Study plan

Name of study plan: Stavební inženýrství - pozemní stavby, specializace Statika pozemních staveb

Faculty/Institute/Others:
Department:
Branch of study guaranteed by the department: Welcome page
Garantor of the study branch:
Program of study: Civil Engineering - Building Engineering
Type of study: Follow-up master full-time
Required credits: 90
Elective courses credits: 0
Sum of credits in the plan: 90
Note on the plan: platí pro nástup od akad. roku 2023/24

Name of the block: Compulsory courses
Minimal number of credits of the block: 42
The role of the block: Z

Code of the group: NC20230102
Name of the group: Statika pozemních staveb, 1. semestr
Requirement credits in the group: In this group you have to gain at least 21 credits
Requirement courses in the group: In this group you have to complete at least 5 courses
Credits in the group: 21
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
101MAPS	**Mathematics PS** *Jana Nosková, Michal Zdražil, Iva Malechová, Jozef Bobok* ***Jana Nosková*** *Jana Nosková (Gar.)*	Z,ZK	3	2P+1C	Z	z
124PS4C	**Building Structures 4** *Vladimír Žďára, Hana Gattermayerová, Tomáš Čejka, Ctislav Fiala* ***Vladimír Žďára*** *Vladimír Žďára (Gar.)*	Z,ZK	4	2P+2C	Z	z
132NAK	**Numerical Analysis of Structures** *Bořek Patzák, Martin Horák, Tomáš Krejčí* ***Bořek Patzák*** *Bořek Patzák (Gar.)*	Z,ZK	5	2P+2C	Z	z
133B03C	**Concrete Structures 3C** *Jan Vítek, Lukáš Vráblík, Jan Vesecký* ***Lukáš Vráblík*** *Jan Vítek (Gar.)*	Z,ZK	5	2P+2C	Z	z
134O02C	**Steel Structures 2C** *Martina Eliášová* ***Martina Eliášová*** *Martina Eliášová (Gar.)*	Z,ZK	4	2P+2C	Z	z

Characteristics of the courses of this group of Study Plan: Code=NC20230102 Name=Statika pozemních staveb, 1. semestr

101MAPS	Mathematics PS	Z,ZK	3
Focused on basic and more advanced statistical and probabilistic methods of data analysis as well as on hypothesis testing and regression.			
124PS4C	Building Structures 4	Z,ZK	4
132NAK	Numerical Analysis of Structures	Z,ZK	5
Variational principles of mechanics. Method of weighted residuals, conditions of convergence (continuity, integrity). Principles of FEM. Isoparametric elements, area coordinates, numerical integration. Application of method to selected 1D and 2D problems (Elasticity, heat transfer, consolidation). Algorithmic aspects of the method.			
133B03C	Concrete Structures 3C	Z,ZK	5
Extension of knowledge in the design of prestressed concrete structures. Introduction to special hybrid and thin-walled structures. Modern materials and design solutions for the future.			
134O02C	Steel Structures 2C	Z,ZK	4
Deepening of knowledge received from courses 133NNK and 134OK01. Amplifying of theoretical knowledge in the field of steel grade selection, toughness, global analysis of structures, buckling of structural systems, joint classification, and high strength steel and demanding composite steel and concrete structures. Complementation of knowledge from fire resistance of steel and composite structures and detailed design of industrial buildings and crane girders. Design of masts, towers, chimneys, tanks, silos and pipelines, technological structures, pre-stressed steel structures and basis of design from aluminium alloys and stainless steel, and cable and membrane structures.			

Code of the group: NC20230202
Name of the group: Statika pozemních staveb, 2. semestr
Requirement credits in the group: In this group you have to gain at least 21 credits

Requirement courses in the group: In this group you have to complete at least 5 courses
Credits in the group: 21
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors, **authors** and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
135ZS02	**Foundations 2** *Josef Jettmar, Jan Masopust, Daniel Jirásko **Jan Masopust** Josef Jettmar (Gar.)*	Z,ZK	4	2P+2C	L	Z
132DY01	**Dynamics of structures 1** *Tomáš Krejčí, Jiří Máca, Karel Pohl, Kristian D'Amico **Jiří Máca** Jiří Máca (Gar.)*	Z,ZK	5	2P+2C	L	Z
132EADC	**Experimental Analysis and Diagnostics C** *Michal Polák, Robert Jára, Pavel Padevět, Pavel Tesárek, Tomáš Plachý **Michal Polák** Michal Polák (Gar.)*	KZ	3	1P+2C	L	Z
133B04C	**Concrete Structures 4C** *Martin Petřík, Petr Štemberk **Petr Štemberk** Petr Štemberk (Gar.)*	Z,ZK	5	2P+2C	L	Z
134DK02	**Timber Structures 2** *Karel Mikeš, Lukáš Velebil **Jakub Dolejš** Karel Mikeš (Gar.)*	Z,ZK	4	2P+1C	L	Z

Characteristics of the courses of this group of Study Plan: Code=NC20230202 Name=Statika pozemních staveb, 2. semestr

135ZS02	Foundations 2	Z,ZK	4
The course deepens the knowledge from the previous course ZS1. It covers design principles, risks associated with the foundation of structures, deeper design of flat foundations, deeper design of deep foundations, negative casing friction of drilled piles, grouting (calculations and execution), construction pits, improvement of foundation soils.			
132DY01	Dynamics of structures 1	Z,ZK	5
Principles of theory of vibration, dynamic loading. Free and forced vibration of single-degree-of-freedom systems. Damped vibration. Methods of dynamic analysis of muti-degreee-of-freeedom systems.			
132EADC	Experimental Analysis and Diagnostics C	KZ	3
Experiments focused on monitoring of the amount of climatic loads on building and engineering structures (wind, snow, temperature loads), diagnostics of building and engineering structures, tests carried out on physical models of building and engineering structures (model similarity laws, seismic simulations on shake tables, wind tunnel simulations of wind effects, static load tests on physical models), monitoring of building and engineering structures, static load tests (building structures, engineering structures, bridges), dynamic load tests and experimental modal analysis (building structures, engineering structures, bridges, footbridges), effects of technical seismicity, evaluation of adverse effects of vibration on the human body, assessment of the influence of building vibrations on installed machines and devices).			
133B04C	Concrete Structures 4C	Z,ZK	5
Extension of knowledge in the field of design of reinforced concrete structures, when the emphasis is put on development of engineering sense. Within the scope of this subject, the student acquires ability to estimate arrangement of reinforcement in RC slabs of general shape, ability to define basic strut-and-tie models for given structural details, ability to provide optimum reinforcement at general point of RC slabs and RC walls based on normal forces distributions obtained with common engineering software. Also, the student learns the basic principles plastic design of RC structures and design of RC foundations.			
134DK02	Timber Structures 2	Z,ZK	4
Lectures on a design of timber elements and structures - static action, choice of computational models and methods, design of details and joints, fire resistance			

Name of the block: Compulsory elective courses
Minimal number of credits of the block: 8
The role of the block: PV

Code of the group: NC20230102_2
Name of the group: Statika pozemních staveb, PV předměty, 1. semestr
Requirement credits in the group: In this group you have to gain at least 4 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 4
Note on the group: V případě splnění některého předmětu v bakalářském studiu nelze tento předmět zapsat znovu.

