Civil Engineering BSc Curricula

Contain

Course descriptions

General Studies in Engineering

Number of Credits: 4

Descriptive Geometry

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 1.

Prerequisites: -

Brief Syllabus:

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.
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.

Recommend Readings:

- G. Young, H. E. Baxter, Descriptive Geometry, New York, The Macmillan Company, 1921. http://www.ebooksread.com/authors-eng/george-young/descriptive-geometry-hci-78.shtml
- E. F. Watts, J. T. Rule, Descriptive Geometry, Prentice-Hall, INC 1946
- http://archive.org/details/descriptivegeome033051mbp
- H.S.M. Coxeter, Projective Geometry, New York Springer-Verlag 1987 2nd ed.

Responsible of Subject: Dr. Vörös László, associate professor, DLA

Number of Credits: 3

Construction Materials 1

Weekly Hours: 2 lectures, 0 practical lessons, 0lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 1

Prerequisites: -

Brief Syllabus:

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

Recommend Readings:

- Manfred Hegger, Volker Auch-Schwelk, Matthias Fuchs, Thorsten Rosenkranz, Construction Materials Manual, 2006.
- K. L. Murty (ed.) Materials ageing and degradation in light water reactors: Mechanisms and management, 2012.
- E Allen, J Iano, Fundamentals of Building Construction: Materials and Methods, 6th Edition, ISBN: 978-1-118-13891-5

Responsible of Subject: Dr.Orbán Zoltán, assistant professor, PhD

Number of Credits: 2

Application of Computer 1

Weekly Hours:1 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 1.

Prerequisites: -

Brief Syllabus:

This course aims to provide an introduction to the use of computers in architectural design. Students are intrduced to the theory of 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.

Recommend Readings:

- E Prakoso, AutoCAD Block Best Practices, Course Notes, 2012.
- R Szeliszki, Computer Vision: Algorithms and Applications (Texts in Computer Science), ISBN-13: 978-1848829343
- N Katsikis, MATLAB - A Fundamental Tool for Scientific Computing and Engineering Applications - Volume 2, ISBN 978-953-51-0751-4

Responsible of Subject: Dr. Halada Miklós, assistant professor, DLA

Number of Credits: 5

Mathematics a/1

Weekly Hours: 3 lectures,2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 1
Prerequisites: -

Brief Syllabus:

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

Recommend Readings:

- George B. Thomas, Jr.: Thomas's Calculus , Pearson Addision Wesley, 2005.
- Anthony J. Pettofrezzo: Vectors and Their Applications , Dover Books on Mathematics, 2005.
- Briggs, Cochran & Gillett, Calculus for Scientists and Engineers: Early Transcendentals, ISBN: 9781256787716

Responsible of Subject:: Dr. Perjésiné Hámori Ildikó, dr. associate professor, PhD

Number of Credits: 6

Mechanics 1(Statics)

Weekly Hours: 2 lectures, 3 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum:1.

Prerequisites: --

Brief Syllabus:

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.

Recommend Readings:

- Wight, J. K, MacGregor J. Reinforced concrete mechanics & design, Pearson, 2012.
- R C Hibbeler, Engineering Mechanics: Statics (13th Edition), ISBN-13: 978-0132915540
- R C Hibbeler, Engineering Mechanics: Solution Manual, ISBN-13: 978-0132915540

Responsible of Subject:: Dr. Pomezanski Vanda, assistant professor, PhD

Number of Credits: 2

Physics for Civil Engineers

Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 2.

Prerequisites: -

Brief Syllabus:

This course aims at teaching the basics of physics. Physics is the branch of science that describes matter, energy, space, and time at the most fundamental level.

Mechanics: basic principles and definitions, position, displacement, velocity, motion along a line, uniform motion, velocity, acceleration, free fall, circular motion, projectiles motion, Newton's laws, work done, power, work-kinetic energy theorem, conservation of energy, gravitational force, simple harmonic motion, pendulum, damped oscillations, sound waves, the speed of sound waves, ultrasound, surface tension of liquids, capillarity. Electrodynamics: electric charge, electric field, field lines, electric potential energy, electric potential, electric current, electric current density, direct current, alternating current, thermo-electricity, electrolysis, magnetic fields. Optics: speed of light, the laws of reflection and refraction, optical fibers, optical imaging, plane mirrors, spherical mirrors, lenses, aberrations, optical instruments, cameras, microscopes, telescopes, the human eye, seeing, color sensitivities, interference of light, multilayered (antireflection) coatings, diffraction, polarization, dichroism, lasers, the main types of lasers, holography. Electromagnetic radiations: types of luminescence, black body radiation, light sources, fundamentals of photometry, Beer-Lambert law, light filters, x-rays, x-ray diagnostics, natural and iduced radioactivity, radioactive isotopes, dosimetry, detectors.

Our main goals are to present the basic concept of physics that students need to know for later courses, and to emphasize that physics is a tool for understanding the real world, and to teach transferable problem-solving skills that students can use throughout their lives.

Recommend Readings:

- Alan Giambattista, Betty McCarthy Richardson, Robert C. Richardson College Physics McGraw-Hill (2007)
- Hans C. Ohanian, Physics for Engineers and Scientists (Third Edition) (Vol. 1), ISBN-13: 978-0393930030
- James A. Jacobs, Thomas F. Kilduff, Hans C. Ohanian, Engineering Materials Technology: Structures, Processing, Properties, and Selection, ISBN 0130481858

Responsible of Subject:: Dr. Nyitray Gergő, assistant professor, PhD

Application of Computers 2

Number of Credits: 3

Weekly Hours: 1 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 2.

Prerequisites: -

Brief Syllabus:

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.

Recommend Readings:

- E Prakoso, AutoCAD Block Best Practices, Course Notes, 2012.
- R Szeliszki, Computer Vision: Algorithms and Applications (Texts in Computer Science), ISBN-13: 978-1848829343
- N Katsikis, MATLAB - A Fundamental Tool for Scientific Computing and Engineering Applications - Volume 2, ISBN 978-953-51-0751-4

Responsible of Subject: Dr. Halada Miklós, assistant professor, DLA

Number of Credits: 5

Mathematics a/2

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum:: 2

Prerequisites: Mathematics a/1

Brief Syllabus:

Brief Syllabus: 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.

Recommend Readings:

- George B. Thomas, Jr.: Thomas's Calculus , Pearson Addision Wesley, 2005.
- Anthony J. Pettofrezzo: Vectors and Their Applications , Dover Books on Mathematics, 2005.
- John Lane Bell, A Primer of Infinitesimal Analysis, Cambridge University Press, ISBN 978-0-521-62401-5

Responsible of Subject: Dr. Perjésiné Hámori Ildikó dr. associate professor, PhD

Number of Credits: 7

Mechanics 2 (Mechanics of Materials)

Weekly Hours: 2 lectures, 4 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum:2

Prerequisites: Mechanics 1

Brief Syllabus:

Brief Syllabus: 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, Hookes 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.

