Description of Civil Engineering BSc Courses

GENERAL COURSES:

Compulsory English for Civil Engineers 1. (BMEGT63A3E1 - 4 hours/4 credits)
The course is designed to enable students to communicate fluently and effectively in study environment. Receptive, productive and interactive activities and strategies are included in the curricula.

Compulsory English for Civil Engineers 2. (BMEGT63A3E2 - 4 hours/4 credits)
The courses are designed to enable students to communicate fluently and effectively in study environment. Receptive, productive and interactive activities and strategies are included in the curricula. By the end of the semester the overall language ability of the students is at level B2 (by the Common European Framework of Reference.

Communication Skills for Civil Engineers (BMEGT60AEO - 2 hours/2 credits)
The Communication Skills course is designed to meet the language needs of civil engineering students in academic and professional fields. Special emphasis is on the language of meetings and discussions, oral presentation and summary writing.

Mathematics A1a – Calculus (BMETE90AX00 - 6 hours/6 credits)
Algebra of vectors in plane and in space. Arithmetic of complex numbers. Infinite sequences. Limit of a function, some important limits. Continuity. Differentiation: rules, derivatives of elementary fuctions. Mean value theorems, l'Hospital's rule, Taylor theorem. Curve sketchig for a function, local and absolute extrema. Integration: properties of the Riemann integral, Newton-Leibniz theorem, antiderivatives, integration by parts, integration by substitution. Integration in special classes of functions. Improper integrals. Applications of the integral.

Mathematics A2a - Vector Functions (BMETE90AX02 - 6 hours/6 credits)
Solving systems of linear equations: elementary row operations, Gauss-Jordan- and Gaussian elimination. Homogeneous systems of linear equations. Arithmetic and rank of matrices. Determinant: geometric interpretation, expansion of determinants. Cramer's rule, interpolation, Vandermonde determinant. Linear space, subspace, generating system, basis, orthogonal and orthonormal basis. Linear maps, linear transformations and their matrices. Kernel, image, dimension theorem. Linear transformations and systems of linear equations. Eigenvalues, eigenvectors, similarity, diagonalizability. Infinite series: convergence, divergence, absolute convergence. Sewuences and series of functions, convergence criteria, power series, Taylor series. Fourier series: axpansion, odd and even functions. Functions in several variables: continuity, differential and integral calculus, partial derivatives, Young's theorem. Local and global maxima/minima. Vector-vector functions, their derivatives, Jacobi matrix. Integrals: area and volume integrals.

Mathematics A3 for Civil Engineers (BMETE90AX07 - 4 hours/4 credits)
Differential geometry of curves and surfaces. Scalar and vector fields. Potential theory. Classification of differential equations. Linear differential equation of the second order. Nonlinear differential equations. Systems of linear differential equations. The concept of probability. Discrete random variables an their distributions. Random variables of continuous distribution. Two-dimensional distributions, correlation and regression. Basic notions of mathematical statistics.