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors, **authors** and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
102YFPL	**Solid State Physics in Civil Engineering** *Jiří Konfršt **Jiří Konfršt** Jiří Konfršt (Gar.)*	Z	2	1P+1C	Z	PV
122YTSD	**Technology of Component Production** *Rostislav Šulc **Rostislav Šulc** Rostislav Šulc (Gar.)*	Z	2	1P+1C	Z,L	PV
124YADO	**Acoustics and Daylighting of Buildings** *Jaroslav Vychytil, Jiří Nováček **Jiří Nováček** Jaroslav Vychytil (Gar.)*	Z	2	1P+1C	Z	PV
124YCPV	**The Principles of Circular Economy in Building Construction** *Tereza Pavlů **Tereza Pavlů** Tereza Pavlů (Gar.)*	Z	2	1P+1C	Z	PV
124YDPH	**Diagnosis and Surveying of Building Structures** *Eva Burgetová **Eva Burgetová** Eva Burgetová (Gar.)*	Z	2	1P+1C	Z	PV
124YDSR	**Demolitions of Buildings and Material Recycling** *Šárka Šilarová, Zuzana Rácová **Šárka Šilarová** Šárka Šilarová (Gar.)*	Z	2	1P+1C	Z	PV

124YPBS	**Principles of Building Fire Safety** *Vladimír Mózer* ***Vladimír Mózer*** *Vladimír Mózer (Gar.)*	ZK	2	1P+1C	Z	PV
124YPRS	**Failures, Deterioration, Renovations** *Radek Zigler* ***Radek Zigler*** *Radek Zigler (Gar.)*	Z	2	1P+1C	Z	PV
125OZE1	**Renewable Energy Sources** *Michal Kabrhel* ***Michal Kabrhel*** *Michal Kabrhel (Gar.)*	ZK	3	2P	Z,L	PV
132PRPM	**Deformation and Failure of Materials** *Milan Jirásek, Petr Havlásek, Lenka Dohnalová* ***Milan Jirásek*** *Milan Jirásek (Gar.)*	Z,ZK	5	2P+2C	Z	PV
132YKPA	**Statics for Architecture** ***Aleš Jíra***	Z	2	1P+1C	Z,L	PV
132YMMO	**Modern Methods of Optimization** *Matěj Lepš, Jan Zeman* ***Matěj Lepš*** *Matěj Lepš (Gar.)*	Z	2	1P+1C	Z	PV
132YSEI	**Seismic Engineeering** *Jiří Máca* ***Jiří Máca*** *Jiří Máca (Gar.)*	Z	2	1P+1C	Z	PV
132YSSK	**Reliability of Structures** *Jaroslav Kruis* ***Jaroslav Kruis*** *Jaroslav Kruis (Gar.)*	Z	2	1P+1C	Z	PV
133YBEX	**Concrete under Extreme Conditions** *Petr Štemberk, Radek Štefan, Marek Foglar* ***Radek Štefan*** *Radek Štefan (Gar.)*	Z	2	1P+1C	Z	PV
133YPRK	**Failures and Rehabilitation of Concrete Structures** *Petr Štemberk, Jakub Žák* ***Petr Štemberk*** *Petr Štemberk (Gar.)*	Z	2	1P+1C	Z	PV
134YDKM	**Timber structures and bridges** *Anna Kuklíková* ***Anna Kuklíková*** *Anna Kuklíková (Gar.)*	Z	2	1P+1C	Z	PV
134YROK	**Extending the Life of Steel and Timber Structures** *Karel Mikeš* ***Karel Mikeš*** *Karel Mikeš (Gar.)*	Z	2	1P+1C	Z	PV
134YSMK	**Stability and modelling of steel structures** *Josef Macháček, Michal Jandera* ***Michal Jandera*** *Josef Macháček (Gar.)*	Z	2	1P+1C	Z	PV
135YGSM	**Geotechnical Software for Numerical modelling** *Jan Salák, Alena Zemanová, Daniel Turanský, Jan Ježek* ***Alena Zemanová*** *Alena Zemanová (Gar.)*	Z	2	1P+1C	Z	PV
210YDSM	**Diagnostics of Building Materials Properties** *Jiří Litoš* ***Jiří Litoš*** *Jiří Litoš (Gar.)*	Z	2	1P+1C	Z	PV
210YSB	**Special Concretes** *Pavel Reiterman, Vendula Kellnerová, Ondřej Holčapek* ***Pavel Reiterman*** *Pavel Reiterman (Gar.)*	Z	2	2P	Z,L	PV

Characteristics of the courses of this group of Study Plan: Code=NC20230102_2 Name=Statika pozemních staveb, PV předměty, 1. semestr

102YFPL	Solid State Physics in Civil Engineering	Z	2
Solids, crystal structure, atomic shell theory, valence layer chemical bonds, dislocation disturbances, critical crack energy,vibration of masses, systems natural frequency of vibration and damped vibration, basics concepts of fracture mechanics, types of fracture, electron microscopes, scanning tunneling microscope, atomic force microscope, diffraction, diffraction methods, semiconductors, p-n junction, photovoltaic effect, solar cells, heat and moisture transport.			
122YTSD	Technology of Component Production	Z	2
124YADO	Acoustics and Daylighting of Buildings	Z	2
The course focuses on a more detailed explanation and practice of selected topics in the field of daylighting and building acoustics that students may encounter in future design practice.			
124YCPV	The Principles of Circular Economy in Building Construction	Z	2
124YDPH	Diagnosis and Surveying of Building Structures	Z	2
Course sets out key consideratons and implications which require structure assessment. The course provides an objective framework and methodical and systematic approach to surveying (structural diagnosis, preliminary and comprehensive survey, visual inspection, site inspections, laboratory tests, investigation kits, types of defects and damages, symptoms, manifestation, significance, criticality, reason for failures case studies)			
124YDSR	Demolitions of Buildings and Material Recycling	Z	2
The use of construction waste from demolitions from the production of building materials and from other sectors in the construction industry with the aim of: significantly reducing the volumes of landfilled materials, reducing the consumption of primary raw materials, a new perspective on the design of buildings and structures in accordance with a closed life cycle. Legislation, levels of recycling in developed countries, recycling in CR, possibilities of recycling buildings and structures, design of structures from the point of view of sustainable development, minimization of landfills, examples and demonstrations of recycling technologies, low-waste technologies			
124YPBS	Principles of Building Fire Safety	ZK	2
The course is focused on the presentation and acquisition of the most important concepts and principles of fire safety in buildings. Attention is paid to all the main components of fire safety design that are important for the protection of life and health, property, the environment and other assets. The course is intended for students of non-fire disciplines and should enable them to take into account aspects of fire safety from the initial stages of project preparation of buildings.			
124YPRS	Failures, Deterioration, Renovations	Z	2
The course is focused on the current issue of restoration, reconstruction and modernization of buildings (residential, industrial, etc.), on historical structures and materials, the issue of degradation and aging of structures and materials of historical buildings, their residual life and failures of historical buildings and their parts. An integral part is the issue of structural-technical and historical surveys, diagnostics and assessment of the structural-technical condition and remaining service life.			
125OZE1	Renewable Energy Sources	ZK	3
Renewable sources are becoming increasingly important sources of energy for buildings. Understanding their characteristics is key to the proper design and operation of these systems. The course therefore looks in detail at renewable sources and their applications.			
132PRPM	Deformation and Failure of Materials	Z,ZK	5
Viscoelasticity, models for concrete creep. Theory of plasticity, principles of limit and incremental analysis. Fracture mechanics. Damage mechanics.			
132YKPA	Statics for Architecture	Z	2
132YMMO	Modern Methods of Optimization	Z	2
The course is aimed at an overview of numerical optimization methods applicable not only in the Civil Engineering area. The emphasis is put more on the introduction of driving principles, however, practical applications in MATLAB environment are also conducted during exercises.			
132YSEI	Seismic Engineeering	Z	2
Basic principles of design of earthquake resistant structures. Methods of calculating the response of structures to earthquake loads according to Eurocode 8.			