Recommend Readings:

- Hibbeler, Mechanics of Materials (9th Edition), ISBN-13: 978-0133254426
- Wight, J. K, MacGregor J. Reinforced concrete mechanics & design, Pearson, 2012.
- Riley, Mechanics of Materials, ISBN-13: 978-0471705116

Responsible of Subject: Dr. Pomezanski Vanda, assistant professor, PhD

Number of Credits: 5

Mathematics a/3

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 3

Prerequisites: Mathematics a/2

Brief Syllabus:

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

Recommend Readings:

- GEORGE B. THOMAS, JR.: THOMAS' CALCULUS, PEARSON ADDISION WESLEY, 2009.
- Readings are found on platform of CooSpace https://coospace.tr.pte.hu/
- D G Zill, A First Course in Differential Equations with Modeling Applications, ISBN-13: 978-1111827052

Responsible of Subject: Dr. Perjésiné Hámori Ildikó dr. associate professor, PhD

Number of Credits: 4

Mechanics 3 (Dynamics)

Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 3

Prerequisites: Mechanics 2

Brief Syllabus:

Brief Syllabus: This course is aimed to provide basic and advanced knowledge on the principles of kinematics and kinetics. Topics covered by the course include: Kinematics of particles. Motion of rigid bodies in orthogonal coordinate system. Kinematics of rigid bodies. Kinetics of particles. Kinetics of rigid bodies. Central impacts. Effect analysis of a fallen body. Vibrations. Analysis of the free and force vibration of one degree freedom systems. Matrix equations of several degree of freedom systems. Analysis of the free and force vibration of several degree freedom systems. Free vibrations of beam structures.

Recommend Readings:

- L. P. Pitaevskii, E.M. Lifshitz, Physical Kinetics: Volume 10 (Course of Theoretical Physics S), ISBN-13: 978-0750626354
- Samuel D. Lindenbaum, Analytical Dynamics: Course Notes, ISBN-13: 978-9810214678
- Hibbeler, Engineering Mechanics: Dynamics (13th Edition), ISBN-13: 978-0132911276

Responsible of Subject: Dr. Pomezanski Vanda, assistant professor, PhD

Economic Sciences and Humanities

Number of Credits: 3

Economics 1

Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

A Place of Subject in Curriculum: 1

Prerequisites: -

Brief Syllabus:

The main aim of this course is to introduce the basic concepts and processes of economics. This knowledge will help the students to understand other topics of economics, and to synthesize the knowledge of economic.

The course discusses several concepts of economics, some historically specific aspects and its connection to other scientific disciplines. The course highlights the motivations and decision situations of the micro players of the economy, the households and mainly enterprises. During this process the students will learn the most important concepts (management, poverty, needs, assets, production, consumption, distribution, etc.). The course presents the social position and role, the main types of operational framework, goals of internal and external stakeholders, and the characteristics of the basic operations. During the semester the students learn the types of the most important economic spaces and markets, their processes and connections, the specialities of the market decisions. The course also describes the concept of economic systems, their types, the reasons and areas of the economic role of the state, the possibilities and difficulties of the economic measurement and finally the most important specialities of an economic system (e.g. unemployment, inflation).

Recommend Readings:

- R. Panneerselvam: Engineering Economics, Prentice-Hall of India Pvt.Ltd, 2004, ISBN: 8120317432
- Chan S. Park: Fundamentals of Engineering Economics, Pearson Education, 2012, ISBN: 0273772910
- Abol Ardalan: Economic and Financial Analysis for Engineering and Project Management, CRC Press, 1999, ISBN: 1566768322

Responsible of Subject: Dr. Varga Attila, professor, DLA

Number of Credits: 5

Engineering Management

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 3

Prerequisites: -

Brief Syllabus:

System approach. Organizations as systems. Reasons for establishing organizations. Elements of organizations. Objectives of organizations. Individual and organizational objectives. Necessities. Representation of organizations, descriptive models of organizations. Organizational units. Business organizations (companies, associations, state-owned companies, privately owned companies). Business environment, PEST and SWOT analyses. Planning and uncertainty. Functions in organizations. Projects. Tools of representation technique. Leadership activity. Means of the leader. Leadership functions. Forms of leadership behaviour. Leadership skills. Leadership styles. Problem solving and decision making. Problem solving methods. Creative way of thinking. Decision making models, decision making rationalism. Group decisions. Decision and risk.

Recommend Readings:

- Susan Quinn: Management Basics, Bissett School of Business, Pages : 75, ISBN: 978-87-7681-717-6
- Olaf Passenheim: Project Management, Pages : 126, ISBN: 978-87-7681-487-8
- Svein-Arne Jessen: Project Leadership - Step by Step, Part I and Part II Pages : 112 and 120, ISBN: 978-87-7681-553-0 and 978-87-7681-597-4

Responsible of Subject: Dr. Kondor Tamás, associate professor, DLA

Number of Credits: 2

Engineering Practice in the EU

Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 2

Prerequisites: -

Brief Syllabus:

The aim of the course is to introduce students to the system of professional engineering licences, the role and operation of the chambers of commerce and professional associations, the forms and possibilities of training and further education through examples from different countries.
Course content:
A brief history of the EU, the institutional system of education in the EU, training policies. Opportunities for engineering education and further education inside and outside EU countries. The dual training system in higher education. The recognition of academic qualifications and degrees. Regulation and licensure in engineering. The role and operation of the chambers of commerce, the system of traineeship, chamber membership.

- International Engineering Technologist Agreement.
- Graduate Attributes and Professional Competencies.

Recommend Readings:

Compulsory course material:

- How the European Union works (European Commission, 2014)

Recommended course materials:

- http://ec.europa.eu/internal_market/qualifications/docs/guide/users_guide_hu.pdf
- 2005/36 EC on the Mutual Recognition of Professional Qualifications
- http://europa.eu/legislation_summaries/internal_market/living_and_working_in_the_internal_market/c11065_hu.htm

Responsible of Subject: Dr.Szabó Éva, associate professor, DLA

Number of Credits: 2

Construction Management 1

Weekly Hours: 0 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 4

Prerequisites: -

Brief Syllabus:

Students are introduced to the process of construction they face as a qualified civil engineer. As construction is an answer to a social or economic problem within the field of construction investment, it is important that students learn about the different aspects of construction projects to solve this question. Management aspects of construction projects, especially in the preparation work, design, execution and operation, are covered through the following topics: definition, content and preparation processes of cost estimates; aids for preparing cost estimates; types and content of standards; standards for working hours, material utilization and machine operating hours; budget preparation, profile plans, measurement calculations; price analysis, essentials of costs, direct and indirect costs; elements and calculation of construction budgets; preliminary and subsequent calculation; tendering, cost planning; budget preparation software; layout of the construction site; content of detailed organizational layout designation; temporary and utility buildings; public utilities and power supply on the construction site; utility buildings and roads; definition and application of production management; production management in the construction industry; elements of construction operations; methods and representation of operation sequences; preparation and content of linear time schedules.

