

STUDY GUIDE 2025/2026
UNIVERSITY OF PÉCS
FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY

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UNIVERSITY OF PÉCS
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COURSES OFFERED IN FOREIGN LANGUAGES

A. ARCHITECTURE (One Tier Master program)

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: 3

Credits (ECTS): 3

Semester: Fall

Lecturer: Dr. HALADA Miklós

Course title: Digital Architecture 2.EPE031ANEM

Language of instruction: English

Form of teaching: 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: 3

Credits (ECTS): 3

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: Réka Sárközi

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: Réka Sárközi

Course title: Mathematics 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; polynomials; rational-fractional functions; algebraic functions; sequences of real numbers (definition of monotonicity, 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): 4

Semester: Fall

Lecturer: Dr. PERJÉSNÉ Dr. Hámori Ildikó

Course title: Mathematics 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. PERJÉSNÉ 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: 3

Credits (ECTS): 5

Semester: Fall

Lecturer: Dr ORBÁN Zoltán

Course title: Strength of Materials / Mechanics MSE402ANEM

Language of instruction: English

Form of teaching: lecture

Form of assessment: exam

Course description: Students continue to learn the fundamentals of mechanics, compression and stressing of bar structures, which helps them with dimensioning basic structural components of construction and selecting

the most appropriate materials. To assist with this, students learn the rules of technical and building constructional representations and various structural systems.

In particular, students cover the following topics: stress and deformation, Hooke's Law, axial prestressing and compression of bar structures, pure shear, design of bolted joints, wooden joints, bending stress, perpendicular and oblique bending, shear stresses with simultaneous bending, eccentric stresses of materials with and without tension strength, issues of design and examination, EUROCODE's and Hungarian standards.

Class hours/week: 2

Credits (ECTS): 3

Semester: Spring

Lecturer: Dr ORBÁN Zoltán, JUHÁSZ Tamás

Course title: Lectures on Architecture I. EPM072ANEM

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: Lectures on Architecture 2. EPM073ANEM

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: Spring

Credits (ECTS): 2

Lecturer: Dr MOLNÁR Tamás

Course title: 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: 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: History of Architecture 2. 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 topics 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: Architectural theory EPE068ANEM

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: Spring

Lecturer: Prof. Dr. BACHMANN Bálint

Course title: Digital Presentation EPM032ANEM

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: 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: 3

Credits (ECTS): 3

Field of Sciences: architects, designers, urbanist
Semester: Spring
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: 3

Credits (ECTS): 3

Field of Sciences: architects, designers, urbanist

Semester: Fall

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: 3

Credits (ECTS): 3

Field of Sciences: architects, designers, urbanist

Semester: Spring

Lecturer: Dr. BACHMANN Erzsébet

Course title: Architectural Drawing 4. EPE348ANEM

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): 3

Semester: Fall

Lecturer: Dr NÉMETH Pál

Course title: Architectural Drawing 5. EPE351ANEM

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: 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: 4 P

Credits (ECTS): 6

Field of Sciences: architects, civil engineer, urbanistic

Semester: Fall

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): 6

Field of Sciences: architects, civil engineer, urbanistic

Semester: Spring

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: Fall

Lecturer: Dr ZOLTÁN Erzsébet

Course title: Building Constructions 4. EPE102ANEM

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: Spring

Lecturer: Dr ZOLTÁN Erzsébet

Course title: **Building Construction 5. EPE105ANEM**

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: Fall

Lecturer: Dr KISTELEGI István jr.

Course title: **Design Studio 1. EPE311ANEM**

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: semester mark

Course description: Through the introduction of common problems related to the design of buildings and the architectural environment, Basics of Architecture aims to help students approach the essence and inner structure of a building. Through examples of national and international contemporary architecture, students study the methodology of the design process as well as those important factors which determine the location, geometry, etc. of the future building. Students must be able to interpret certain architectural solutions and situations.

In the framework of getting prepared for design, students study operating buildings with similar functions and examples published in professional literature. On this basis they finalize their design project. In addition to their final drawing plans, they hand in their assignments at the end of the semester. Also assessed are the preliminary studies, the evaluation of different alternatives and the technical description of the concept together with the necessary sketches. The buildings are modelled as well.

Class hours/week: 1 L, 3 P

Credits (ECTS): 9

Field of Sciences: architects, civil engineer, urbanistic, designers

Semester: Fall

Lecturer: Dr ZOLTÁN ERZSÉBET

Course title: **Design Studio 2. EPE312ANEM**

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).

Class hours/week: 1 L, 4 P

Credits (ECTS): 6

Field of Sciences: architects, civil engineers, urban designers, designers

Semester: Spring

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: 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.

Class hours/week: 1+4

Credits (ECTS): 8

Semester: Fall

Lecturer: Dr MEDVEGY Gabriella

Course title: Design Studio 4. EPE314ANEM

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+4

Credits (ECTS): 8

Semester: Spring

Lecturer: Dr MEDVEGY Gabriella

Course title: Design Studio 5. EPE315ANEM

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: 1 + 4

Credits (ECTS): 8

Semester: Fall

Lecturer: Dr HUTTER Ákos

Course title: Design Studio 6. EPE316ANEM

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): 8

Semester: Spring

Lecturer: Dr HUTTER Ákos

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, 1 P

Credits (ECTS): 3

Semester: Fall

Lecturer: BALOGH Tamás

Course title: Architectural technology & construction management 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): 3

Field of Sciences: architects, civil engineers

Semester: Fall

Lecturer: DR FÜREDI BALÁZS

Course title: Architectural technology & construction management 2. MSE061ANEM

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): 3

Semester: Spring

Lecturer: Dr KONDOR Tamás

Course title: Architectural technology & construction management 3. MSE056ANEM

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: 1L, 2P

Credits (ECTS): 3

Semester: Fall

Lecturer: Dr. FÜREDI Balázs

Course title: Energy systems 1. MSE086ANEM

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): 3

Semester: Spring

Lecturer: Dr KISTELEGGI István

Course title: Introduction to urban planning EPE029ANEM

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+2

Credits (ECTS): 3

Field of Sciences: architects, urban designers, civil engineers

Semester: Spring

Lecturer: Dr GYERGYÁK JÁNOS

Course title: **Complex Design 1. EPM310ANEM**

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: 8

Credits (ECTS): 6

Field of Sciences: architects

Semester: Fall

Lecturer: Dr HUTTER Ákos

Course title: **Complex Design 2. EPM319ANEM**

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: 10

Credits (ECTS): 11

Field of Sciences: architects

Semester: Spring

Lecturer: Dr. HUTTER Ákos

Course title: **Complex Design 3. EPM320ANEM**

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: 10

Credits (ECTS):11

Field of Sciences: architects

Semester: fall

Lecturer: Dr. HUTTER Ákos

Course title: **Complex building constructions** EPM115ANEM

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+2

Credits (ECTS): 6

Field of Sciences: architects

Semester: fall

Lecturer: Dr. HUTTER Ákos

Course title: **Lectures on Interior Spaces** EPM026ANEM

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: 2

Field of Sciences: architects, industrial designers, designers

Semester: Spring

Credits (ECTS): 3

Lecturer: Dr BORSOS Ágnes

Course title: Lectures on urban landscape EPM0238ANEM

Language of instruction: English

Form of teaching: practice

Form of assessment: semester grade

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: 4

Credits (ECTS): 5

Semester: Spring

Lecturer: Dr GYERGYÁK János

Course title: Architecture of Pécs

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

Course title: Experimental Design Studio EPM228ANEM

Language of instruction: English

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:
Class hours/week: 2+2
Semester: Spring
Credits (ECTS): 5
Lecturer:

Course title: Lectures on Experimental Design EPM227ANEM
Language of instruction: English
Form of teaching: lecture
Grading: mid-Semester grade
Requirements: regular class attendance and participation in excursions
Form of assessment: study and a poster
Course description:
Class hours/week: 2
Semester: Spring
Credits (ECTS): 3
Lecturer:

Course title: Lectures on Public Buildings EPM0226ANEM
Language of instruction: English
Form of teaching: lecture
Grading: mid-Semester grade
Requirements: regular class attendance and participation in excursions
Form of assessment: study and a poster
Course description:
Class hours/week: 2
Semester: Spring
Credits (ECTS): 3
Lecturer:

Course title: Lectures on theory of architectural design 1. EPM070ANEM
Language of instruction: English
Form of teaching: lecture
Grading: Examination
Requirements: regular class attendance
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
Semester: Spring
Credits (ECTS): 3
Lecturer:

Course title: Lectures on theory of architectural design 2. EPM069ANEM available from 2021/2022 only!

Language of instruction: English

Form of teaching: lecture

Grading: Examination

Requirements: regular class attendance

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

Semester: Spring

Credits (ECTS): 3

Lecturer:

Course title: Lectures on ecodesign 1. EPM048ANEM

Language of instruction: English

Form of teaching: lecture

Grading: Examination

Requirements: regular class attendance

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

Semester: Spring

Credits (ECTS): 3

Lecturer: Prof. Dr. KISTELEGI István

B. CIVIL ENGINEERING BSC

Course title: Engineering Mathematics 1 MSB593ANEP

Language of instruction: English

Form of teaching: 2 lectures, 2 practices

Form of assessment: Semester mark

Course description: This lecture and practical based course aims to give students a solid mathematics basis through covering the following topics: sets of numbers (natural, integer, rational, real and complex numbers); vectors and operations with vectors, scalar and vector products and their applications; sets and operations with sets; matrix and determinant, solving linear equation systems definition of functions.

Class hours/week: 4

Credits (ECTS): 4

Semester: Fall 1st semester

Lecturer: Dr. Perjésiné Hámori Ildikó dr.

Course title: Materials Science MSB021ANEP

Language of instruction: English

Form of teaching: 2 lectures

Form of assessment: Semester mark

Course description: The course provides basic knowledge about the materials structure on different, macroscopic, mesoscopic and atomic levels, destructive and non-destructive methods of studying materials. The course topics starts from the smallest entities of the material, and builds up the macroscopic objects step by step, with emphasis on how the construction materials are composed. Several novel technologies and materials are also be studied.

Class hours/week: 2

Credits (ECTS): 2

Semester: Fall 1st semester

Lecturer: Dr. Len Adél

Course title: Enterprises and labour market MSB448ANEP

Language of instruction: English

Form of teaching: 2 lectures

Form of assessment: Examination grade

Course description: The purpose of the class is to introduce the adaptability of the connection between enterprises and engineering. The most important connections between engineering innovation and organizational management and integration within labour market. Challenges and opportunities related with the a fore mentioned topics. The course focuses on the role of companies and enterprises in economy.

Class hours/week: 2

Credits (ECTS): 3

Semester: Fall 1st semester

Lecturer: Dr. Füredi Balázs

Course title: Mechanics 1. (Statics) MSE256ANEP

Language of instruction: English

Form of teaching: 1 lecture, 3 practices

Form of assessment: Examination grade

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.