Physics for Civil Engineers (BMETE13AX13 - 2 hours/ 2 credits)
Electric charge, Coulomb's law, electric field, electric flux. Work and energy in electric fields. Electric potential. Capacitors, dielectrics. The piezoelectric effect and its applications. The contact potential, its application for temperature measurements. Electric current, Kirchhoff's laws, electric circuits. Magnetic field. The Biot-Savart law, Ampere's law. Forces in magnetic fields, practical applications. Magnetic flux, Faraday's law. Practical applications of Faraday's law in sensors. Self induction, mutual induction. Varying electromagnetic fields. Magnetic properties of matter, magnetic circuits. AC-circuits, impedance. Sensors in measurements. Measurement of basic electric quantities. Resistance, capacitance and magnetic induction based sensors. Magnetic, thermoelectric and piezoelectric sensors. Measurement of displacement, force, acceleration. Measurement of flow of gases and liquids. Measurement of liquid level. Measurement of humidity and temperature. Thermovision, thermograms
Civil Engineering Representation and Drawing (BMEEOMEAT01 - 4 hours/4 credits)
Classification of projection methods. Multiview orthogonal projection, use of picture planes. Fitting, joinig and intersecting problems. Successive auxiliary views. Defining true shape of objects. Defining and projecting of polyhedrons. ffinty and collineation. Section of polyhedrons, operations in solid geometry. Axonometrical systems, orthogonal and oblique projection. Topographic map. Generating and descripting curved surfaces. Generating and descripting warped surfaces. Basics of technical drawings, common system of notations, symbol of materials. Role of the human body in determining dimensions. Concept and technical content of groundplan and section. Elevation. Free-hand sketches of constructions, renders.
Chemistry of Construction Materials (MEEOEMAT02 - 2 hours/2 credits)
Basics of chemistry: atomic structure and chemical bonding. General properties of gases, liquids and solids. Solutions. Phase diagrams. Types and rate of chemical reactions. Chemical equilibrium. Acids, bases and salts, pH. Hydrolyses of salts. Electrochemistry. Chemistry of construction materials: cement, lime, gypsum, ceramics, metals and polymers. Corrosion of cement.
Statics (BMEEOTMAT03 - 5 hours/6 credits)
Fundamental principles and methods of structural analysis. Forces and rigid bodies in plane and in space. Statically determinate compound structures. Trusses. Distributed loads, center of gravity. Internal forces, internal force diagrams. Structures in 3D. Influence diagrams of beams and trusses. Contact forces: friction, rolling resistance.
Strength of Materials (BMEEOTMAT04 - 6 hours/6 credits)
Moment of inertia, principal axes. Mechanical classification of materials. Stresses and strains. Elastic-plastic materials. Stresses of beams, design and check. Centric tension/compression, simple shear, torsion, symmetrical/unsymmetrical bending, bending and shear, bending and tension/compression. Plane stress state, principal stresses. Principle of virtual displacements and forces. Principle of potential and complementary energy. Deflection of beams by the moment-area method and by work principle. Euler-buckling of elastic columns.
Dynamics (BMEEOTMAT05 - 3 hours/3 credits)
Kinematics of particles: rectilinear motion, curvilinear motion. Newton''s second law. Linear and angular momentum, work, kinetic energy. Plane motion of rigid bodies. Kinetics of rigid body in case of plane motion. Direct central impact of moving mass and

elastic structure. Free and forced vibration of single degree of freedom and multi degrees of freedom systems. Support vibration. Viscous damping.

Technical Informatics (BMEEOFTAT06 - 2 hours/2 credits)

General introduction to informatics, history of informatics. Basic hardware, networking, infocommunication tools and services. Software basics from operating systems, office application, mathematical and modelling solutions, CAD és database management systems, computer graphics and digital image processing.

Civil Engineering Informatics (BMEEOFTAT31 - 4 hours/5 credits)

Data types and data structures. Types and features of algorithms (efficiency, effectivity, complexity), algorithms and program design, design methodologies. Standard numerical and non-numerical algorithms. Databases and database management systems, design of databases, relational databases, SQL. Elements of computer graphics, graphical modeling. Solution of technical problems by computers.

Surveying I. (BMEEOAFAT08 - 4 hours/4 credits)

Fundamentals of positioning and map projections. National grid reference system, geodetic control network. Evaluation of measurement precision, propagation of error. Measurement of horizontal angles. Parts of the theodolite and its use for observations. Measurement of lengths, electronic distance measurement. Determination of hights: leveling and trigonometrical heighting. Global positioning system.

Surveying II. (BMEEOAFAT09 - 3 hours/3 credits)

Computations in map projection''s plane, basic relations in polar and rectangular coordinates, and orientation procedures. Traversing, vertical traverse and node. Densification of control network using GPS technique. Detail survey, chain and radiation. Electronic total stations. Instruments and procedures of mapping. Setting out buildings and structures. Measurement of deformations and settlements. Survey of buildings and facilities.

Introduction to Geoinformatics (BMEEOFTAT10 - 3 hours/3 credits)

Basics of geographic information systems. Application of GIS in technical and civil engineering practice. The concept of information systems. The role of location-based information. Information systems components and application. Process of data modelling. Geometric data reference systems. Data sources and data collection methods. Technical background of GIS systems, their operational development perspectives, and their realization problems.