Recommend Readings:

- F. Harris, R. McCaffer, F. Edum-Fotwe. Modern Construction Management, Blackwell Publishing, West Sussex, 2006.
- Olaf Passenheim: Project Management, Pages : 126, ISBN: 978-87-7681-487-8
- Dr. Abimbola Windapo: Fundamentals of Construction Management, Pages : 182, ISBN: 978-87-403-0362-9

Responsible of Subject: Dr. Kondor Tamás, associate professor, DLA

Number of Credits: 2

Enterprise Management

Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 5

Prerequisites: -

Brief Syllabus:

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

Recommend Readings:

- A. Norton, J. Hughes Enterprise Management, Cima Publishing, 2009.
- John J. Hampton: Fundamentals of Enterprise Risk Management, Pages : 126, ISBN: 978-0814414927
- Meier, Marco, Sinzig, Werner, Mertens, Peter: Enterprise Management with SAP SEM™/ Business Analytics, ISBN: 978-3-540-24735-7

Responsible of Subject: Dr. Kiss Tibor, professor, PhD

Number of Credits: 3

Construction Management 2

Weekly Hours: 1 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 5

Prerequisites: Construction Management 1

Brief Syllabus:

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

Recommend Readings:

- B. Cooke and P. Williams. Construction Planning, Programming and Control, Blackwell Publishing, West Sussex, 2004.
- Olaf Passenheim: Project Management, Pages : 126, ISBN: 978-87-7681-487-8
- Dr. Abimbola Windapo: Fundamentals of Construction Management, Pages : 182, ISBN: 978-87-403-0362-9

Responsible of Subject: Dr. Kondor Tamás, associate professor, DLA

Number of Credits: 5

Construction Management 3

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 6

Prerequisites: -

Brief Syllabus:

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

Recommend Readings:

- R. Chudley and R. Greeno. Building Construction Handbook, Butterworth-Heinemann, England, Oxford, 2010.
- P. Fenn, R. Gameson. Construction Conflict Management and Resolution, Taylor & Francis, London, 2003.
- Olaf Passenheim: Project Management, Pages : 126, ISBN: 978-87-7681-487-8

Responsible of Subject: Dr. Kondor Tamás, associate professor, DLA

General Studies in Civil Engineering

Number of Credits: 3

Basics of Architecture (module B)

Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 1

Prerequisites: -

Brief Syllabus:

Through the introduction of common problems related to the design of buildings and the architectural **urban 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.

Recommend Readings:

- Ernst and Peter Neufert, Neufert Architects' Data
- Francis D. K. Ching: Building Construction Illustrated, Wiley, 4 edition, 2008, p. 478, ISBN 978-0-470-08781-7
- Graham Bizley: Architecture in Detail II, Elsevier Ltd., 2010, p. 221, ISBN 978-0-08-096535-2

Responsible of Subject: Dr. Medvegy Gabriella, associate professor, DLA

Number of Credits: 4

Geodesy 1

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 1

Prerequisites: -

Brief Syllabus:

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

Recommend Readings:

- W. Torge: Geodesy, de Gruyter, Berlin, 2001. p. 432, ISBN 3-11-017072-8
- Xu, Guochang (Ed.): Sciences of Geodesy – II, Springer, ISBN 978-3-642-28000-9
- Thomas H. Meyer: Introduction to Geometrical and Physical Geodesy: Foundations of Geomatics, 2010, p.260, ISBN: 9781589482159

Responsible of Subject: Dr. Gulyás András, associate professor, PhD

Number of Credits: 4

Construction Materials 2

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 2

Prerequisites: Construction Materials 1

Brief Syllabus:

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

Recommend Readings:

- Manfred Hegger, Volker Auch-Schwelk, Matthias Fuchs, Thorsten Rosenkranz, Construction Materials Manual, 2006.
- K. L. Murty (ed.) Materials ageing and degradation in light water reactors: Mechanisms and management, 2012.
- E Allen, J Iano, Fundamentals of Building Construction: Materials and Methods, 6th Edition, ISBN: 978-1-118-13891-5

Responsible of Subject: Dr. Orbán Zoltán, assistant professor, PhD

Number of Credits: 2

Geodesy 2

Weekly Hours: 0 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 2

Prerequisites: Geodesy 1

Brief Syllabus:

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.

Recommend Readings:

- W. Torge: Geodesy, de Gruyter, Berlin, 2001. p. 432, ISBN 3-11-017072-8
- Xu, Guochang (Ed.): Sciences of Geodesy – II, Springer, ISBN 978-3-642-28000-9
- Thomas H. Meyer: Introduction to Geometrical and Physical Geodesy: Foundations of Geomatics, 2010, p.260, ISBN: 9781589482159

Responsible of Subject: Dr. Gulyás András, associate professor, PhD

Number of Credits: 2

Geodesy Field Practice

Weekly Hours: 0 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 2

Prerequisites: -

Brief Syllabus:

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 caried out in field settings or on real structures.

Recommend Readings:

- W. Torge: Geodesy, de Gruyter, Berlin, 2001. p. 432, ISBN 3-11-017072-8
- Xu, Guochang (Ed.): Sciences of Geodesy – II, Springer, ISBN 978-3-642-28000-9
- Thomas H. Meyer: Introduction to Geometrical and Physical Geodesy: Foundations of Geomatics, 2010, p.260, ISBN: 9781589482159

Responsible of Subject: Dr. Gulyás András, associate professor, PhD

Helps in Subject: Aradi László, teaching assistant

Number of Credits: 2

Basics of Geographic Information Systems 1.

Weekly Hours: 1 lectures, 1 practical lessons. 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 3

Prerequisites: -

Brief Syllabus:

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.

Recommend Readings:

- Paul A. Longley, Mike Goodchild, David J. Maguire and David W. Rhind: Geographic Information Systems and Science, 2010, ISBN 978-0470721445
- Otto Huisman and Rolf A. de By: Principles of Geographic Information Systems, ITC, Enschede, The Netherlands, 2009, ISBN 978–90–6164–269–5
- GIS Commons: An Introductory Textbook on Geographic Information Systems, http://giscommons.org/

Responsible of Subject: Dr. Gulyás András, associate professor, PhD

Number of Credits: 3

Geology

Weekly Hours: 1 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum:3

Prerequisites: -

Brief Syllabus:

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

- to identify, specify the most relevant empirical methods in connection of the necessary investigations of geological structures;
- to analyze and evaluate the basic results of geological interpretations.

Recommend Readings:

- David D. Pollard and Raymond C. Fletcher: Fundamentals of Structural Geology, 2005, ISBN 9780521839273
- Parthasarathy, V. Panchapakesan and R. Nagarajan: Engineering Geology, Wiley, p. 532, ISBN 9788126541829
- Luis Gonzalez de Vallejo, Mercedes Ferrer: Geological Engineering, CRC Press, 2011, p.700, ISBN: 978-0-415-41352-7

Responsible of Subject: Dr. Szűcs István, associate professor, CSc

Number of Credits: 4

Hydrology and Hydraulics

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 3

Prerequisites: -

Brief Syllabus:

This is an introductory course on the elements of the hydrologic cycle. The following physical processes and principles are described: the water balance equation, precipitation and its measurements, areal averages, interception, infiltration, evaporation, runoff, unit hydrograph theory, river morphology, hydrology of lakes, groundwater.

