Institute of Structural Engineering–COURSES – winter term

Subject: **Steel and timber structures (Ing. Róbert Šoltýs, PhD.)**
Code: **2507801**
Number of credits: **5**
Semester of study: **WT**
Academic degree: **bachelor**

Target of this course is to acquaint students with principle of design of metal and timber structures according to relevant technical standards and principles. In practical part of the subject, students will design simple steel and timber civil structures with focus on structural design and detailing.

Subject: **Metal structures and bridges (Ing. Róbert Šoltýs, PhD., Ing. Patrícia Vaňová)**
Code: **2506511**
Number of credits: **5**
Semester of study: **WT**
Academic degree: **bachelor**

Target of this course is to acquaint students with principle of design of metal and timber structures according to relevant technical standards and principles. In practical part of the subject, students will design simple steel and timber civil structures and bridges with focus on structural design and detailing.
In practical part of the subject, students will design of simple structures and hall objects: roof structures - roof cladding, beams, lattice-girders and bracing. Lateral bond of hall object and design of column base. Space stiffness of hall objects. Outside and inside walls. Loading and space layout of railway and highway bridges. Bearing systems of bridges.

Subject: **Timber structures and bridges (Ing. Viktória Bajzecerová, PhD.)**
Code: **25000120**
Number of credits: **4**
Semester of study: **WT**
Academic degree: **bachelor**

The target of this subject is to acquaint the students with the principle of design of timber structures according to valid technical standards and regulations.

Students are familiar with design an extensive range of timber load-bearing structures: the planar trusses, frames, and arches, timber roof structures, spatial structures, construction systems of timber multi-storey buildings, and timber bridges and footbridges. Principles and methods for protecting wood and timber structures are introduced.
Within the practical, students design several types of timber structures as timber truss of industrial building roof, sports hall structure, and a timber footbridge. The emphasis is on the principles of economic and reliable design of timber structures in accordance with current theoretical knowledge and technical standards.

Subject: **Elasticity I (assoc. prof. Ing. Eva Kormaníková, PhD.)**
Code: **2504031**
Number of credits: **4**
Semester of study: **WT**
Academic degree: **bachelor**

Objective of the Elasticity I is to analyze simple state of stress (Simple tension (compression), Simple shear, Simple torsion, Simple bending), Buckling of centric loaded columns and combined state of stress (Shear under bending, General bending, Bending with tension (compression)).

Subject: **Static analysis of constructions (assoc. prof. Ing. Kamila Kotrasová, PhD.)**
Code: **2507761**
Number of credits: **5**
Semester of study: **WT**
Academic degree: **bachelor**

The goal of subject Static of structures is inform students with solving of statically determinate planar structures (simple, continuous beams with hinge, frames, three-hinged frames, arches and orthogonally loaded frames), calculation of displacements at statically determinate structures and methods for solving of statically determinate structures: force method, force method, slope deflection method and displacement method.

Subject: **Transport engineering planning (assoc. prof. Ing.Brigita Salaiová, PhD.)**
Code: **25000048**
Number of credits: **5**
Semester of study: **WT**
Academic degree: **bachelor**

The goal is to manage the design process in the area of transport - principles of transport-planning process, defined by the functions of roads in the area, design of road network, the relationship of roads and local roads and their impact on the environment.
Transport in land-use planning. Solution of transport in land-use planning documentation. Traffic engineering documentation. Roads and their function in the territory. Roads network. Principles of design of roads in the area. Traffic forecast. Methods of transport modeling. Capacity of transport facilities. Design of parking facilities. Communications for pedestrians and cyclists. Relationship of roads and the environment. Traffic noise.

Subject: **Transport structures (assoc. prof. Ing.Brigita Salaiová, PhD., Ing. Darina Kušnírová, PhD.)**
Code: **25000050**
Number of credits: **5**
Semester of study: **WT**
Academic degree: **bachelor**

The course is focused on the issue of explaining the design and construction of transport structures. The aim is to become familiar with the principles of design of roads and highways and to get basic knowledge about geometry problems of transport structures.