Class hours/week: 5

Credits (ECTS): 5

Semester: Fall 1st semester

Lecturer: Juhász Tamás

Course title: Fluid Mechanics in Engineering 1. MSB281ANEP

Language of instruction: English

Form of teaching: 2 lectures

Form of assessment: Examination grade

Course description: The aim of this course is to present the basic concepts of physics that students need to know for later courses and future careers. To emphasize that physics is a tool for understanding the real world. To teach transferable problem solving skills. Physics is the branch of science that describes matter, energy, space, and time in the most fundamental level. Physicists look patterns in the physical phenomena that occur in the universe. The goal is to find the most basic laws that govern the universe and to formulate those laws in the most precise way possible.

Class hours/week: 2

Credits (ECTS): 3

Semester: Fall 1st semester

Lecturer: Dr. Nyitray Gergely

Course title: Technical drawing 1. MSB276ANEP

Language of instruction: English

Form of teaching: 2 lectures, 2 practices

Form of assessment: Semester mark

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: 4

Credits (ECTS): 4

Semester: Fall 1st semester

Lecturer: Dr. Sárközi Réka

Course title: Building constructions 1. EPB024ANEP

Language of instruction: English

Form of teaching: 3 lectures, 2 practices

Form of assessment: Examination grade

Course description: The course consists of lectures and practices. During the lectures students are introduced to basic architectural design methods and presentation of this design in the form of basic technical drawings. The students learn the basic terms and types of these drawings. When an artificial space is designed it has to be protected against several environmental effects. Students get to know these effects and how we choose different kinds of building structures to create the needed protection. On the basis of the above mentioned the basic building structure systems are introduced to the students.

On the practical lessons students have to make different kinds of technical drawings about the topics introduced on the lectures. In the end they have to complete a simple architectural documentation of a traditional residential building.

Class hours/week: 1

Credits (ECTS): 7

Semester: Fall 1st semester

Lecturer: Dr. Kokas Balázs

Course title: Engineering mathematics 2. MSB594ANEP

Language of instruction: English

Form of teaching: 2 lectures, 2 practices

Form of assessment: Examination grade

Prerequisites: MSB593ANEP, Engineering Mathematics 1.

Course description: This lecture and practical based course aims to give students a solid mathematics basis through covering the following topics: sets of numbers (natural, integer, rational, real and complex numbers); vectors and operations with vectors, scalar and vector products and their applications; sets and operations with sets; matrix and determinant, solving linear equation systems definition of functions.

Class hours/week: 4

Credits (ECTS): 4

Semester: Spring 2nd semester

Lecturer: Dr. Perjésiné Hámori Ildikó, dr.

Course title: Strength of materials MSB011ANEP

Language of instruction: English

Form of teaching: 2 lectures, 4 practices

Form of assessment: Examination grade

Prerequisites: MSE256ANEP, Mechanics 1. (Statics)

Course description: Students continue to learn the fundamentals of mechanics, compression and stressing of bar structures, which helps them with dimensioning basic structural components of construction and selecting the most appropriate materials. To assist with this, students learn the rules of technical and building constructional representations and various structural systems.

In particular, students cover the following topics: stress and deformation, Hooke's Law, axial pre-stressing and compression of bar structures, pure shear, design of bolted joints, wooden joints, bending stress, perpendicular and oblique bending, shear stresses with simultaneous bending, eccentric stresses of materials with and without tension strength.

Class hours/week: 4

Credits (ECTS): 7

Semester: Spring 2nd semester

Lecturer: Dr. Fülöp Attila

Course title: Construction materials 1. MSB016ANEP

Language of instruction: English

Form of teaching: 2 lectures, 1 practice, 2 laboratory

Form of assessment: Examination grade

Course description: This is an introductory overview of the various materials used in construction industry. After an introduction into the history of building materials fundamental principles of structural, physical and long-term performance of materials are presented. Special emphasis is given in the course to concrete mix design and concrete technology.

Class hours/week: 5

Credits (ECTS): 5

Semester: Spring 2nd semester

Lecturer: Salem Ali Mohamed Mohamed

Course title: Geodesy MSB032ANEP

Language of instruction: English

Form of teaching: 2 lectures, 4 laboratory

Form of assessment: Semester mark

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.

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): 7
Semester: Spring 2nd semester
Lecturer: Aradi László

Course title: Basics of structural design MSB086ANEP

Language of instruction: English

Form of teaching: 1 lecture, 2 laboratory

Form of assessment: Semester mark

Course description: Structural design theory. Methodology of the engineering design. Structural, material and load modelling. Strength design, approximate and exact calculations. Summary of the structural mechanics. Statically determined and undetermined structures. EN 1990 (2002) (English): Eurocode - Basis of structural design. The Eurocode design code system. General assumptions, objectives, major concepts. Basic knowledges of the probabilistic design. Probability variables, main values, variance, quantile, etc. Limit state design concept, design situations, actions, combination of actions, verification of limit states. Actions on structures - General actions - Densities, self-weight, imposed loads for buildings. Actions on structures - General actions - Snow loads. Actions on structures - General actions - Wind actions. Actions on structures - Traffic loads on bridges. Actions on structures - Actions induced by cranes and machinery.

Class hours/week: 2

Credits (ECTS): 5

Semester: Spring 2nd semester

Lecturer: Dr. Fülöp Attila

Course title: Technical drawing 2. MSB277ANEP

Language of instruction: English

Form of teaching: 2 practices

Form of assessment: Semester mark

Prerequisites: MSB276ANEP, Technical Drawing 1.

Course description: Studying of the 2D functions of AutoCAD with the help of machines drawings examples.

Topics: Basic functions of AutoCAD (drawing, annotation, paper space, printing).

Class hours/week: 2

Credits (ECTS): 2

Semester: Spring 2nd semester

Lecturer: Etlinger József

Course title: Engineering mathematics 3. MSB595ANEP

Language of instruction: English

Form of teaching: 2 lectures, 2 practices

Form of assessment: Examination grade

Prerequisites: MSB594ANEP, Engineering Mathematics 2.

Course description: This lecture and laboratory work based course aims to give engineering students a solid mathematics basis through covering the following topics:

- Elements of ordinary differential equations: classification, types of solutions, analytical solution of first order, separable and linear differential equations, solution of second order incomplete and linear with constant coefficients ODEs,
- Elements of probability: Classical probability: random events, experiments, sample space, computing probability with combinatorial, geometrical methods, conditional probability and independence, Bayes' theorem and the law of total probability, Random variables: discrete and continuous random variables, transformations of random variables, expectation and variance and their properties, Markov's, Chebishev's inequality, law of large numbers, central limit theorem, joint and marginal random variables, independence, covariance, correlation,
- Elements of statistics: o elements of descriptive statistics, commonly used quantities inferential statistics: point estimation of mean and variance, interval estimation: confidence interval for the mean in case of normal

populations, statistical tests of samples, hypothesis and its alternative(s), errors, linear regression and correlation, goodness of regression by chi-square test.

Class hours/week: 3

Credits (ECTS): 4

Semester: Fall 3rd semester

Lecturer: Dr. Perjésiné Hámori Ildikó

Course title: Fluid Mechanics in Engineering 2. MSB283ANEP

Language of instruction: English

Form of teaching: 1 lecture, 1 practice

Form of assessment: Examination grade

Prerequisites: MSB281ANEP, Fluid Mechanics in Engineering 1.

Course description: 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).

Class hours/week: 2

Credits (ECTS): 2

Semester: Fall 3rd semester

Lecturer: Dr. Pál-Schreiner Judit

Course title: Fluid Mechanics in Engineering 3. MSB285ANEP

Language of instruction: English

Form of teaching: 1 lecture, 1 practice

Form of assessment: Examination grade

Prerequisites: MSB281ANEP, Fluid Mechanics in Engineering 1.

Course description: 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

Credits (ECTS): 2

Semester: Fall 3rd semester

Lecturer: Dr. Pál-Schreiner Judit

Course title: Structural analysis MSB112ANEP

Language of instruction: English

Form of teaching: 2 lectures, 1 practice

Form of assessment: Examination grade

Prerequisites: MSB110ANEP, Strength of Materials

Course description: This course aims to provide basic and advanced knowledge on the principles of the calculations of statically indeterminate plane structures. Topics covered by the course include the manual solution of statically indeterminate plane structures by the force method for frames, trusses and continuous beams. The manual solution of statically indeterminate plane structures by the displacement method for frames, trusses and continuous beams. The moment distribution (Cross) method. Determination of maximal internal forces of cross-sections. Force influence lines of statically determinate structures. 3D cases.

The aim of the course in addition is to introduce the necessary basics and relationships for mastering the subject group and to provide general knowledge for the recognition and analysis of load-bearing forces in load-bearing structures. Further aim is to provide a solid basic knowledge for further technical education

During the course, students become acquainted with the behavior of statically determinate and indeterminate planar structures with a moving vehicle load. They master the process of producing maximum stress diagrams for distributed and concentrated load.

Class hours/week: 4

Credits (ECTS): 4

Semester: Fall 3rd semester

Lecturer: Dr. Pomezanski Vanda

Course title: Geographic information systems MSB117ANEP

Language of instruction: English

Form of teaching: 1 lecture, 3 laboratory

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.

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: 2

Credits (ECTS): 5

Semester: Fall 3rd semester

Lecturer: Aradi László

Course title: Geodesy field practice MSB033ANEP

Language of instruction: English

Form of teaching: 3 laboratory

Form of assessment: Semester mark

Prerequisites: MSB032ANEP, Geodesy

Course description: The purpose of the course is to introduce the students to the methodology of techniques and technologies for geodetic measurements, geospatial data acquisition methods, data processing and analysis technique. The measurements will be carried out in field settings or on real structures.

Class hours/week: 3

Credits (ECTS): 5

Semester: Fall 3rd semester

Lecturer: Aradi László

Course title: Soil Mechanics and Earthworks MSB111ANEP

Language of instruction: English

Form of teaching: 2 lectures, 2 practices, 1 laboratory

Form of assessment: Examination grade

Prerequisites: MSB110ANEP Strength of Materials

Course description: This is an introductory course on the basic and various aspects of soil mechanics. Topics covered by the course include: soil site explorations, Soil classification, Soil consistency, soil compaction, stresses in soil, consolidation, permeability, and shear strength of soil. This is in addition an introductory course on the basic and advanced knowledge on the principles of lateral earth pressure, retaining walls, sheet-pile walls, cantilever sheet-pile walls, anchored sheet-pile walls, braced-excavation, reinforced earth, retaining walls with metallic strip reinforcement, retaining walls

Class hours/week: 3

Credits (ECTS): 6

Semester: Fall 3rd semester

Lecturer: Salem Ali Mohamed Mohamed

Course title: Technical drawing 3/A MSB278ANEP

Language of instruction: English

Form of teaching: 2 practices

Form of assessment: Semester mark

Prerequisites: MSB277ANEP, Technical Drawing 2.

