The main objective of this subject is to introduce students to the major concepts of sustainable development and sustainable construction. The engineering means towards sustainable, environment-conscious construction are presented using the concepts of ecology. The theoretical unit of the subject covers the following topics: topicality, importance and necessity of ecological way of thinking in architecture; exact definition and systematization of ecological, energetic and solar terms; development conditions of ecological construction and their political and economic motives, psychological background; comprehensive retrospective examples from the beginning to industrialization; chronological evolution of ecological architecture from the late 1960's to now; typology of residential buildings and evolution of the integration of active energy utilization techniques; development of solar architectural concepts, passive energy utilization and the prototypes of combined energy utilization; climate systems utilizing environmental energy evolved from external walls which are not only rigid boundaries but serve as energy utilizing changeable shells reacting to climate changes; energetic and ecological feasibility and importance of condensed ways of construction; appearance and evolution of ecological urbanism where the solar house converts into a solar city, architecture psychological aspects of ecological thinking; change and maturation of scientific and designer's attitude, a comprehensive organic design approach to the relationship between energy and ecology.
Class hours/week: 2+2
Credits (ECTS): 3
Semester: Fall
Lecturer: Dr KISTELEGDI István jr.

Course title: Furniture Design and History PMRESNE092A

Language of instruction: English
Form of teaching: lecture
Form of assessment: examination
Course description: Space and mass are closely interrelated notions in architecture, which means that there is no hierarchical relationship between architectural design and 'interior design'. Architecture as a profession is indivisible, however the practice of sharing design tasks has led to the development of certain specialised fields like 'urban design' and 'interior design'. (The greatest architects in history had never given up the complexity of the profession. They were successful architects, urban designers, interior designers and furniture designers at the same time.) The main focus of lectures is on the works of outstanding designers. In seminars students consult the instructor and discuss potential solutions to design assignments.
Class hours/week: 2
Credits (ECTS): 2
Field of Sciences: architects, interior designers, designers
Semester: Spring
Lecturer: Dr BORSOS Ágnes

Course title: Landscape and Garden Design 1. PMRTENE040A

Language of instruction: English
Form of teaching: lecture
Grading: exam
Course description: This subject covers the basic aspects design, including architectural aspects, in the green environment. In addition to teaching the encyclopaedic knowledge of the specialised field, the history of garden design provides a theoretical background for the creation of artificial environments and the optimal establishment of a connection between green surfaces and gardens and buildings. Studying the notion of landscape, its basic categories, development and management ensure the maintenance of the wider environment of the settlements and their sustainable development. Mastering the methods and components of environmental protection provides students with the means that enable them to effectively protect environmental values.
Class hours/week: 2
Field of Sciences: architects, urban designers, industrial designers, interior designers, designers
Semester: Spring
Credits (ECTS): 2
Lecturer: Dr GYERGYÁK János

Course title: Landscape and Garden Design 2. PMRTENE041A

Language of instruction: English
Form of teaching: lecture
Grading: exam
Course description: The objective of this subject is to offer the basic aspects of the design of the green environment including its architectural points. The purpose is to teach students the basics of urban environmental design and give them the means to create a new approach used in urban environments, including the specialised knowledge and that related to architectural work. The elements of urban environment, their inspection and presentation possibilities and design aspects are listed. The relationship between the architect and the landscape designer in community places and densely populated settlements is also covered.
Class hours/week: 2
Field of Sciences: architects, urban designers, industrial designers, interior designers, designers
Semester: Fall
Credits (ECTS): 2
Lecturer: Dr GYERGYÁK János

Course title: Preservation of Built Heritage I. PMRESNE064A
Language of instruction: English
Form of teaching: lecture
Form of assessment: exam
Course description: The history of European art in the 19th century. Style pluralism, the appearance of modernism. Historicizing approach. The concept of industrial arts, all-artistic endeavours. Fine arts and industrial arts of the turn of century. Acquisition of the basics of art history, improvement of aesthetic standards and visual memory.
Class hours/week: 2
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr KOVÁCS-ANDOR Krisztián

Course title: Preservation of Built Heritage 2. PMRESNE065A
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: Putting the theoretical methods of historical heritage protection into practice. Damage mapping; preparation of surveys and stability survey documentation of a historical building or buildings located in a world heritage site. During the course students acquire skills to help research, document, conserve and continuously preserve buildings with historic and artistic values; they learn damage mapping as well as the preparation of surveys and stability survey documentation. This subject includes an architectural design project in the practical part (marked with a P) where students can develop their architectural skills.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr KOVÁCS Andor Krisztián

Course title: Preservation of Built Heritage 3. PMRESNE066A
Language of instruction: English
Form of teaching: practice
Form of assessment: semester mark
Course description: Students study the complex rules of the ethical architectural attitude towards historical buildings and the protected environment. Using examples from both Hungary and abroad, students are introduced to the architectural approach of contemporary historical heritage protection. The objective of the subject is to give students a means of establishing a correct attitude towards historical heritage and to find sensitive solutions to architectural planning tasks.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can develop their architectural skills.
Class hours/week: 2
Credits (ECTS): 2
Field of Sciences: architects, urban designers, civil engineers
Semester: Fall
Lecturer: Dr. KOVÁCS-ANDOR Krisztián

Course title: Town- and Spatial Planning PMRURNE135A
Language of instruction: English
Form of teaching: lecture, practice
Grading: semester mark
Course description: The subject uses a morphological approach to examine the connection between the shapes and functions of the built environment and its role in the structure of the settlement. The approach is two-sided: on the one hand it considers the mass, and on the other, the lack of mass. In the subject 'Design theory'

we show how it is possible to create complex shapes with the combination of basic spatial forms. Through the analysis of historical and contemporary examples we examine the interaction and the aesthetic quality of urban architecture and the particular culture.
This subject includes an architectural design project in the practical part (marked with a **P**) where students can practice and further develop the content of the lectures (marked with an **L**).
Minimum number of students: 3
Class hours/week: 1+2
Field of Sciences: architects, urban designers, civil engineers
Semester: Fall
Credits (ECTS): 2
Lecturer: Dr GYERGYÁK János

Course title: Urban Studies 2. PMRURNE131A
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: Through a series of practical classes as well as group and individual consultations, students prepare the arrangement plan of a chosen district of a town or a smaller village taking the local regulations and the concepts of settlement development acquired during the preceding semester into consideration. On the basis of the arrangement plan, students prepare the layout plan, of a chosen project. This plan is published and discussed in the group. This subject includes an architectural design project in the practical part (marked with a P) where students can practice and further develop the content of the lectures (marked with an L).
Class hours/week: 1+1
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr GYERGYÁK János

Course title: Architecture of Pécs PMSTENE507
Language of instruction: English, German
Form of teaching: lecture, practice
Grading: mid-Semester grade
Requirements: regular class attendance and participation in excursions
Form of assessment: study and a poster
Course description: Course content includes a lecture about the city of Pécs. Later on several excursions will be organised where students will visit different places of the rich architectural heritage of Pécs. Finally students will be required to prepare a study and a poster about one of the visited places.
Minimum number of students: 3
Class hours/week: 2
Semester: Fall, Spring
Credits (ECTS): 4
Lecturer: Dr MOLNÁR Tamás

B. CIVIL ENGINEERING COURSES

CIVIL ENGINEERING BSC

Course title: Technical drawing 1. MSB276ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: The objective of this subject is to teach students the fundamentals of descriptive geometry, giving them practical skills through the following topics; characteristics of science, geometrical construction, theoretical sciences, basics of symbolic logic, geometrical transformation, projection representation, simple statements, representation of space structures, relations, the Monge system, universal existence, the fit, section, distance and angle of space structures.

Class hours/week: 2+2

Credits (ECTS): 4

Semester: Fall

Lecturer: Dr VÖRÖS László

Course title: Technical drawing 2. MSB277ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: mid-semester exam

Course description: This lecture and practical based subject provides students with a useful knowledge concerning the fundamentals of construction materials and covers the following topics: chemical, physical and mechanical properties of construction materials; features and application of heat and sound insulation materials; waterproofing materials, bitumen, damp-proof layers, methods for later drying out of wet walls; production, testing and properties of construction ceramics, choice and application of ceramic masonry elements; types of mortar and their testing and properties, application of special mortars in the construction industry; construction with stone and their testing and application; types of timber, structure, physical and mechanical properties of wood, defects in wood and wood protection; metal and reinforced concrete, production, testing and mechanical properties of steel; architectural glass; properties of plastic materials and their application in the construction industry.

Class hours/week: 1+1

Credits (ECTS): 2

Semester: Spring

Lecturer: Dr HALADA Miklós

Course title: Technical drawing 3. MSB278ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: semester mark

Course description: Students' experience of CAD systems is expanded through this practical based course in the application of computers in the field of architecture and design. The course is made up of units including the following topics: modelling building construction details using CAAD software, preparation of plans presenting engineering components and spatial illustrative figures, attaching engineering specifications and descriptions to components and the entire model, selecting and sorting existing geometric and assigned data, processing data and attaching the results to drawings using word processing and spreadsheet programs.By the end of the semester students will be familiar with CAAD systems to a level which will enable them to complete their engineering design project. This subject includes an architectural design project in the practical part (marked with a P) where students can develop their architectural skills.

Class hours/week: 1+1

Credits (ECTS): 3
Semester: Fall
Lecturer: Dr HALADA Miklós

Course title: Construction Materials 1. MSB080ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: mid-semester exam
Course description: This lecture and practical based subject provides students with a useful knowledge concerning the fundamentals of construction materials and covers the following topics: chemical, physical and mechanical properties of construction materials; features and application of heat and sound insulation materials; waterproofing materials, bitumen, damp-proof layers, methods for later drying out of wet walls; production, testing and properties of construction ceramics, choice and application of ceramic masonry elements; types of mortar and their testing and properties, application of special mortars in the construction industry; construction with stone and their testing and application; types of timber, structure, physical and mechanical properties of wood, defects in wood and wood protection; metal and reinforced concrete, production, testing and mechanical properties of steel; architectural glass; properties of plastic materials and their application in the construction industry.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr ORBÁN Zoltán

Course title: Mathematics 1. MSB293ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This lecture and practical based subject provides students with a useful knowledge concerning the fundamentals of construction materials and covers the following topics: chemical, physical and mechanical properties of construction materials; features and application of heat and sound insulation materials; waterproofing materials, bitumen, damp-proof layers, methods for later drying out of wet walls; production, testing and properties of construction ceramics, choice and application of ceramic masonry elements; types of mortar and their testing and properties, application of special mortars in the construction industry; construction with stone and their testing and application; types of timber, structure, physical and mechanical properties of wood, defects in wood and wood protection; metal and reinforced concrete, production, testing and mechanical properties of steel; architectural glass; properties of plastic materials and their application in the construction industry.
Class hours/week: 3+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr Perjésiné HÁMORI Ildikó

Course title: Mathematics 2. MSB294ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This lecture and practical based subject aims to extend students mathematics knowledge and its application to engineering and architecture through the following topics: definition of definite and

indefinite integrals, calculus of definite integrals using the Newton-Leibniz theory, application of definite integrals to engineering (architectural) problems, calculation of volume and centres of gravity, analysis of multivariable functions, interpretation and application of partial derivatives, definition, calculus and application of double integrals in authentic practical problems.

Class hours/week: 2+2

Credits (ECTS): 3

Semester: Spring

Lecturer: Dr Perjésiné HÁMORI Ildikó

Course title: Mathematics 3.MSB295ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: This course aims at teaching the basics of the elements of linear algebra, vector analysis and series.Linear algebra: concept of n-dimensional vector space, matrix, determinant, rank, matrix inverse. Solution of linear equation systems: Cramer's rule, Gauss-Jordan elimination, change of basis. Eigenvalues and eigenvectors.Vector analysis: Vector-scalar functions, curves in space and their tangents, curvature, torsion, arc length, surfaces as a two variable vector-scalar function, tangent plane, the area of a surface. Scalar-vector functions, gradient, directional derivatives.Vector-vector functions, line and surface integral, divergence and curl. Green' and Stokes' theorem, elements of potential theory.
Numerical and function series, Taylor and Fourier series.

Class hours/week: 2+2

Credits (ECTS): 5

Semester: Fall

Lecturer: Dr PerjésinéHÁMORI Ildikó

Course title: Mechanics 1. (Statics) MSE256ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: This course aims at teaching the basics of mechanics and covers the following topics: equilibrium states and conditions of equilibrium; resultant and balance of plane force systems; defining load-bearing structures, their types and loads. This theme is also expanded through the calculation of support reactions, simple hinged structures, loads on structures, calculation of loads, types of structural systems, definition and calculation of internal forces and internal force diagrams, definition of support and internal forces of joint structures, three-joint girders, Gerber girders and compound joint structures. The definition and types of truss is also covered and the forces influencing them.