132YSSK	Reliability of Structures	Z	2
The course is devoted to the reliability of elements and systems. Element reliability is time dependent while the reliability of systems is of type strength-load. Complicated cases are solved by the FORM method. Two simulation methods are introduced: Monte Carlo and LHS.			
133YBEX	Concrete under Extreme Conditions	Z	2
The course is focused on concrete and concrete structures under extreme conditions.			
133YPRK	Failures and Rehabilitation of Concrete Structures	Z	2
The course focuses on the description of failures of concrete structures, explanation of the causes of these failures and the design of remedial measures. Methods of strengthening existing concrete structures are also discussed. Surface repairs, strengthening of contactors, strengthening of structural elements to the effects of bending moment and shear, and foundation structures are discussed. The course appropriately combines theoretical approaches with common practice.			
134YDKM	Timber structures and bridges	Z	2
Timber structures focused to national strategy of sustainable development. New timber-based materials. Structural systeme of houses and bridges. Repairing and strengthtening. Fire design. Production, protection, erection and maintenance. Design and evaluation of bridges, roofs structures in normal temperature and in fire.			
134YROK	Extending the Life of Steel and Timber Structures	Z	2
Materials used for bearing structures. Developments in the area of regulations and standardization. Causes of defects, malfunctions, survey of objects, static assumptions of reconstruction. Possibilities of strengthening, strengthening of steel and timber structures and strengthening of connections. Using of computers in reconstructions and development of numerical models.			
134YSMK	Stability and modelling of steel structures	Z	2
Subject YSMK covers two parts. The first one deals with stability and strength of steel plates, the second one with stability and strengths of steel frame structures. In the first part the historic collapses of steel structures are analysed including the importance of imperfections for a design of thin plated structures. Presented are principles of theory of buckling, linear and nonlinear theory of buckling of thin plates. The results are applied to the 4th class cross sections in harmony with Eurocode. Buckling due to normal, shear and local loadings including their combination is analysed in a detail. In the end the application of the results is shown together with design of necessary stiffeners. The second part is focused on member and structure stability. Possible global analysis methods are presented together with methods for compression and bending interaction for slender members. In detail, specific cases of lateral torsional buckling are explained including also tapered members.			
135YGSM	Geotechnical Software for Numerical modelling	Z	2
Students get acquainted with the Finite Element Method, the currently dominant tool for numerical modeling in Geotechnics. Emphasis is placed on introducing the basic principles of the Finite Element Method and their subsequent application to selected problems of Geotechnical Engineering. The course summarises the types of finite elements used in geotechnical applications, material models suitable for the description of soil deformation, and selected specifics associated with numerical modeling in geotechnics. This knowledge is further applied in the modeling of foundation, embedded walls, and stability problems.			
210YDSM	Diagnostics of Building Materials Properties	Z	2
Failures of building materials, mechanical, thermal, chemical and other influences on the development of failures of building materials. Diagnostics of their occurrence. Basics of experimental measurement and instrumentation of tested elements and structures. Theory of experiment, measurement and processing of results. Testing machines and equipment. Deformation measuring instruments. Destructive testing of mechanical properties. Non-destructive test methods. Test methodology for various materials (concrete, mortar, metallic elements, wood, glass, plastics, composites and others).			
210YSB	Special Concretes	Z	2
This course is aimed at expanding knowledge in the field of special concretes and composites for specific applications. The core of the course is to acquaint students with both the technological aspects of the production, testing and use of special concretes, as well as the applicable legislative framework for individual types of special concretes. Specific practical applications and experiences are also presented within the course.			

Code of the group: NC20230202_2

Name of the group: Statika pozemních staveb, PV předměty, 2. semestr

Requirement credits in the group: In this group you have to gain at least 4 credits

Requirement courses in the group: In this group you have to complete at least 1 course

Credits in the group: 4

Note on the group: V případě splnění některého předmětu v bakalářském studiu nelze tento předmět zapsat znovu.

Code	**Name of the course / Name of the group of courses** ***(in case of groups of courses the list of codes of their members)*** *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
101YFAV	**Introduction to Functional Analysis and Variational Methods** *Jozef Bobok, Petr Kučera* ***Aleš Nekvinda*** *Aleš Nekvinda (Gar.)*	KZ	2	1P+1C	Z,L	PV
101YMCD	**Methods of Time Discretization** *Petr Mayer* ***František Bubeník*** *František Bubeník (Gar.)*	Z	2	1P+1C	L	PV
101YMST	**Mathematical statistics for technicians** *Daniela Jarušková* ***Jana Nosková*** *Daniela Jarušková (Gar.)*	Z	2	1P+1C	L	PV
101YNUM	**Numerical Methods** *Ivana Pultarová, Martin Ladecký, Liya Gaynutdinova* ***Ivana Pultarová*** *Ivana Pultarová (Gar.)*	Z	2	1P+1C	L	PV
123YMPU	**Materials for Coatings** *Miloš Jerman* ***Miloš Jerman*** *Miloš Jerman (Gar.)*	Z	2	1P+1C	L	PV
124YHVK	**Long Span Structures** ***Vladimír Žďára***	Z	2	1P+1C	L	PV
124YKHK	**Building Quality Complex Assessment** *Martin Volf* ***Martin Volf*** *Martin Volf (Gar.)*	Z	2	1P+1C	L	PV
124YMOB	**Modelling of Buildings - BIM** *Zdenko Malík* ***Zdenko Malík*** *Zdenko Malík (Gar.)*	Z	2	1P+1C	L	PV
124YPFS	**Precast concrete structures** *Radek Zigler, Jiří Witzany* ***Radek Zigler*** *Radek Zigler (Gar.)*	Z	2	1P+1C	L	PV
124YPS5	**Prefabricated structures** *Tomáš Čejka* ***Tomáš Čejka*** *Tomáš Čejka (Gar.)*	Z	2	1P+1C	L	PV