Course description: After to study the basic working rules of the AutoCAD software, the students will get more information about a special software for civil engineers.

Class hours/week: 2

Credits (ECTS): 2

Semester: Fall 3rd semester

Lecturer: Etlinger József

Course title: Mechanics 2. (Dynamics) MSB078ANEP

Language of instruction: English

Form of teaching: 2 lectures, 2 practices

Form of assessment: Semester mark

Prerequisites: MSB594ANEP, Engineering Mathematics 2.

Course description: Introduction into the fundamentals of the dynamics - kinematics and kinetics of a particle and of the rigid body, mechanical vibrations.

The aim of the course is to introduce the students into the following themes: Kinematics and kinetics of a particle. Constrained motion. Kinematics and kinetics of rigid bodies. Mass moments of inertia. Work and power theorems. Kinetic energy. Central and eccentric impact. Analysis of the free and forced vibrations with and without damping.

Class hours/week: 3

Credits (ECTS): 4

Semester: Spring 4th semester

Lecturer: Dr. Len Adél

Course title: Road construction MSB141ANEP

Language of instruction: English

Form of teaching: 2 lectures, 2 practices

Form of assessment: Examination grade

Prerequisites: MSB111ANEP Soil Mechanics and Earthworks

Course description: Historical development of road transport. Characteristics of the Hungarian road network, classification of roads. Forces affecting vehicles, movements of vehicles on straight sections, curves and on slopes. Resistances, sight distances, super elevation and geometry of transition curves. Analysis of road traffic: capacity and levels of service. Phasing of horizontal and vertical alignment, design limit values, drainage. Plotting, longitudinal section, cross-section. Junctions and intersections. Road signs, traffic signals. Analysis of road accidents. Environmental issues in design and construction. Pavement structural layers, materials of earthworks and pavement layers, their qualification characteristics. Design of flexible and rigid pavements. Construction technology of road bases, intermediate and wearing courses (materials, machinery of production and construction). Quality control, laboratory testing. Maintenance of roads, elements of pavement management systems. The Trans-European road network (TEN-T) of the European Union.

Class hours/week: 3

Credits (ECTS): 5

Semester: Spring 4th semester

Lecturer: Dr. Gulyás András

Course title: Hydrology MSB047ANEP

Language of instruction: English

Form of teaching: 1 lecture, 1 practice, 1 laboratory

Form of assessment: Semester mark

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.

Class hours/week:

Credits (ECTS): 4

Semester: Spring 4th semester

Lecturer: Dr. Pál-Schreiner Judit

Course title: Construction technology 1. MSB013ANEP

Language of instruction: English

Form of teaching: 2 lectures, 2 practices

Form of assessment: Examination grade

Prerequisites: MSB024ANEP, Building Constructions 1.

Course description: During their studies, the students acquire the technology of finishing construction processes. The main topics of the lectures are: making of ceilings, the machines of concreting works, plastering, dry construction systems, wall and floor tiling. The main topics of the practices: special earthworks, waterproofing, heating insulation, placing of cranes, site planning, site visit. During the completion of the semester task, students have to make a technology plan.

Class hours/week: 2

Credits (ECTS): 4

Semester: Spring 4th semester

Lecturer: Dr. Füredi Balázs

Course title: Building Constructions 2. MSB025ANEP

Language of instruction: English

Form of teaching: 3 lectures, 1 practice

Form of assessment: Semester mark

Prerequisites: MSB109ANEP, Building Constructions 1.

Course description: This subject intends to teach the following topics: requirements of building constructions; history of wall structures; walls built from solid bricks and stone, general rules of brick bounds; modern masonry materials, ceramic blocks, partition walls; lintels and openings of load-bearing wall structures; brick and stone arches, reinforced concrete joists; requirements and planning aspects of stairs, interior stairs, structural solutions for curved 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.

Class hours/week: 2

Credits (ECTS): 5

Semester: Spring 4th semester

Lecturer: Dr. Halada Miklós

Course title: Environment Protection for Engineers MSB020ANEP

Language of instruction: English

Form of teaching: 2 lectures

Form of assessment: Semester mark

Course description: Short history of the environmental protection (EP). Concepts and fields of the EP. The regulation and the institution of the EP in Hungary. The process of pollution. The elements of the environment, its characteristics and pollution data. New fields in the EP. Global problems. Suggested solutions. Renewable energy sources.

Class hours/week: 2

Credits (ECTS): 2

Semester: Fall 5th semester

Lecturer: Dr. Pécz Tibor

Course title: **Mechanics 2. (Dynamics)** MSB078ANEP

Language of instruction: English

Form of teaching: 1 lecture, 2 practices

Form of assessment: Examination grade

Course description: Introduction into the fundamentals of the dynamics - kinematics and kinetics of a particle and of the rigid body, mechanical vibrations.

The aim of the course is to introduce the students into the following themes: Kinematics and kinetics of a particle. Constrained motion. Kinematics and kinetics of rigid bodies. Mass moments of inertia. Work and power theorems. Kinetic energy. Central and eccentric impact. Analysis of the free and forced vibrations with and without damping.

Class hours/week: 3

Credits (ECTS): 4

Semester: Spring 4th semester

Lecturer: Dr. Len Adél

Course title: **Public utilities** MSB418ANEP

Language of instruction: English

Form of teaching: 2 lectures

Form of assessment: Examination grade

Prerequisites: MSB429ANEP, Hydrology, MSB285ANEP, Fluid Mechanics in Engineering 3.

Course description: Basics of public utilities systems. Water management infrastructure (Drinking water supply, including the system of pipes, storage reservoirs, pumps, valves, filtration and treatment equipment and meters, including buildings and structures to house the equipment, used for the collection, treatment and distribution of drinking water; Sewage collection, and disposal of waste water; Drainage systems storm sewers, ditches, etc.); Energy infrastructure (Electrical power network, electrical grid, substations, and local distribution; Natural gas pipelines, storage and distribution terminals, as well as the local distribution network; Steam or hot water production and distribution networks for district heating system).

Class hours/week: 3

Credits (ECTS): 2

Semester: Fall 5th semester

Lecturer: Dr. Pál-Schreiner Judit

Course title: **Steel structures** MSB002ANEP

Language of instruction: English

Form of teaching: 2 lectures, 2 practices

Form of assessment: Examination grade

Prerequisites: MSB380ANEP, Steel Structures 2.

Course description: The goal of the semester is that the students should learn the conventional steel structures, and should be able to solve the design of the execution drawings independently.

This subject aims to provide a theoretical and practical knowledge necessary for the design, production and mounting of steel buildings used in engineering and includes the following topics: Steel buildings: Structural systems and load-bearing systems of simple steel buildings. Secondary load-bearing systems of simple steel buildings. Roofing, steel walls, sheeting, basics of strength design. Detailed elastic and plastic design of the main load-bearing structural elements: beam, columns, frames. Structural connections of the main frames': beam-to-beam, beam-to-column and column-base connections (according to Eurocode 3 part 1-8). Structural solutions of bracings, sections, connections and design. Cranes in steel buildings. Multi-storey steel buildings: Static models, structural details, steel-concrete composite structural solutions. Design process and theories at multi-storey buildings. Bracing solutions. Dimensioning of bracings' elements, structural connections (welded, bolted), coverings and slab systems. Special design solutions of steel truss systems (arrangement, sections, joint solutions, analysis and strength design. Cable structures: Structural solutions, applied sections, topology, theory of design. Bracings, coverings, assembly techniques. Theoretical basis of the design of welded, class 4 cross-sectioned structural elements.

Class hours/week: 4

Credits (ECTS): 4

Semester: Fall 5th semester
Lecturer: Dr. Fülöp Attila

Course title: Reinforced concrete structures MSB165ANEP

Language of instruction: English

Form of teaching: 1 lecture, 2 practices

Form of assessment: Examination grade

Prerequisites: MSB383ANEP, Reinforced Concrete Structures 2.

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: 3

Credits (ECTS): 4

Semester: Fall 5th semester

Lecturer: Juhász Tamás

Course title: Road construction MSB141ANEP

Language of instruction: English

Form of teaching: 2 lectures, 1 practice

Form of assessment: Examination grade

Course description: Historical development of road transport. Characteristics of the Hungarian road network, classification of roads. Forces affecting vehicles, movements of vehicles on straight sections, curves and on slopes. Resistances, sight distances, super elevation and geometry of transition curves. Analysis of road traffic: capacity and levels of service. Phasing of horizontal and vertical alignment, design limit values, drainage. Plotting, longitudinal section, cross-section. Junctions and intersections. Road signs, traffic signals. Analysis of road accidents. Environmental issues in design and construction. Pavement structural layers, materials of earthworks and pavement layers, their qualification characteristics. Design of flexible and rigid pavements. Construction technology of road bases, intermediate and wearing courses (materials, machinery of production and construction). Quality control, laboratory testing. Maintenance of roads, elements of pavement management systems. The Trans-European road network (TEN-T) of the European Union.

Class hours/week: 3

Credits (ECTS): 5

Semester: Fall 4th semester

Lecturer: Dr. Gulyás András

Course title: Infrastructure Engineering Structures MSB006ANEP

Language of instruction: English

Form of teaching: 3 lectures

Form of assessment: Semester mark

Prerequisites: EPB104ANEP, Building Constructions 4.

Course description: The primary intention of this subject is to teach students the following theoretical topics: prefabricated skeleton structures, reinforced concrete building systems (BVM-TIP and UNIVÁZ), pillar-framed buildings, hot rolled steel, cold formed steel and wooden structures. Students will learn about doors, windows, interior doors and skylights, layered facade structures, different type of wall cladding materials like brick, stone, metal, fibre cement and resin bonded wall covering panels. Students will be introduced to the principles of making suspended ceilings. The topics listed above serve as a basic theoretical knowledge for students and are complimented by practical drawing sessions where students work through the design of a prefabricated reinforced concrete multi-storey residential building.

Class hours/week: 3
Credits (ECTS): 3
Semester: Fall 5th semester
Lecturer: Dr. Perényi László

Course title: Foundation (Earthworks) MSB004ANEP

Language of instruction: English
Form of teaching: 1 lecture, 1 practice
Form of assessment: Semester mark

Prerequisites: MSB135ANEP, Geotechnics 1. (Soil Mechanics)

Course description: This is an introductory course on the basic and advanced knowledge on the principles of lateral earth pressure, retaining walls, sheet-pile walls, cantilever sheet-pile walls, anchored sheet-pile walls, braced-excavation, reinforced earth, retaining walls with metallic strip reinforcement, retaining walls

Class hours/week: 2

Credits (ECTS): 2

Semester: Spring 6th semester

Lecturer: Salem Ali Mohamed Mohamed

Course title: Water resource management MSB430ANEP

Language of instruction: English
Form of teaching: 2 lectures
Form of assessment: Examination grade

Prerequisites: MSB429ANEP, Hydrology, MSB285ANEP, Fluid Mechanics in Engineering 3.