Roads and their elements, terminology. Width arrangement of roads. Tracing. Design elements of roads. Length of sight. Design speed. Horizontal alignment - straight, curves. Elements of itineraries in longitudinal section - vertical alignment of the road, vertical curves. Path element in cross-section. Earth body - earthworks for the construction of natural body, compacting embankments, slope cutting natural body, drainage facilities. Objects – culvers, walls, bridges and tunnels. Documentation of construction of roads and highways. Technical studies.

Subject: **Soil mechanics (Ing. Slávka Harabinová, PhD., Ing. Eva Panulinová, PhD.)**
Code: **25000443**
Number of credits: **5**
Semester of study: **WT**
Academic degree: **bachelor**

The goal is to teach students the basic properties of soils, methods of detection and classification of soils. Apply strength and deformation characteristics of soils for solution of geotechnical task for stress in soils, earth pressure, compressibility and consolidation as well as compacting and its control.

Subject: **Soil Mechanics (Ing. Eva Panulinová, PhD., Ing. Slávka Harabinová, PhD.)**
Code: **2503811**
Number of credits: **4**
Semester of study: **WT**
Academic degree: **bachelor**

The goal of the subject is to acquaint students with the theoretical and practical thesis of basic geotechnics. At the end of study students will be able to use the relevant standards and regulations, assess the geological environment and its properties, describe and classify the soil and to calculate the stresses and strain in the ground.

Subject: **Concrete and concrete bearing structures(doc. Ing. Sergej Priganc, CSc.)**
Code: **2507771**
Number of credits: **5**
Semester of study: **WT**
Academic degree: **bachelor**

Design of concrete window lintels, consoles, loggias, and reinforced concrete rings in masonry structures. Solving plates and principles of their reinforcement. Stress analysis and deformation of slabs/plates acting in two directions, design and arrangement of reinforcement. Solution and reinforcement of circular and intercircular plates. Design and assessment of a reinforced concrete wall on supports. Calculation and assessment of frame structures in interaction with the foundation structure. Design and assessment of masonry structures.

Subject: **Metal bridges II (Ing. Patrícia Vaňová, prof. Ing. Vincent Kvočák, PhD.)**
Code: **2506771**
Number of credits: **5**
Semester of study: **WT**
Academic degree: **master**

Target of this subject is to acquaint students with principle of design of metal bridges according to technical standards and principles. It includes design of truss, box girder, arch, cable-stay and suspension bridges. The problems of stability of compressed elements of openly arranged bridges, arch ridges, etc. are discussed. Practical part of the subject is focused on the specific solution of railway truss bridge

Subject: **Selected chapters of metal and timber structures I (Ing. Róbert Šoltýs, PhD., Ing. Daniel Dubecký, PhD., Ing. Viktória Bajzecerová, PhD.)**
Code: **2506871**
Number of credits: **4**

Semester of study: **WT**
Academic degree: **master**

To offer the special theoretical and practical set-out oriented on selected current strength-stability problems of reliability and economical design of metal and timber structures, in accordance with new theoretical knowledge, practical experiences and relevant technical standard.
- design methods for special steel structures subjected to wind loading, aerodynamics and aeroelasticity of steel bridges, towers, buildings and cable roofs,
- fatigue analysis of steel structures and analysis of various types of structural steel joints,
- wood and wood-based material properties, fire resistance of timber structures, analysis, design, and resistance of timber structures, particularly composed of glued laminated timber, cross-laminated timber, and timber-concrete composite members.

Subject: **Elasticity II (assoc. prof. Ing. Eva Kormaníková, PhD.)**
Code: **2507991**
Number of credits: **4**
Semester of study: **WT**
Academic degree: **master**

The object of the Elasticity II is to analyze the typical design elements such as walls, plates, beams in Cartesian and Polar coordinate system. Besides the closed solutions there is devoted focus to numerical methods, especially the Finite Element Method. There are analyzed the simple structural elements in the non-linear -plastic zone.