Class hours/week: 2+3

Credits (ECTS): 6

Semester: Fall

Lecturer: Dr POMEZANSKI Vanda

Course title: Project Management 1. MSB341ANEP

Language of instruction: English

Form of teaching: practice

Form of assessment: semester mark

Course description: Students are introduced to the process of construction they face as a qualified civil engineer. As construction is an answer to a social or economic problem within the field of construction investment, it is important that students learn about the different aspects of construction projects to solve this question. Management aspects of construction projects, especially in the preparation work, design, execution and operation, are covered through the following topics: definition, content and preparation processes of cost

estimates; aids for preparing cost estimates; types and content of standards; standards for working hours, material utilization and machine operating hours; budget preparation, profile plans, measurement calculations; price analysis, essentials of costs, direct and indirect costs; elements and calculation of construction budgets; preliminary and subsequent calculation; tendering, cost planning; budget preparation software; layout of the construction site; content of detailed organizational layout designation; temporary and utility buildings; public utilities and power supply on the construction site; utility buildings and roads; definition and application of production management; production management in the construction industry; elements of construction operations; methods and representation of operation sequences; preparation and content of linear time schedules.

Class hours/week: 2

Credits (ECTS): 2

Semester: Spring

Lecturer: Dr KONDOR Tamás

Course title: Construction management 2. PMKEKNE039CA

Language of instruction: English

Form of teaching: lecture

Form of assessment: exam

Course description: The lectures and practicals of this course introduce students to those aspects of management which are innovative in assisting construction work and covers the following topics: definition and application of production management in the construction industry; elements of the construction process, their representations and relations; methods of production and construction management, their comparisons and potential applications; essentials of linear and progress chart scheduling, elements and contents of time schedules; methods and conditions for the sequencing of processes, calculating the demand for labour; the influence of money as a resource on construction scheduling; computer aided methods for construction management; types of management methods using flowcharts; essentials of the critical path method (CPM), its principles and preparation process; analysis of flowcharts from logical and chronological points of view.

Class hours/week: 2

Credits (ECTS): 3

Semester: Fall

Lecturer: Dr KONDOR Tamás

Course title: Construction management 3. PMKEKNE040CA

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: This subject intends to provide students with the engineering and economic knowledge necessary for responsible participation in a development and investment process and covers the following topics: improvement of networks, essentials and elements of MPM (Metra Potential Method) diagrams; computer aided processes of networks; essentials and application of the continuous production management method and sequence programming; essentials, roles and elements of spatial organization; systems, types and content of organization plans; controlling the construction site, rights and duties of the site manager; technical administration on the construction site; technical supervision and the role of the design foreman in construction.

Class hours/week: 2+2

Credits (ECTS): 5

Semester: Fall

Lecturer: Dr KONDOR Tamás

Course title: Enterprise Management PMKEKNE037A

Language of instruction: English

Form of teaching: lecture

Form of assessment: semester mark

Course description: The objective of this course is to introduce the general aspects of enterprise management including legal, economic and administrative aspects. In particular the following topics are covered: theoretical concepts related to enterprise, reproduction and enterprise; definition of enterprise and management and the connections between them; economic environment of enterprise; markets and competition; definition of enterprise strategy and tactics; types of enterprises; special enterprise issues in the market of construction investments, phases of the construction implementation cycle; tendering according to FIDIC offers, tendering in EU countries, methods of tendering, types of contracts, elements of contract strategy.

Class hours/week: 2

Credits (ECTS): 2

Semester: Fall

Lecturer: Dr KISS Tibor

Course title: Geographic Information Systems 1. MSB126ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: semester mark

Course description: Role and characteristics of geographic information systems, its use in civil engineering. Principles and processes of modelling spatial structures (nodes, lines, areas) and their characteristics as attributes. Procedures of data acquisition, possible data sources. Location references, use of positioning systems (GPS, Galileo), accuracy issues. Earth-based spatial–temporal location and extent references. Data structure of geographic information systems, database organisation, connections to existing digital maps. Implementation issues of geographic information systems mainly from the user's point of view. Integration, storage, editing, sharing, and displaying geographic information. Application tools in geographic information systems to create interactive queries (user-created searches), analysis of spatial information, describing data in map, and presentation the results of all these operations.

Class hours/week: 1+1

Credits (ECTS): 2

Semester: Fall

Lecturer: Dr GULYÁS András

Course title: Geographic Information Systems 2 MSB127ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: Process of modelling of the real world, analogue and digital models, structure of raster based and vector based geographic information systems, technological background of geographic information systems, data acquisition procedures and data sources. Relations of information from different sources. Data capture and data representation of civil engineering spatial systems and networks (road and railway networks, public utilities, built-in areas, environmental effects). Application of remote sensing technologies. Raster-to-vector translation. Projections, coordinate systems, reference sets and systems. Accuracy and uncertainty issues. Graphic display techniques, data output, topology and cartography. Open standards and web-based mapping. Available digital maps, databases, open and commercial geographic information systems software solutions. Analysis of the time dimension. Use of geographic information systems for engineering decision support.

Class hours/week: 1+1

Credits (ECTS): 2

Semester: Spring

Lecturer: Dr GULYÁS András

Course title: Basics of Structural Design MSB378ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: semester mark

Course description: The course provides knowledge on the basics of structural design according to contemporary design codes. Topics covered includes: Structural materials, structural effects, definitions of structural shapes. Structural design. Structural costs, damage ratio, safety, reliability. Optimized risk. Deterministic and probabilistic methods of design. Eurocode programme. Ultimate and serviceability limit states. Conception of limit states. Design, characteristic and representative values. Partial factors. Design supported by experiments. Effects on structures. Combinations of effects in design states.

Class hours/week: 2+1

Credits (ECTS): 3

Semester: Fall

Lecturer: Dr FÜLÖP Attila

Course title: Building Constructions 1. PMTESNB037CA

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: semester mark

Course description: This subject intends to teach the following topics: requirements of building constructions; history of wall structures; walls built from small bricks, general rules of brick joints; modern masonry materials, skeleton ceramics, partition walls; lintels for openings of load-bearing wall structures, discharge of loads; masonry lintels, stone arches, reinforced concrete joists; requirements and planning aspects of stairs, interior stairs, structural solutions for radial stairs, interior stairs made of reinforced concrete, metal and wood, stair structures of residential and public buildings, structural design of monolithic reinforced concrete stairs, stair structures made of stone and cast stone, pre-fabricated stair structures, entrance stairs, terrain stairs.

In addition students will be introduced to the regulations and requirements of flat floor structures, wooden ceiling structures, ceiling structures with steel beams, pre-fabricated reinforced concrete ceiling structures, the relationship between reinforced concrete beams and their lining, structural design of ring beams, monolithic reinforced concrete ceilings, floor coverings, structural breakthroughs in ceiling structures, curved ceiling structures, the historical development, types and structural design of vaults.This course provides a sound basis for students to improve their construction and structural design skills, through both the theory based lectures and through the practical element of the course, where students are introduced to the construction process of a residential building.

This subject includes an architectural design project in the practical part (marked with a P) where students can practice and further develop the content of the lectures (marked with an L).

Class hours/week: 1+2

Credits (ECTS): 4

Semester: Fall

Lecturer: Dr ZOLTÁN Erzsébet

Course title: Construction Materials 2 PMRATNE003CA

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: This course provides students with essential knowledge concerning the fundamentals of construction materials and covers the following topics: chemical, physical and mechanical properties of construction materials; features and application of heat and sound insulation materials; waterproofing materials, bitumen, damp-proof layers, methods for later drying out of wet walls; production, testing and properties of construction ceramics, choice and application of ceramic masonry elements; types of mortar and their testing, application of special mortars in the construction industry; construction with stone and their testing and

application; types of timber structures, physical and mechanical properties of wood, defects in wood and wood protection; metal and reinforced concrete, production, testing and mechanical properties of steel; architectural glass; properties of plastic materials and their application in the construction industry. Deterioration of construction materials.

Class hours/week: 2+2

Credits (ECTS): 4

Semester: Spring

Lecturer: Dr ORBÁN Zoltán

Course title: Geodesy 1. MSB124ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: Students are taught the geodesic activities of surveying and marking out the natural and built environment. This assists with the design, construction and operation of engineering projects. Students cover the following aspects of geodesic studies: shape of the Earth, principle of localization on Earth, projection systems, geodetic equipment, methods and equipment for measuring altitude and their applications, methods and equipment for horizontal measurement and their applications, methods to determine base and detail points, multi-angular measurements, orthogonal sub-measurements, tachymetry, basic geodetic calculations, and fundamental photogrammetric operations.

Class hours/week: 2+2

Credits (ECTS): 4

Semester: Fall

Lecturer: Dr GULYÁS András

Course title: Geodesy 2 MSB125ANEP

Language of instruction: English

Form of teaching: practice

Form of assessment: exam

Course description: This module aims to reinforce the basic concepts upon which the science of geodesy is based and the mathematical tools applied. It will examine how terrestrial and increasingly space based geodetic measurements and techniques are used to define, maintain and use global and local coordinate reference systems. Students are taught the applications of industrial geodesy, and the geodesy knowledge needed for designing and setting-out engineering structures.

Class hours/week: 2

Credits (ECTS): 2

Semester: Spring

Lecturer: Dr GULYÁS András

Course title: Geology MSB134ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: The goal of the course is to introduce the basic knowledge of the engineering geology, become familiar with the structure of the Earth, the lithosphere material, the surface conditions and the forces shaping the rock / soil formations. Showing the exploration of the possibilities of building materials, material testing, etc. as well. The objective of the course is to study and acquire the basics of investigation and interpretation of geological phenomena in connection of Earth's crust in mutual relation of natural geological structures and/or human constructions. With the basics of Geology course students are able:to identify, specify

the most relevant empirical methods in connection of the necessary investigations of geological structures;to analyze and evaluate the basic results of geological interpretations.
Class hours/week: 1+1
Credits (ECTS): 3
Semester: Fall
Lecturer: Dr SZŰCS István

Course title: Geotechnics (Earth Structures) PMTATNB134CA
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: This course presents the application of principles of earthworks. It considers the following topics: active and passive earth stresses; compaction of soil (optimum water content; soil density and Proctor-tests; in-situ compaction; Compaction equipment); bearing capacity and slope stability; geosynthetics; retaining structures (gravity, cantilever, sheet pile, anchored earth and mechanically stabilized earth (reinforced earth) walls). The course is based on the regulations according to Eurocode 7 standards.
Class hours/week: 1+1
Credits (ECTS): 3
Semester: Fall
Lecturer: Dr SZŰCS István

Course title: Geotechnics (Foundations) PMRATNE202CA
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: General geotechnical education starts with an introduction to the geological–engineering aspects of building sites so students can get acquainted with the basic physical, dynamic and water permeability properties of soils. Students learn about the different methods, types and application aspects of foundations, their constructions and construction technologies. They are taught the design principles of flat and deep foundations. They study geotechnical reasons for damage to buildings and possible approaches for reinforcing foundations and strengthening soils. Special emphasis is given to the effect foundations and their loads have on the surrounding soil.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr SZŰCS István

Course title: Hidrology MSB729ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This is an introductory course on the elements of the hydrologic cycle. The following physical processes and principles are described: the water balance equation, precipitation and its measurements, areal averages, interception, infiltration, evaporation, runoff, unit hydrograph theory, river morphology, hydrology of lakes, groundwater.Elementary fluid mechanics. Understanding of the fundamental principles of hydrostatics and hydrodynamics; the basic ideas of dimensioning of hydraulic structures and hydraulic machinery. Hydrostatics (absolute and relative equilibrium, pressure head diagrams and buoyancy). Application of the Bernoulli equation (laminar and turbulent flow in pipes, losses and pipe systems). The impulse momentum equation, open channel flow (Chezy). Specific energy, supercritical and subcritical flow, hydraulic jump, stilling basins. Hydraulic machinery
Class hours/week: 2+2

Credits (ECTS): 4

Semester: Fall

Lecturer: Dr Pálné SCHREINER Judit

Course title: Reinforced Concrete Structures 1 PMRSTNE096CA

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: This course deals with loadbearing concrete structures and covers the following topics: history of concrete and reinforced concrete structures; components of reinforced concrete and their connections; regulations related to the design work of reinforced concrete structures; Hungarian and European standards; strength of reinforced concrete structures; load-bearing capacity of structures (bending, stress states, shear, torsion, complex design, axial and eccentric compression, load-bearing line); serviceability limit states (limits of deformation and cracking); principle of prestressing; design and force interaction of reinforced concrete structures; construction principles, prefabricated and monolith structures, joints, statically determinate and indeterminate structures; structure, shape, function; inspections of condition, maintenance, reinforcement, built heritage and its restoration. The practical element of the course deals with the design of traditional and modern structures, construction technologies, approaches to solving architectural problems arising during construction. This course material aims to develop students' independent construction ability through tailored tasks.