Elementary fluid mechanics. Understanding of the fundamental principles of hydrostatics and hydrodynamics; the basic ideas of dimensioning of hydraulic structures and hydraulic machinery. Hydrostatics (absolute and relative equilibrium, pressure head diagrams and buoyancy). Application of the Bernoulli equation (laminar and turbulent flow in pipes, losses and pipe systems). The impulse momentum equation, open channel flow (Chezy). Specific energy, supercritical and subcritical flow, hydraulic jump, stilling basins. Hydraulic machinery

Recommend Readings:

- H. M. Raghunath: Hydrology: Principles, Analysis and Design, New Age International, 2006, p.476, ISBN 81-224-1825-2
- Ernest Brater, Horace King, James Lindell, C. Wei: Handbook of Hydraulics, McGraw-Hill, 1996, p. 640, ISBN 9780070072473
- Brutsaert,W. (2005): Hydrology – An Introduction. Cambridge Univ. Press. At Cabot, GB661.2 .B78 2005, ISBN 0521824796
- Chow, V.T. ed.(1964):Handbook of Applied Hydrology. kiadó: McGraw-Hill ISBN 10:0070107742/ ISBN 13:9780070107748
- Anderson M., McDonnell J.J. (2005): Encyclopedia of Hydrological Sciences. 5 volumes. Kiadó:Wiley. ISBN: 9780470848944 ISBN:0470848944

Responsible of Subject: Dr. Pálné Schreiner Judit, assistant professor, PhD

Number of Credits: 3

Basics of Structural Design

Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 3

Prerequisites: Mechanics 2

Brief Syllabus:

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

Recommend Readings:

- Hunt T. Tony Hunt's Structures Notebook, 2003 ISBN 978-075-0658-97-3
- H. Gulvanessian, J-A. Calgaro and M. Holicky Designers' Guide to EN 1990 Eurocode: Basis of Structural Design ISBN 0-7277-3011-8
- EN 1990 Eurocode: Basis of Structural Design. CEN 2002

Responsible of Subject: Dr. Fülöp Attila, assistant professor, PhD

Number of Credits: 3

Basics of Environmental Engineering

Weekly Hours: 2 lectures, 0 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 3

Prerequisites: Mechanics 2

Brief Syllabus:

This course aims to give a basic knowledge of environmental processes and environmental protection to engineering student. The lectures cover the following topics: the history of environmental protection; juristical regulation and institution of environmental protection in Hungary; global problems and question of sustainable development; basic concepts; process of pollution; atmosphere and its processes; water protection; land and soil protection; waste treatment and management; noise and vibration; new fields in the environmental protection; renewable energy sources.

Recommend Readings:

- Moser, M. (1997): Circulations in Nature and Society. Ministry of Environmental Protection and Land Management. Budapest.
- Rausz, A. (ed.) (2005): Environmental Statistical Yearbook of Hungary 2004. Hungarian Central Statistical Office. Budapest.
- Robert A. Corbitt: Standard Handbook of Environmental Engineering, McGraw-Hill, 1999, ISBN 063-9785306672
- Saurabh Kumar Soni: ENVIRONMENTAL ENGINEERING-I, Katson Books, 2014, p. 275, ISBN 978-93-5014-334-6
- Saurabh Kumar Soni: ENVIRONMENTAL ENGINEERING-II, Katson Books, 2014, p. 325, ISBN 978-93-5014-419-0

Responsible of Subject: Dr. Kiss Tibor, professor, PhD

Number of Credits: 4

Timber, Masonry and Stone Structures

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 4

Prerequisites: Mechanics 2

Brief Syllabus:

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

Recommend Readings:

- Harbhajan Singh: Design of Masonry and Timber Structure : With Earthquake Resistant Measures, Abhishek Publications, 2010, p. 256, ISBN 9788182472853
- W.M.C. McKenzie: Design of Structural Masonry, Palgrave Macmillan, p. 288, ISBN 9780333792377
- Tedd Benson: Building the Timber Frame House, The Revival of a Forgotten Craft, Touchstone, 1981, p. 224, ISBN 9780684172866

Responsible of Subject: Dr. Iványi M. Miklós, associate professor, DLA

Number of Credits: 4

Road and Railway Design 1

Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 4

Prerequisites: -

Brief Syllabus:

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.
Practical design task: study plan of a road section of 2-3 km length, design of a 250-350 m section.
Mark parts: intermediate test 20%, practical design task 40%, exam result 40%

Recommend Readings:

- P. Schonfeld,J.-C. Jong: Intelligent Road Design, WIT Press, 2006, p. 420, ISBN 1-84564-003-9
- Wolfgang Kühn: Fundamentals of Road Design, WIT Press, 2013, p. 327, ISBN 978-1-84564-097-2
- J. S. Mundrey: Railway Track Engineering, Tata McGraw-Hill Education, 2010, p. 630, ISBN 978-0-07-068012-8

Responsible of Subject: Dr. Gulyás András, associate professor, PhD

Number of Credits: 4

Public Utilities

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 4

Prerequisites: Hydrology and Hydraulics

Brief Syllabus:

Basics of public utilities systems and their planning:
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).

Recommend Readings:

- J.C. Bonbright, A.L. Danielsen, D.R. Kamerschen: Principles of Public Utility, Public Utilities Reports, p. 700, 1988, ISBN 978-0910325233
- Andreas Bausch, Burkhard Schwenker: Handbook Utility Management, Springer Science & Business Media, 2009, p.781, ISBN 978-3-540-79348-9
- Darryl S. L. Jarvis, M. Ramesh, Xun Wu, Eduardo Araral, Jr. (Eds.): Infrastructure Regulation: What Works, Why and How Do We Know?, World Scientific, 2011, p. 600, ISBN 978-981-4335-73-7
- Hamada, M. et al (2014): Critical Urban Infrastructure Handbook, kiadó:CRC Press ISBN-13:978-1466592049 ISBN-10:1466592044

Responsible of Subject: Dr. Pálné Schreiner Judit, assistant professor, PhD

Number of Credits: 4

Geotechnics 1 (Soil Mechanics)

Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 4

Prerequisites: -

Brief Syllabus:

This course presents the application of principles of soil mechanics. It covers the following topics: the origin and nature of soils; soil classification (Grain size distribution, Atterberg limits, Classification of fine grained soils) ; the effective stress principle; hydraulic conductivity and seepage; stress-strain-strength behavior of cohesionless and cohesive soils and application to lateral earth stresses; consolidation theory and deformation characteristics of soils; and laboratory and field methods for evaluation of soil properties in design practice. The course is based on the regulations according to Eurocode 7 standards.

Recommend Readings:

- Karl Terzaghi: Soil Mechanics in Engineering Practice, John Wiley & Sons, 1996, p. 549, ISBN 0-471-08658-4
- Sahashi K Gulhati, Manoj Datta: Geotechnical Engineering, Tata McGraw-Hill Education, 2005., p. 738, ISBN 978-0-07-058829-5
- Donald P. Coduto: Geotechnical Engineering: Principles and Practices, Prentice Hall, 1999, p. 759, ISBN 9780135763803
- Ulrich Smoltczyk - Geotechnical Engineering Handbook, Ernst & Sohn; 2003, p. 2175, ISBN: 978-3433014523

Responsible of Subject: Dr. Szűcs István, associate professor, PhD

Number of Credits: 4

Water Resources Management

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 4

Prerequisites: Hydraulics and Hydrology

Brief Syllabus:

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

The following physical processes and principles are described: the water balance equation, precipitation and its measurements, areal averages, interception, infiltration, evaporation, runoff, unit hydrograph theory, river morphology, hydrology of lakes, groundwater.

Recommend Readings:

- Loucks, Daniel P., van Beek, Eelco, Stedinger, Jery R., Dijkman, Jozef P.M.,Villars, Monique T.Water: Resources Systems Planning and Management: An Introduction to Methods, Models and Applications ISBN: 9231039989
- L. Lenton, Mike Muller: Integrated Water Resources Management in Practice: Better Water Management for Development ISBN: 9781844076499
- Integrated Urban Water Management int he City of the Future (2011) Kiadó: ICLEI European Secretaria. ISBN: 978-3-943107-08-1 (PDF) ISBN: 978-3-943107-02-9 (CD ROM)
- Correlje, A.F.et al(2008): Every Drop Counts-Environmentally Sound Technologies for Urban and Domestic Water Use Efficiency. ed.: Schuetze ,T.kiadó: TU Delft. ISBN: 978-92-807-2861-3
- Hamada, M. et al (2014): Critical Urban Infrastructure Handbook, kiadó:CRC Press ISBN-13:978-1466592049 ISBN-10:1466592044

Responsible of Subject: Dr. Pálné Schreiner Judit, assistant professor, PhD

Number of Credits: 1

Hydrology Field Practice

Weekly Hours: 0 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 4

Prerequisites: Hydrology and Hydraulics

Brief Syllabus:

Measuring of free surface slope, depth and flow velocity in rivers. Discharge calculation and bed survey in river Danube and small streams by means of various methods. Water sampling methods in rivers, creeks, lakes and subsurface waters. Hydro-biological and chemical investigation and analysis. Measurements of surface-runoff and infiltration. Observation of flow phenomena in hydraulic systems and measurement of characteristic hydraulic features. 2 days.