Institute of Structural Engineering – COURSES – summer term

Subject: **Steel and timber bearing members (Ing. Mohamad Al Ali, PhD.,Ing. Róbert Šoltýs, PhD.)**
Code: **2505511**
Number of credits: **5**
Semester of study: **ST**
Academic degree: **bachelor**

This course is focused on design of steel and timber bearing members according to relevant technical standards. It will be pointed to elastic and plastic stress response, local and global buckling of steel members under compression and bending and design and detailing of connections. As well as basic principles in design of timber bearing members will be given.

Subject: **Steel bearing members (Ing. Mohamad Al Ali, PhD., Ing. Róbert Šoltýs, PhD.)**
Code: **2507491**
Number of credits: **6**
Semester of study: **ST**
Academic degree: **bachelor**

This course is focused on design of steel bearing members according to relevant technical standards. It will be pointed to elastic and plastic stress response, local and global buckling of steel members under compression and bending and design and detailing of connections.

Subject: **Theoretical mechanics (assoc. prof. Ing. Eva Kormaníková, PhD.)**
Code: **2500181**
Number of credits: **5**
Semester of study: **ST**
Academic degree: **bachelor**

Objectives of the Theoretical Mechanics is to analyze concurrent system of forces, General system of forces, Statics of rigid particles and bodies, Trusses, Internal loadings developed in structural members (beams, frames, arches), Reactions of composed structures and transverse loading frames.

Subject: **Construction mechanics (assoc. prof. Ing. Kamila Kotrasová, PhD.)**
Code: **2507851**
Number of credits: **4**
Semester of study: **ST**
Academic degree: **bachelor**

The aim of the course is to acquaint students with the solution of statically indeterminate structures the force and deformation method of constant load, the effect of temperature and tempering supports. Indicate the calculation of influence and fold lines for statically determinate and indeterminate structures, and computation structures on flexible base substrate.

Subject: **Roads and motorways (assoc. prof. Ing. Brigita Salaiová, PhD., Ing. Darina Kušnírová, PhD.)**
Code: **2505641**
Number of credits: **4**
Semester of study: **ST**
Academic degree: **bachelor**

The course is focused on problems of design of roads and highways, the construction of road earthbody and layers of pavement. It clarifies the principles of design and construction of roads and highways. Theory of movement of motor vehicles after road communication. The size and length of longitudinal profile - design of lane for heavy vehicles. Drainage - a design of culver. Road equipment - safety equipment on roads. Design of intersections. Capacity and level of service of intersections. Classification and structure of pavements. Material for road pavements.

Subject: **Railway structures I (assoc. prof. Ing. Ján Mandula, PhD., Ing. Peter Orolin, PhD.)**
Code: **2506091**
Number of credits: **5**
Semester of study: **WT**
Academic degree: **bachelor**

The objective of the subject is to introduce of students with problems of railway track geometry components and alignment, clearances and to practice acquires knowledge and skills.
Relation between vehicle and track, dynamics of driving, driving the vehicle in a straight and arc, trackside and rolling resistance, the loading diagrams. Tracing railways, type of route, and their use, ways developing routes, geological survey. Geometrical position and arrangement of rails, track gauge and extension of track gauge. The cant of rail. Horizontal alignment of railway track, spiral curve, circular curves with spiral. The vertical alignment of the railway track, decisive rising and lost slope, quarries vertical alignment and curvature, route constant resistance. The spatial editing of routes. Transition area, bridges and tunnels. Proposal subgrade, types of structures, calculation of stress and assessment of the load capacity and adverse effects of frost.

Subject: **Foundation I (Ing. Slávka Harabinová, PhD., Ing. Eva Panulinová, PhD.)**
Code: **25000444**
Number of credits: **5**
Semester of study: **ST**
Academic degree: **bachelor**

The goal is to teach students to solve problems of foundations. The subject also covers the issue of foundation soil´s stability and strain, issues of choice and statical solution of foundation structure according to Eurocode 7 and selection of most suitable technological procedures when executing foundation of building structures.