This subject includes an architectural design project in the practical part (marked with a P) where students can practice and further develop the content of the lectures (marked with an L).

Class hours/week: 2+2

Credits (ECTS): 4

Semester: Fall

Lecturer: Dr ORBÁN Zoltán

Course title: Reinforced Concrete Structures 2 PMTSTNB139CA

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: The course provides basic knowledge on the behaviour of reinforced concrete slabs and frames and introduces their design methods. The topics covered will include: introduction of reinforced concrete slab systems and frame systems, interaction of slabs and frames, approximation methods for slab and frame design, detailing according to the Eurocode 2. The students will solve design problems on selected multi-storey buildings.

Class hours/week: 2+2

Credits (ECTS): 5

Semester: Spring

Lecturer: Dr ORBÁN Zoltán

Course title: Steel Structures 1. PMKSTNE050CA

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: This subject aims to provide essential theoretical and practical knowledge for the design, manufacturing and assembly of steel structures used in engineering. The course includes the following topics: definition, types and characterisation of steel structures, their advantages and disadvantages; design principles and methodology; Eurocode 3; components of steel bars, basic materials, joints; constructural design of pre-stressed bars; compressed bars; design of trusses; relationship between the built environment and steel structures; modelling steel materials; design principles; process of planning steel structures; structural bars:

classification, structural design, limit states, standard dimensions; bars and beams subject to eccentric tension or compression;bolted, riveted and welded joints: classification, technology and application; design, application and dimensioning of simple structures, latticed and solid-web girders, split-section beams; stability limit states of structural bars, turning out and plate buckling; effects of strength and stability on the behaviour of structural bars, design principles; structural design, behaviour and dimensioning of beam-beam and column-beam joints; application and construction principles of complex steel structures; harmonising the design of steel structures and artistic viewpoints.To complete the course students must be able to create a technically and aesthetically suitable solution for buildings and civil engineering steel structures.

Class hours/week: 2+2

Credits (ECTS): 4

Semester: Fall

Lecturer: Dr FÜLÖP Attila

Course title: Steel Structures 2. PMTSTNB043CA

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: Classification of steel structures, application, principles of construction. Stability limit states of structural elements: buckling, plate buckling, behaviour, design method. Strength and stability interactions in the behaviour of structural elements, design methods. Beam-to-beam and beam-to-column connections: structural details, behaviour and design. Brittle fracture and fatigue: feature and design principles.

Class hours/week: 2+2

Credits (ECTS): 5

Semester: Spring

Lecturer: Dr FÜLÖP Attila

Course title: Timber, Masonry and Stone Structures PMTSTNB140CA

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: The course provides basic knowledge to the theory, design and construction of timber, masonry and stone structures. The subjects covered include: strength and material characteristics of wood. Basic design methods for members of traditional timber structures. Design of wooden connections for shear, tension and compression. Design of timber structures according to Eurocode 5. History of masonry constructions. Types and strength characteristics of masonry. Non-reinforced and reinforced walls. Design methods for masonry according to Eurocode6. Mixed (stone and brick) walls. Design and assessment of loadbearing stone structures.

Class hours/week: 2+2

Credits (ECTS): 4

Semester: Spring

Lecturer: Dr IVÁNYI M. Miklós

Course title: Water Resources Management PMTKGNB404CA

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: The tasks, methods and tools of water management are covered in the course. Hungarian specialities of water management. Types and tasks of hydraulic engineering structures with the following topics: Watershed management of lowland and hilly areas. Regulation of lakes and rivers. Reservoirs and storage. Flood control and land drainage. Inland navigation. Water power development. Water intake and pumping stations. Small hydraulic engineering structures. Characteristic environmental impacts of hydraulic engineering structures.The following physical processes and principles are described: the water balance equation,

precipitation and its measurements, areal averages, interception, infiltration, evaporation, runoff, unit hydrograph theory, river morphology, hydrology of lakes, groundwater.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr Pálné SCHREINER Judit

Course title: Bridge Construction MSB395ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: mid-semester exam
Course description: This course is aimed to provide basic knowledge on the design, construction and maintenance of bridges. Topics covered will include: history of bridge construction; elements of bridges; characteristics of steel, concrete, masonry and timber bridges, classical and modern bridge construction techniques; basics of bridge design; bridge defects; bridge inspection; bridge maintenance
Class hours/week: 2+2
Credits (ECTS): 3
Semester: Spring
Lecturer: Dr IVÁNYI Miklós

Course title: Building Constructions 2 EPB111ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: mid-semester exam
Course description: The primary intention of this subject is to teach students the following theoretical topics: drawing representation of roof structures, wooden roof structures and joinery, Chevron roof structures, vacant and collar beam roof structures, purlin roof structures, roof structures with one, two and multiple support members, roof structure with slanted support members, purlin roofs with struts, mansard roof structures, hipped roof structures, carpenter joints, suspended roof structures, structural solutions for building in attics, damp-proofing requirements and their materials (bitumen and plastic layers), structural requirements of damp-proofing against soil moisture, horizontal and vertical wall insulation, horizontal floor insulation, insulation of footings, waterproofing against ground water, constructional solutions for structures penetrating insulation and connecting structures, types and requirements of foundations, systematisation and rules of flat foundations, production of continuous footings, roofing, imbricate roof structures, tough roofing systems, tile roofing, concrete roof tiles, slate roofs, wooden and thatched roofs, boarded roofs, flashing and guttering, breakthroughs in roofing, metal plates, chimneys and gravitational ventilation. The topics listed above serve as a basic theoretical knowledge for students and are complimented by practical sessions where students work through the design of a residential building.
This subject includes an architectural design project in the practical part (marked with a P) where students can practice and further develop the content of the lectures (marked with an L).
Class hours/week: 2+1
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr ZOLTÁN Erzsébet

Course title: Computer Aided Structural Design 1 MSB374ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark

Course description: This course is aimed to provide basic knowledge on Computer Aided Structural Design. Topics covered by the course include: Basic knowledge of useful and well developed industrial designer software like AXIS, TEKLA and ANSYS. 2D and 3D design system, modelling solid bodies. Engineering drawings and analysis of complete structural systems.
Class hours/week: 1+1
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr HALADA Miklós

Course title: Computer Aided Structural Design 2 MSB375ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: This course is aimed to provide advanced knowledge on Computer Aided Structural Design. Topics covered by the course include: Advanced knowledge of useful and well developed industrial designer software like AXIS, TEKLA and ANSYS. Tasks for engineering practice and scientific research
Class hours/week: 1+1
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr HALADA Miklós

Course title: Engineering Timber Structures EPB393ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The objective of the subject is to introduce students to modern timber structures of buildings underlining the special characteristics of wood as an orthotropic material. Students must be able to use the introduced structures in a technically correct way. Wood as a building material and its characteristic features. History of wooden structures. Traditional structures. Engineering joints. Modern, engineered ceilings and floor structures. Glued-laminated timber structures. Wooden buildings, log homes, framing structures, prefabricated structures. Non-load-bearing wooden structures. Manufacturing load-bearing timber structures. Protective treatment of timber structures.
Class hours/week: 2+1
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr IVÁNYI M. Miklós

Course title: Reinforced Concrete Structures 3 MSB394ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The course provides basic and advanced knowledge on the structural behaviour and design of high-rise reinforced concrete structures and industrial buildings. Topics covered include:
structural systems of high-rise buildings, slab systems, frames, stiffening systems, design of shear walls, design of industrial buildings.
Class hours/week: 2+3
Credits (ECTS): 6
Semester: Fall

Lecturer: Dr ORBÁN Zoltán

Course title: Steel Structures 3 MSB390ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: Introduction of different types of steel buildings (industrial buildings, single and multi-storey buildings, sport-courts and special structures) and structural solutions. Design of structures according to Eurocode standards: structural details, load effects, analysis, load bearing design. Design of bracing system. Basis of computer aided design. The role of using Internet in engineering design.

Class hours/week: 2+3

Credits (ECTS): 6

Semester: Fall

Lecturer: Dr FÜLÖP Attila

Course title: Steel-Concrete Composite Structures MSB391ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: The purpose of the course is to provide adequate knowledge in the field of designing steel-concrete composite structures. The presentations and practicles cover the followings. Historical overwiev. Mechanics of interaction between flexural composite elements. Elastic analysis. Determination of shearflow. Means of connection in composite structures. Different types of shear connectors. Analysis of headed studs. Push out experiments. Analysis and design of tipical structural elements in highrise buildings and bridges (composite beams, columns, slabs) in ultimate and serviceability limit states according to Eurocode4. Constructional technology.

Class hours/week: 2+1

Credits (ECTS): 3

Semester: Fall

Lecturer: Dr IVÁNYI M. Miklós

Course title: Strengthening of Structures MSB392ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: semester mark

Course description: This course is aimed to provide basic and advanced knowledge on the principles of the rehabilitation and strengthening of structures constructed from various types of materials. Topics covered by the course include: deterioration of structural materials, inspection, diagnosis and assessment of structures, basic principles of structural rehabilitation and strengthening, methods of strengthening steel, concrete and timber structures, introduction of specific technologies such as strengthening with shotcrete, strengthening and repair with high performance concrete (HPC), strengthening with fibre reinforced plastics (FRP), design examples and case studies on strengthening bridges, buildings and other civil engineering structures.

Class hours/week: 2+1

Credits (ECTS): 3

Semester: Fall

Lecturer: Dr ORBÁN Zoltán

Course title: Underground Structures MSB384ANEP

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: mid-semester exam

Course description: The purpose of the course is to provide knowledge in the field of designing underground civil engineering objects. The presentations and practicles cover the followings. Classification of underground constructions by tehir functions, structures and materials. Special loads and effects. Active and passive lateral earth pressure. Hydrostatic pressure. Structural- and soil-models. Interaction between soil and structure. Construction technology. Solutions for water insolation. Structural analysis and design of underground garages, tunnels, pools, reservoirs, bunkers, silos, pipelines. Reinforced soil structures. Special construction materials of underground structures. Fiber reinforced concrete , concrete with welded steel frames.

Class hours/week: 2+1

Credits (ECTS): 4

Semester: Spring

Lecturer: Dr HUTTER Ákos

CIVIL ENGINEERING MSC (STRUCTURAL ENGINEERING)

Course title: Mathematics MSM083ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: Basic concepts and rules of probability: random experiments, sample space, events, counting, probability of events, conditional probability, independence of events, total probability rule, Bayes-rule. Discrete random variables: probability mass function and cumulative distribution function, mean and variance. Discrete distributions: uniform, Bernoulli, binomial, geometric, hypergeometric and Poisson. Continuous random variables: density function and cumulative distribution function, mean and variance. Continuous distributions: uniform, normal, exponential, gamma, t and chi-square. Joint probability distributions. Random sampling and data description. Point estimation of parameters. Confidence interval for a single sample. Test hypothesis for a single sample. Linear regression and correlation. The Maple computer algebra system is used for solving random problems and statistical computations.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr KLINCSIK Mihály

Course title: Building Physics MSM088ANEP
Language of instruction: English
Form of teaching:lecture
Form of assessment: semester mark
Course description: Unifying character overview, summary and update of the Buildings' Physics knowledge acquired during the BSc course in accordance with the changes in legislation occurred since the BSc course. Followed the summary and update the following subjects are discussed: multi-dimensional heat transfer and temperature distribution, cold-bridges, up-to-date ventilation systems, thermal comfort measures, glazing and shading devices, low energy buildings, passive solar techniques, passivhaus. Acoustics: acoustical properties of vertical and horizontal structures from the point of view of sound insulation and seismic inhibition. Unifying character overview, summary and update of the Buildings' Chemistry knowledge acquired during the BSc course. Recent developments in Buildings' Chemistry including nano technology.
Class hours/week: 2
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr FÜLÖP László

Course title: Numerical Methods for Civil Engineering MSM084ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The course is an introduction to the basics of numerical methods which are indispensable in further studies of structural engineering subjects, e.g. structural analysis and structural optimization. This course not provides the full aspects of the theory and application of numerical methods, but represents the subject in engineering point of view where some benchmark problem is presented and solved using commercial software.
Purpose and Target Audience

Class hours/week: 2+2
Credits (ECTS): 3
Semester: Fall
Lecturer: Dr CSÉBFALVI Anikó