Performing hydraulic measurements at 3 different facilities, 2 hours each, altogether 1 day. Presentation of basic hydraulic phenomena, determination of various hydraulic parameters applicable in practice. Head loss in pipe flows, issuing through bottom orifice, outflow under gates.

Recommend Readings:

- CHANSON, H.:Environmental Hydraulics of Open Channel Flows, Elsevier Butterworth-Heinemann, 2004, p. 483, ISBN 978 0 7506 6165 2
- R. L. Lenton, Mike Muller: Integrated Water Resources Management in Practice: Better Water Management for Development ISBN: 9781844076499
- G.L. Karia, R.A. Christian: Wastewater Treatment: Concepts And Design Approach ISBN: 8120328604
- Shaw, E.M.(1994): Hydrology in practice. Van Nostrand Reinhold, Kiadó: Chapman & Hall ISBN-13: 978-0-412-48290-8, ISBN: 0-412-48290-8
- Shaw, E.M. (1989): Engineering hydrology techniques in practice. Kiadó:Routledge ISBN-13: 978-0-7487-4448-0, ISBN: 0-7487-4448-7
- Brutsaert W.(2005): Hydrology – An Introduction. kiadó: Cambridge Univ. Press. At Cabot, GB661.2 .B78 2005, ISBN 0521824796

Responsible of Subject: Dr. Pálné Schreiner Judit, assistant professor, PhD

Number of Credits: 2

Basics of Geographic Information Systems 2

Weekly Hours: 1 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 4

Prerequisites: Basics of Geographic Information Systems 1.

Brief Syllabus:

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

Recommend Readings:

- Paul A. Longley, Mike Goodchild, David J. Maguire and David W. Rhind: Geographic Information Systems and Science, 2010, ISBN 978-0470721445
- Otto Huisman and Rolf A. de By: Principles of Geographic Information Systems, ITC, Enschede, The Netherlands, 2009, ISBN 978–90–6164–269–5
- GIS Commons: An Introductory Textbook on Geographic Information Systems, http://giscommons.org/

Responsible of Subject:: Dr. Gulyás András associate professor, PhD

Helps in Subject: Illyés Tamás teaching assistant

Number of Credits: 1

Building Services Engineering

Weekly Hours: 1 lectures 0 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 4

Prerequisites: -

Brief Syllabus:

This subject introduces students to the field of building services engineering and its relation to other professional fields and covers the following topics: energy consumption of buildings and location of consumption meters; space demand and location of building services equipment and centres; water supply, complete plumbing systems of buildings, cold water, hot water supply, sewerage systems, water use in architectural activities; heating technology, elements of central heating systems, energy saving in central heating; gas supply, role of gas supply and gas use in the energy supply of buildings, gas equipment in buildings, gas fittings and fixtures; renewable energy sources, passive and active utilisation of solar energy; geothermal energy; handling air, cooling and air conditioning systems, loading of rooms, comfort parameters; ventilation, cooling and heating; electricity supply and networks; electrical appliances in buildings, elements of electric wiring networks of buildings.
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).

Recommend Readings:

- Shan K. Wang, Handbook of Air Conditioning and Refrigeration, McGraw-Hill, 2000
- Fülöp L., Active Solar and PV Systems, IPA Building energetics, 2012.
- Magyar Z. Indoor environmental quality and EPBD, IPA Building energetics, 2012.
- D. Chadderton. Building services Engineering, Taylor & Francis, 2000.

Responsible of Subject: Dr.Fülöp László, associate professor, PhD

Number of Credits: 4

Steel Structures 1

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 5.

Prerequisites: -

Brief Syllabus:

This subject aims to provide essential theoretical and practical knowledge for the design, manufacturing and assembly of steel structures used in engineering. The course includes the following topics: definition, types and characterisation of steel structures, their advantages and disadvantages; design principles and methodology; Eurocode 3; components of steel bars, basic materials, joints; constructural design of pre-stressed bars; compressed bars; design of trusses; relationship between the built environment and steel structures; modelling steel materials; design principles; process of planning steel structures; structural bars: classification, structural design, limit states, standard dimensions; bars and beams subject to eccentric tension or compression; bolted, riveted and welded joints: classification, technology and application; design, application and dimensioning of simple structures, latticed and solid-web girders, split-section beams; stability limit states of structural bars, turning out and plate buckling; effects of strength and stability on the behaviour of structural bars, design principles; structural design, behaviour and dimensioning of beam-beam and column-beam joints; application and construction principles of complex steel structures; harmonising the design of steel structures and artistic viewpoints.
To complete the course students must be able to create a technically and aesthetically suitable solution for buildings and civil engineering steel structures.

Recommend Readings:

- Alexander Reichel, Peter Ackermann, Alexander Hentschel, Anette Hochberg, Building with Steel, 2007. ISBN 978-3-7643-8386-2
- Ivanyi, M. - Skaloud, M.: Stability Problems of Steel Structures CISM Courses and Lectures No 323, International Centre for Mechanical Sciences, SPRINGER - Verlag, Wien - New York, 1992, p. 415. ISBN: 978-3-211-82398-9
- Iványi, M. Miklós - Bancila, Radu - Iványi, Péter - Iványi, Miklós: Stability and Ductility of Planar Plated Steel Structures POLLACK PRESS, Pécs, 2010, p.305. ISBN 978-963-7298-3

Responsible of Subject: Dr. Fülöp Attila, assistant professor, PhD

Number of Credits: 4

Building Constructions 1

Weekly Hours: 1 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 5.

Prerequisites: -

Brief Syllabus:

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).

Recommend Readings:

- Malcolm Millais, Building Structures: From Concepts to Design
- Francis D.K. Ching: Building Construction Illustrated, Wiley, 4 edition, 2008, p. 478, ISBN 978-0-470-08781-7
- Graham Bizley: Architecture in Detail II, Elsevier Ltd., 2010, p. 221, ISBN 978-0-08-096535-2

Responsible of Subject: Dr. Zoltán Erzsébet Szeréna associate professor, DLA

Number of Credits: 2

Road and Railway Design 2

Weekly Hours: 1 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum:5.

Prerequisites: -

Brief Syllabus:

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.

Practical design task: design of a railway section of 2-3 km length or a simple station track network.
Mark parts: intermediate test 20%, practical design task 40%, exam result 40%

Recommend Readings:

- P. Schonfeld,J.-C. Jong: Intelligent Road Design, WIT Press, 2006, p. 420, ISBN 1-84564-003-9
- Wolfgang Kühn: Fundamentals of Road Design, WIT Press, 2013, p. 327, ISBN 978-1-84564-097-2
- J. S. Mundrey: Railway Track Engineering, Tata McGraw-Hill Education, 2010, p. 630, ISBN 978-0-07-068012-8

Responsible of Subject: Dr.Gulyás András, associate professor, PhD

Number of Credits: 3

Geotechnics 2 (Earthworks)

Weekly Hours: 1 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 5.