124YRHS	**Reconstruction of Historical Building Structures** *Tomáš Čejka, Radek Zigler, Jiří Witzany* ***Jiří Witzany*** *Jiří Witzany (Gar.)*	Z	2	1P+1C	L	PV
125YTCH	**Technological Equipment of Buildings** *Ilona Koubková, Hana Kabrhelová, Pavla Hofbauer Pechová* ***Ilona Koubková*** *Ilona Koubková (Gar.)*	Z	2	2P	L	PV
126YBVE	**BIM in Public Investments** *Stanislav Vitásek* ***Stanislav Vitásek*** *Stanislav Vitásek (Gar.)*	Z	2	2P	L	PV
126YPDV	**Development Project** *Kateřina Eklová Kateřina Eklová (Gar.)*	Z	2	2C	L	PV
132YNAK	**Nonlinear Analysis of Materials and Structures** *Bořek Patzák, Petr Kabele, Daniel Rypl* ***Daniel Rypl*** *Daniel Rypl (Gar.)*	Z	2	1P+1C	L	PV
132YNA2	**Numerical Analysis of Structures 2** *Bořek Patzák* ***Bořek Patzák*** *Bořek Patzák (Gar.)*	Z,ZK	4	2P+1C	L	PV
132YPM2	**Computer Analysis of Structures 2** *Jiří Máca, Petr Fajman* ***Jiří Máca*** *Petr Fajman (Gar.)*	Z	2	1P+1C	L	PV
132YSHK	**Statics and Reconstruction of Historical Structures** *Petr Fajman* ***Petr Fajman*** *Petr Fajman (Gar.)*	Z	2	1P+1C	L	PV
132YUPM	**General Principles of Mechanics** *Milan Jirásek* ***Milan Jirásek*** *Milan Jirásek (Gar.)*	Z,ZK	4	2P+1C	L	PV
133YATK	**Applied Theory of Structures** *Lukáš Vráblík, Radek Hájek* ***Lukáš Vráblík*** *Lukáš Vráblík (Gar.)*	Z,ZK	4	2P+1C	L	PV
133YMVB	**Concrete and Masonry Structures 1** *Tomáš Trtík, Petr Bílý, Josef Novák* ***Petr Bílý*** *Petr Bílý (Gar.)*	Z	2	1P+1C	L	PV
133YPNB	**Fire desgn og concrete and mnsory structures** *Radek Štefan, Martin Benýšek* ***Radek Štefan*** *Radek Štefan (Gar.)*	Z	2	1P+1C	L	PV
133YVHB	**Ultrahigh Performance Concretes** *Josef Fládr* ***Josef Fládr*** *Josef Fládr (Gar.)*	Z	2	1P+1C	L	PV
134YHNK	**Stainless steel and aluminium structures** *František Wald, Břetislav Židlický* ***František Wald*** *František Wald (Gar.)*	Z	2	1P+1C	L	PV
134YNDK	**Load-bearing timber roof constructions** *Karel Mikeš* ***Karel Mikeš*** *Karel Mikeš (Gar.)*	Z	2	1P+1C	L	PV
134YNSK	**Design of Glass Structures** *Martina Eliášová* ***Martina Eliášová*** *Martina Eliášová (Gar.)*	Z,ZK	2	1P+1C	L	PV
134YPMK	**Design of Membrane Structures** *Svitlana Kalmykova* ***Svitlana Kalmykova*** *Svitlana Kalmykova (Gar.)*	Z	2	1P+1C	L	PV
134YPOD	**Fire Resistance of Steel and Timber Structures** *Zdeněk Sokol* ***Zdeněk Sokol*** *Zdeněk Sokol (Gar.)*	Z	2	1P+1C	L	PV
134YSOD	**Connections of steel and timber structures** *Robert Jára, František Wald* ***Robert Jára*** *František Wald (Gar.)*	Z	2	1P+1C	L	PV
134YSOK	**Special steel structures** *Jakub Dolejš* ***Jakub Dolejš*** *Jakub Dolejš (Gar.)*	Z	2	1P+1C	L	PV
135YVPZ	**Computer analysis in underground structures** *Daniel Turanský, Jan Ježek, Jan Pruška, Matouš Hilar* ***Jan Pruška*** *Jan Pruška (Gar.)*	Z	2	1P+1C	L	PV

Characteristics of the courses of this group of Study Plan: Code=NC20230202_2 Name=Statika pozemních staveb, PV předměty, 2. semestr

101YFAV	Introduction to Functional Analysis and Variational Methods	KZ	2
101YMCD	Methods of Time Discretization	Z	2
The course is devoted to a universal and very effective method for solving problems involving time, the so-called evolutionary problems, especially for partial differential equations with a time variable. This method represents a modern approach to modeling and solving engineering tasks. These problems, both linear and non-linear, model events in many engineering fields, such as heat conduction, oscillations, also in rheology and other parts.			
101YMST	Mathematical statistics for technicians	Z	2
Inferential statistics. Theory of probability. Random variables and its characteristics. Basic methods of mathematical statistics.			
101YNUM	Numerical Methods	Z	2
Numerical computing in applied mathematics: course for beginners.			
123YMPU	Materials for Coatings	Z	2
Students will gain an overview of how to protect building structures from corrosion and other harmful influences such as UV radiation, acid rain, etc. Students will also learn about methods and technologies of surface treatment. The course consists of 6 lectures and 6 exercises. In the lectures, students will learn about both historical and more importantly modern surface treatments for different types of structures. In the exercises, students will perform a surface treatment on a fragment of a structure and will be able to check the quality of the work done by themselves in the last exercise by means of a tear-off test.			
124YHVK	Long Span Structures	Z	2
The subject deals with the analysis of structural solutions applied in building designs by the world's best architects. Although attention will be focused mainly on the solution of load-bearing structures, we will also pay attention to the wider context of the design. Reading existing constructions is a natural way to learn the principles of their design. And naturally we will learn from the best. An extensive database of completed buildings, including more than 5,000 buildings, will enable us to take a trip into history and the present on all the world's continents.			
124YKHK	Building Quality Complex Assessment	Z	2
Students will gain an overview of design strategies in green architecture and sustainable building and learn how to conduct assessments to achieve high quality buildings. In addition, they will learn basic information on life cycle assessment of materials and buildings.			
124YMOB	Modelling of Buildings - BIM	Z	2
The course is designed to introduce the phenomenon of parametric design, which is becoming very widespread in today's world. It is the connection of 3D models and BIM models with visual programming. Instead of writing code in a classical programming language, Nodes are connected, and the resulting script can be created visually and without knowledge of the programming language. These scripts can be used primarily for: - creating parametric geometry, - working with data in a BIM model, - structural and physical analysis, design optimization. Thematically, the course covers two main areas of parametric modeling, replicating two software platforms: Revit + Dynamo (JaVe) Rhino + Grasshopper (ZdMa)			