Geology (BMEEOEMAT11 - 3 hours/3 credits)

The geology provides the characterisation of geological formations and materials from a civil engineering point of view. It describes the processes and the interactions between the engineering works and the geological environment. The dynamics of the Earth, the description of raw materials and geo-materials used in engineering practice (minerals and rocks), the geological risks such as earthquakes, volcanism, landslides and their effect, characterisation of surface and subsurface waters and related geological problems.

Construction Materials I. (BMEEOEMAT12 - 3 hours/3 credits)

Introduction of the main properties of the most widely applied materials in construction: physical, hydro-technical and thermal parameters. Strength and deformation characteristics: stress, strain, fatigue, creep, relaxation, toughness, brittleness, and hardness. Binders: lime and its derivatives, gypsum, and cements (raw materials, production, clinker minerals, and properties). Aggregates: types, basic properties,

aggregate mix design. Concrete: types, properties of fresh and hardened concrete, admixtures, concrete mix design, testing and interpreting the strength of concrete. Metals: general properties, iron, steel production and the basic mechanical properties, effect of temperature, weldability. Timber: mechanical properties, and influence of moisture content. Waterproofing: applicable materials in general.

Soil Mechanics (BMEEOGTAT13 - 4 hours/4 credits)

Origin of soils, soil exploration, soil samples. Components of soils (phase relationships, grain size distribution, consistency limits), soil classification, compaction. Stresses in the soil (under static conditions, conditions of steady vertical flow). Flow of water through soil due gravity (Darcy's law, coefficient of permeability, flow nets). Compressibility of soil (reasons and types of compression). Shear strength of soil (Mohr-Coulomb failure criterion, determination of shearing strength).

Earthworks (BMEEOGTAT14 - 3 hours/3 credits)

Scope of earth works. Plastic limit states, Rankine earth pressures. Earth pressure and passive resistance of „real" walls. Soilstatical design of retaining structures. Stability of earth works. Construction of earth works. The designal, executional and monitoring questions of construction. Dewatering of earth works. Geosynthetics.

Foundation Engineering (BMEEOGTAT15 - 3 hours/4 credits)

Foundation Types. Design of rigid and flexibile shalow foundations (spread, pier, slab, box foundation). Determination the bearing capacity and settlements of soils under load. Factors effecting the value of differential settlements. Stability analysis. Types and design of different support systems of Excavations. Bearing capacity of pile foundations. Anchorages. Design of ground Anchors. Design and construction of cast in situ and prefabricated diaphragm walls. Dewatering. (3 hours/4 credits)

Basis of Design (BMEEOHSAT16 - 2 hours/2 credits)

Basis of design and actions on structures. Mechanical modelling of materials, loads and structures. Principles and requirements for safety and durability of structures, serviceability and ultimate limit states. Standardised design methods. Eurocode 1 and the National Application Documents. Densities, self-weight and imposed loads. Snow and wind loads. Thermal actions. Actions on structures exposed to fire. Loads and deformations imposed during execution. Accidental actions. Design background of highway and railway bridges.

Steel Structures I. (BMEEOHSAT17 - 3 hours/3 credits)

Steel material: grades, notations. Mechanical properties of structural steell. Steel products. Structural elements: classification, arrangement, behaviour, limit states, design method: tension and compression members, beam. Flexural buckling. Bending and shear resistance: elastic and plastic design. Lateral torsional buckling. Mechanical and welded connections: classification, technology, application. Bolts and welds: behaviour, limit states, design method. Fatigue and brittle fracture.

Reinforced Concrete Structures I. (BMEEOHSAT18 - 3 hours/4 credits)

The fundamental theory of reinforced concrete structures''s design. Mechanical properties of concrete, of steel bars and of presstressing tendons, bond conditions. The design of reinforced concrete and prestressing reinforced concrete crosssections for axial and tangential loading (effects of tension, compression, bending and torsion). Rules and applications of detatiling provisions. The reinforcement of bent beams.