Prerequisites: -

Brief Syllabus:

This course presents the application of principles of earthworks. It considers the following topics: active and passive earth stresses; compaction of soil (optimum water content; soil density and Proctor-tests; in-situ compaction; Compaction equipment); bearing capacity and slope stability; geosynthetics; retaining structures (gravity, cantilever, sheet pile, anchored earth and mechanically stabilized earth (reinforced earth) walls). The course is based on the regulations according to Eurocode 7 standards**.**

Recommend Readings:

- Karl Terzaghi: Soil Mechanics in Engineering Practice, John Wiley & Sons, 1996, p. 549, ISBN 0-471-08658-4
- Sahashi K Gulhati, Manoj Datta: Geotechnical Engineering, Tata McGraw-Hill Education, 2005., p. 738, ISBN 978-0-07-058829-5
- Donald P. Coduto: Geotechnical Engineering: Principles and Practices, Prentice Hall, 1999, p. 759, ISBN 9780135763803
- Ulrich Smoltczyk - Geotechnical Engineering Handbook, Ernst & Sohn; 2003, p. 2175, ISBN: 978-3433014523
- Robert M Koerner: Designing With Geosynthetics, Xlibris, Corp.; 6 edition, 2012, p. 524 ISBN: 978-1462882885

Responsible of Subject: Dr. Szűcs István, associate professor, CSc

Helps in Subjects: Aradi László, teaching assistant

Number of Credits: 4

Reinforced Concrete Structures 1

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 5.

Prerequisites: -

Brief Syllabus:

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

Recommend Readings:

- Wight, J. K, MacGregor J. Reinforced concrete mechanics & design, Pearson, 2012.
- Nawy, E.G.. (2003). Reinforced Concrete A Fundamental Approach. Fifth Edition, Prentice Hall
- Jack C. McCormac, Design of Reinforced Concrete, ISBN-13: 978-1118129845
- Principles of Reinforced Concrete Design Mete A. Sozen, Toshikatsu Ichinose, Santiago Pujol ISBN 9781482231489
- W.H. Mosley, Ray Hulse, J.H. Bungey Reinforced Concrete Design to Eurocode 2 ISBN: 9780230302853

Responsible of Subject: Dr.Orbán Zoltán, assistant professor, PhD

Number of Credits:1

Road and Railway Survey Practice

Weekly Hours: 0 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 5.

Prerequisites: -

Brief Syllabus:

This course provides practical knowledge for road and railway surveying methods. The target of measuring practice is the learning of specific geodetic tasks of the road and railway construction. Within these tasks practices include new road and railway axis setting out as well as tangents, circular arc and transition curve main point and details calculation and setting out. Identification of the main parameters of existing alignments and tracks such as main point, radius of curvature, length of transition, central angle, super-elevation. Longitudinal and cross section measurements of existing road and railway. Short and long-chord measuring of railway lines, calculation for track alignment. Levelling the rail track and calculation the raising for tamping. Getting started with simple rail track diagnostic measuring. Another target in the road field is to acquire knowledge in testing of materials, adequacy tests, pavement mixture design, special tests in asphalt mechanics, while in the railway field to get acquainted with assembly of rail-fixing and measurement of mechanical characteristics.

Recommend Readings:

- P. Schonfeld,J.-C. Jong: Intelligent Road Design, WIT Press, 2006, p. 420, ISBN 1-84564-003-9
- Wolfgang Kühn: Fundamentals of Road Design, WIT Press, 2013, p. 327, ISBN 978-1-84564-097-2
- J. S. Mundrey: Railway Track Engineering, Tata McGraw-Hill Education, 2010, p. 630, ISBN 978-0-07-068012-8

Responsible of Subject: Dr. Lindenbach Ágnes, professor, PhD

Number of Credits:4

Geotechnics 3 (Foundations)

Weekly Hours: 2 lectures, 2 practical lessons 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 6.

Prerequisites: -

Brief Syllabus:

General geotechnical education starts with an introduction to the geological–engineering aspects of building sites so students can get acquainted with the basic physical, dynamic and water permeability properties of soils. Students learn about the different methods, types and application aspects of foundations, their constructions and construction technologies. They are taught the design principles of flat and deep foundations. They study geotechnical reasons for damage to buildings and possible approaches for reinforcing foundations and strengthening soils. Special emphasis is given to the effect foundations and their loads have on the surrounding soil.

Recommend Readings:

- K. Széchy, L. Varga. Foundation engineering, Akadémiai Kiadó, 1978.
- Karl Terzaghi: Soil Mechanics in Engineering Practice, John Wiley & Sons, 1996, p. 549, ISBN 0-471-08658-4
- Sahashi K Gulhati, Manoj Datta: Geotechnical Engineering, Tata McGraw-Hill Education, 2005., p. 738, ISBN 978-0-07-058829-5
- Donald P. Coduto: Geotechnical Engineering: Principles and Practices, Prentice Hall, 1999, p. 759, ISBN 9780135763803

Responsible of Subject: Dr. Szűcs István, associate professor, PhD

Number of Credits5

Steel Structures 2

Weekly Hours: 2 lectures 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 6.

Prerequisites: **Steel Structures 1**

Brief Syllabus:

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

Recommend Readings:

- Alexander Reichel, Peter Ackermann, Alexander Hentschel, Anette Hochberg, Building with Steel, 2007. ISBN 978-3-7643-8386-2
- Ivanyi, M. - Skaloud, M.: Stability Problems of Steel Structures CISM Courses and Lectures No 323, International Centre for Mechanical Sciences, SPRINGER - Verlag, Wien - New York, 1992, p. 415. ISBN: 978-3-211-82398-9
- Iványi, M. Miklós - Bancila, Radu - Iványi, Péter - Iványi, Miklós: Stability and Ductility of Planar Plated Steel Structures POLLACK PRESS, Pécs, 2010, p.305. ISBN 978-963-7298-3

Responsible of Subject: Dr.Fülöp Attila, assistant professor, PhD

Number of Credits:5

Reinforced Concrete Structures 2

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 6.

Prerequisites: Reinforced Concrete Structures 1.

Brief Syllabus:

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

Recommend Readings:

- Wight, J. K, MacGregor J. Reinforced concrete mechanics & design, Pearson, 2012.
- Mc Comac and Brown, Design of Reinforced Concrete, 9th Edition, 2011.
- Jack C. McCormac, Design of Reinforced Concrete, ISBN-13: 978-1118129845
- Principles of Reinforced Concrete Design Mete A. Sozen, Toshikatsu Ichinose, Santiago Pujol ISBN 9781482231489
- W.H. Mosley, Ray Hulse, J.H. Bungey Reinforced Concrete Design to Eurocode 2 ISBN: 9780230302853

Responsible of Subject: Dr.Orbán Zoltán, assistant professor, PhD

Helps in Subject: Juhász Tamás, teaching assistant

Number of Credits:3

Complex Accessibility

Weekly Hours: 0 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 8.