Course title: Structurs 1. MSM405ANEP
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The course covers the matrix methods of structurally determinate and indeterminate trusses, frame structures, and cable supported structures, including the basics matrix theory and determination of mathematical modelling of structures. This course uses computer-based methods for the analysis of large-scale structural systems. Topics covered include: modelling strategies for complex structures; application to tall buildings, cable-stayed bridges, and tension structures; introduction to the theory of active structural control; design of classical feedback control systems for civil structures; and simulation studies using customized computer software.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr CSÉBFALVI Anikó

Course title: Structures 2. MSM406ANEP
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: semester mark
Course description: Dynamic effort of impulse loads for single degree of freedom systems in elastic and plastic states. Calculations of natural frequencies and mode shapes for beams. Free vibration of beams. Excitation of beams by moving force. Exact dynamic stiffness matrices of beam systems. Dynamic stiffness matrices in case of application of finite element method. Calculation of vibration equations using modal analysis and numerical integrations. Calculation of machine foundations. Dynamic calculation of structure in case of support movements. Earthquake response analysis for SDOF. Dynamic effects of wind loads. Equations of motion for multi degree of freedom structures.
Class hours/week: 1+1
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr ORBÁN Ferenc

Course title: Construction Materials MSM082ANEP
Language of instruction: English
Form of teaching: lecture
Form of assessment: semester mark
Course description: The course provides advanced knowledge in the field of building materials and technologies. The subjects covered include: novel insulation materials and systems, PUR fumes with simultaneous heat and water insulation capability, corkwood products and coatings, novel water insulation products and technologies, novel plywood structures, concrete surfaces with high aesthetic requirements, novel concrete design procedures, high strength and high performance concrete, durable concrete, self-compacting concrete, foam concrete, fibre reinforced concrete, novel concrete testing methods, novel formwork systems, industrial floors, application of nano-technology.
Class hours/week: 2

Credits (ECTS): 2
Semester: Fall
Lecturer: Dr ORBÁN Zoltán

Course title: Geotechnical Design MSM139ANEP
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: exam
Course description: This course aims at teaching the basics of geotechnical design and covers the following topics: Basis of structural design, General rules for geotechnical design, Ground investigation and testing, Ground characterization, Design of footings and piles.
This subject intends to provide students with knowledge in the basics of actions and materials, depth of investigation points, identification and classification of soil and rock, sampling, groundwater measurements, laboratory and in-situ tests, derive geotechnical parameters. An additional objective is to prepare students with a basic knowledge for planning piles using cone penetration test.
Class hours/week: 2+1
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr SZŰCS István

Course title: Interaction Between Soil and Structure MSM138ANEP
Language of instruction: English
Form of teaching:lecture
Form of assessment: semester mark
Course description: Dynamic effort of impulse loads for single degree of freedom systems in elastic and plastic states. Calculations of natural frequencies and mode shapes for beams. Free vibration of beams. Excitation of beams by moving force. Exact dynamic stiffness matrices of beam systems. Dynamic stiffness matrices in case of application of finite element method. Calculation of vibration equations using modal analysis and numerical integrations. Calculation of machine foundations. Dynamic calculation of structure in case of support movements. Earthquake response analysis for SDOF. Dynamic effects of wind loads. Equations of motion for multi degree of freedom structures.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr SZŰCS István

Course title: Structural Optimization MSM407ANEP
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: semester mark
Course description: Structural materials, structural effects, definitions of structural shapes. Structural design. Structural costs, damage ratio, safety, reliability. Optimized risk. Deterministic and probabilistic methods of design. Eurocode program. Ultimate and serviceability limit states. Conception of limit states. Design, characteristic and representative values. Partial factors. Design supported by experiments. Effects on structures. Combinations of effects in design states.
Class hours/week: 1+1
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr FÜLÖP Attila

Course title: Stability of Structures MSM411ANEP
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: exam
Course description: Introduction to the theory of structural stability. The possible ways of reaching load bearing capacity, definition of static loading, methods of producing structural static models. Mathematical backgrounds of stability design (static method /eigenvalue problem/, energy method /variational problem/, kinematic method). Planar and 3D buckling problems of general bars, frames and trusses. Investigation of the local plate buckling of plates and plated structures (linear and non-linear); analysis of the post-critical (post-buckling) behavior and the post-critical load-bearing capacity.
Class hours/week: 2+1
Credits (ECTS): 3
Semester: Spring
Lecturer: Dr FÜLÖP Attila

Course title: Case Studies in Geotechnics MSM140ANEP
Language of instruction: English
Form of teaching: lecture
Form of assessment: semester mark
Course description: This course aims at teaching the basics of geotechnical and soil mechanical problems and covers the following topics: Swelling of clay, foundation on organic soil, weak and compressible soil, failures of geotechnical structures and buildings.
This subject intends to provide students with knowledge in the case studies from all over the world (e.g. deep excavations, dams, building damages). An additional objective is to prepare students with a basic knowledge in Geomechanics of Failures (e.g. Collapse of compacted soil, dynamics of dam sliding).
Class hours/week: 2
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr SZŰCS István

Course title: Numerical Methods in Geotechnics MSM141ANEP
Language of instruction: English
Form of teaching:lecture
Form of assessment: semester mark
Course description: This course aims at teaching the basics of soil mechanics connecting to the geotechnical-numerical modeling and covers the following topics: mathematical models and computer programs, programming basic mechanism with excel, Finite Element Modeling (FEM).
This subject intends to provide students with knowledge in the basics of understand and program consolidation, settlements, bearing capacity of footings, equilibrium of gravity walls, embedded walls, bearing capacity of piles and anchorages. An additional objective is to prepare students with a basic knowledge for use Mohr-Coulomb,- Hardening-soil,- Soft-soil models and analyse geotechnical problems with FEM (e.g. sheet piles, retaining walls, slope stability) .
Class hours/week: 2
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr SZŰCS István

Course title: Prestressed Technologies MSM409ANEP
Language of instruction: English
Form of teaching:lecture
Form of assessment: semester mark
Course description: This course is aimed at providing basic and advanced knowledge on the mechanics, design and construction of prestressed concrete structures. Topics covered will include: basic concept of prestressing, prestressing systems and technologies, stress distribution in prestressed concrete structures, determination of prestress losses, flexural and shear behaviour at service and ultimate loads, deflection and crack control, design for serviceability and ultimate limit states, design of prestressed beams and slabs, external prestressing, strengthening with prestressing, durability and maintenance of prestressed concrete structures, case studies.
Class hours/week: 2
Credits (ECTS): 2
Semester: Spring
Lecturer: Dr IVÁNYI M. Miklós

Course title: Seismic Design PMTSTNM077OA
Language of instruction: English
Form of teaching:lecture
Form of assessment: semester mark
Course description: This course provides a comprehensive introduction to the earthquakes damages, principles of seismic behaviour, analysis and design of structures. The aim is to provide basic understanding and skills to carry out conceptual design of earthquake-resistant building. Introduction to earthquake engineering. Basics of seismology, earthquake characteristics and effects of earthquakes on structures. Ground motions, site effects and liquefaction. Understanding of dynamic behaviour of structures under seismic excitation. Seismic provisions of design codes (EUROCODE 1 and 8, ASCE/SEI 7-10). General principles of the structural design and seismic-resistant concrete and steel structures. Serviceability and ultimate limit states for structures. Methods for seismic analysis and design of structures: quasi-static load approach, response spectrum methods, and time-history analysis. Soil-structure interaction. Assessment and retrofitting of existing structures (ASCE 41-13, FEMA-547, EUROCODE 8, Part 3). Risk assessment. Mitigation of seismic effects.
Class hours/week: 2
Credits (ECTS): 3
Semester: Fall
Lecturer: Dr KATONA Tamás

C. COMPUTER SCIENCE ENGINEERING

COMPUTER SCIENCE ENGINEERING BSC

Course title: Algorithm Design IVB364ANMI
Language of instruction: English
Form of teaching: lecture
Form of assessment: semester mark
Course description: The course provides an introduction to basic algorithms, their design and basic analysis. The course also aims to provide an overview of several different data structures, their advantages and disadvantages, and their uses. Introduction to algorithm design. Algorithm analysis. The Big Oh Notation. Data structures: queues, stacks, lists, binary trees, hash tables, dictionaries, associative tables. Basic algorithms. Sorting and searching. Graphs and graph algorithms.
Class hours/week: 2
Credits (ECTS): 3
Semester: Fall
Lecturer: Dr ACHS Ágnes

Course title: Mathematics 1. IVB291ANMI
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: Sets of numbers (natural, whole, rational and real numbers); vectors and operations with vectors, scalar and vector products and their applications; sets and operations with sets; projections; definition of functions; presentation of functions; polinoms; rational-fractional functions; algebraic functions; sequences of real numbers (definition of monotonity, limitedness, convergence and divergence); limit value and continuity of functions; types of discontinuity; definition of tangents; differential calculus of functions in one variable, differential quotients, derivative, relation between differentiability and continuity; rules of derivation, derivatives of algebraic functions; integral calculus: definition of the primitive function and indefinite integral, properties of indefinite integrals, basic integrals, integral processes, definition of the Riemann integral, its geometric and physical meaning, integral function, Newton-Leibniz theory.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr Perjésiné Dr HÁMORI Ildikó

Course title: Mathematics 2. IVB292ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: exam
Course description: Definition of definite and indefinite integrals, calculus of definite integrals using the Newton-Leibniz theory, application of definite integrals to engineering (architectural) problems, calculation of volume and centres of gravity, analysis of multivariable functions, interpretation and application of partial derivatives, definition, calculus and application of double integrals in authentic practical problems.Students will also learn about transcendental functions: notable limit values and their derivation, application of differential calculus, Rolle's theorem, Lagrange's mean value theorem, rule of L'Hospital, testing functions, differentials of differentiable functions and their application for fault calculation, tangency of curves, osculating circles, curvature of the plane curve at P0, Taylor-polinoms, integration with replacements, partial integration, special

integrals, geometric and engineering applications of definite integrals, improprius integrals, numeric integration, examples with common differential functions, definition of differential equations, their classification and solutions, solution of differential equations of the first and second order, definition of multivariable functions, partial derivatives, gradients, extreme values of the multivariable function, definition of the double integral and its calculus in the standard range.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Spring
Lecturer: Dr Perjésiné Dr HÁMORI Ildikó

Course title: Foundations of Electrical Signals of Hardware IVB286ANMI
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The goal of the course for the IT students to evolve the basic knowledge of electrical engineering and electrical circuit design approach, the basic relationships and methods of calculation awareness. Electrostatics. The electrical field. Circuits Basics. The stationary magnetic field. The time-varying electromagnetic field. Electromagnetic waves. Poynting vector. Sinusoidal alternating quantities. DC and sinusoidal varying voltage networks, and the presentation and application of calculation methods of two-gates.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr IVÁNYI Miklósné

Course title: Introduction to Computing Science IVB365ANMI
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: This course intended to introduce students to some of the classical and important number theoretic problems and to different areas of number theory. Primes, Divisibility and the Fundamental Theorem of Arithmetic. Greatest Common Divisor (GCD), Euclidean Algorithm. Congruences, Chinese Remainder Theorem, Hensel's Lemma, Primitive Roots. Quadratic Residues and Reciprocity. Arithmetic Functions, Diophantine Equations, Continued Fractions.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr KLINCSIK Mihály

Course title: Applied mathematics 1 IVB007ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: semester mark
Course description: Matrices and vectors. Systems of linear equations. Matrix inversion and determinants. Ranks, range and linear equations. Vector spaces. Linear independence, bases and dimension. Linear transformations and change of basis. Diagonalisation. Inner products and orthogonality. Solution techniques of linear system of equations. Eigenvalues and eigenvectors. Application of linear algebra.
Class hours/week: 2+2

Credits (ECTS): 5
Semester: Spring
Lecturer: Dr KLINCSIK Mihály

Course title: Modelling of Transport Processes IVB287ANMI
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The aim of this basic scientific course to give the subject some expert knowledge of specific subjects and give a general assistance to the technical issues to better understand the approach of the phenomenon from another point of view. During the lecture modern physics chapters will be processed , including the mechanical, optical and thermodynamic phenomena general context, foundations of quantum mechanics, nuclear physics, basic concepts and the dynamics of elementary particles, electrical conductivity of metals, superconductivity, basics of nano-electronics. The topics of the excercises are related to the lectures and the tasks from the topics of mechanics, thermodynamics, the topic of optical waves. Selected tasks in the topic of modern physics (piezo.electricity, electro-and magneto-striction).
Class hours/week: 2+1
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr IVÁNYI Miklósné