Timber and Masonry Structures (BMEEOHSAT19 - 3 hours/3 credits)
Strength and material characteristics of wood. Basic design methods for members of traditional timber structures. Design of wooden connections for shear, tension and compression. Types and strength characteristics of masonry. Non-reinforced and reinforced walls. Design method according to EC6. Mixed (stone and brick) walls. Design and valuation of loadbearing stone structures.
Building Construction Study (BMEEOMEAT20 - 3 hours/3 credits)
Subject of building construction science. Effects on buildings, requirements. Building with load bearing walls and frame skeleton. Floor, stairs. Foundation and under grade insulation. Flat roof. Pitched roof: roof truss and roofing. Door (external and internal), window. Floor finish, façade finish (envelope). Practical building physics. Basics of building services engineering. Auxiliary structures of construction.
Roads (BMEEOUVAT21 - 3 hours/3 credits)
Charasteristics of road transportation. Road networks, categories. Vehicle proceeding in straight and circular sections. Speeds, impedances. Sight distances. Horizontal and vertical alignment, harmonization. Rural and urban intersections, sizing. Multi-level intersections. Implementing of roads. Planning phases. Materials of road structures. Flexible and inflexible road structures.
Railway Tracks (BMEEOUVAT22 - 3 hours/3 credits)
Development of railway transportation. Railway definitions. Railway impedances, kinematics. Aligning and regulation of arcs. Horizontal and vertical alignment, harmonization. Railway superstructure: sizing, stresses, railroading. Structures and geometry of track geometries. Railway stations. Development of railways.
Basics of Environmental Engineering (BMEEOVKAT23 - 2 hours/2 credits)
Basic knowledge of ecology and environmental protection, ecology of populations and biocoenoses, nutrient cycles, ecological and environmental impacts of human activities, environmental economy, environmental impacts of engineering activities (water, air, soil contamination), basics of environmental planning.
Public Works (BMEEOVKAT24 - 4 hours/4 credits)
Basics of public work systems and their planning: drinking water supply and treatment, sanitary sewer systems and urban drainage, waste water treatment, centralized heating systems, energy and telecommunication networks. Information systems of public works. Public works reconstruction. Planning practice.
Hydrology I. (BMEEOVVAT25 - 3 hours/3 credits)
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.
Hydraulics I. (BMEEOVVAT26 - 3 hours/3 credits)
Elementary fluid mechanics. Understanding of the fundamental principles of hydrostatics and hydrodynamics; the basic ideas of dimensioning of hydraulic structures and hydraulic machinery. Hydrostatics (absolute and relative equilibrium, pressure head diagrams and buoyancy). Application of the Bernoulli equation (laminar and turbulent flow in pipes, losses and pipe systems). The impulse momentum equation, open channel flow (Chezy). Specific energy, supercritical and subcritical flow, hydraulic jump, stilling basins. Hydraulic machinery.

Hydraulic Engineering, Water Management (BMEEOVVAT27 - 4 hours/4 credits)
The tasks, methods and tools of water management. Hungarian specialities of water management. Types and tasks of hydraulic engineering structures with the following topics: Watershed management of lowland and hilly areas. Regulation of lakes and rivers. Reservoirs and storage. Flood control and land drainage. Inland navigation. Water power development. Water intake and pumping stations. Small hydraulic engineering structures. Characteristic environmental impacts of hydraulic engineering structures. During the practical lessons four design works will be elaborated.
Micro- and Macroeconomics (BMEGT30A001 - 4 hours/4 credits)
Introduction to macroeconomics. Output and aggregata demand. Fiscal policy and foregn trade. Money and banking. Interest rates and monetray transmission. Monetray and fiscal policy. Aggregate supply, prices and adjustment to shocks. Inflation, expectations, and credibility. Unemployment. Exchange rates and the balance of payments. Economic growth. Economics and the economy. Tools of economicanalysis. Demand, supply and the market. Elasticities of demand and supply. Consumer choice and demand decisions. Introducing supply decisions. Costs and supply. Perfect competition and pure monopoly. Market structure and imperfect competition. The labor market. Factor markets and income distribution.
Management and Enterprise (BMEGT20A001 - 4 hours/4 credits)
Intended for engineering students who would like a better conceptual understanding of the role of management int he decision making process. This course introduces the essentials of management as they apply within the contemporary work environment. Particular attention is paid to management theories, corporate finance, leadership, teamwork, quality management, management of technology, economics calculation and operations management. For problem formulation both the managerial interpretation and the mathematical techniques are applied.
Business Law (BMEGT55A001 - 2 hours/2 credits)
The problems of the area will be treated in two major parts. Part One introduces students to the general topics, for example the concept of law, the functions of the law in the socieconomic life. Some basic legal problems, like the conception, characteristics and functions of the modern state and, in a comparative view, the characteristics of the Anglo-Saxon and continetal systems of business law and the development of the Hungarian business law will be also discussed. The emphasis of Part Two is on the questions of company law and competition law presented in a European context. The lectures of this part outline not only the regulations of the Hungarian Company Act and Company Registry Act but they cover EU directives and regulations on companies and competition as well.
Urban and Regional Development (BMEEOUVAT28 - 3hours/3credits)
Infrastructure development – urban development. Historical trends. Ports, waterways, canals, railway lines, roads, motorways, air transport, high speed railways and informatics as driving forces in regional development from ~1400 to 2030. Urban planning activities. Transportation and land use planning. Sustainable, reliable transportation – a precondition of balanced development. The role of public and collective transport. How to influence and regulate individual car use? Historical trends of cities: Concentration, decentralization, suburbanization, reurbanization. International and national policies on water management. The effect of the European Union and main requirements of the Lisbon Strategy. Environmental Impact Assessments. Strategic