Course description: This course exposes students to an expansive suite of topics and methods within the field of Hydraulic Engineering. 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.

Class hours/week: 2

Credits (ECTS): 2

Semester: Spring 6th semester

Lecturer: Dr. Pál-Schreiner Judit

Course title: Steel- composite structures MSB001ANEP

Language of instruction: English
Form of teaching: 1 lecture, 1 practice
Form of assessment: Semester mark

Prerequisites: MSB380ANEP, Steel Structures 2., MSB383ANEP, Reinforced Concrete Structures 2.

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 overview. 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 typical 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

Credits (ECTS): 2

Semester: Spring 6th semester

Lecturer: Dormány András

Course title: Railway construction MSB418ANEP

Language of instruction: English

Form of teaching: 2 lectures, 1 practice

Form of assessment: Examination grade

Course description: Evolution of railway transport, its principles. Structure of the railway network (lines, stations, auxiliary tracks). Characteristics of the Hungarian railway network. Elements of railway substructure and superstructure. Rails, sleepers, rail-fixing, rail-joints. Structure and geometry of rail connections (turnouts and crossovers). Horizontal and vertical alignment of railways, tracing and lining of curves. Tracks of long rails and continuous welded rails. Railway earthworks, ballast and protecting layers in substructure. Dynamics of railway transport, load bearing capacity of railway tracks, design of superstructure. Technology of manual and mechanical rail laying. Stations and rail traffic management systems, safety issues. Maintenance of railway tracks. Quality of railway services. Urban, high-speed and special railways. Co-operation of railway networks in the European Union.

Class hours/week: 3

Credits (ECTS): 4

Semester: Spring 6th semester

Lecturer: Dr. Gulyás András

Course title: Strengthening of structures MSB392ANEP

Language of instruction: English

Form of teaching: 2 lectures, 1 practice

Form of assessment: Semester mark

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

Class hours/week: 3

Credits (ECTS): 3

Semester: Fall 7th semester

Lecturer: Dr. Orbán Zoltán

Course title: Underground structures MSB384ANEP

Language of instruction: English

Form of teaching: 2 lectures, 1 practice

Form of assessment: Semester mark

Prerequisites: MSB136ANEP, Geotechnics 2. (Earthworks)

Course description: This is an introductory course on the basic and advanced knowledge of underground space and underground construction technologies, including planning, construction methods, safety, and environmental considerations. This course is designed to teach students geotechnical issues related to tunnelling and underground construction, particularly in urban areas. The fundamentals of tunnel design and the most common methodologies for tunnel construction are presented with the aid of documented case histories. Teaching students different methods of soil improvement, Site Dewatering, and supported deep excavation.

Class hours/week: 3

Credits (ECTS): 3

Semester: Fall 7th semester

Lecturer: Salem Ali Mohamed Mohamed

Course title: Geotechnics 3. (Foundations) MSB137ANEP

Language of instruction: English

Form of teaching: 2 lectures, 2 practices

Form of assessment: Examination grade

Prerequisites: MSB136ANEP, Geotechnics 2. (Earthworks)

Course description: This is an introductory course on the basic and advanced knowledge on the principles and design of the different type of foundation. Topics covered by the course include: soil site explorations, bearing capacity of soil, shallow foundations, deep foundations, pile caps, soil improvement, Site Dewatering and supported deep excavation.

Class hours/week: 4

Credits (ECTS): 4

Semester: Fall 7th semester

Lecturer: Salem Ali Mohamed Mohamed

Course title: Structural dynamics 1. MSB387ANEP

Language of instruction: English

Form of teaching: 2 lectures

Form of assessment: Examination grade

Prerequisites: MSB257ANEP, Mechanics 2. (Dynamics), MSB386ANEP, Structural Analysis 3.

Course description: The aim of the course is to present the basics of vibrations of mechanical structures in civil engineering: elements of vibrating mechanical models (mass, stiffness, rigid and elastic elements); to introduce the students into the analysis of the vibration of one, two or more degrees of freedom mechanical systems, into the modelling of these systems and into the study of the response of mechanical structures to dynamic loads.

Class hours/week: 2

Credits (ECTS): 2

Semester: Fall 7th semester

Lecturer: Dr. Pomezanski Vanda

Course title: Engineering timber structures EPB393ANEP

Language of instruction: English

Form of teaching: 1 lecture, 1 practice

Form of assessment: Examination grade

Prerequisites: MSB397ANEP, Timber and Masonry Structures

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 7th semester

Lecturer: Dr. Orbán Zoltán

Course title: Hydraulic engineering MSB432ANEP

Language of instruction: English

Form of teaching: 1 lecture, 2 practices

Form of assessment: Examination grade

Prerequisites: MSB429ANEP, Hydrology, MSB285ANEP, Fluid Mechanics in Engineering 3.

Course description: This course exposes students to an expansive suite of topics and methods within the field of Hydraulic Engineering. 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.

Class hours/week: 3

Credits (ECTS): 5

Semester: Fall 7th semester

Lecturer: Dr. Pál-Schreiner Judit

Course title: Complex design 1. MSB388ANEP

Language of instruction: English

Form of teaching: 2 practices

Form of assessment: Semester mark

Prerequisites: MSB390ANEP, Steel Structures 3., MSB394ANEP, Reinforced Concrete Structures 3.

Course description: The course is aimed to summarize and unify competences, skills and abilities the students gained all through their previous studies of 6 semesters in structural and architectural design. Upon completion of this course the student should be able to create complex reconstruction plans for existing building structures implying inter alia existing condition survey reports, structural strengthening design proposals. The course develops an ability to function effectively as a member as well as a leader on technical teams.

Class hours/week: 2

Credits (ECTS): 2

Semester: Fall 7th semester

Lecturer: Juhász Tamás

Course title: Road pavement and railway track structures MSB233ANEP

Language of instruction: English

Form of teaching: 2 lectures

Form of assessment: Semester mark

Prerequisites: MSB231ANEP, Road and Railway Design 1., MSB232ANEP, Road and Railway Design 2.

Course description: Types, composition and functions of road pavement structures, their climatic and traffic loading, deterioration features. Theoretical and practical pavement structure design methods, analytic road pavement structure design. Road pavement structural design software. Design of the strengthening of existing road pavement structures. Earthworks for road pavement structures. Characterisation of the condition of existing road structures. New structure design. Strengthening of the asphalt pavement. Base layers, pavement bases. Asphalt mixes for road construction. Analysis of asphalt mixes. Asphalt and concrete pavements, and their maintenance tasks. Stone pavements, the idea of preventive maintenance, surface dressings, recycling and re-use innovative technologies. The dynamics of the railways. The elements of the superstructure: rail, sleeper, fastenings, ballast. The strengthening of the structure by protection layer. Level crossings, and extraordinary types of superstructures. The structural design of turnouts. The structure of the welded tracks. Superstructures of high speed railways.

Class hours/week: 2

Credits (ECTS): 3

Semester: Fall 7th semester

Lecturer: Dr. Gulyás András

Course title: Road and Railway Field Practice MSB234ANEP

Language of instruction: English

Form of teaching: 1 laboratory

Form of assessment: Semester mark

Prerequisites: MSB231ANEP, Road and Railway Design 1., MSB232ANEP, Road and Railway Design 2.

Course description:

Class hours/week: 1

Credits (ECTS): 1

Semester: Fall 7th semester

Lecturer:

Course title: Computer aided structural design 2. (Tekla) MSB375ANEP

Language of instruction: English

Form of teaching: 2 laboratory

Form of assessment: Semester mark

Prerequisites: MSB374ANEP, Computer Aided Structural Design 1. (Tekla)

Course description: Preparing the students for using the common softwares in Hungary and Europe during the structural design tasks, the logical structural thinking and possibilities in the design.

The course will be in assistant with the using of Tekla Structures, as it was used in the Structural Design Softwares 1. in the prior semester, where was the drawing of steel parts and assemblies and reinforced concrete structures and applications.

Structural Design Softwares 2. starts from that material and further develops the knowledge of the students by presenting and applying softwares that can be effectively applied in parametric design.

An insight into the use of Rhino 6 and its plug-in's will be provided, Grasshopper which is able to work closely with some of the target design softwares including FEM and detailing softwares.

Other topics are also included such as Tekla Structures in connection with ConSteel and Rhino and IDEA Statica.

Class hours/week: 2

Credits (ECTS): 2

Semester: Fall 7th semester

Lecturer: Juhász Tamás

Course title: Computer aided structural design 4. (Nemetschek) MSB377ANEP

Language of instruction: English

Form of teaching: 2 laboratory

Form of assessment: Semester mark

Prerequisites: MSB376ANEP, Computer Aided Structural Design 3. (Nemetschek)

Course description: In this practical based course students will learn advanced modelling methods in Nemetschek Allplan software. The first big half of the course is about how to create own standards within the software to improve the design process to a large extent. The students will get detailed knowledge about how to create own layers/lines/patterns, a unique reinforcement/ strand/welded mesh and the programming of automatically updated lists/texts combining it with Allplans "Assistants". The other half of the course is about free 3D modelling methods which is most commonly used in precast elements in the civil engineering firm. From the completed model a detailed design documentation shall be made that includes formwork, reinforcement and cast-in fixture plans. In this way the student will learn another part of Allplans modules and can feel the efficiency of the standards by comparing the work dynamic to the previous course.

Class hours/week: 2

Credits (ECTS): 2

Semester: Fall 7th semester

Lecturer: Juhász Tamás

Course title: Complex design 2. MSB389ANEP

Language of instruction: English

Form of teaching: 2 lectures

Form of assessment: Semester mark

Prerequisites: MSB388ANEP, Complex Design 1.

Course description: The course is aimed to summarize and unify competences, skills and abilities the students gained all through their previous studies of 7 semesters in structural and architectural design. Upon completion of this course the student should be able to create complex reconstruction plans for existing building structures implying inter alia existing condition survey reports, structural strengthening design proposals. The course develops an ability to function effectively as a member as well as a leader on technical teams.

Class hours/week: 2

Credits (ECTS): 2

Semester: Spring 8th semester

Lecturer: Juhász Tamás

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): 5

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): 4

Semester: Fall

Lecturer: Dr ORBÁN Ferenc

Course title: **Construction Materials 2.** 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

Credits (ECTS): 3

Semester:Spring

Lecturer:Dr SZŰCS István

Course title: **Soil Structure Interaction** 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: 3

Credits (ECTS): 3

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

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 SZÚCS 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): 2

Semester: Spring

Lecturer: Dr SZÚCS 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 SZÚCS István

Course title: Seismic Design MSM414ANEP

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: Spring

Lecturer:Dr KATONA Tamás

C. COMPUTER SCIENCE ENGINEERING BSC

Course title: Introduction to University Life IVB015ANMI

Language of instruction: English

Form of teaching: lecture

Form of assessment: exam

Course description: The subject introduces the students to the new education system for them, the university system. In addition, it tries to provide assistance in all areas of learning and orientation.