Course title: Applied Mathematics 2. IVB008ANMI
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The aim of the course to help students to understand the models of phenomena with randomness, the laws of probability theory and the rules of statistical calculations.Foundatoins, experiments and events, probability, conditional probability. Probabilistic variables and their application. Discrete and continuous distributions. Expectation and standard deviation. Variance and higher moments. Covariance and correlation. Normal, Poisson, gamma, chi-square, Student's t and F distribution. Foundations of mathematical statistics. Population, samples. Hypothesis testing, tests. Correlation and linear regression.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr KLINCSIK Mihály

Course title: System Theory 1 IVB352ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: exam
Course description: The aim of the course is the analysis of the fundamental properties of continuous- and discrete-time deterministic signals, and examination of linear, time-invariant systems and networks.The concept of system and network. Operations on continuous- and discrete-time signals. The impulse response and its application. State-variables, state-space representation of systems. Determination of the transfer characteristic based on the state-space representation. Fourier-series of periodic signals. Spectral representation of general signals, the Fourier-transform. Band-limited and time-limited signals. Signal representation in the complex frequency domain. The Laplace- and the Z-transform. Transfer function of the

system. Network analysis in the complex frequency domain. Interpretation, spectral representation, and Laplace-transform of sampled signals. Discrete-time simulation of continuous-time systems.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr SÁRI Zoltán

Course title: Computer Architecture I. IVB366ANMI
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: exam
Course description: The aim of the course is to introduce the lower abstract layers of computer architectures. After presenting the main periferals and computer components, these abstract layers will be examined. Going from the pure hardware, from transistors, we head through digital logic, microarchitecture and further layers toward the higher level abstract layers. Introduction (data, information, algorithm), computer architecture types, Neumann-Harvard architecture, Basic computer architecture – CPU, bus, RAM, peripheries.Microcontroller, microprocessor, micro computer, CISC, RISC. Development of computers. Memory types, buses. Microarchitecture, IJVM, Mic-2, Mic-3, Instruction sets.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr VÁRADY Géza

Course title: Computer Architecture II. IVB367ANMI
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: exam
Course description: The aim of the course is to examine the higher abstract layers of computer architectures. The course discusses the layers from the Instruction Set Architecture and goes through the OS and Assembly layers. This and the preciding course shows how the hardware and software of a computer works. ISA level, tasks of OSM, virtual memory, paging, segmentation, support of I/O, parallelisation, processes, Assembly level, Parallel architectures, SUN Ultrasparc, IBM Power, SGI, Architectures for high performance computing, supercomputers.
Class hours/week: 2+1
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr VÁRADY Géza

Course title: Computer Networks II. PMRRTNB228HA
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This course is intended to help students understand the mechanisms of upper OSI layers.We will focus on an overview of network, transport and application layers. Students who successfully complete this course will have a concept and knowledge building, operating and managing computer networks. Students will also have hands on experience in building computer networks, configuring active network devices, switches, routers through lab sessions.

Class hours/week: 2+3
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr VÁRADY Géza

Course title: Control Engineering PMTMINB314HA
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: exam
Course description: The course provides the students with the fundamental concepts of control engineering including the operating principles of control systems, their analysis and synthesis. The student successfully completing the course will be able to analyze continuous and discrete control systems in various engineering applications, to understand and solve the most common control problems in real-time embedded environment. The course provides sufficient background for later specialized studies.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Jancskárné Dr ANWEILER Ildikó

Course title: Databases 1. IVB334ANMI
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: exam
Course description: This course provides the students with an introduction to the core concepts in databases. It is centered around the core skills of identifying organizational information requirements, modeling them using conceptual data modeling techniques, converting the conceptual data models into relational data models and verifying its structural characteristics with normalization techniques, and implementing and utilizing a relational database using an industrial-strength database management system.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr SZENDRŐI Etelka

Course title: Databases II. PMTRTNB331HA
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: The course is designed to develop programming proficiency in a selected DBMS. Emphasis is on data definition, data manipulation, and data control statements as well as on report generation. The course helps the students understand the concept of database transaction and apply it appropriately to an application context. Upon completion, students should be able to write scripts of SQL commands, stored procedures, triggers, functions. After finishing the course students should be able to write programs that create, update and produce reports which are representative of industry requirements.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr SZENDRŐI Etelka

Course title: Digital Logic Design IVB033ANMI
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: semester mark
Course description: The majority of the instruments in information technology are digital systems. The course helps the students to understand the mathematical and electronic basics of these systems, and gives instructions for the planning and creation of them. Starting from the simplest building elements, the level of digital computers is reached systematically.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr TUKORA Balázs

Course title:Electronics IVB040ANMI
Language of instruction: English
Form of teaching:lecture
Form of assessment: exam
Course description: Making the students acquainted with the basic electronic parts, analog and digital circuits, and the basics of wired and optical signal transmission. Passive and active electric parts.Physical fundamentals of semiconductors, the operation of p-n junction.Diode, bipolar transistor.Operation, characteristics, working modes, models of JFET and MOSFET. Active parts of optical signal transmission. Low-signal amplifier base circuits.Setting of the operating point, characteristics of amplifying.Concept of signal and power adaptation.Principles of feedback.The architecture and typical use of operational amplifiers.Types of signal sources and drains, their circuit models, rules of connecting them together. Disturbance signals.
Class hours/week: 2
Credits (ECTS): 3
Semester: Spring
Lecturer: Dr TUKORA Balázs

Course title: Foundations of Information Security PMRRTNB237HA
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: This course is intended to help students gain fundamental and comprehensive understanding of information security. We will focus on an overview of major information security issues, technologies, and approaches. Students who successfully complete this course will have a concept and knowledge of security properties, concerns, policies, models, cryptography, PKI, firewalls, security evaluation, and real life security cases. Students will also have hands on experience in selected information security technologies through lab sessions.
Class hours/week: 2+1
Credits (ECTS): 3
Semester: Spring
Lecturer: Dr ERCSEY Zsolt

Course title: Integrated Systems PMTMINB317HA

Language of instruction: English
Form of teaching: lecture
Form of assessment: exam
Course description: The nature of the course is synthetic. In the information technology base material (technical system engineering, control engineering, intelligent systems) body of knowledge can utilize to negotiate a short description specified topics example of a large, hierarchical engineering systems and networks (case study, simulation and animation application software to take into account).
Class hours/week: 2
Credits (ECTS): 3
Semester: Fall
Lecturer: Dr SÁRI Zoltán

Course title: Intelligent Systems I. PMTMINB315HA
Language of instruction: English
Form of teaching: lecture
Form of assessment: semester mark
Course description: This course is a comprehensive introduction to the theory and practice of artificial intelligent systems. Definitions of intelligence. Measure of machine intelligence. Agent technology: theory and solutions. Sensing, learning, information processing, knowledge representation.Approximations of problem solutions.Theory of biology-driven information processing.Artificial neural networks.Fuzzy systems, genetic algorithms. Expert and decision support systems. Speech processing, speech recognition, text and translation control systems.
Class hours/week: 2
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr SÁRI Zoltán

Course title: Intelligent Systems II. PMTMINB216HA
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: This course continues the course Intelligent systems I. In this course soft computing technics: the theory and practice of neural networks, fuzzy systems and genetic algorithms will be detailed. Some advanced topics on fuzzy controllers and adaptive fuzzy inference systems and its applications for quasi-optimization of system models are also covered.Upon completion of this course the students will be able to: Utilize the state of the art topics of soft computing in their research activities.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Spring
Lecturer: Dr SCHIFFER Ádám

Course title: Foundation of Informatics IVB183ANMI
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: The aim of the course is to cover all the fields of informations witch will be needed for the students to start their Computer science study. The course starts with computer hardware and software basics

with CPU's, RAM and ROM memories, drives, peripheries, etc. The software side is more relevant which starts with the common operating system features but focuses on the command interpreters. The next big theme is word processing where Office Word programs, Word and Powerpoint and LaTex will be introduced. In the end speadsheeting is trained and functions.
Class hours/week: 2+1
Credits (ECTS): 3
Semester: Fall
Lecturer: Dr SCHIFFER Ádám

Course title: Measurement and Data Acquisition IVB269ANMI
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: exam
Course description: The students learn the basic concepts of the measurement theory, structure and practice of the programmable data acquisition systems and virtual instrumentation. The basic concepts of measurement. The relationship between the measurement and modeling. Characteristics of measurement procedures, the basic structure types. Basic methods for processing measurement data. Measuring instrument design. Smart sensors and actuators. Development of data acquisition system with programmed measurement units. Virtual instrumentation. Applying graphical programming language in the instrumentation.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr SCHIFFER Ádám

Course title: Operating Systems IVB186ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: exam
Course description: The aim of this course is to teach students the basics and design of operating systems. The course will cover several concepts of operating systems. Operating systems concepts. System calls. Processes and threads. Interprocess communication, race conditions, busy waiting, mutual exclusion, sleep and wakeup, semaphores, mutexes. Message passing. Scheduling. Batch systems. Interactive systems. Real-time systems. Input/output, device controllers, DMA, Deadlock, detection and recovery, prevention, avoidance. Disks. Memory management. Allocation strategies. Virtual memory. Paging and segmentation. File systems.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Spring
Lecturer: Dr ERCSEY Zsolt

Course title: Programming I. IVB332ANMI
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: This course provides an introduction to all of the fundamental aspects of the C programming language, including elementary data types; arithmetic, logical and bitwise operators; control-flow statements; functions; structures; pointers; program scope rules; good program design practices; and C debugging techniques. Emphasis is on the ANSI-standard C.

Class hours/week: 1+2
Credits (ECTS): 2
Semester: Fall
Lecturer: Dr ACHS Ágnes

Course title: Programming II. IVB305ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: semester mark
Course description: The purpose of this course is to introduce the students to the fundamental concepts of object-oriented programming and appreciate the complexity of application development. Students will learn the basic concepts of program design, problem solving, and fundamental design techniques for object-oriented and event-driven programs. Program development will incorporate the implementing a solution in a programming language C# .NET, and testing the completed application.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr SZENDRŐI Etelka

Course title: Programming III. IVB306ANMI
Language of instruction: English
Form of teaching: lecture
Form of assessment: exam
Course description: The primary goal of this course is to introduce advanced object-oriented programming and the Java Programming Language.The course emphasizes an in-depth study of object-oriented programming paradigm including advanced topics in: inheritance: abstract classes, interfaces, multiple inheritance, inheritance hierarchies, polymorphism; application programming interface: GUI programming, event dispatch/handling; exception handling: throwing and catching exceptions; the base of network programming and JDBC.The course is divided into two interacting sections: a lecture-based theory section and a laboratory-based programming section. Each laboratory session tackles different programming problems that are typical of this style of program design. The lecture-based sections prepare the laboratory tasks, but it deals with some concepts in larger context as well.
Class hours/week: 2
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr ACHS Ágnes

Course title: Software Technology PMTRTNB325HA
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: semester mark
Course description: This course discusses the processes, methods, techniques and tools that organizations use to determine how they should conduct their business, with a particular focus on how computer-based technologies can most effectively contribute to the way business is organized. The course covers a systematic methodology for analyzing a business problem or opportunity, determining what role, if any, computer-based technologies can play in addressing the business need, articulating business requirements for the technology

solution, specifying alternative approaches to acquiring the technology capabilities needed to address the business requirements, and specifying the requirements for the information systems solution.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Dr SZENDRŐI Etelka

Course title: Visual and Programming I. IVB268ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: semester mark
Course description: The goal of the course for the IT students to evolve the basic knowledge of visual programming in Labview, see its basic concepts and methods. Introducing the LabVIEW application development system, major parts and concepts, elementary properties; programming basics in LabVIEW, structured directives, data types and operations, array and record type elements, graphic displays, elements of file management, error control, program tracking options, Data Connectivity, Even based programming, exception handling; using ActiveX controls and programming, code using external interfaces (C - LabView connection); Multithreaded programming processes.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr SCHIFFER Ádám

Course title: Digital Control IVB196ANMI
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: exam
Course description: This course is a comprehensive introduction to control system synthesis in which the digital computer plays a major role, reinforced with hands-on laboratory experience. The course covers elements of real-time computer architecture; input-output interfaces and data converters; analysis and synthesis of sampled-data control systems using classical and modern methods.The student should get an understanding for discrete time control systems, how to analyze, design and implement digital controllers.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Jancskárné Dr ANWEILER Ildikó