Prerequisites: -

Brief Syllabus:

In daily life, as we maneuver through society, nothing is more important yet taken for granted more often than access. For millions of people with disabilities, the access that most of us take for granted is difficult, impossible, or achievable only with the intervention of a third party. We live in what is considered an independent society, yet independent access to programs, facilities, and employment are not easily achievable by many. Physical access is historically the arbiter of success and the source of opportunity in education, employment, and social freedom. Thus, accessibility is a civil rights issue for many people with disabilities and for our society. This course will provide you with an overview of the principals and guiding documents that support accessible environments.
By completing this course students
- will be able understand the goals of accessible design,
- will learn how to apply at least two principles of accessible design to a project,
- will describe flexible design principles that support accessible spaces,
- will learn how to achieve equal access through integrated design.

Recommend Readings:

• Alison Grant, Geraldine McNamara Designing for Accessibility, ISBN-13: 978-1859463642
• Building access handbook 2007. ISBN 978-0-7726-5851-7
• Dr MAGDOLNA HORVÁTH, TAMÁS TURI - Ergonomics – Accessibility, PTE PMMIK, 2014
• JOACHIM FISCHER, PHILIPP MEUSER - Accessible Architecture (Construction and Design Manual), DOM publishers, (ISBN-13 978-3869221700)
• JOSEPH SPITERI – Access for All (Design Guidelines), National Commission Persons with Disability (ISBN 978-99909-71-53-8) 2011
• FRANCESC ARAGALL - European Concept for Accessibility (Technical Assistance Manual), EuCAN (ISBN 2-919931-24-5) 2003

Responsible of Subject: Dr. Kistelegdi István, professor, DLA

Professional Studies in Civil Engineering

Number of Credits: 2

Structural Diagnostics Laboratory Practice

Weekly Hours: 0 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 4.

Prerequisites:: -

Brief Syllabus:

This course provides students with knowledge on structural diagnostics techniques. The following areas are covered: in-situ testing methods for concrete, steel, masonry and timber structures; the use of non-destructive testing methods in civil engineering; testing the mechanical properties of materials and behaviour of structural elements subjected to various types of loading. Some test methods will be demonstrated at real constructions.

Recommend Readings:

- V.M. Malhotra, Nicholas J. Carino, Handbook on Nondestructive Testing of Concrete Second Edition,
- ISBN 9780849314858
- Active Standard ASTM C1314, Standard Test Method for Compressive Strength of Masonry Prisms
- Bruce A. Suprenant, Nondestructive Evaluation & Testing of Masonry Structures, ISBN-13: 978-0924659577
- Hibbeler, Mechanics of Materials (9th Edition), ISBN-13: 978-0133254426

Responsible of Subject: Dr. Orbán Zoltán, assistant professor, PhD

Helps in Subject: Dr. Fülöp Attila, assistant professor, PhD

Number of Credits: 5

Theoretical Basics of Structural Analysis

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 4.

Prerequisites: -

Brief Syllabus:

This course is aimed 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.

Recommend Readings:

- Hunt T. Tony Hunt's Structures Notebook, 2003 ISBN 978-075-0658-97-3
- H. Gulvanessian, J-A. Calgaro and M. Holicky Designers' Guide to EN 1990 Eurocode: Basis of Structural Design ISBN 0-7277-3011-8
- EN 1990 Eurocode: Basis of Structural Design. CEN 2002

Responsible of Subject: Dr.Fülöp Attila assistant professor, PhD

Number of Credits: 5

Finite Element Modelling

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 5.

Prerequisites:: -

Brief Syllabus:

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.

Recommend Readings:

- Fish, J. – Belytschko, T. : First Course in Finite Elements, Wiley, 2008.
- Akin, J. E. : Finite Elements for Analysis and Design, Academic Press, 1995.
- Zienkiewicz, O. C. – Taylor, R. L. : The Finite Element Method: The Basis + Solid Mechanics, Butterworth, 2000.

Responsible of Subject: Dr. Pomezanski Vanda, assistant professor, PhD

Number of Credits: 3

Building Design

Weekly Hours: 1 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 5.

Prerequisites:: -

Brief Syllabus:

This course serves as an introduction to the home environment and gives students a theoretical and practical basis for designing residential buildings. To achieve this, lectures are given in the following topics: arrangement of space in a house, fixtures in a house, suitable floor plan layout of spaces, external appearance of the building (familiarisation with an emphasis on the deviations and differences depending on sitting arrangements), service requirements, types of residential building, and the history of residential buildings.
In their semester assignment, students present the problems arising from mass formation and the sitting arrangements of buildings and during the practical sessions they prepare models and are taught techniques and tools of representation (drawing tools, methods and tools for modelling).
This subject includes an architectural design project in the practical part (marked with a P) where students can practice and further develop the content of the lectures (marked with an L).

Recommend Readings:

- Ernst and Peter Neufert, Neufert Architects' Data ISBN 9780258965092
- Malcolm Millais, Building Structures: From Concepts to Design ISBN: 978-0415336239
- Heino Engel, Structure Systems, 2007. ISBN-13: 978-3775718769

Responsible of Subject: Dr. Medvegy Gabriella, associate professor, DLA

Number of Credits: 4

Constructions 2

Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 6.

Prerequisites: Building Constructions 1.

Brief Syllabus:

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).

Recommend Readings:

- Heino Engel, Structure Systems, 2007.
- Klaus Sedlbauer, Eberhard Schunck, Rainer Barthel, Hartwig Künzel, Flat Roof Construction Manual, 2010.
- Roy Chudley, Roger Greeno, Building Construction Handbook,2010

Responsible of Subject: Dr.Zoltán Erzsébet Szeréna associate professor, DLA

Number of Credits: 4

Underground Structures

Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 6.

Prerequisites: -

Brief Syllabus:

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

Recommend Readings:

- Roy, Rob (2006), Earth-Sheltered Houses: How to Build an Affordable Underground Home. New Society Publishers. ISBN 978-0-86571-521-9.
- Sargis S. Safarian, Ernest C. Harris. Design and construction of silos and bunkers, Van Nostrand Reinhold, 1985 ISBN 9780442278014
- R.S. Sinha. Underground Structures Design and Instrumentation ISBN: 978-0-444-87462-7
- K. Széchy, L. Varga. Foundation engineering, Akadémiai Kiadó, 1978.
- R Sihna, Underground Structures, 1st Edition, eBook ISBN: 9780444599025
- • Technical Reports Series 439, Decommissioning of Underground Structures, Systems and Components, STI/DOC/010/439 (ISBN:92-0-104405-4)

Responsible of Subject: Dr.Hutter Ákos, associate professor, DLA

Helps in Subjects: Juhász Tamás, teaching assistant

Number of Credits:3

Bridge Construction

Weekly Hours: 2 lectures, 2 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 6.

Prerequisites: -

Brief Syllabus:

This course is aimed to provide basic knowledge on the design, construction and maintenance of bridges. Topics covered will include: history of bridge construction; elements of bridges; characteristics of steel, concrete, masonry and timber bridges, classical and modern bridge construction techniques; basics of bridge design; bridge defects; bridge inspection; bridge maintenance

Recommend Readings:

- J Zhao, D Tonias, Bridge Engineering, Third Edition, ISBN-13: 978-0071752497
- R M Barker, J A Puckett, Design of Highway Bridges, ISBN-13: 978-0470900666
- EN 1990 Eurocode: Basis of Structural Design. CEN 2002

Responsible of Subject: Dr. Iványi M.Miklós, associate professor, DLA

Number of Credits: 4

Industrial and Agricultural Building Design

Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 7.

Prerequisites: -

Brief Syllabus:

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. 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, volume design practice, methods of representation, and preparation of colour designs. 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).