Class hours/week: 1

Credits (ECTS): 2

Semester:Fall

Lecturer: Dr Péter Iványi

Course title: Engineering Physics 1. IVB049ANMI

Language of instruction: English

Form of teaching: lecture

Form of assessment: exam

Course description: The aim of this course is to present the basic concepts of physics that students need to know for later courses and future careers. To emphasize that physics is a tool for understanding the real world. To teach transferable problem solving skills. Classical Mechanics deals with bodies at rest and in motion and the conditions of rest and motions when bodies are under the influence of forces.

Class hours/week: 2+2

Credits (ECTS): 2

Semester:Fall

Lecturer: Dr Gergely Nyitray

Course title: Engineering Physics 2. IVB050ANMI

Language of instruction: English

Form of teaching: lecture

Form of assessment: exam

Course description: The aim of this course is to present the basic concepts of physics that students need to know for later courses and future careers. To emphasize that physics is a tool for understanding the real world. To teach transferable problem solving skills. Classical Mechanics deals with bodies at rest and in motion and the conditions of rest and motions when bodies are under the influence of forces. The topics are as follows: Kinematics, Newton's Laws, Forces, Work-Energy Theorem, Constants of motion (Energy, Linear Momentum, Angular Momentum), Multi-particle Dynamics, Rotational Dynamics, Oscillatory Motion, Lagrangian Formalism. Classical Thermodynamics is the description of the states of Thermodynamic Systems at near-equilibrium, that uses macroscopic, measurable properties. It is used to model exchanges of Energy, Work and Heat based on the Laws of Thermodynamics. Transport Processes concerns the exchange of Mass, Energy, Charge, Momentum and Angular Momentum between observed systems. Examples of transport processes include Heat Conduction, Fluid Flow, Molecular Diffusion and Electromagnetic Radiation.

Class hours/week: 2+2

Credits (ECTS): 2

Semester:Fall

Lecturer: Dr Gergely Nyitray

Course title: Algorithm Design IVB052ANMI

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): 2

Semester:Fall

Lecturer: Dr SZABÓ Levente

Course title: Engineering Mathematics 1. MSB593ANMI

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; polynomials; rational-fractional functions; algebraic functions; sequences of real numbers (definition of monotonicity, boundedness, 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): 4

Semester:Fall

Lecturer: Dr Perjésiné Dr HÁMORI Ildikó

Course title: Engineering Mathematics 2. MSB594ANMI

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 P_0 , Taylor-polynomials, integration with replacements, partial integration, special integrals, geometric and engineering applications of definite integrals, improper 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): 4

Semester: Spring

Lecturer: Dr Perjésiné Dr HÁMORI Ildikó

Course title: Foundations of Informatics 1. IVB183ANMI

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description:

Class hours/week: 1+2

Credits (ECTS): 3

Semester: Fall

Lecturer: Dr Ildikó HORVÁTH

Course title: Foundations of Informatics 2. IVB184ANMI

Language of instruction: English

Form of teaching: lecture, practice

Form of assessment: exam

Course description: The Foundations of Informatics 2 Course is mainly laboratory work helped with presentations live by the lecturer using the AutoCAD program. The application of this generally usable technical program provide an example about the CAD programs. It helps to study their structure and to learn their practical use.

Class hours/week: 2+2

Credits (ECTS): 3

Semester: Spring

Lecturer: Dr Ildikó HORVÁTH

Course title: Introduction to Computing Science IVB014ANMI

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): 4

Semester: Spring

Lecturer: Dr KLINCSIK Mihály

Course title: IP Based Systems 1. IVB026ANMI

Language of instruction: English

Form of teaching: lecture, lab

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 Zsolt ERCSEY

Course title: Software Engineering IVB064ANMI

Language of instruction: English

Form of teaching: lecture, lab

Form of assessment: exam

Course description: Students learn methods used in large scale software development projects, emphasizing requirements analysis, design, implementation, and testing. The course introduces the engineering of complex software systems. The focus is on software engineering principles and the methods and tools that support the principles. Particular attention will be paid to object-oriented development techniques. Students will apply the methods in a series of assignments. Moreover, through group project, students can obtain hands-on experiences on entire phases and workflow of the software process. It is also expected that students will participate in a formal presentation of their team project.

Class hours/week: 2

Credits (ECTS): 2

Semester: Fall

Lecturer: Dr Etelka Szendrői

Course title: System Theory IVB058ANMI

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): 6

Semester: Fall

Lecturer: Dr SÁRI Zoltán

Course title: **Computer Architectures** IVB062ANMI

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 peripherals 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, peripherals. Microcontroller, microprocessor, micro computer, CISC, RISC. Development of computers. Memory types, buses. Microarchitecture, IJVM, Mic-2, Mic-3, Instruction sets.

Class hours/week: 3

Credits (ECTS): 3

Semester: Fall

Lecturer: Dr VÁRADY Géza

Course title: **Introduction to computer networks** IVB368ANMI

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

Credits (ECTS): 4

Semester: Fall

Lecturer: Dr VÁRADY Géza

Course title: **Databases 1.** IVB009ANMI

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 2. IVB004ANMI

Language of instruction: English

Form of teaching: lecture, laboratory

Form of assessment: exam

Course description: 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 1. IVB018ANMI

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: Foundation of Informatics 1. 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 which 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, peripherals, 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 spreadsheets are trained and functions.

Class hours/week: 2+1

Credits (ECTS): 3

Semester:Fall

Lecturer: Dr SCHIFFER Ádám

Course title: **Operating Systems** IVB051ANMI

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): 6

Semester: Spring

Lecturer:Dr ERCSEY Zsolt

Course title: **Programming I.** IVB053ANMI

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: 2+2

Credits (ECTS): 5

Semester:Fall

Lecturer: ZIDARICS Zoltán

Course title: **Programming II.** IVB054ANMI

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+3

Credits (ECTS): 5

Semester: Fall

Lecturer: Dr SZENDRŐI Etelka

Course title: **Programming III.** IVB055ANMI

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+2

Credits (ECTS): 5

Semester: Spring

Lecturer: Dr SZENDRŐI Etelka

Course title: **Programming IV.** IVB003ANMI

Language of instruction: English

Form of teaching: lecture, lab

Form of assessment: exam

Course description:

Class hours/week: 2+3

Credits (ECTS): 4

Semester: Spring

Lecturer: Dr ACHS Ágnes

Course title: **Programming V.** IVB338ANMI

Language of instruction: English

Form of teaching: lecture, lab

Form of assessment: exam

Course description:

Class hours/week: 1+2

Credits (ECTS): 4

Semester: Spring

Lecturer: ZIDARICS Zoltán

Course title: **Programming Paradigms.** IVB339ANMI

Language of instruction: English

Form of teaching: lecture

Form of assessment: exam

Course description: On completion of the course, the student will be able to write 64 bit programs in Assembly language. Furthermore, the student will confidently use the necessary development tools and will understand the relations of Assembly language with the hardware, high-level languages and operating systems.

Class hours/week: 2+3

Credits (ECTS): 5

Semester:Fall

Lecturer: Dr IVÁNYI Péter

Course title: **Software Engineering** IVB307ANMI

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

Credits (ECTS): 2

Semester:Fall

Lecturer: Dr SZENDRŐI Etelka

Course title: **Work, fire and health safety** MSB018ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 1 lab

Form of assessment: Exam

Prerequisites:

Course description: The fields and basics of the work safety. Institutes and regulation in Hungary and the EU. The main role of work and fire safety in the system of human. Definitions of the security system. Job hazards and hurts. Prevention of the accidents. Human health. Types of the fire and the classes of flammability. Rules of the fire safety. Methods and Equipments of the fire fighting. Important accidental and fire safety rules on the work places. Requirements of the work safety and the using of the life support system. Transport and storage of the dangerous and toxical materials. Ergonomical views and rules. Types of coveralls. First aid. The using of BLS (Basic Life Support), reanimation technics, rules and the life supporting systems.

Class hours/week: 2

Credits (ECTS): 3

Semester: Spring 6th semester

Lecturer: Dr. Pécz Tibor

Course title: **Quality management 1.** MSB449ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 0 lab

Form of assessment: Exam

Prerequisites:

Course description: The purpose of the class is to introduce the way quality oriented approach should be implemented in engineering practice; the way quality, quality assurance and quality management appears in

technical development processes and in the general technological fields; how non-special innovative developing projects can be supported via professional quality-centered practices. The course focuses on the concept of “quality” and the way it appears concerning products and services

Class hours/week: 2

Credits (ECTS): 3

Semester: Spring 2nd semester

Lecturer: Krisztián SZÚCS

Course title: Web programming 1. IVB065ANVM

Language of instruction: English

Form of teaching: lab. practice

Form of assessment: Semester grade

Prerequisites:

Course description: Class hours/week: 2

Credits (ECTS): 2

Semester: Spring 2nd semester

Lecturer: Anett LÉNÁRT

Course title: Web programming 2. IVB475ANVM

Language of instruction: English

Form of teaching: lab. practice

Form of assessment: Semester grade

Prerequisites:

Course description: After successful completion of the course students will be able to create relatively complex using the apparatus of both client and server side.

Class hours/week: 2

Credits (ECTS): 3

Semester: Spring 6th semester

Lecturer: Anett LÉNÁRT

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): 4

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): 4

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: Fall

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 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: Spring

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: Fall

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): 6

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 course 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): 6

Semester: Fall

Lecturer: Jancskárné Dr. 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): 12

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 acquainted with 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): 5

Semester: Fall

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: Spring

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: 4

Credits (ECTS): 4

Semester: Spring

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 BSC

Course title: Engineering mathematics 1. MSB293ANVM

Language of instruction: English

Form of teaching: 2 lectures, 2 practice

Form of assessment: Exam

Course description: This lecture and practical based course aims to give students a solid mathematics basis through covering the following topics: sets of numbers (natural, integer, rational, real and complex numbers); vectors and operations with vectors, scalar and vector products and their applications; sets and operations with sets; matrix and determinant, solving linear equation systems definition of functions. Presentation of elementary functions. Sequences of real numbers (definition of monotonicity, limit, convergence and divergence); limit and continuity of functions; types of discontinuity; definition of tangents; differential calculus of functions in one variable, differential coefficient, derivatives, relations between differentiability and continuity; rules of derivation, derivatives of elementary functions; osculating circles, tangent of the plane curve at a given point.