Course title: Image Processing IVB191ANMI
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: exam
Course description The aim of the course is to provide the basic theoretical and practical background required for the understanding and implementation of fundamental sound- and image processing algorithms.Discrete time signals and systems analysis review. Properties and representation of linear, time invariant systems. Discrete Fourier-transform and Fast Fourier transform with applications. Signal analysis in the frequency domain. Digital filter design, properties of FIR and IIR systems.Filtering in time domain and frequency

domain.Representation and manipulation of images.Image filtering.Image correction, histogram-based techniques.Image segmentation and morphology.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Spring
Lecturer: Dr SÁRI Zoltán

Course title: Programmable Logic Control IVB195ANMI
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: exam
Course description: The course provides the students with the fundamental concepts of programmable logic control including the operating principles of PLC. The course explains the basic programing concepts and skills required to write an appropriate real-time open-loop control program. Upon completion of this course, students will demonstrate the ability to: Explain operating principles and major components of a Programmable Logical Controllers. Develop control strategy in several IEC 61131 conform languages. Convert state chart and function block diagrams into PLC programs. Edit, monitor and analyze PLC programs.
Class hours/week: 2+2
Credits (ECTS): 5
Semester: Fall
Lecturer: Jancskárné Dr ANWEILER Ildikó

Course title: Robot Technology I. IVB354ANMI
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: semester mark
Course description: Making the students acquainted with the fundamentals of robot technology by means of the introduction of industrial robots and their serving equipments.Fundamentals of computer integrated manufacturing (CIM). Introducing of industrial robots; grippers and sensors; other equipments and machines in the robot cell; devices that ensure the material flow between the cells, and other major tools in connection with CIM, separately and through their relationship, in the complex system of industrial production. Anatomy and types of robots.Operation of handling, manufacturing, assembling etc. robots and almost every tools working in the automated production.Fundamentals and tools of sensor technology.
Class hours/week: 2+1
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr TUKORA Balázs

Course title: Robot Technology II. IVB355ANMI
Language of instruction: English
Form of teaching: lecture, laboratory
Form of assessment: exam
Course description: Introduction of the theoretical and mathematical fundamentals that is needed for controlling and programming robots. Practicing robot programming in workshops.Programming modes of robots.Determination of position and orientation.Homogenous, relative transformations.Geometry of robot manipulators.Direct and reverse kinematics of robots.Path control.Dynamic system of robots.Machine

vision.Cameras, geometric camera models.Image processing techniques. Linear filters, convolution, correlation. Edge detection, image segmentation.

Class hours/week: 2+2

Credits (ECTS): 5

Semester: Spring

Lecturer: Dr KOVÁCS György

COMPUTER SCIENCE MSC

Course title: Quantum Informatics, Cryptography IVM180ANMI
Language of instruction: English
Form of teaching:lecture
Form of assessment: semester mark
Course description: In the course we would like to provide a relatively general overview of the area of quantum information. This goal is mostly motivated by the recent developments of quantum cryptography which are already usable for achieving some cryptographical protocols. Because of this rapid evolution of quantum cryptography and quantum information our students have to be trained in this area too.
Class hours/week: 2
Credits (ECTS): 5
Semester: Spring
Lecturer: Dr NYITRAY Gergely

Course title: Signals and Systems IVM181ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: semester mark
Course description: The goal of the course is the analysis of the input-output relation of continuous- and discrete-time systems, based on the description of the characteristics and connections of the components and parts. Description of continuous-time and discrete-time signals and component characteristics, analysis of connection constraints of signal-flow networks, solution of the system of equations representing the network.
Class hours/week: 3+1
Credits (ECTS): 5
Semester: Spring
Lecturer: Dr SÁRI Zoltán

Course title: Artificial Intelligence IVM435ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: exam
Course description: This course introduces students to basic concepts and methods of artificial intelligence from a computer science perspective. Emphasis of the course will be on the selection of data representations and algorithms useful in the design and implementation of intelligent systems. The course will contain an overview of one AI language and some discussion of important applications of artificial intelligence methodology.
Class hours/week: 2
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr. IVÁNYI Péter

Course title: Advanced Image Processing IVM202ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: semester mark
Course description: This course presents a comprehensive overview of PDE (Partial Differential Equations) based linear and non-linear diffusion models applied in image processing. These models play important role not only in in enhancement of digital images, but preprocess raw images for quantitative analyses. These methods

are widely used in machine vision algorithms, both in engineering and medical practice. The students will gain knowledge and skills in topics not ordinarily covered in depth in regular courses and of specific interest to advanced level studies.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Fall
Lecturer: Jancskárné Dr ANWEILER Ildikó

Course title: Parallel Algorithms and Programming VM325ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: exam
Course description: The aim of the course is to introduce the concept of parallel programming to the students. The course also shows different algorithms that can be used in parallel engineering simulations.Parallel architectures.Memory models. Measurement of the efficiency of algorithms. Parallel algorithm patterns: task parallelism, task farming, geometric decomposition, etc. Finite element mesh generation: Structured and unstructured meshes, advancing front method, Delaunay method, Paving. Parallel mesh generation.
Class hours/week: 2
Credits (ECTS): 4
Semester: Spring
Lecturer: Prof.Dr. IVÁNYI Péter

Course title: Computer Vision Systems VM203ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: exam
Course description: The main of this course is to show and investigate the mechanism of human vision, and to introduce computer vision that is based on it. The field of computer vision is an important area of informatics and therefore the students can understand the theoretical and practical basis of this field.Basis of radiometry, filters, photometry and its basis.The mechanism of human vision.Color perception, shape recognition.Combination of colours – color systems. On the basis of this information it is possible to model and implement the automatic, machine vision. Constraints of machine vision.Detectors and measurements.Reproduction of colors.
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr VÁRADY Géza

Course title: Intelligent Control Systems IVM194ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: exam
Course description: The goal of the coarse is to summarize the modern branches of control engineering on the fields of sampled, optimal, predictive and adaptive control systems, and system identification, which presumably will have a long term impact on the theory and practice of robot- and process-control. The application of methods is presented in the frame of typical design tasks of control engineering, using modern equipment. Most of the methods serve the purpose of design multi-variable systems.
Class hours/week: 2+2

Credits (ECTS): 4
Semester: Fall
Lecturer: JancskárnéDr. ANWEILER Ildikó

Course title: Project work IVM308ANMI
Language of instruction: English
Form of teaching:lecture
Form of assessment: semester mark
Course description: During the course the students investigate and solve an engineering problem. The projects are assigned to the individual students and they work on it on their own under the supervision of the lecturer. This course is a preparation for the Diploma work. The diploma work can be a continuation of this course.
Class hours/week: 4
Credits (ECTS): 4
Semester: Fall
Lecturer: Dr SCHIFFER Ádám

Course title: Robotic Systems IVM193ANMI
Language of instruction: English
Form of teaching:lecture, practice
Form of assessment: exam
Course description: Getting acquaintedwith some important robot application areas and the possibilities of connecting robots into a system – requirements, problems. Short story of robots/industrial robots.Basic concepts and their explanation.Robot applications around the World, in every parts of life.Special (micro, nano) robots, particular applications (e.g. surgery robots).Robot mechanics, robot control, AI in control and operation.Bot programming. Organizational and financial questions, design of robot systems, industrial design, production planning for robot use. Robot cells, robot production systems, integration of robots into mechanical and architectural systems, robots in continuous production, robots in discrete production: welding, assembly, manipulation, disassembly, etc. Computer vision systems
Class hours/week: 2+2
Credits (ECTS): 4
Semester: Spring
Lecturer: Dr. KOVÁCS György

Course title: Information Theory IVM193ANMI
Language of instruction: English
Form of teaching:lecture
Form of assessment: exam
Course description: Introduction to Information theory, basic terms and concepts, the information and its measurement. Concept of entropy. Modell of the communication channel. Characteristics of channels, capacity of channels. Coding theory.
Class hours/week: 2
Credits (ECTS): 4
Semester: Fall
Lecturer: Prof. Dr. Péter IVÁNYI

Course title: Artificial Intelligence 1. IVM435ANMI
Language of instruction: English
Form of teaching:lecture

Form of assessment: exam
Course description: Introduction to Information theory, basic terms and concepts, the information and its measurement. Concept of entropy. Modell of the communication channel. Characteristics of channels, capacity of channels. Coding theory.
Class hours/week: 2
Credits (ECTS): 3
Semester: Fall
Lecturer: Prof. Dr. Péter IVÁNYI

Course title: Artificial Intelligence 2. IVM436ANMI
Language of instruction: English
Form of teaching:lecture
Form of assessment: exam
Course description: This course is the continuation of Artificial Intelligence 1. More techniques and methods are discussed, however the focus is shifted on the students work, where students are solving actual problems with AI methods.
Class hours/week: 2
Credits (ECTS): 3
Semester: Fall
Lecturer: Prof. Dr. Péter IVÁNYI

Course title: Parallel Technologies 1. IVM327ANMI
Language of instruction: English
Form of teaching:lecture
Form of assessment: exam
Course description: The course discusses the basic concepts of parallel programming for high performance computers. The basic programming patterns are also introduced and discussed. In this course the OpenMP programming environment is used to demonstrate the effect and results of parallelisation. Further topics that are discussed: mesh generation, mesh partitioning.
Class hours/week: 2
Credits (ECTS): 4
Semester: Fall
Lecturer: Prof. Dr. Péter IVÁNYI

Course title: Parallel Technologies 2. IVM328ANMI
Language of instruction: English
Form of teaching:lecture
Form of assessment: exam
Course description: This course is the continuation of Parallel Technologies 1, and uses the MPI environment for further deepen the knowledge about parallel computing. In the course several implementations of programs are investigated.
Class hours/week: 2
Credits (ECTS): 4
Semester: Fall
Lecturer: Prof. Dr. Péter IVÁNYI

D. ELECTRICAL ENGINEERING

Course title: Electrical Materials IVB039ANVM

Language of instruction: English

Form of teaching: lecture

Form of assessment: semester mark

Course description: The main aim of this course is to introduce the students to the fundamentals and the practical knowledge of the material science. Categories and subdivision of material sciences. Evolution of knowledge on material structure, atomic models. Structure of the table of elements. Occurrence of elements in terrestrial crust, atmosphere and the universe. Main properties and usage of various materials. Properties and preparation of X-rays. Fundamentals and taxonomy of crystals, defects in crystals, single crystal growth. Destructive and non-destructive methods of structural investigation in material science. Liquids, synthetic materials and polymers.

Class hours/week: 2

Credits (ECTS): 4

Semester: Fall

Lecturer:

Course title: Mathematics a/1.

Language of instruction: English

Form of teaching: practice

Form of assessment: exam

Course description: This lecture and practical based course aims to give engineering students a solid mathematics basis through covering the following topics: sets of numbers (natural, whole, rational and real numbers); vectors and operations with vectors, scalar and vector products and their applications; sets and operations with sets; projections; definition of functions; presentation of functions; polinoms; rational-fractional functions; algebraic functions; sequences of real numbers (definition of monotonity, limitedness, convergence and divergence); limit value and continuity of functions; types of discontinuity; definition of tangents; differential calculus of functions in one variable, differential quotients, derivative, relation between differentiability and continuity; rules of derivation, derivatives of algebraic functions; integral calculus: definition of the primitive function and indefinite integral, properties of indefinite integrals, basic integrals, integral processes, definition of the Riemann integral, its geometric and physical meaning, integral function, Newton-Leibniz theory. Students learn the basics of mathematics enabling them to interpret and understand engineer sciences and through solving elementary tasks they deepen their basic theoretical knowledge in the field of engineering.

Class hours/week: 2

Credits (ECTS): 5

Semester: Fall

Lecturer:

Course title: Mathematics a/2.