124YPFS	Precast concrete structures	Z	2
Residential houses made of precast conrete panels, of which approx. 82 thousand were built in the period 1960-1995 do not meet the required extent of the current dynamically developing society and in many cases require the implementation of regeneration and modernization interventions enabling their full use. The course is focused on the current issues of renewal, reconstruction and modernization of precast houses, modernization of apartments in precast houses, on the issue of freeing parterres of precast houses for services, shops, offices, fitness centers, etc. Renovation, modernization, or regenerations require the removal of functionally inadequate completion structures, technical equipment, installations and, in some cases, even demanding interventions in supporting structures. As part of the construction of communication networks, modernization of urban development, etc., it is necessary in some cases to carry out partial or complete demolition of a precast panel building. As part of the regeneration of precast panel housing estates, an extension is also carried out, or completion of precast houses. The implementation of the mentioned plans requires a survey and diagnostics of supporting and peripheral structures, joints of parts and an evaluation of the structural-technical condition and an assessment of the residual life of precast panel structures and buildings.			
124YPS5	Prefabricated structures	Z	2
124YRHS	Reconstruction of Historical Building Structures	Z	2
In the period from the second half of the 19th century by 1960, more than 250 thousand of two- to five-story brick apartment (mainly rental) houses in traditional brick technology were constructed in the Czech Republic. Brick buildings from this period were built according to regulations, building codes and laws from the turn of the 19th and 20th centuries. Multi-storey brick tenement houses do not meet the current thermal, acoustic and other requirements, the requirements of a dynamically developing society to the required extent, and in many cases require regeneration and modernization interventions, including the replacement of non-compliant and out-of-date structures and equipment enabling their further use. The course is focused on the current issue of renewal, reconstruction and modernization of brick multi-storey rental apartment buildings, on historical structures and materials, the issue of degradation and aging of structures and materials of historic brick residential buildings, their residual life, failures and reconstruction of historical buildings and their parts. Furthermore, the course is focused on the issue of improving the well-being of the internal environment, the replacement of finishing structures, opening fillings, etc. as an integral part of the modernization of these buildings.			
125YTCH	Technological Equipment of Buildings	Z	2
Sauna, fireplaces, kitchen technology, elevators, technology swimming pools, heat pumps, heat source and technological system, technology cooling, fire safety equipment, sprinklers.			
126YBVE	BIM in Public Investments	Z	2
126YPDV	Development Project	Z	2
132YNAK	Nonlinear Analysis of Materials and Structures	Z	2
Students become acquainted with the concepts of linear stability and calculation of elastoplastic load capacity. Linear stability - evaluation of the critical load and buckling shape. Analysis of structures according to the 2nd order theory - equilibrium conditions on a deformed structure, initial stress matrix. Elastoplastic analysis of structures - evaluation of the limit load capacity, distribution of internal forces at the limit state - static incremental method, kinematic method. Solving stability and elastoplasticity problems by means of a general-purpose finite element program.			
132YNA2	Numerical Analysis of Structures 2	Z,ZK	4
Advanced course on finite element method. Formulation of plate elements suitable for thin and thick plates, plates on elastic foundation. Introduction to nonlinear problems: geometrical and material nonlinearity, solution methods, implementation aspects.			
132YPM2	Computer Analysis of Structures 2	Z	2
Limit state of frames. Stability analysis of structures. Second order theory. Beams and gridwork girders on elastic foundation. Plate and wall structures. Dynamic analysis of structures. Verification of results.			
132YSHK	Statics and Reconstruction of Historical Structures	Z	2
Short overview of historical vaults and roof trusses. Static behaviour and most frequent causes of failure. Methods of reconstruction, changes in foundation conditions included. Most frequent causes of failure of panel buildings. Visit to the historical part of Prague Castle.			
132YUPM	General Principles of Mechanics	Z,ZK	4
Tensors, differential operators and their application in mechanics, Gauss and Green theorems. General structure of the basic equations of linear and nonlinear statics, energy and duality. Principle of virtual work (power), variational principles (Lagrange, Castigliano, Hellinger-Reissner, Hu-Washizu) and their application to continuous and discrete models of beams, frames, plates, walls and three-dimensional bodies.			
133YATK	Applied Theory of Structures	Z,ZK	4
Detailed introduction to theoretical approaches to the effects of creep and shrinkage on structures. Principles of time-dependent analysis. Methods for the analysis of thin-walled concrete structures, stability theory.			
133YMVB	Concrete and Masonry Structures 1	Z	2
The content of the subject will be selected problems from the following areas: Reinforcement of discontinuities of reinforced concrete structures. Introduction to nonlinear modeling of reinforced concrete structures. Preparation of input data for numerical models. Design of structures using MATLAB. Presentation of selected programs for the design of concrete structures.			
133YPNB	Fire desgn og concrete and mnsory structures	Z	2
The course is focused on fire resistance of concrete and masonry structures: concrete and concrete structures exposed to fire, design rules, thermal analysis, loads, design principles, design methods, material properties of concrete and steel reinforcement at high temperatures, fire design of masonry structures.			
133YVHB	Ultrahigh Performance Concretes	Z	2
The aim of the course is to present a special type of concrete that achieves great strength and high durability, which enables the realization of very thin structures. The components of high performance concrete are presented and the main differences in composition of ordinary concrete and HPC. A large part of the lectures is devoted to the components of high performance concrete, the composition and the method of manufacturing, which are subsequently accompanied by laboratory exercises, where the students can experience the theoretical knowledge in practical use.			
134YHNK	Stainless steel and aluminium structures	Z	2
Subject YHNK covers two parts: the first concerns design of structures from aluminium alloys, the second deals with stainless steel structures. Structures of aluminium alloys: Introduction and practice in designing of aluminium structures. Structures of stainless steel: Evolution of stainless steel materials/structures and examples of realized structures. Stainless steels suitable for structures are described in a detail, including their properties. Dissimilarities in assessments of members under common loadings with respect to low-carbon steels is described for both ultimate and serviceability limit states. In the end the possibilities concerning connections of stainless steel members, erection and installation of stainless steel members are described.			
134YNDK	Load-bearing timber roof constructions	Z	2
System of roofs structures. Creation of numerical models for assessment of internal forces and deformations for main different roof systems and structures. Analysis of the static function and behaviour of main individual elements and their design. Historic structures and their reconstruction. Designing typical structural details based on carpentry joints. We will discuss also using modern methods of joining elements of timber structures.			
134YNSK	Design of Glass Structures	Z,ZK	2
The subject is intended for students of the master's program Civil Engineering, deepens the knowledge acquired in the subject 134YNKS. Extension of theoretical knowledge in the field of stability of glass beams, columns and walls. Principles of designing structural elements made of glass according to normative documents, experimental verification of material properties of glass, safety glass, use of software support for designing.			
134YPMK	Design of Membrane Structures	Z	2
134YPOD	Fire Resistance of Steel and Timber Structures	Z	2
The class gives introduction to fire modeling, fire safety and fire resistance of steel, steel-concrete composite and timber structural elements.			