Class hours/week: 4

Credits (ECTS): 4

Semester: Fall 1st semester

Lecturer: Dr. Perjésiné, Dr. Hámori Ildikó

Course title: Engineering mathematics 2. MSB294ANVM

Language of instruction: English

Form of teaching: 2 lectures, 2 practice

Form of assessment: Exam

Prerequisites: Engineering mathematics 1.

Course description: The presentations give an introduction to important mathematical techniques of exercise solving and the basic theory of calculus. Equal emphasis is given to learning new mathematics and to learning how to construct and write down correct mathematical arguments. Upon completion of this course the student should be able to: interpret, and put into practice solving basic mathematical problems using computer algebra, application of derivation, integral calculus in one variable, differential and integral calculus in two variable.

Class hours/week: 4

Credits (ECTS): 5

Semester: Spring 2nd semester

Lecturer: Dr. Perjésiné, Dr. Hámori Ildikó

Course title: Engineering mathematics 3. MSB2945NVM

Language of instruction: English

Form of teaching: 1 lecture, 2 practice

Form of assessment: Semester mark

Prerequisites: Engineering mathematics 2.

Course description: This lecture and practical based course aims to give electrical engineering students a solid mathematics basis through covering the following topics: ODE: classification, types of solution, analytical solution of first order, separable and linear differential equations, solution of incomplete and linear, second order ODE, Euler numerical method for first and second order differential equation, Laplace transform for linear ODE. Linear algebra Solution of linear equation system: Cramer's rule, Gauss-Jordan elimination, change of basis method. Eigenvector, eigenvalue, Fourier series.

Class hours/week: 3

Credits (ECTS): 3

Semester: Fall 3rd semester

Lecturer: Dr. Perjésiné, Dr. Hámori Ildikó

Course title: Basic laws, equations and models 1. MSB288NVM

Language of instruction: English

Form of teaching: 2 lectures, 2 practice

Form of assessment: Exam

Prerequisites:

Course description: The aim of this course is to present the basic concepts of physics. To emphasize that physics is a tool for understanding the real world. To teach transferable problem solving skills. Physics is the branch of science that describes matter, energy, space, and time in the most fundamental level. The goal is to find the most basic laws that govern the universe and to formulate those laws in the most precise way possible. The topics are the following: Kinematics, Newton's Laws, Forces, Work-Energy Theorem, Conservation of Energy, Conservation of Momentum, Multi-particle Dynamics, Rotational Dynamics, Conservation of Angular Momentum, Oscillatory Motion, Lagrangian Formalism.

Class hours/week: 4

Credits (ECTS): 4

Semester: Fall 1st semester

Lecturer: Dr. Nyitray Gergely

Course title: Basic laws, equations and models 2.MSB289NVM

Language of instruction: English

Form of teaching: 2 lectures, 1 practice

Form of assessment: Exam

Prerequisites:

Course description: The aim of this course is to present the basic concepts of thermodynamics. To teach transferable problem solving skills. Classical thermodynamics is the description of the states of thermodynamic systems at near-equilibrium, that uses macroscopic, measurable properties. It is used to model exchanges of energy, work and heat based on the laws of thermodynamics. Transport processes concerns the exchange of mass, energy, charge, momentum and angular momentum between observed systems. Examples of transport processes include heat conduction, fluid flow, molecular diffusion and electromagnetic radiation.

Class hours/week: 3

Credits (ECTS): 4

Semester: Spring 2nd semester

Lecturer: Dr. Nyitray Gergely

Course title: Basic laws, equations and models 3.MSB290NVM

Language of instruction: English

Form of teaching: 1 lectures, 2 practice

Form of assessment: Semester Mark

Prerequisites:

Course description: The aim of this course is to present the basic concepts of classical optics. The topics are the following: Geometric Optics, Photometric Units, Interference of Light, Interferometers, Diffraction of Light, Polarization of Light, Interaction of Electromagnetic Waves with a Substance, Waveguides and Opticalal Fibers. Learning Objectives: problem-solving skills are remain important, these include: Thinking logically and analitically, Making simplifying assumptions, Constructing mathematical models, Using valid approximations.

Class hours/week: 3

Credits (ECTS): 4

Semester: Spring 2nd semester

Lecturer: Dr. Nyitray Gergely

Course title: Basic IT 1. IVB183ANVM

Language of instruction: English

Form of teaching: 1 lecture, 2 lab

Form of assessment: Semester Mark

Prerequisites:

Course description: The aim of this course is to present the basic concepts of classical optics. The topics are the following: Geometric Optics, Photometric Units, Interference of Light, Interferometers, Diffraction of Light, Polarization of Light, Interaction of Electromagnetic Waves with a Substance, Waveguides and Opticalal Fibers.

Learning Objectives: problem-solving skills are remain important, these include: Thinking logically and analitically, Making simplifying assumptions, Constructing mathematical models, Using valid approximations.

Class hours/week: 3

Credits (ECTS): 3

Semester: Fall 1st semester

Lecturer: Schäffer Zsolt

Course title: **Basic IT 2. IVB185ANVM**

Language of instruction: English

Form of teaching: 0 lecture, 0 practice, 2 lab

Form of assessment: Semester Mark

Prerequisites: **Basic IT 1.**

Course description: The Foundations of Informatics 2 Course is mainly laboratory work helped with presentations live by the lecturer using the AutoCAD program. The application of this generally usable technical program provides an example about the CAD programs. It helps to study their structure and to learn their practical use. Students are required to complete the technical drawing of small parts of different technical tools. It is carried out in 2D in multi view orthographic projections and in so called 3D drawings in orthogonal axonometric projection based on printed figures showing the objects in the opposite projections. The drawings are completed with dimensioning and annotation. Different parts of the drawings can have different scaling. The preparation of plotted and printed drawings can be carried out in the so called model or paper spaces. The control of the result happens by printing in pdf files.

Class hours/week: 3

Credits (ECTS): 3

Semester: Spring 2nd semester

Lecturer: Schäffer Zsolt

Course title: **Computer programming 1. IVB332ANVM**

Language of instruction: English

Form of teaching: 1 lecture, 0 practice, 2 lab

Form of assessment: Semester Mark

Prerequisites:

Course description: The Foundations of Informatics 2 Course is mainly laboratory work helped with presentations live by the lecturer using the AutoCAD program. The application of this generally usable technical program provides an example about the CAD programs. It helps to study their structure and to learn their practical use. Students are required to complete the technical drawing of small parts of different technical tools. It is carried out in 2D in multi view orthographic projections and in so called 3D drawings in orthogonal axonometric projection based on printed figures showing the objects in the opposite projections. The drawings are completed with dimensioning and annotation. Different parts of the drawings can have different scaling. The preparation of plotted and printed drawings can be carried out in the so called model or paper spaces. The control of the result happens by printing in pdf files.

Class hours/week: 3

Credits (ECTS): 3

Semester: Fall 1st semester

Lecturer: Zidarics Zoltán

Course title: **Electromagnetic fields IVB038ANVM**

Language of instruction: English

Form of teaching: 2 lecture, 2 practice, 0 lab

Form of assessment: Exam

Prerequisites: **Engineering mathematics 1.**

Course description: The aim of this course is to present the basic concepts of electromagnetism that students need to know for later courses. The topics are the following: Electric field in vacuum, electric field in dielectrics, energy of an electric field, steady electric current, magnetic field in vacuum, magnetic field in substance,

electromagnetic induction, Maxwell's equations, electrical oscillations, electromagnetic waves. Learning Objectives: Thinking logically and analitically, Making simplifying assumptions, Constructing mathematical models, Using valid approximations, Understanding the basic laws of electromagnetism.

Class hours/week: 5

Credits (ECTS): 4

Semester: Fall 3rd semester

Lecturer: Kisander Zsolt

Course title: **Electrical materials** IVB039ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 1 lab

Form of assessment: Exam

Prerequisites:

Course description: The aim of this course is to present the basic concepts of Material Science that students need to know for later courses and future careers. Learning Objectives: Excel in careers related to the entire life cycle of materials—from synthesis and processing, through design and development, to manufacturing, performance, reclamation and recycling. Know the fundamental science and engineering principles relevant to materials. Understand the relationship between nano/microstructure, characterization, properties and processing and design of materials. Possess a knowledge of the significance of research, the value of continued learning and environmental/social issues surrounding materials.

Class hours/week: 4

Credits (ECTS): 3

Semester: Fall 1st semester

Lecturer: Dr. Nyitray Gergely

Course title: **Quality management 1.** MSB449ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 0 lab

Form of assessment: Exam

Prerequisites:

Course description: The purpose of the class is to introduce the way quality oriented approach should be implemented in engineering practice; the way quality, quality assurance and quality management appears in technical development processes and in the general technological fields; how non-special innovative developing projects can be supported via professional quality-centered practices. The course focuses on the concept of "quality" and the way it appears concerning products and services

Class hours/week: 2

Credits (ECTS): 3

Semester: Spring 2nd semester

Lecturer: Szűcs Krisztián

Course title: **Enterprises and labour market** MSB448ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 0 lab

Form of assessment: Exam

Prerequisites:

Course description: The purpose of the class is to introduce the adaptability of the connection between enterprises and engineering. The most important connections between engineering innovation and organizational management and integration within labour market; Challenges and opportunities related with the a fore mentioned topics. The course focuses on the role of companies and enterprises in economy.

Class hours/week: 2

Credits (ECTS): 3

Semester: Fall 3rd semester

Lecturer: Szűcs Krisztián

Course title: Industrial law IVB450ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 0 lab

Form of assessment: Exam

Prerequisites:

Course description: To familiarize students with the basic types of intellectual property protection, to help participate in R&D activities. The course focused on topics such as the European patent system, developing IP strategies, patent search and research success stories. The programme included lectures and presentations, Q&A sessions, hands-on exercises and case studies on success stories from the field.

Class hours/week: 2

Credits (ECTS): 3

Semester: Spring 4th semester

Lecturer: Bagdán Viktor

Course title: Project management 1 MSB341ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 0 lab

Form of assessment: Exam

Prerequisites:

Course description: The goal of the course is to introduce how the professional project management works in large enterprise environment using the related processes (like Integration management, Scope management, Quality management, HR management, Communication Management, Risk management and Change management). Over the basic project management we will also have a focus on the agility as well, will introduce some international business processes and show them how important are the strategy, the organization development and the leading in our changing world where the digitalization's role is bigger day by day. The course is based on up-to-date practical knowledge and on the operating methods of IT Services Hungary Kft.

Class hours/week: 2

Credits (ECTS): 3

Semester: Fall 1st semester

Lecturer: Varga Tibor

Course title: Work, fire and health safety MSB018ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 1 lab

Form of assessment: Exam

Prerequisites:

Course description: The fields and basics of the work safety. Institutes and regulation in Hungary and the EU. The main role of work and fire safety in the system of human. Definitions of the security system. Job hazards and hurts. Prevention of the accidents. Human health. Types of the fire and the classes of flammability. Rules of the fire safety. Methods and Equipments of the fire fighting. Important accidental and fire safety rules on the work places. Requirements of the work safety and the using of the life support system. Transport and storage of the dangerous and toxical materials. Ergonomical views and rules. Types of coveralls. First aid. The using of BLS (Basic Life Support), reanimation technics, rules and the life supporting systems.