Environmental Evaluations. Drainage and waste water treatment in regional context. Case studies. Historical examples.

Surveying Field Course (BMEEOAFAT30 - 9 days/3 credits)

There is a complex surveying work. It is connected with engineering. The students valuate of given situation, specify the necessary surveyor works and methods. They practice the required measurement-, computation-, planing-, setting out-, and documentation works. They carried out Control Station-, detail-, engineering establishment measurements to determine point positions, including setting out works, pegging of batter boards and deformation measurements etc. They will be familiar with modern instruments and methods (GPS total stations, laser).

Theory of Administration, Real-estate Registration (BMEEOUVAT29 - 3 hours/3 credits)

The establishment, the development and the current status of the Hungarian Land Registry is discussed in this course. Moreover the basic methods of property evaluations are discussed as well as the property development and property management. The assessment is done with a Mid-Term Test related to all the aforementioned topics. Tasks and competencies of central and local governments in the international practice. Structure and operation of local governments. Establishments, committees and authorities, institutions of legal control. Stakeholders of local settlement politics. Finance of local governments. Types of goods and servuices. Registration system of properties. Property evaluation, rules of their marketing.

BRANCH OF STRUCTURAL ENGINEERING:

Construction Management – Estimates (BMEEPEKAS01 - 3 hours/3 credits)

Social- and economic environment of Construction. Parties and stakeholders of construction projects, their cooperations. Break-down structures of construction projects (WBS, RBS, OBS). Basics of process composition and process analysis. Characteristic human-, material- and technical resources. Construction equipments, main technologies. Works and standards. Basics of cost- and time estimates. Schedules and other on-site documents. Site management.

Construction Management – Contracting (BMEEPEKAS02 - 2 hours/2 credits)

Pricing and logistics survey. Cost analysis, engineer's price, bid. Investment and contracting. Public procurement. Up-to-date project planning and monitoring methods. Networking techniques and project models (PERTtime, CPMtime, CPMcost, MPM/PDMtime). Technology oriented project models. Basics of Engineering Economics. Financing construction projects.

Rock Mechanics (BMEEOEMAS03 - 2 hours/2 credits)

Petrophysical properties of solid rocks, the characterisation of rock blocks and rock masses, the jointing system in the rock environment. The deformation processes and rheological characters in rock mechanics, the influence of joint spacing. The durability and effect of rock environment on the engineering structures. The evaluation of geological conditions in rock environment at tunnels foundations and rocky slopes. The influence of material properties on the petrophysical properties of rocks.

Construction Materials II. (BMEEOEMAS04 - 4 hours/4 credits)

Plastics: types, aging, influence of heat, chemical resistance, fibre reinforced polymers. Glass: basic physical and chemical properties. Heat, sound insulating materials and their basic properties. Ceramics: raw materials, production, categorisations and properties within them. Basic mathematical statistics for evaluation of test results of material

properties. Bitumen: raw material, production, basic properties, modification and utilisation. Concrete: effect of cement content and type on the properties, effect of water/cement ratio, curing, effect of temperature (ambient and that of concrete) during construction, water tightness, frost resistance and other special properties. Steel: effect of carbon content, Fe – C phase diagram, martensite, tempering (heat treatment), Pourbaix diagram, protection against corrosion.