Language of instruction: English

Form of teaching: practice

Form of assessment: exam

Course description: This lecture and practical based subject aims to extend students mathematics knowledge and its application to engineering and architecture through the following topics: definition of definite and indefinite integrals, calculus of definite integrals using the Newton-Leibniz theory, application of definite integrals to engineering (architectural) problems, calculation of volume and centres of gravity, analysis of multivariable functions, interpretation and application of partial derivatives, definition, calculus and application of double integrals in authentic practical problems. Students will also learn about transcendental functions: notable limit values and their derivation, application of differential calculus, Rolle's theorem, Lagrange's mean value theorem, rule of L'Hospital, testing functions, differentials of differentiable functions and their application for fault calculation, tangency of curves, osculating circles, curvature of the plane curve at P0, Taylor-polinoms, integration with replacements, partial integration, special integrals, geometric and engineering applications of

definite integrals, improprius integrals, numeric integration, examples with common differential functions, definition of differential equations, their classification and solutions, solution of differential equations of the first and second order, definition of multivariable functions, partial derivatives, gradients, extreme values of the multivariable function, definition of the double integral and its calculus in the standard range.
Class hours/week: 2 + 2
Credits (ECTS): 5
Semester: Spring
Lecturer:

Course title: Mathematics a/3.
Language of instruction: English
Form of teaching: lecture**,**practice
Form of assessment: exam
Course description: This course aims at teaching the basics of the elements of linear algebra, vector analysis and series. Linear algebra: concept of n-dimensional vector space, matrix, determinant, rank, matrix inverse. Solution of linear equation systems: Cramer's rule, Gauss-Jordan elimination, change of basis. Eigenvalues and eigenvectors. Vector analysis: Vector-scalar functions, curves in space and their tangents, curvature, torsion, arc length, surfaces as a two variable vector-scalar function, tangent plane, the area of a surface. Scalar-vector functions, gradient, directional derivatives. Vector-vector functions, line and surface integral, divergence and curl. Green' and Stokes' theorem, elements of potential theory. Numerical and function series, Taylor and Fourier series.
Class hours/week: 2 + 2
Credits (ECTS): 53
Semester: Fall
Lecturer:

Course title: Computer Science 1.
Language of instruction: English
Form of teaching:lecture
Form of assessment: semester mark
Course description: The course starts with computer hardware and software basics with CPU's, RAM and ROM memories, drives, peripheries, etc. The software side is more relevant which starts with the common operating system features but focuses on the command interpreters. The next big theme is word processing where Office Word programs, Word and Powerpoint and LaTex will be introduced. In the end speadsheeting is trained and functions. *Learning outcomes:* At the end of the course the students will be able to use the Word, Excel, and Powerpoint software, the Latex text editing system, to create scripts.
Class hours/week: 2
Credits (ECTS): 3
Semester: Fall
Lecturer:

Course title: Computer Science 2.
Language of instruction: English
Form of teaching: lecture,
Form of assessment: exam
Course description: : This course provides the students with an introduction to the core concepts in databases. It is centered around the core skills of identifying organizational information requirements, modeling them using conceptual data modeling techniques, converting the conceptual data models into relational data models and verifying its structural characteristics with normalization techniques, and implementing and utilizing a relational database using an industrial-strength database management system.
Class hours/week: 2 L

Credits (ECTS): 4
Semester: Spring
Lecturer:

Course title: Electrical Engineering 1. IVB468ANVM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The aim of the subject is to convey fundamental knowledge on the governing relations of electrical and magnetic fields as well as characteristics, laws and computation methods of linear, time-invariant electrical circuits. Modeling of electrical networks with concentrated parameters, fundamentals of dipole theory and network topology. Computation procedures and methods of network analysis for linear, time-invariant dipole networks. Transient state analysis, phenomena accompanying switching events in direct current circuits.
Class hours/week: 2L, 2P
Credits (ECTS): 5
Semester: Fall
Lecturer:

Course title: Electrical Engineering 2. IVB469ANVM
Language of instruction: English
Form of teaching: lecture
Form of assessment: exam
Course description: The aim of the subject is to convey knowledge on methods of alternating current network analysis. Mathematical representation of sinusoidal quantities, network analysis in case of harmonic excitation as well as general periodic excitation, computation of one- and three-phased networks. Fundamentals of AC quadrupole theory, main principles and methods of transfer function analysis, network analysis in time and frequency domain based on parametric plots and Bode diagrams.
Class hours/week: 2L, 3P
Credits (ECTS): 5
Semester: Fall
Lecturer:

Course title: Electromagnetic Fields IVB469ANVM
Language of instruction: English
Form of teaching: lecture, seminar
Form of assessment: exam
Course description: Main quantities and source terms of static electric field. Electric charge, work in electric field, computation of field strength and potential, capacity, field quantities in insulators, continuity rules on boundary surfaces, energy and energy density of static electric field. Electric current.
Class hours/week: 3L,2P
Credits (ECTS): 5
Semester: Fall
Lecturer:

Course title: Technical Physics 1.
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: Mechanics: basic principles and definitions, position, displacement, velocity, motion along a line, uniform motion, velocity, acceleration, free fall, circular motion, projectiles motion, Newton's laws, work done, power, work-kinetic energy theorem, conservation of energy, gravitational force, simple harmonic motion, pendulum, damped oscillations, sound waves, the speed of sound waves, ultrasound, surface tension of liquids,

capillarity. Electrodynamics: electric charge, electric field, field lines, electric potential energy, electric potential, electric current, electric current density, direct current, alternating current, thermo-electricity, electrolysis, magnetic fields. Optics: speed of light, the laws of reflection and refraction, optical fibers, optical imaging, plane mirrors, spherical mirrors, lenses, aberrations, optical instruments, cameras, microscopes, telescopes, the human eye, seeing, color sensitivities, interference of light, multilayered (antireflection) coatings, diffraction, polarization, dichroism, lasers, the main types of lasers, holography.
Class hours/week: 4L,2P
Credits (ECTS): 4
Semester: Fall
Lecturer:

Course title: Technical Physics 2.

Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: Concept of thermodynamic system, parameters, extensive and intensive quantities, zeroth law, state indicators, the concept of temperature, gas laws, state equation. Concept of quasistatic process. State equations, internal energy, expansion work, heat, material transfer work. The first law of thermodynamics. Concept of Kelvin and Clausius machine. The Carnot cycle, efficiency, reduced heat. The entropy law. The second law of thermodynamics. The Gibbs fundamental equation, enthalpy, free-energy, free-enthalpy. Thermodynamic potentials, Maxwell relations. The Gibbs-Durham relation. The third law of thermodynamics. **Class hours/week:** 4L,1P
Credits (ECTS): 4
Semester: Fall
Lecturer:

Course title: Electric Power Conversion 1. IVB465ANVM

Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: Students learn the working principle, operational properties, selection and operation conditions of electrical machines applied in engineering practice along with fundamentals of electric drives. Students learn the structure and operation of direct-current machines, transformers, synchronous and asynchronous machines.
Class hours/week: 3L,1P
Credits (ECTS): 4
Semester: Spring
Lecturer:

Course title: Computer Programming 1.

Language of instruction: English
Form of teaching: lecture
Form of assessment: semester mark
Course description: This course provides an introduction to all of the fundamental aspects of the C programming language, including elementary data types; arithmetic, logical and bitwise operators; control-flow statements; functions; structures; pointers; program scope rules; good program design practices; and C debugging techniques. Emphasis is on the ANSI-standard C. Variables and data types, operators. Control flow. Functions and modular programming. Variable scope. Static and global variables. Pointers and memory addressing. Arrays and pointer arithmetic. Strings. Searching and sorting algorithms. User-defined data types, structures, unions, bitfields. Memory allocation. Linked lists, binary trees. Pointers to pointers, pointer and string arrays, multidimensional arrays. Stacks and queues. I/O, using files. C standard library: stdio.h, ctype.h, stdlib.h, assert.h, stdarg.h, time.h. Students will learn the basic concepts of program design and data structures. They will learn fundamental C concepts such as algorithmic thinking, problem solving, control

structures (if, if…else, switch, while, do…while, for), data types, operators, input/output, functions (user-defined and library) and arrays.
Class hours/week: 2
Credits (ECTS): 3
Semester: Fall
Lecturer:

Course title: Computer Programming 2.
Language of instruction: English
Form of teaching: 2 tutorials
Form of assessment: semester mark
Course description: The purpose of this course is to introduce the students to the fundamental concepts of object-oriented programming and appreciate the complexity of application development. Students will learn the basic concepts of program design, problem solving, and fundamental design techniques for object-oriented and event-driven programs. Program development will incorporate the implementing a solution in a programming language C# .NET, and testing the completed application. Fundamentals of object-oriented theory. The concept of Class and object. Creating properties, methods, creating classes and objects. Constructors. Passing parameters to constructors, overloading constructors. Inheritance. Passing parameters to methods.
Class hours/week: 2
Credits (ECTS): 3
Semester: Spring
Lecturer:

Course title: Digital Logic Design 1. IVB033ANVM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: examination
Course description: The majority of the instruments in information technology are digital systems. The course helps the students to understand the mathematical and electronic basics of these systems, and gives instructions for the planning and creation of them. Starting from the simplest building elements, the level of digital computers is reached systematically. Tasks, operation and architecture of the logic systems. Boole algebra, logic functions, two- and more-valued logic. Planning of combinational networks. Minimizing of logical functions, hazards, elimination of them. Combinational networks from memory elements and programmable logic circuits. Sequential networks: types and description modes of them. Elemental and complex sequential networks. Basics of microprocessor systems, main parts and tasks. Introduction to the assembly programming.
Class hours/week: 2L,2P
Credits (ECTS): 4
Semester: Fall
Lecturer:

Course title: Digital Logic Design 2. IVB033ANVM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: examination
Course description: The majority of the instruments in information technology are digital systems. The course helps the students to understand the mathematical and electronic basics of these systems, and gives instructions for the planning and creation of them. Starting from the simplest building elements, the level of digital computers is reached systematically. Complex sequential networks (counters, shift registers, encoders, decoders etc). Electrical parameters of digital systems (signal level, transfer characteristics, propagation time, dissipation, quality factor, fan-out, fan-in). Logical circuit technologies (TTL, ECL, MOS, CMOS), comparison. Memories (RAM, ROM EPROM, EEPROM ect.), registers, bus systems. Application techniques.
Class hours/week: 2L,2P

Credits (ECTS): 4
Semester: Spring
Lecturer:

Course title: Computer Networks 1.
Language of instruction: English
Form of teaching: lecture, tutorial
Form of assessment: exam
Course description: The course discusses the aims and function of computer networks. Physical and theorethical limitations and expectations shaped the evolution of telecommunication. During the lectures, we classify networks and compare them. The lecture discusses the lower layers of computer networks. History of computer networks, types of computer networks. Standards for computer networks. ISO-OSI reference modell. Physical and data link layer, multiplexing, modulation methods. Local and city networks. After completion of the course the student will be able to: describe the OSI-ISO reference modell, to understand the lower level components of a computer network, to understand the technology of the lower layers.
Class hours/week: 3L,1T
Credits (ECTS): 5
Semester: Spring
Lecturer:

Course title: Electronics 1. IVB040ANVM
Language of instruction: English
Form of teaching: lecture, tutorial
Form of assessment: exam
Course description: The aim of this course is to provide an introduction to the fundamentals of analogue electronics. Methods of electronic circuit analysis and synthesis are presented and illustrated at laboratory practice. Passive devices. Methods of passive circuit analysis. First order filters. Resonance filters. Characteristics of quadrupoles, amplifiers. Transfer functions. Noise, noise rejection, distortion. Basic principles of semiconductor devices. P-N junction, semiconductor diodes: structure, characteristics, packaging, transient phenomena in switching mode. Varactors, Zener diodes. Applications: rectifiers, voltage clippers, potential, voltage multipliers. Structure, principle of operation and characteristics of bipolar junction transistors. H-parameter model. Miller principle.
Class hours/week: 2L,1T
Credits (ECTS): 4
Semester: Spring
Lecturer:

Course title: Electronics 2. IVB040ANVM
Language of instruction: English
Form of teaching: lecture, tutorial
Form of assessment: exam
Course description: This course provides basic knowledge and design principles of electronic circuits based on operational amplifiers. Advanced applications include analogue and switched capacitance active filters, linear and switching power supplies, analogue-digital and digital-analogue converters
Class hours/week: 2L,2T
Credits (ECTS): 4
Semester: Fall
Lecturer:

Course title: Electronics 3. IVB040ANVM
Language of instruction: English

Form of teaching: lecture
Form of assessment: exam
Course description: The aim of this course is to provide introduction to advanced analogue and front end digital electronic circuits. Introduction to fundamentals of power electronics. Characteristics, control circuits, cooling of power semiconductor devices. Architecture, operation principle, control solutions of inverters and frequency converters. Modeling of electronic noise. Active noise rejection methods. Clock signal preparation, jitter minimization, direct digital synthesizer (DDS) circuits. Modulators, demodulators, lock-in amplifiers. Radio communication measurements. Graphics displays.
Class hours/week: 2L
Credits (ECTS): 3
Semester: Spring
Lecturer:

Course title: Electrical Power Engineering 1. IVB459ANVM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: exam
Course description: The main aim of this course is to introduce students to the energy sources, energy generation, the types of power plants, electrical networks and consumers, the dimensioning of conductors, the over-voltage protection, the fundamentals of the electric safety. To provide students with the fundamental and high level basic knowledge essential for the work of elelctrical engineers. Nonrenewable and renewable primary and secondary energy sources. Electric energy generation, types and structures of power plants, electric networks and consumers. Structure and characteristics of the electric energy system. Power and data conductors and cables. Considerations and methods of dimensioning conductors. Over-current protection devices and their dimensioning. Fundamentals of the electric safety, dimensioning the protection against electric shock. Fundamentals of over-voltage protection.
Class hours/week: 2L, 1P
Credits (ECTS): 4
Semester: Fall
Lecturer:

Course title: Communication Engineering IVB001ANVM
Language of instruction: English
Form of teaching: lecture, tutorial
Form of assessment: semester mark
Course description: The main aim of this course is to introduce the fundamentals of communication engineering, the classification and characteristics of communication networks.Fundamentals of communication engineering. Classification and characteristics of communication networks. Line-, package- and cell-connected systems. Properties and application possibilities of data transfer media: coaxial cable, twisted wire pair, optical lead, wireless solutions. Concept, properties and production of analogue and digital signals. Concept and properties of analogue and digital signal transfer. Properties and application possibilities of modulation procedures: analogue and digital signal with sinusoidal or pulsed carrier.
Class hours/week: 2L, 1T
Credits (ECTS): 4
Semester: Fall
Lecturer:

Course title: Measurement Technology 1. IVB266ANVM
Language of instruction: English
Form of teaching: lecture, tutorial
Form of assessment: semester mark

Course description: The main objective is cognition, knowledge deepening and practice of electrical measurement technology. Synthetic review of operation principles of direct operation electromechanical, analogue and digital electronic instruments and oscilloscopes. Presentation of measurement methods and practice in laboratory environment. Measurement accuracy, error, error propagation. Complex measurements in single-phase and three-phase circuits.
Class hours/week: 2L, 2T
Credits (ECTS): 4
Semester: Fall
Lecturer:

Course title: Measurement Technology 2. IVB266ANVM
Language of instruction: English
Form of teaching: lecture, tutorial
Form of assessment: semester mark
Course description: The main aim of this course is to introduce the electrical measurement and the operational principles of electrical measurements. The objective is familiarization and practice of electrical measurement of non-electrical quantities based on the knowledge acquired at Measurement technology I. Therein the cognition of operation principles of sensors and structure of related electrical measurement and signal transfer circuits. Concerned areas within the frame of this subject are cognition and practice of electrical measurement of temperature, radiation and mechanical quantities in laboratory conditions.
Class hours/week: 1L, 2T
Credits (ECTS): 4
Semester: Spring
Lecturer:

Course title: Control Engineering 1. IVB197ANVM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: This course provides fundamentals of open loop control as well as an introduction to programmable logic controllers. At seminars students get acquainted with the design steps of open loop control system, principles and practice of PLC programming. Subdivisions of control engineering, open and closed loop control, disturbance compensation. Open loop control systems, combinational and sequentional logic circuits. Electromagnetic relays, relay logic, ladder diagrams. Semiconductor logic gates, flip-flops, delay circuits, signal conditioners, signal adapters. Programmable Logic Controllers, functions, architecture, cyclic operation principle, programming. Configuration of PLC systems.
Class hours/week: 1L, 2P
Credits (ECTS): 4
Semester: Spring
Lecturer:

Course title: Control Engineering 2. IVB197ANVM
Language of instruction: English
Form of teaching: lecture, practice
Form of assessment: semester mark
Course description: The aim of this course is to provide insight into fundamentals of closed loop control theory. Characteristic functions of systems theory in frequency and Laplace operator domain respectively. Nyquist and Bode plots. Steady state error, disturbance compensation. Stability criteria, gain and phase margin, controller tuning. Numerical simulation and design of control systems.
Class hours/week: 1L, 1P
Credits (ECTS): 4
Semester: Spring
Lecturer:

E. LANGUAGE COURSES

HUNGARIAN

Course title: Basic Hungarian I. SZE053AN
Language of instruction: English (Hungarian)
Form of teaching: seminar
Form of assessment: two tests
Course description: The course is designed for students with no previous knowledge of the Hungarian language. The aim of the course is to provide students with tools enabling them to successfully manage basic communicational situations in the Hungarian language environment. The main focus of the course is spoken communication. In additions to classroom tuition, some lessons are held on the campus or in the city so that students gain experience in using Hungarian in life-like situations.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall/Spring
Lecturer: JULIA TÖRÖK torokj@pmmik.pte.hu

Course title: Basic Hungarian II SZE054AN
Language of instruction: English
Form of teaching: Seminar
Form of assessment: Two tests
Course description: The course assumes a very basic knowledge of the Hungarian language. It is designed for students who have taken Basic Hungarian 1 or have spent a few months in Hungary and acquired some basic Hungarian vocabulary and communication skills. The aim of the course is to provide students with tools enabling them to successfully manage basic communicational situations in the Hungarian language environment. The main focus of the course is spoken communication. In additions to classroom tuition, some lessons are held on the campus or in the city so that students gain experience in using Hungarian in life-like situations.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall/Spring
Lecturer: Júlia TÖRÖK torokj@pmmik.pte.hu

GERMAN

Course title: Basics of Professional German SZEO049AN
Language of instruction: English
Form of teaching: practice
Form of assessment: two tests (semester mark)
Course description: The course is an introductory German course for students with no prior knowledge of the language. Based on a communicative and task-based approach, it is designed to develop proficiency in oral and written communication skills. Students will develop their listening, speaking, reading and writing skills through a variety of stimulating activities. Vocabulary will be presented in the context of professionally significant issues. Topics cover areas such as introducing and talking about oneself, telling time and recounting a day, family life, describing and renting an apartment, cities and countries, languages, making an appointment or giving directions.
Class hours/week: 4
Credits (ECTS): 3
Semester: Fall/Spring
Lecturer: Katalin TAMÁS tamaska@pmmik.pte.hu

Course title: Basics of Professional German II SZE048AN
Language of instruction: English
Form of teaching: practice
Form of assessment: two tests (semester mark)
Course description: The course is an introductory German course for students with elementary knowledge of the language. Based on a communicative and task-based approach, it is designed to develop proficiency in oral and written communication skills. Students will develop their listening, speaking, reading and writing skills through a variety of stimulating activities. Vocabulary will be presented in the context of professionally significant issues.
Topics cover areas such as introducing and talking about oneself, studies, the daily routine of a student, studying abroad, shopping, eating, going out, travelling, weather or health and fitness.
Additionally, the course will provide students with a foundation in a number of grammatical structures and concepts.
Class hours/week: 4
Credits (ECTS): 3
Semester: Fall/Spring
Lecturer: Katalin TAMÁS tamaska@pmmik.pte.hu

ENGLISH

Course title: English for Spoken Technical Communication PMEILNE501
Language of instruction: English
Form of teaching: Seminar
Form of assessment: semester mark
Course description: The course is designed for students with intermediate knowledge of English. The aim of the course is to develop spoken (receptive, interactive and productive) language proficiency in the context of engineering and technology with topics including energy resources, materials science, IT, telecommunications, environmental protection, architecture and construction. A selection of online resources, documentaries, videos and articles from the written media is discussed. Students will study and practise effective presentation skills and give a presentation on a chosen topic relevant to their particular fields of study.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall/ Spring
Lecturer: TÖRÖK Júlia, torokj@pmmik.pte.hu

Course title: English for Spoken Technical Communication II SZE019AN
Language of instruction: English
Form of teaching: Seminar
Form of assessment: Two presentations and one test
Course description: The course is designed for students with a higher intermediate knowledge of English. The aim of the course is to develop spoken (receptive, interactive and productive) language proficiency in the context of engineering and technology with topics including innovations and new technologies, IT and telecommunications, environmental protection, cities and urban planning, transport, materials science. A selection of resources, documentaries, videos and articles from the media is discussed. Students will give two presentations on chosen topics relevant to the course material and their interest and will also be required to evaluate the presentations of their peers.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall/ Spring
Lecturer: Andrea VARGA varga.andrea@pmmik.pte.hu

Course title: English for Written Technical Communication SZE020AN
Language of instruction: English
Form of teaching: Seminar
Form of assessment: semester mark
Course description: The course is designed for students with intermediate knowledge of English. The aim of the course is to develop written (receptive and productive) language proficiency in the context of engineering and technology with topics including energy resources, materials science, IT, telecommunications, environmental protection, architecture and construction. A selection of online resources, documentaries and articles from the written media is discussed. Students will improve their reading, writing vocabulary and grammar skills.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall/ Spring
Lecturer: Júlia TÖRÖK torokj@pmmik.pte.hu

Course title: English for Written Technical Communication II SZE015AN
Language of instruction: English
Form of teaching: Seminar
Form of assessment: Two tests
Course description: The course is designed for students with a higher-intermediate knowledge of English. The objective of the course is to develop written language skills in the context of different fields of engineering such as environmental and mechanical engineering, as well as architecture and construction. A selection of online resources and articles from the written media is discussed. Students will improve their reading, writing vocabulary and grammar skills.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall/Spring
Lecturer:

Course title: Introduction to English for Technical Studies I SZE020AN
Language of instruction: English
Form of teaching: practice
Form of assessment: two tests (semester mark)
Course description: The course is designed for students with an intermediate knowledge of English. The aim of the course is to introduce students of architecture, IT or other technical and engineering disciplines to the use of the conventions of academic English. The course develops reading and writing skills in a variety of academic registers as well listening and speaking skills through a range of authentic academic material within a university context.
Class hours/week: 4
Credits (ECTS): 3
Semester: Fall
Lecturer: Julia TÖRÖK torokj@pmmik.pte.hu

Course title: Introduction to English for Technical Studies II SZE022AN
Language of instruction: English
Form of teaching: practice
Form of assessment: two tests (semester mark)

Prerequisite: Introduction to English for Technical Studies I
Course description: The course is designed for students with an intermediate knowledge of English. The aim of the course is to introduce students of architecture, IT or other technical and engineering disciplines to the use of the conventions of academic English. The course develops reading and writing skills in a variety of academic registers as well listening and speaking skills through a range of authentic academic material within a university context.
Class hours/week: 4
Credits (ECTS): 3
Semester: Fall
Lecturer: Julia TÖRÖK torokj@pmmik.pte.hu

Course title: Introduction to English for Architecture and Civil Engineering SZE006AN
Language of instruction: English
Form of teaching: practice
Form of assessment: two tests (semester mark)
Course description: The course is designed for students with a lower-intermediate knowledge of English. The aim of the course is to improve students' career specific vocabulary and develop the four key language components: reading, listening, speaking and writing through realistic reading passages and dialogues, reading and listening comprehension tasks and guided speaking and writing exercises. Topics include parts of a building, shapes and structures, basic math, measurements and construction materials.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall
Lecturer: Julia TÖRÖK torokj@pmmik.pte.hu

Course title: **English for Architecture and Civil Engineering SZE002AN**
Language of instruction: English
Form of teaching: practice
Form of assessment: one tests and one presentation (semester mark)
Course description: The course is designed for students with an intermediate knowledge of English. The aim of the course is to develop spoken and written language proficiency in the context of architecture with topics including building materials and structures, traditional and modern housing, sustainable architecture, heritage conservation and urban design. A selection of resources, documentaries and articles is discussed. Students will study and practice effective presentation skills and give a presentation on an architectural and civil engineering project of their choice.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall/Spring
Lecturer: Julia TÖRÖK torokj@pmmik.pte.hu

Course title: English for Engineering and Building Services SZE001AN
Language of instruction: English
Form of teaching: seminar and practical based
Form of assessment: one test and one design task
Course description: English for Engineering and Building Services is not just for Mechanical and Building Services students, it is also useful for all students who aim to design energy efficient buildings. The course deals with the following, roles of building service engineers, environmental conservation during construction, energy

efficiency in buildings, introduction to thermodynamics, characteristics of materials, the design process, space and water heating, plumbing and sanitation, emerging technologies in buildings, energy audits, writing reports and giving quotes.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall/Spring
Lecturer: Marcus JUBY marcus@pmmik.pte.hu

Course title: English for Information Technology SZE004AN
Language of instruction: English
Form of teaching: Seminar
Form of assessment: Two tests and one presentation
Course description: The course is designed for students with an intermediate knowledge of English. The aim of the course is to develop spoken (receptive, interactive and productive) and written (receptive and productive) language proficiency in the context of information technology with topics including new technologies, software evaluation, the Internet and the World Wide Web, computer security and networks. A selection of online resources, documentaries, videos and articles from the media is discussed. Students will give a presentation on a chosen topic relevant to the course material and their interest and will also be required to evaluate the presentations of their peers. Students will improve their reading, writing vocabulary and grammar skills.
Class hours/week: 2
Credits (ECTS): 2
Semester: Fall/Spring
Lecturer: Andrea VARGA varga.andrea@pmmik.pte.hu