Class hours/week: 2

Credits (ECTS): 3

Semester: Spring 6th semester

Lecturer: Dr. Pécz Tibor

Course title: Electrical engineering 1. IVB468ANVM

Language of instruction: English

Form of teaching: 2 lecture, 2 practice, 0 lab

Form of assessment: Exam

Prerequisites:

Course description: This subject covers the fundamental principles of the electricity that is required to the study of students attending the B.Sc. program. It aims to increase students' knowledge and expertise and determine whether they satisfy the requirements of the course. 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. The aim of the subject is also to convey knowledge on methods of alternating current network analysis. Mathematical representation of sinusoidal quantities and AC power analysis.

Class hours/week: 2

Credits (ECTS): 5

Semester: Fall 1st semester

Lecturer: Dr. Gyurcsek István

Course title: **Electrical engineering 2. IVB469ANVM**

Language of instruction: English

Form of teaching: 2 lecture, 3 practice, 0 lab

Form of assessment: Exam

Prerequisites: **Electrical engineering 1.**

Course description: This subject covers the fundamental principles of the electricity that is required to the study of students attending the B.Sc. program. It aims to increase students' knowledge and expertise and determine whether they satisfy the requirements of the course. The aim of the subject either is to convey fundamental knowledge on the advanced AC circuit analysis examining three-phase circuits, frequency responses and resonance behaviors, followed by first- and second order dynamic circuits. The aim of the subject is also to convey knowledge on methods of the general circuit analysis applying integral transform methods like Laplace transform and Fourier transform.

Class hours/week: 2

Credits (ECTS): 5

Semester: Spring 2nd semester

Lecturer: Dr. Gyurcsek István

Course title: **Electrical safety technology IVB457ANVM**

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 1 lab

Form of assessment: Exam

Prerequisites: **Electrical power engineering 1.**

Course description: HD 60364-4-41:2007: Low voltage electrical installation. Part 4-41. Protection for safety, protection against electric shock. Basic protection and fault protection, IP protection levels and classes of fault protection. Protection by automatic disconnection of supply and their rating (TN-C, TN-S, TN-C-S). Protective earthing in TT systems. Residual current devices (RCD). Protective earthing in IT systems. Arts of fault protection without PE conductor. Local measurements and controls with instruments meeting the standard EN 61557. Measurement of insulation resistance, the continuity of PE conductors, earthing resistance, the loop impedance and the residual current circuits.

Class hours/week: 3

Credits (ECTS): 4

Semester: Fall 7th semester

Lecturer: Showqi Hageb

Course title: **Electromagnetic compatibility IVB458ANVM**

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 0 lab

Form of assessment: Semester Mark

Prerequisites: Electromagnetic fields

Course description: Goal, terminology and topics of the electromagnetic compatibility (EMC). Electromagnetic environment, arts of coupling of electromagnetic disturbances and arts of interferences. Electrostatic discharge/damage (ESD), electromagnetic pulse (EMP), over-voltage protection. Low frequency interference (LFI), harmonics, voltage disturbances, network reactions, filters, shielding. Radio frequency interferences (RFI). Conductive and wireless signal transmission. EMC calculations, measurements, measuring devices, modeling, simulation. EMC directive, regulation and standards.

Class hours/week: 3

Credits (ECTS): 2

Semester: Fall 5th semester

Lecturer: Dr. Elmer György

Course title: **Electronics 1. IVB040ANVM**

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 2 lab

Form of assessment: Exam

Prerequisites:

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.

Class hours/week: 4

Credits (ECTS): 4

Semester: Spring 2nd semester

Lecturer: Bagdán Viktor

Course title: **Electronics 2. IVB041ANVM**

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 2 lab

Form of assessment: Exam

Prerequisites: Electronics 1.

Course description: The aim of this course is to provide an introduction to the fundamentals of analogue electronics, and base knowledge of digital electronics. The course is a continuation of Electronics 1. SEMICONDUCTORS, AMPLIFIERS, OSCILLATORS, POWER SUPPLIES, DIGITAL ELECTRONICS.

Class hours/week: 4

Credits (ECTS): 3

Semester: Fall 3rd semester

Lecturer: Bagdán Viktor

Course title: **Electronics 3. IVB042ANVM**

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 2 lab

Form of assessment: Exam

Prerequisites: Electronics 2.

Course description: The training course, which includes presentations and reference materials, will deepen the technical expertise of experienced engineers and accelerate the development of those early in their studies. The training courses dive into all the technical details of many key product specs. In an op amp, for example, these specs include input common mode or VCM, input offset voltage or VOS, intrinsic noise, open loop gain or AOL, bandwidth, slew rate, output swing, and stability. In addition to the specs, we will also cover some typical applications of each type of product. In the case of an op amp, these applications may include photodiode amplifier, level translator, power amplifier, voltage-to-current converter, and ADC driver.

Class hours/week: 4

Credits (ECTS): 4

Semester: Spring 4th semester

Lecturer: Bagdán Viktor

Course title: Digital logic design 1. IVB033ANVM

Language of instruction: English

Form of teaching: 2 lecture, 2 practice, 0 lab

Form of assessment: Exam

Prerequisites:

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: 4

Credits (ECTS): 4

Semester: Fall 1st semester

Lecturer: Dr. Tukora Balázs

Course title: Digital logic design 2. IVB034ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 2 lab

Form of assessment: Semester Mark

Prerequisites: Digital logic design 1.

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: 4

Credits (ECTS): 4

Semester: Spring 2nd semester

Lecturer: Zidarics Zoltán

Course title: Microcomputers IVB035ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 0 lab

Form of assessment: Semester Mark

Prerequisites: Digital logic design 2.

Course description: This course provides fundamentals of Microcomputers. Architecture of microcomputers. Fundamentals of microprocessors (bit number, buses, interrupt, DMA, stack, etc). Structure of simple microprocessors: architecture, units (ALU, control unit, registers), operation (phase, machine cycle, command). Instruction suit, instruction groups, machine code. Assembly programming. Peripherals and peripheral couplers (typical fitting tasks, characteristics of VLSI circuits, the concept of intelligence, multipurpose elements). Levels of information storage. Memories (types, grouping, parameters, functions, properties, interface, application technique). Microprogrammed and wired control units. RISC and CISC processors (concepts, objectives, benefits, drawbacks, tendencies). Architecture and instruction set of ARM and INTEL 8051 microcontrollers. Developer environments, programming techniques, simulators, debugging.

Class hours/week: 4

Credits (ECTS): 4

Semester: Fall 5th semester

Lecturer: Kisander Zsolt

Course title: Measurement technology 1. IVB266ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 2 lab

Form of assessment: Semester Mark

Prerequisites: Electrical Engineering 1.

Course description: This subject covers the fundamental principles of the electrical measurement technology that is required to the study of students attending the B.Sc. program. It aims to increase students' knowledge and expertise and determine whether they satisfy the requirements of the course. The aim of the subject is to convey fundamental knowledge on the measurement theory as well as principles of operation of different sort of testing instruments, measurement methods. The aim of the subject is also to convey knowledge on theories and methods of sensor technology. Measurement methods for mechanical parameters, temperature and different kind of radiations are also included.

Class hours/week: 4

Credits (ECTS): 5

Semester: Fall 3rd semester

Lecturer: Dr. Gyurcsek István

Course title: Measurement technology 2. IVB267ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 2 lab

Form of assessment: Semester Mark

Prerequisites: Measurement technology 1.

Course description: This subject covers the fundamental principles of the electrical measurement technology that is required to the study of students attending the B.Sc. program. It aims to increase students' knowledge and expertise and determine whether they satisfy the requirements of the course. The aim of the subject is to convey fundamental knowledge on the measurement theory as well as principles of operation of different sort of testing instruments, measurement methods. The aim of the subject is also to convey knowledge on theories and methods of sensor technology. Measurement methods for mechanical parameters, temperature and different kind of radiations are also included.

Class hours/week: 4

Credits (ECTS): 5

Semester: Fall 3rd semester

Lecturer: Dr. Gyurcsek István

Course title: Control engineering 1. IVB197ANVM

Language of instruction: English

Form of teaching: 2 lecture, 2 practice, 0 lab

Form of assessment: Exam

Prerequisites: Digital logic design 1.

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 sequential 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: 4

Credits (ECTS): 5

Semester: Fall 3rd semester

Lecturer: Kisander Zsolt

Course title: Control engineering 2. IVB198ANVM

Language of instruction: English

Form of teaching: 2 lecture, 1 practice, 0 lab

Form of assessment: Exam

Prerequisites: Engineering Mathematics 2.

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: 3

Credits (ECTS): 3

Semester: Fall 3rd semester

Lecturer: Kisander Zsolt

Course title: Communication engineering IVB001ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 1 lab

Form of assessment: Semester mark

Prerequisites: Electromagnetic fields

Course description: This course covers fundamentals of analog and digital communications. We study the related basics of signals and systems (sampling and quantization, modulation, signal detection) and the physical and electrical properties of communication systems. Historical background and related fields. Required topics in mathematics, physics, electronics and information theory. Fourier representation of signals and systems. Mathematical description of signals in time and frequency domain. Fourier series and transformation. Fourier representation of signals and systems. Mathematical description of systems. Convolution and its properties. Filters, amplifiers, attenuators. Physical and electrical properties of signals and systems. Losses, noises, in different transfer medias. Wired transmission. Coaxial cable and twisted pair. Equivalent circuits of cables. Wired transmission. Telegraph equations. Attenuation, insertion loss, mismatch loss. Optical cables. Wireless transmission. Basics of radiocommunication. Common wireless standards. Amplitude modulation and demodulation. Angle modulations, frequency and phase modulation. PCM and delta modulation. Baseband data transmission. Intersymbol interference. Nyquist channel. Digital modulations (binary), ASK, FSK, PSK. Digital modulations, (quadrature) QAM, QPSK.

Class hours/week: 3

Credits (ECTS): 4

Semester: Spring 4th semester

Lecturer: Kisander Zsolt

Course title: Programmable logic controllers IVB199ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 2 lab

Form of assessment: Exam

Prerequisites: Control engineering 1.

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 programming 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. PLC evolution.

Class hours/week: 4

Credits (ECTS): 5

Semester: Fall 7th semester

Lecturer: Malkó Tibor

Course title: Communications systems IVB002ANVM

Language of instruction: English

Form of teaching: 3 lecture, 0 practice, 1 lab

Form of assessment: Exam

Prerequisites: Basic IT 1.