Structural Analysis (BMEEOTMAS05 - 5 hours/5 credits)

Force and displacement influence lines of statically determinate structures. Maximal internal force diagrams. Solution of statically indeterminate plane structures by the force method. Frames, trusses, and continuous beams. Solution of statically indeterminate plane structures by the displacement method. The moment distribution method. Orthogonal plane frames, grids, continuous beams. Thin plates.

Finite Element Modelling (BMEEOTMAS06 - 3 hours/4 credits)

Principles and solution methods of the finite element method. FEM models of different structures: frames, grids, plates, walls, shells and compound structures. Modeling of supports and connections. Computational problems: static, dynamic (seismic) analyses. Industrial FEM codes (NASTRAN, AXIS, FEM-DESIGN) and solution of practical problems by them. Approximate verification of FEM solutions.

Steel Structures II. (BMEEOHSAS07 - 3 hours/4 credits)

Lattice and truss girders, welded plate girders, configuration, behaviour, design. Local plate buckling. Calculation of Class 4 sections. Shear buckling. Web crippling and design for transverse loads. Beam-columns. Strength check, stability phenomena and analysis, interaction of flexural buckling and lateral torsional buckling. Behaviour and design of built-up columns. Connections: behaviour, classification. Joints and connections in lattice girders. Splicing and connections in members subjected to tension or bending. Simple column base. Simple and continuous beam-to-column connections. Simple and continuous beam-to-beam connections. Torsion. Warping. Behaviour, parameters. Stress analysis.

Reinforced Concrete Structures II. (BMEEOHSAS08 - 4 hours/4 credits)

One and two way reinforced concrete slabs. Approximate methods for concrete slabs. Design and structural joints of concrete slabs according to EC2. Approximate methods for multi-story concrete frames. Design and structural joints of concrete frames. Bracings of buildings for lateral loads. Detailing of concrete structures according EC2.

Bridge Construction (BMEEOHSAS09 - 3 hours/4 credits)

History and classification of bridges. Materials, functional and structural aspects. Design codes for highway and railway bridges. The substructure: abutments, pylons and anchors. Bearings and expansion joints. Superstructure in concrete, prestressed concrete, steel and steel-concrete composite construction. Types of superstructure: RC slab bridges, steel plate girder bridges, ribbed plated bridges, steel truss girder bridges, box girder bridges. Refurbishment of bridges. Aesthetics of bridges. The bridge and its environment.

Constructional Technology (BMEEOHSAS10 - 3 hours/3 credits)

Fabrication of steel- and prefabricated reinforced concrete structures. Advanced erectional- and constructional technologies. The influence of the constructional technologies on the structures. Welding technologies (interaction of the welding method and the steel material). Construction of welded structures, design aspects. Fatique and brittle fracture of steel structures. Modern connecting elements and fasteners. In situ,

prestressed and special RC constructional technologies. Quality control, qualification, verification of the capability.

Underground Structures, Deep Foundation (BMEEOGTAS11- 4 hours/4 credits)

Types and field of application of deep foundations (stone columns, diaphragm walls). Load transfer mechanizm of deep foundations. Determination the bearing capacity and settlement by different methods (by theoretical formulas,load tests,sounding).Design and construction of Pedestrian subways, Underground garages. Analysis against uplift. Insulations.

Building Construction I. (BMEEOMEAS12 - 3 hours/4 credits)

Primary and additional structures of buildings, protection - Part 1. (Method: effects requirements, introduction and evaluation of variations, relations to other building components. Load bearing structures (walls, frames, floors, stairs, foundation). Protection against moist (insulation of under grade structures, waterproofing of flat roofs, waterproofing against functional water). Structures of architectural finishes (floor finish, wall finish, suspended ceiling, façade cladding and composition).