134YSOD	Connections of steel and timber structures	Z	2
The subject allows insight and ability to apply the knowledge related to structural connections and its application by software.			
134YSOK	Special steel structures	Z	2
Crane supporting structures - actions, design, detailing. Silos - actions, behaviour, silos with rigid and non-rigid section. Masts - division, detiling, design. Cable roofs - procedure of calculation.			
135YVPZ	Computer analysis in underground structures	Z	2
Numerical methods in CAD/CAM in geomechanics. Basic types of constitutive models of soil and rock mass behavior. Summary of PC geotechnical software both in the field of conventional methods and in numerical modelling domain. Practical solutions of selected geotechnical problems.			

Name of the block: Povinně volitelné předměty, doporučení S1
Minimal number of credits of the block: 40
The role of the block: S1

Code of the group: NC20230102_1
Name of the group: Statika pozemních staveb, projekt, 1. semestr
Requirement credits in the group: In this group you have to gain at least 5 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 5
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors, **authors** and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
132P03C	**Structural Design 3C** *Pavel Tesárek, Jan Zeman, Petr Kabele, Jiří Němeček, Aleš Jíra, Michal Šejnoha, Jan Sýkora, Michael Somr **Aleš Jíra***	KZ	5	4C	Z	S1
133P03C	**Structural Design 3C** ***Iva Broukalová*** *Jitka Vašková (Gar.)*	KZ	5	4C	Z	S1
134P03C	**Structural Design 3C** ***Michal Jandera*** *Michal Jandera (Gar.)*	KZ	5	4C	Z	S1
135P03C	**Structural Design 3C** *Jan Salák, Jan Pruška, Jan Kos **Jan Pruška***	KZ	5	4C	Z	S1

Characteristics of the courses of this group of Study Plan: Code=NC20230102_1 Name=Statika pozemních staveb, projekt, 1. semestr

132P03C	Structural Design 3C	KZ	5
Students develop individual projects under supervision of teachers from the Department of Mechanics. Project topics are presented at the department website. Students may propose own topics - in this case, suitability of the topic and feasibility of the project will be evaluated by the project supervisor.			
133P03C	Structural Design 3C	KZ	5
The subject is focused on concrete and masonry structures. The assignment can be: elaboration of the structural design documentation, the analysis of the given problem requiring subject matter search and literature retrieval, the numerical analysis of the selected element or part of the structure, the preparation, execution and evaluation of experiments, etc. Collaboration of several students on one assignments is also possible. Consultation with participating departments K124 and K135 is not mandatory for all students. The extent of outputs depends on the type of assignment and the decision of the leading teacher.			
134P03C	Structural Design 3C	KZ	5
Design of steel / timber load bearing building structure according to external requirements in relation to interaction of load bearing and final completion structural elements. The project is assigned by the seminar leader.			
135P03C	Structural Design 3C	KZ	5
Design, static calculation and drawing documentation of the building substructure			

Code of the group: NC20230202_1
Name of the group: Statika pozemních staveb, projekt, 2. semestr
Requirement credits in the group: In this group you have to gain at least 5 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 5
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors, **authors** and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
132P04C	**Structural Design 4C** *Bořek Patzák, Martin Horák, Pavel Padevět, Pavel Tesárek, Jan Zeman, Petr Fajman, Jiří Němeček, Aleš Jíra, Michal Šejnoha, ... **Aleš Jíra***	KZ	5	4C	L	S1
133P04C	**Structural Design 4C** ***Jitka Vašková***	KZ	5	4C	L	S1
134P04C	**Structural Design 4C** ***Michal Jandera*** *Michal Jandera (Gar.)*	KZ	5	4C	L	S1
135P04C	**Structural Design 4C** ***Jan Pruška*** *Jan Salák (Gar.)*	KZ	5	4C	L	S1

Characteristics of the courses of this group of Study Plan: Code=NC20230202_1 Name=Statika pozemních staveb, projekt, 2. semestr

132P04C	Structural Design 4C	KZ	5
Students develop individual projects under supervision of teachers from the Department of Mechanics. Project topics are presented at the department website. Students may propose own topics - in this case, suitability of the topic and feasibility of the project will be evaluated by the project supervisor.			
133P04C	Structural Design 4C	KZ	5
The subject is focused on concrete and masonry structures. The assignment can be: elaboration of the structural design documentation, the analysis of the given problem requiring subject matter search and literature retrieval, the numerical analysis of the selected element or part of the structure, the preparation, execution and evaluation of experiments, etc. Collaboration of several students on one assignments is also possible. Consultation with participating departments K124 and K135 is not mandatory for all students. The extent of outputs depends on the type of assignment and the decision of the leading teacher.			
134P04C	Structural Design 4C	KZ	5
Design of steel / timber load bearing building structure according to external requirements in relation to interaction of load bearing and final completion structural elements. The project is assigned by the seminar leader.			
135P04C	Structural Design 4C	KZ	5
Design, static calculation and drawing documentation of the building substructure			

Code of the group: NC20230300
Name of the group: Stavební inženýrství - pozemní stavby, diplomová práce
Requirement credits in the group: In this group you have to gain at least 30 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 30
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
124DPM	**Diploma Thesis** *Tomáš Čejka, Tomáš Vlach, Jiří Pazderka, Kateřina Mertenová, Martin Jiránek, Marek Pokorný* ***Jiří Pazderka*** *Jiří Pazderka (Gar.)*	Z	30	24C	Z	S1
132DPM	**Diploma Thesis** *Bořek Patzák, Martin Horák, Jiří Máca, Karel Pohl, Michal Polák, Pavel Padevět, Pavel Tesárek, Tomáš Plachý, Milan Jirásek, ...* ***Aleš Jíra***	Z	30	24C	Z	S1
133DPM	**Diploma Thesis** ***Martin Tipka***	Z	30	24C	Z	S1
134DPM	**Diploma Thesis** *Jakub Dolejš* ***Jakub Dolejš*** *Jakub Dolejš (Gar.)*	Z	30	24C	Z	S1
135DPM	**Diploma Thesis** *Jan Masopust, Jan Pruška* ***Jan Pruška*** *Jan Pruška (Gar.)*	Z	30	24C	Z	S1

Characteristics of the courses of this group of Study Plan: Code=NC20230300 Name=Stavební inženýrství - pozemní stavby, diplomová práce

124DPM	Diploma Thesis	Z	30
The topics of diploma theses are based on the needs of practice or the scientific research activity of the department, the scope and difficulty corresponds to the student's knowledge acquired during the master's studies. The supervisor of the thesis can designate additional consultants to the student.			
132DPM	Diploma Thesis	Z	30
In accordance with the thesis proposal.			
133DPM	Diploma Thesis	Z	30
In accordance with a thesis proposal.			
134DPM	Diploma Thesis	Z	30
Design of steel / timber load bearing building structure according to external requirements in relation to interaction of load bearing and final completion structural elements. A study focused on research of load bearing structures may be also the topic of the the project. The project is assigned by a final project superisor individually.			
135DPM	Diploma Thesis	Z	30
In the diploma thesis, the student deals with a topic chosen by the department from those regularly announced by the department. It addresses, for example, problems related to the design and construction of geotechnical structures, civil engineering structures, special foundations for industrial, transport, housing and water management structures, earth and rock structures in complex cases and waste disposal structures. The thesis builds on and develops the findings of the thesis project.			