Subject: **Concrete and masonry bearing member (doc. Ing. Sergej Priganc, CSc.)**
Code: **25000042**
Number of credits: **5**
Semester of study: **WT**
Academic degree: **bachelor**

Definitions of basic terms and conditions of their use in the design of load-bearing elements and structures. Methods of design of load-bearing structures. Loads on structures and their calculation. Design of load-bearing elements for bending shear, torsion and compression. Principles of drawing documentation of concrete structures. Design of masonry elements for simple stress methods.

Subject:	**Metal bridges I (Ing. Patrícia Vaňová, prof. Ing. Vincent Kvočák, PhD.)**
Code:	**2506071**
Number of credits:	**5**
Semester of study:	**ST**
Academic degree:	**master**

Target of this subject is to acquaint students with principle of design of metal bridges according to technical standards and principles. It includes general lecture about divisions of metal bridges; problems of loading and spatial modification of road and railway bridges; solutions of decks of road and railway bridges; design of girder bridges – including bridges with thin-walled cross-sections and composite steel-concrete bridges with design of composite elements. Practical part of the subject is focused on the specific solution of railway girder bridge and road composite bridge.

Institute of Environmental Engineering – RESEARCH

Master study - Department of Structural Mechanics and Department of Steel and Timber Structures (prof. Ing. Michal Tomko, PhD., Ing. Robert Šoltýs, PhD.)
Structural Health Monitoring, dynamics of structures, modal analysis
Preface: 07 Dynamics Aerodynamics.pdf

Bachelor/ Master study - Department of Steel and Timber Structures(Ing. Robert Šoltýs, PhD.)
Wind Engineering, aerodynamics of structures, numerical methods in wind engineering and aerodynamics
Preface: Dynamics-Aerodynamics.pdf

Bachelor/ Master study - Department of Steel and Timber Structures(Ing. Viktória Bajzecerová, PhD.)
The research program in-depth analyses the behaviour of timber-concrete composite member. Various types of shear connections have already been used, such as an inclined pair of screws, a notched connection, and an adhesive connection. The research consists of shear tests of connections, short and long-term bending tests, tests in the climate chamber, and extensive theoretical analysis.
Preface: Bajzecerova_Erasmus+_research.pdf

Master / PhD. study - Department of Structural Mechanics (prof. Ing. Eva Kormaníková, PhD.)
The research is focused on multiscale modeling of multi-physical problems of composite structural elements. The attention will be given to the problem with the inclusion of material heterogeneity, numerical and experimental analysis of structural elements made of composite materials, and delamination of laminated structural members.
The developed field of numerical analysis of composite structures will be focused on the development of material models for numerical simulations of multi-physical interaction problems of laminate and sandwich structures. Delamination of laminates and sandwich with contact element application will be investigated for delamination in mode I, II, and III or in the mixed mode of delamination. The application of composite materials in the members will be focused on laminate and sandwich plates and shels.

Master study - Department of Geotechnics and Transportation Engineering(assoc. prof. Ing. Brigita Salaiová, PhD., Ing. Lenka Mandulová)
The research is focused on theoretical and experimental analysis of traffic-technical characteristics of roads, traffic flow characteristics and technical characteristics of roads for numerical modeling of traffic noise for different types of roads, intersections and roads. The SPB method, the modified SPB method with reflect board and the CPX method are used for the measurement.

Master study - Department of Geotechnics and Transportation Engineering (assoc. prof. Ing. Ján Mandula, PhD., Ing. Jakub Bokomlaško)
The research is focused on the theoretical and experimental analysis of layered road structures and their response to traffic loads, road construction materials and their verification in the laboratory and in situ. Viscoelastic properties and fatigue of asphalt mixtures in order to prolong the life of layered structures. For static and dynamic analysis of track structural elements.