Building Construction II. (BMEEOMEAS13 - 3 hours/3 credits)

Building components, protection - Part 2. (Method: as in Part 1). Space limiting structures (structures and roofing of pitched roof, built-in roof space, doors, windows, shading). Increased protection of buildings (thermal insulation, protection against moist, energetic design of buildings, protection against noise and fire, protection against effects harmful to health). Systems of construction and building (panels and cast wall construction, frames of reinforced concrete, steel, and wood, dry-tech construction, ready-made building).

Residential Building Design (BMEEOMEAS14 - 3 hours/3 credits)

Principle design methodology. Functional rules of residential building design. Selection of ground plan system and structure of the building. Sectional arrangement, forming façade, shaping the mass. Providing architectural and form quality. Creative application of building construction knowledge.

Laboratory Practice of Testing of Structures and Materials (BMEEOHSAS15 – 9 days/3 credits)

Illustration of steel element behaviour under various loading conditions by modelling and testing of structural details. Demonstration of the measuring process and the methods of the experimental stress analysis, presentation the application of these technics. Modern construction materials and methods of testing. General and special testing process in case of steel, concrete and timber structures.

Field Course of Structure Geodesy (BMEEOAFAS16 - 3 days/1 credit)

Among the most often used structural controll observation tehcniques we study the GPS technique, the CYRA laser scanner, the electronic level and the digital photogrammetry. Afterwards we show processing techniques of the observations.

MAJOR OF BUILDINGS:

Steel Buildings (BMEEOHSASA1 - 4 hours/5 credits)

Design of simple and larger halls. Design of trusses with large span. Study on the UTE Stadium. Analysis and Design of Steel Buildings: analysis; cross-sections; structural members; structural members with Class 4 cross-sections; structural joints; bracing systems. Design of terminal halls (study on Kansai and Budapest terminals). Studies on structures awarded by ECCS. Design for seismic effect. Design for fire effect.

Reinforced Concrete Buildings (BMEEOHSASA2 - 4 hours/5 credits)
Speciality of reinforced concrete structures' planning, loads and effects, general design consideration for earthquake force, Types of lateral resistive system, design and structural elements of frames, of box systems, of wall systems, of flat plates, foundations, structural design and typical cases of reinforced concrete halls, design of monolithic, prefabricated, prestressed structural elements.
Timber Structures (BMEEOHSASA3 - 3 hours/3 credits)
Material models and strength classes of woods. Stress design of timber structures according to EC5. Design in service states (deflection, durability, fire resistance). Design for single and double shear doweled connections. Design and structural detailing for split-ring and nail-plate joints. Design and layout of glulam structures. Special timber structures: arches, frames, nailed shells and lattice structures. Comparative analysis of existing timber structures.
Strengthening of Structures (BMEEOHSASA4 - 2 hours/2 credits)
General rules and methods for diagnostic and qualification of load-bearing structures. Rules and methods for strengthening of structures. Strengthening methods for concrete, steel and timber structures. Strengthening for structural elements using shotcret, additional prestressing force or glued CRP (or steel) lamellen. Problematics of renewal of panel buildings.
Composite Building Structures (BMEEOHSASA5 - 2 hours/2 credits)
Materials of steel-concrete composite building structures. Structural arrangement and behaviour of composite floor beams. Analysis and design of simply supported and continuous composite floor beams. Composite connection: structural details, full and partial composite action. Sructural arrangement and design of composite columns. Structural details, behaviour and design of composite floors with cold-formed trapeziodal sheetings.
Industrial and Agricultural Building Design (BMEEOMEASA6 - 3 hours/3 credits)
Design methodology of industrial buildings. Design phases, aspects of decision. Main functional elements. Structures of industrial buildings: load bearing structure (reinforced concrete, steel and mixed frames). Space limiting structures: wall, roof (reinforced concrete, metal and mixed in material). Structures of natural illumination for halls (sky-lights, glass roofs), doors, windows. Finishing structures (floor finish, interior walls). Fire regulations.

ELECTIVE:
Reinforced Concrete Engineering Works (BMEEOHSASC3 - 3 hours/3 credits)
Subject of building construction science. Effects on buildings, requirements. Building with load bearing walls and frame skeleton. Floor, stairs. Foundation and under grade insulation. Flat roof. Pitched roof: roof truss and roofing. Door (external and internal), window. Floor finish, façade finish (envelope). Practical building physics. Basics of building services engineering. Auxiliary structures of construction.