List of courses of this pass:

Code	Name of the course	Completion	Credits
101MAPS	Mathematics PS	Z,ZK	3
Focused on basic and more advanced statistical and probabilistic methods of data analysis as well as on hypothesis testing and regression.			
101YFAV	Introduction to Functional Analysis and Variational Methods	KZ	2
101YMCD	Methods of Time Discretization	Z	2
The course is devoted to a universal and very effective method for solving problems involving time, the so-called evolutionary problems, especially for partial differential equations with a time variable. This method represents a modern approach to modeling and solving engineering tasks. These problems, both linear and non-linear, model events in many engineering fields, such as heat conduction, oscillations, also in rheology and other parts.			

101YMST	Mathematical statistics for technicians	Z	2
Inferential statistics. Theory of probability. Random variables and its characteristics. Basic methods of mathematical statistics.			
101YNUM	Numerical Methods	Z	2
Numerical computing in applied mathematics: course for beginners.			
102YFPL	Solid State Physics in Civil Engineering	Z	2
Solids, crystal structure, atomic shell theory, valence layer chemical bonds, dislocation disturbances, critical crack energy,vibration of masses, systems natural frequency of vibration and damped vibration, basics concepts of fracture mechanics, types of fracture, electron microscopes, scanning tunneling microscope, atomic force microscope, diffraction, diffraction methods, semiconductors, p-n junction, photovoltaic effect, solar cells, heat and moisture transport.			
122YTSD	Technology of Component Production	Z	2
123YMPU	Materials for Coatings	Z	2
Students will gain an overview of how to protect building structures from corrosion and other harmful influences such as UV radiation, acid rain, etc. Students will also learn about methods and technologies of surface treatment. The course consists of 6 lectures and 6 exercises. In the lectures, students will learn about both historical and more importantly modern surface treatments for different types of structures. In the exercises, students will perform a surface treatment on a fragment of a structure and will be able to check the quality of the work done by themselves in the last exercise by means of a tear-off test.			
124DPM	Diploma Thesis	Z	30
The topics of diploma theses are based on the needs of practice or the scientific research activity of the department, the scope and difficulty corresponds to the student's knowledge acquired during the master's studies. The supervisor of the thesis can designate additional consultants to the student.			
124PS4C	Building Structures 4	Z,ZK	4
124YADO	Acoustics and Daylighting of Buildings	Z	2
The course focuses on a more detailed explanation and practice of selected topics in the field of daylighting and building acoustics that students may encounter in future design practice.			
124YCPV	The Principles of Circular Economy in Building Construction	Z	2
124YDPH	Diagnosis and Surveying of Building Structures	Z	2
Course sets out key consideratons and implications which require structure assessment. The course provides an objective framework and methodical and systematic approach to surveying (structural diagnosis, preliminary and comprehensive survey, visual inspection, site inspections, laboratory tests, investigation kits, types of defects and damages, symptoms, manifestation, significance, criticality, reason for failures case studies)			
124YDSR	Demolitions of Buildings and Material Recycling	Z	2
The use of construction waste from demolitions from the production of building materials and from other sectors in the construction industry with the aim of: significantly reducing the volumes of landfilled materials, reducing the consumption of primary raw materials, a new perspective on the design of buildings and structures in accordance with a closed life cycle. Legislation, levels of recycling in developed countries, recycling in CR, possibilities of recycling buildings and structures, design of structures from the point of view of sustainable development, minimization of landfills, examples and demonstrations of recycling technologies, low-waste technologies			
124YHVK	Long Span Structures	Z	2
The subject deals with the analysis of structural solutions applied in building designs by the world's best architects. Although attention will be focused mainly on the solution of load-bearing structures, we will also pay attention to the wider context of the design. Reading existing constructions is a natural way to learn the principles of their design. And naturally we will learn from the best. An extensive database of completed buildings, including more than 5,000 buildings, will enable us to take a trip into history and the present on all the world's continents.			
124YKHK	Building Quality Complex Assessment	Z	2
Students will gain an overview of design strategies in green architecture and sustainable building and learn how to conduct assessments to achieve high quality buildings. In addition, they will learn basic information on life cycle assessment of materials and buildings.			
124YMOB	Modelling of Buildings - BIM	Z	2
The course is designed to introduce the phenomenon of parametric design, which is becoming very widespread in today's world. It is the connection of 3D models and BIM models with visual programming. Instead of writing code in a classical programming language, Nodes are connected, and the resulting script can be created visually and without knowledge of the programming language. These scripts can be used primarily for: - creating parametric geometry, - working with data in a BIM model, - structural and physical analysis, design optimization. Thematically, the course covers two main areas of parametric modeling, replicating two software platforms: Revit + Dynamo (JaVe) Rhino + Grasshopper (ZdMa)			
124YPBS	Principles of Building Fire Safety	ZK	2
The course is focused on the presentation and acquisition of the most important concepts and principles of fire safety in buildings. Attention is paid to all the main components of fire safety design that are important for the protection of life and health, property, the environment and other assets. The course is intended for students of non-fire disciplines and should enable them to take into account aspects of fire safety from the initial stages of project preparation of buildings.			
124YPFS	Precast concrete structures	Z	2
Residential houses made of precast conrete panels, of which approx. 82 thousand were built in the period 1960-1995 do not meet the required extent of the current dynamically developing society and in many cases require the implementation of regeneration and modernization interventions enabling their full use. The course is focused on the current issues of renewal, reconstruction and modernization of precast houses, modernization of apartments in precast houses, on the issue of freeing parterres of precast houses for services, shops, offices, fitness centers, etc. Renovation, modernization, or regenerations require the removal of functionally inadequate completion structures, technical equipment, installations and, in some cases, even demanding interventions in supporting structures. As part of the construction of communication networks, modernization of urban development, etc., it is necessary in some cases to carry out partial or complete demolition of a precast panel building. As part of the regeneration of precast panel housing estates, an extension is also carried out, or completion of precast houses. The implementation of the mentioned plans requires a survey and diagnostics of supporting and peripheral structures, joints of parts and an evaluation of the structural-technical condition and an assessment of the residual life of precast panel structures and buildings.			
124YPRS	Failures, Deterioration, Renovations	Z	2
The course is focused on the current issue of restoration, reconstruction and modernization of buildings (residential, industrial, etc.), on historical structures and materials, the issue of degradation and aging of structures and materials of historical buildings, their residual life and failures of historical buildings and their parts. An integral part is the issue of structural-technical and historical surveys, diagnostics and assessment of the structural-technical condition and remaining service life.			
124YPS5	Prefabricated structures	Z	2
124YRHS	Reconstruction of Historical Building Structures	Z	2
In the period from the second half of the 19th century by 1960, more than 250 thousand of two- to five-story brick apartment (mainly rental) houses in traditional brick technology were constructed in the Czech Republic. Brick buildings from this period were built according to regulations, building codes and laws from the turn of the 19th and 20th centuries. Multi-storey brick tenement houses do not meet the current thermal, acoustic and other requirements, the requirements of a dynamically developing society to the required extent, and in many cases require regeneration and modernization interventions, including the replacement of non-compliant and out-of-date structures and equipment enabling their further use. The course is focused on the current issue of renewal, reconstruction and modernization of brick multi-storey rental apartment buildings, on historical structures and materials, the issue of degradation and aging of structures and materials of historic brick residential buildings, their residual life, failures and reconstruction of historical buildings and their parts. Furthermore, the course is focused on the issue of improving the well-being of the internal environment, the replacement of finishing structures, opening fillings, etc. as an integral part of the modernization of these buildings.			