Course description: Fundamental knowledge on communication networks. Concept and application of protocol in the communication process. Presentation and characteristics of communication architectures and protocol suites: OSI model TCP/IP protocol suite. Concept, consequences and application of encapsulation in the communication process. Concept of topology. Meaning of physical and logical topology and their application in computer systems. Prevalent computer network topologies. Computer network groups: LAN, MAN, WAN concept, properties. Active network devices (repeaters, hubs, bridges, switches, routers, gateways) characteristics, application possibilities in computer network configuration. Computer network standards, characteristics, application domains. Network level protocols: role and task of addressing in network configuration. Concept and characteristics of routers and routed protocols. Connection based and connection free (IP) network protocols. Transport layer protocols: TCP, UDP characteristics and application in the communication between computers. Real time data transfer. Application layer protocols. QoS concept and application in configuration of communication services. Address classes. Fixed and variable length IP addresses. Concept and configuration aspects of subnets. Public and private IP addresses. Telecommunication technologies. Telecommunication networks and systems.

Class hours/week: 4

Credits (ECTS): 5

Semester: Spring 4th semester

Lecturer: Megyeri Péter

Course title: Electrical power conversion 1 IVB465ANVM

Language of instruction: English

Form of teaching: 3 lecture, 1 practice, 1 lab

Form of assessment: Exam

Prerequisites: Electromagnetic fields

Course description: The aim of this subject is to give general knowledge about AC electrical power convertors (transformers, synchronous and asynchronous machines). Students study the theoretical structure, working principle and vector diagrams of AC electrical power convertors. Relating to the rotating electrical convertors, we study also starting methods, speed control and applications. The aim of the subject is also to give the students possibility to practise their theoretical knowledge by perform measurements in laboratory.

Class hours/week: 5

Credits (ECTS): 4

Semester: Spring 4th semester

Lecturer: Showqi Hageb

Course title: Electrical power conversion 2. IVB465ANVM

Language of instruction: English

Form of teaching: 3 lecture, 1 practice, 1 lab

Form of assessment: Semester Mark

Prerequisites: Electrical power conversion 1.

Course description: The aim of this subject is to give general knowledge about DC electrical power convertors and fundamentals of electric drives. We study general issues of the application of rotating electrical machines. We also study selection methods of electric motor. The aim of the subject is also to give the students possibility to practise their theoretical knowledge by perform measurements in laboratory.

Class hours/week: 5

Credits (ECTS): 4

Semester: Spring 4th semester

Lecturer: Showqi Hageb

Course title: Electrical power engineering 1. IVB459ANVM

Language of instruction: English

Form of teaching: 2 lecture, 1 practice, 0 lab

Form of assessment: Semester Mark

Prerequisites: Electrical power conversion 1.

Course description: 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 communication cables. Considerations and methods of rating cables. Over-current protection devices and their rating. Fundamentals of the electric safety, rating the protection against electric shock. Fundamentals of over-voltage protection.

Class hours/week: 3

Credits (ECTS): 4

Semester: Spring 4th semester

Lecturer: Dr. Elmer György

Course title: Computer networks 1. IVB370ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 2 lab

Form of assessment: Exam

Prerequisites: Communications system

Course description: Concept of topology, characteristics of various network topologies. Segmentation of networks. Connection of networks. Hardware and software structure and characteristics of routers. User interfaces and configuration regimes of routers. Basic parameter setting and configuration of routers. Particularities of router protocols. Static and dynamic traffic management, properties, application domains. Types and characteristics of external and internal routing protocols. Metrics. Distance vector based traffic control, characteristic, benefits, drawbacks. Link-state based traffic management characteristic, benefits, drawbacks. Aspects of traffic filtering, configuration of network access. Configuration and characteristics of routing table. Types, characteristics, configuration of network interfaces (LAN, WAN). Configuration and characteristics of static routes. Connection of networks. Characteristics and parameters of RIP, IGRP, OSPF protocols. Configuration of RIP, IGRP, OSPF protocols. Testing of computer networks operability, troubleshooting.

Class hours/week: 4

Credits (ECTS): 4

Semester: Fall 5th semester

Lecturer: Megyeri Péter

Course title: Computer networks 2. IVB371ANVM

Language of instruction: English

Form of teaching: 1 lecture, 0 practice, 2 lab

Form of assessment: Exam

Prerequisites: Computer networks 1

Course description: Network segmentation. Hardware and software structure and characteristics of switches. Switching theory. Operation modes of switches. Spanning tree protocols, avoiding loops in traffic management. VLAN - concept, configuration aspects. Static and dynamic VLANs. Concept of tagging, standard solutions. VLAN trunking. Characteristics and configuration of trunking protocols. Connection of VLANs. Concept of native VLAN and application in network traffic configuration. Connection of networks. Hardware and software structure, characteristics and configuration of routers. Characteristics of router LAN interfaces. Decomposition to sub-interfaces. Aspects of traffic filtering, configuration of network access. Firewall types. Traffic filtering by means of routers. Standard and extended access control lists (ACL) – characteristics, configuration. Network surveillance. The SNMP protocol.

Class hours/week: 3

Credits (ECTS): 4

Semester: Spring 6th semester

Lecturer: Megyeri Péter

Course title: Embedded computer programming 1. IVB335ANVM

Language of instruction: English

Form of teaching: 1 lecture, 0 practice, 1 lab

Form of assessment: Semester Mark

Prerequisites: Computer programming 1

Course description: This lecture and practical based course aims to give electrical engineering students a solid embedded programming knowledge basis through covering the following topics: Working on embedded Linux environment, Automate programming with Make & Automake, Using glibc, Creating multithread applications.

Class hours/week: 3

Credits (ECTS): 4

Semester: Spring 6th semester

Lecturer: Zidarics Zoltán

Course title: Embedded computer programming 2. IVB3356NVM

Language of instruction: English

Form of teaching: 1 lecture, 0 practice, 2 lab

Form of assessment: Semester Mark

Prerequisites: Embedded computer programming 1

Course description: This lecture and practical based course aims to give computer science engineering students a solid embedded programming basis through covering the following topics: Creating and managing ESP32 and STM32 projects, using Bluetooth, using MQTT, Sharing codes in a version controlling system, Working in a developer workgroup, managing software lifecycle. Students learn the basics of programming enabling them to interpret and understand engineering sciences and through solving elementary tasks they deepen their basic theoretical knowledge in the field of engineering. The practical sessions are designed to complement the requirements of different specialisations.

Class hours/week: 3

Credits (ECTS): 4

Semester: Fall 7th semester

Lecturer: Zidarics Zoltán

Course title: Embedded computer programming, Autonomous intelligent systems. IVB337ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 1 lab

Form of assessment: Exam

Prerequisites: Design of microelectronic systems

Course description: In this subject the students will learn about common peripherals of microcontrollers. These include analog to digital converters, timers and counters, pulse width modulations, external and internal interrupt sources, clock signal distribution systems and embedded communication interfaces like SPI, I2C, UART. Both hardware and software structure and behavior of these peripherals will be discussed on the lectures with examples. Students will learn how to configure a microcontroller and how to create microcontroller based projects by the end of the semester.

Class hours/week: 3

Credits (ECTS): 3

Semester: Fall 7th semester

Lecturer: Kisander Zsolt

Course title: Microelectronics IVB273ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 0 lab

Form of assessment: Semester Mark

Prerequisites:

Course description: This course provides insight into state of the art electronic technologies. Introduction to microelectronic technologies. Component suite of monolithic integrated circuits. Implementation examples of

digital, analogue and radiofrequency circuits. Design methods for very large scale integration. Debugging procedures. Monolithic memories. Programmable devices (microcontrollers, PLD, FPGA). Programming, speed and signal level adjustment.

Class hours/week: 3

Credits (ECTS): 3

Semester: Spring 6th semester

Lecturer: Kisander Zsolt

Course title: Design and product technology IVB274ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 1 lab

Form of assessment: Exam

Prerequisites:

Course description: Acquiring advanced technical knowledge essential to the 21st century to the work of an engineer who wants to be knowledgeable and creative in the world of State of The Art technology. Knowledge of the basics and methods of manufacturing technology. Insight into small series and mass production manufacturing processes and design methods. Independent design task.

Class hours/week: 3

Credits (ECTS): 4

Semester: Fall 5th semester

Lecturer: Bagdán Viktor

Course title: Design of microelectronic systems IVB275ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 2 lab

Form of assessment: Semester Mark

Prerequisites: Microcomputers

Course description: Design of Microelectronic Systems gives an introduction to computer-aided PCB design. On this lecture the students can choose a preferred CAD system (Eagle, Altium, KiCAD) and solve different electronic design problems with it. The following topics will be discussed during the lectures: basic routing techniques, power distributing networks on a PCB, separate power networks for analog and digital circuits, routing signals, differential signals and buses, EMC considerations, designing custom and standard compliant component footprints.

Class hours/week: 4

Credits (ECTS): 4

Semester: Spring 6th semester

Lecturer: Kisander Zsolt

Course title: Digital logic design 3. IVB036ANVM

Language of instruction: English

Form of teaching: 2 lecture, 0 practice, 2 lab

Form of assessment: Exam

Prerequisites: Digital logic design 2.

Course description: Evolution of digital circuits, general purpose logical networks. Types and classification of programmable logic arrays. General block diagram and main units of programmable logic arrays. Burning and testing of programmable logic arrays. Macrocell based devices: PAL, GAL, HAL, FPLA. Complex, large scale integrated devices. Architecture, operation, parameters of FPGAs. Architecture, operation, parameters of CPLDs. Implementation modes of logical networks in programmable logic arrays. Design and selection principles of programmable logic arrays. Testing of logical systems, circuits: Boundary Scan, JTAG. Architecture and operation of elemental boundary scan cell.

Class hours/week: 4

Credits (ECTS): 5

Semester: Fall 5th semester

Lecturer: Megyeri Péter

Course title: Digital logic design 4. IVB037ANVM

Language of instruction: English

Form of teaching: 2 lecture, 1 practice, 0 lab

Form of assessment: Exam

Prerequisites: Digital logic design 3.

Course description: Parameters of digital systems, hardware and software characteristics. Design principles of digital systems. Sampling, quantization. The concept of adaptivity. Characteristics of adaptive systems. Discrete Fourier transform. Duality theorem. Operation and properties of Fast Fourier Transform. FFT algorithms. Basic principles of digital filtering. Design, operation and characteristics of FIR filters. Design, operation and characteristics of IIR filters. Adaptive signal processing. Wiener filtering, signal processing with and without learning algorithms. Principle and implementation of adaptive channel equalizers. Principle and implementation of adaptive signal compression. Principle and implementation of optimal resource management. Adaptive antennae, antenna systems. Architecture and properties of Digital Signal Processors (DSP). Fixed-point and floating point implementations.

Class hours/week: 4

Credits (ECTS): 4

Semester: Spring 6th semester

Lecturer: Kisander Zsolt

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 SZE0049AN

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

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

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