Recommend Readings:

- Bernd Becher, Hilla Becher Basic Forms Of Industrial Buildings ISBN 0500542996
- Andrea Deplazes, Constructing Architecture: Materials, Processes, Structures ISBN: 3764371900
- Alexander Reichel, Peter Ackermann, Alexander Hentschel, Anette Hochberg, Building with Steel, 2007. ISBN 978-3-7643-8386-2

Responsible of Subject: Dr. Hutter Ákos, associate professor, DLA

Number of Credits: 4

Engineering Timber Structures

Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 7.

Prerequisites: -

Brief Syllabus:

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.

Recommend Readings:

- W.M.C. McKenzie, Binsheng Zhang Design of Structural Timber to Eurocode 5 ISBN 9780230007772
- H.J. Larsen and V. Enjily Practical Design of Timber Structures to Eurocode 5 ISBN: 9780727736093
- Design of Structural Elements: Concrete, Steelwork, Masonry and Timber Designs to British Standards and Eurocodes, Third Edition ISBN 9780415467209

Responsible of Subject: Dr.Iványi M. Miklós, associate professor, DLA

Helps in Subject: Juhász Tamás, teaching assistant

Number of Credits: 3

Strengthening of Structures

Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 7.

Prerequisites: -

Brief Syllabus:

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

Recommend Readings:

- Xiao-Ling Zhao: FRP-Strengthened Metallic Structures ISBN 9780415468213
- CEB FIP: Repair and Strengthening of Concrete Structures ISBN: 978-0-7277-1615-6
- Alann André: Fibres for Strengthening of Timber Structures ISSN 1402-1528

Responsible of Subject: Dr.Orbán Zoltán, assistant professor, PhD

Number of Credits: 3

Steel-Concrete Composite Structures

Weekly Hours: 2 lectures, 1 practical lessons, 0 lab.

Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 7.

Prerequisites: -

Brief Syllabus:

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

Recommend Readings:

- Narayanan, R.: Steel-Concrete Composite Structures – Stability and Strength, Spon Press, 2005, ISBN 1-85166-134-4
- Johnson, R. P.: Composite Structures of Steel and Concrete: Beams, Slabs, Columns, and frames for buildings, Blackwell Publishing, 2004, ISBN 1-4051-0035-4
- Oehlers, D.J. and Bradford, M.A.: Composite Steel and Concrete Structural Members: Fundamental Behaviour, Elsevier Science Ltd., 1995, ISBN 0 08 041919 4
- R.P. Johnson: Composite Structures of Steel and Concrete vol. 1, ISBN 0-6202507-7

Responsible of Subject: Dr.Iványi M. Miklós associate professor, DLA

Helps in Subject: Juhász Tamás, teaching assistant

Number of Credits: 6

Steel Structures 3

Weekly Hours: 2 lectures, 3 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 7.

Prerequisites:-

Brief Syllabus:

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

Recommend Readings:

- Alexander Reichel, Peter Ackermann, Alexander Hentschel, Anette Hochberg, Building with Steel, 2007. ISBN 978-3-7643-8386-2
- Ivanyi, M. - Skaloud, M.: Stability Problems of Steel Structures CISM Courses and Lectures No 323, International Centre for Mechanical Sciences, SPRINGER - Verlag, Wien - New York, 1992, p. 415. ISBN: 978-3-211-82398-9
- Iványi, M. Miklós - Bancila, Radu - Iványi, Péter - Iványi, Miklós: Stability and Ductility of Planar Plated Steel Structures POLLACK PRESS, Pécs, 2010, p.305. ISBN 978-963-7298-3

Responsible of Subject: Dr. Fülöp Attila, assistant professor, PhD

Number of Credits: 6

Reinforced Concrete Structures 3

Weekly Hours: 2 lectures, 3 practical lessons, 0 lab.

Language of Instructions: English

Grading: Exam

Place of Subject in Curriculum: 7.

Prerequisites: -

Brief Syllabus:

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.

Recommend Readings:

- Wight, J. K, MacGregor J. Reinforced concrete mechanics & design, Pearson, 2012.
- Principles of Reinforced Concrete Design Mete A. Sozen, Toshikatsu Ichinose, Santiago Pujol ISBN 9781482231489
- W.H. Mosley, Ray Hulse, J.H. Bungey Reinforced Concrete Design to Eurocode 2 ISBN: 9780230302853

Responsible of Subject: Dr. Orbán Zoltán, assistant professor, PhD

Number of Credits15

Diploma Work

Weekly Hours: 2 lectures, 10 practical lessons, 0 lab.

Language of Instructions: English

Grading: Signature

Place of Subject in Curriculum: 8.

Prerequisites: -

Brief Syllabus:

During the semester students are required to accomplish the complete design documentation of a designated structure involving an independent senior structutural designer, as an external consultant. The final project is to be defended in front of the examination board, demonstrating the professional competence of the candidate.

Recommend Readings:

- Johnson, R. P.: Composite Structures of Steel and Concrete: Beams, Slabs, Columns, and frames for buildings, Blackwell Publishing, 2004, ISBN 1-4051-0035-4
- Wight, J. K, MacGregor J. Reinforced concrete mechanics & design, Pearson, 2012.
- R C Hibbeler, Engineering Mechanics: Statics (13th Edition), ISBN-13: 978-0132915540
- Alexander Reichel, Peter Ackermann, Alexander Hentschel, Anette Hochberg, Building with Steel, 2007. ISBN 978-3-7643-8386-2
- Ivanyi, M. - Skaloud, M.: Stability Problems of Steel Structures CISM Courses and Lectures No 323, International Centre for Mechanical Sciences, SPRINGER - Verlag, Wien - New York, 1992, p. 415. ISBN: 978-3-211-82398-9
- Iványi, M. Miklós - Bancila, Radu - Iványi, Péter - Iványi, Miklós: Stability and Ductility of Planar Plated Steel Structures POLLACK PRESS, Pécs, 2010, p.305. ISBN 978-963-7298-3

Responsible of Subject: Dr. Lindenbach Ágnes, professor, PhD

Number of Credits: 2

Computer Aided Structural Design 1

Weekly Hours: 1 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 8.

Prerequisites: -

Brief Syllabus:

This course is aimed to provide basic knowledge on Computer Aided Structural Design. Topics covered by the course include: Basic knowledge of useful and well developed industrial designer software like AXIS, TEKLA and ANSYS. 2D and 3D design system, modelling solid bodies. Engineering drawings and analysis of complete structural systems.

Recommend Readings:

- User manual of AXIS software package, www.axisvm.hu
- User manual of TEKLA software package, www.tekla.com
- User manual of ANSYS software package, www.ansys.com

Responsible of Subject: Dr.Halada Miklós, assistant professor, DLA

Number of Credits:2

Computer Aided Structural Design 2

Weekly Hours: 1 lectures, 1 practical lessons, 0 lab.
Language of Instructions: English

Grading: Mid-semester Exam

Place of Subject in Curriculum: 8.

Prerequisites: -

Brief Syllabus:

This course is aimed to provide advanced knowledge on Computer Aided Structural Design. Topics covered by the course include: Advanced knowledge of useful and well developed industrial designer software like AXIS, TEKLA and ANSYS. Tasks for engineering practice and scientific research

Recommend Readings:

User manual of AXIS software package, www.axisvm.hu
User manual of TEKLA software package, www.tekla.com
User manual of ANSYS software package, www.ansys.com

Responsible of Subject: Dr.Halada Miklós assistant professor, DLA