125OZE1	Renewable Energy Sources	ZK	3
Renewable sources are becoming increasingly important sources of energy for buildings. Understanding their characteristics is key to the proper design and operation of these systems. The course therefore looks in detail at renewable sources and their applications.			
125YTCH	Technological Equipment of Buildings	Z	2
Sauna, fireplaces, kitchen technology, elevators, technology swimming pools, heat pumps, heat source and technological system, technology cooling, fire safety equipment, sprinklers.			
126YBVE	BIM in Public Investments	Z	2
126YPDV	Development Project	Z	2
132DPM	Diploma Thesis	Z	30
In accordance with the thesis proposal.			
132DY01	Dynamics of structures 1	Z,ZK	5
Principles of theory of vibration, dynamic loading. Free and forced vibration of single-degree-of-freedom systems. Damped vibration. Methods of dynamic analysis of muti-degreee-of-freeedom systems.			
132EADC	Experimental Analysis and Diagnostics C	KZ	3
Experiments focused on monitoring of the amount of climatic loads on building and engineering structures (wind, snow, temperature loads), diagnostics of building and engineering structures, tests carried out on physical models of building and engineering structures (model similarity laws, seismic simulations on shake tables, wind tunnel simulations of wind effects, static load tests on physical models), monitoring of building and engineering structures, static load tests (building structures, engineering structures, bridges), dynamic load tests and experimental modal analysis (building structures, engineering structures, bridges, footbridges), effects of technical seismicity, evaluation of adverse effects of vibration on the human body, assessment of the influence of building vibrations on installed machines and devices).			
132NAK	Numerical Analysis of Structures	Z,ZK	5
Variational principles of mechanics. Method of weighted residuals, conditions of convergence (continuity, integrity). Principles of FEM. Isoparametric elements, area coordinates, numerical integration. Application of method to selected 1D and 2D problems (Elasticity, heat transfer, consolidation). Algorithmic aspects of the method.			
132P03C	Structural Design 3C	KZ	5
Students develop individual projects under supervision of teachers from the Department of Mechanics. Project topics are presented at the department website. Students may propose own topics - in this case, suitability of the topic and feasibility of the project will be evaluated by the project supervisor.			
132P04C	Structural Design 4C	KZ	5
Students develop individual projects under supervision of teachers from the Department of Mechanics. Project topics are presented at the department website. Students may propose own topics - in this case, suitability of the topic and feasibility of the project will be evaluated by the project supervisor.			
132PRPM	Deformation and Failure of Materials	Z,ZK	5
Viscoelasticity, models for concrete creep. Theory of plasticity, principles of limit and incremental analysis. Fracture mechanics. Damage mechanics.			
132YKPA	Statics for Architecture	Z	2
132YMMO	Modern Methods of Optimization	Z	2
The course is aimed at an overview of numerical optimization methods applicable not only in the Civil Engineering area. The emphasis is put more on the introduction of driving principles, however, practical applications in MATLAB environment are also conducted during exercises.			
132YNA2	Numerical Analysis of Structures 2	Z,ZK	4
Advanced course on finite element method. Formulation of plate elements suitable for thin and thick plates, plates on elastic foundation. Introduction to nonlinear problems: geometrical and material nonlinearity, solution methods, implementation aspects.			
132YNAK	Nonlinear Analysis of Materials and Structures	Z	2
Students become acquainted with the concepts of linear stability and calculation of elastoplastic load capacity. Linear stability - evaluation of the critical load and buckling shape. Analysis of structures according to the 2nd order theory - equilibrium conditions on a deformed structure, initial stress matrix. Elastoplastic analysis of structures - evaluation of the limit load capacity, distribution of internal forces at the limit state - static incremental method, kinematic method. Solving stability and elastoplasticity problems by means of a general-purpose finite element program.			
132YPM2	Computer Analysis of Structures 2	Z	2
Limit state of frames. Stability analysis of structures. Second order theory. Beams and gridwork girders on elastic foundation. Plate and wall structures. Dynamic analysis of structures. Verification of results.			
132YSEI	Seismic Engineeering	Z	2
Basic principles of design of earthquake resistant structures. Methods of calculating the response of structures to earthquake loads according to Eurocode 8.			
132YSHK	Statics and Reconstruction of Historical Structures	Z	2
Short overview of historical vaults and roof trusses. Static behaviour and most frequent causes of failure. Methods of reconstruction, changes in foundation conditions included. Most frequent causes of failure of panel buildings. Visit to the historical part of Prague Castle.			
132YSSK	Reliability of Structures	Z	2
The course is devoted to the reliability of elements and systems. Element reliability is time dependent while the reliability of systems is of type strength-load. Complicated cases are solved by the FORM method. Two simulation methods are introduced: Monte Carlo and LHS.			
132YUPM	General Principles of Mechanics	Z,ZK	4
Tensors, differential operators and their application in mechanics, Gauss and Green theorems. General structure of the basic equations of linear and nonlinear statics, energy and duality. Principle of virtual work (power), variational principles (Lagrange, Castigliano, Hellinger-Reissner, Hu-Washizu) and their application to continuous and discrete models of beams, frames, plates, walls and three-dimensional bodies.			
133B03C	Concrete Structures 3C	Z,ZK	5
Extension of knowledge in the design of prestressed concrete structures. Introduction to special hybrid and thin-walled structures. Modern materials and design solutions for the future.			
133B04C	Concrete Structures 4C	Z,ZK	5
Extension of knowledge in the field of design of reinforced concrete structures, when the emphasis is put on development of engineering sense. Within the scope of this subject, the student acquires ability to estimate arrangement of reinforcement in RC slabs of general shape, ability to define basic strut-and-tie models for given structural details, ability to provide optimum reinforcement at general point of RC slabs and RC walls based on normal forces distributions obtained with common engineering software. Also, the student learns the basic principles plastic design of RC structures and design of RC foundations.			
133DPM	Diploma Thesis	Z	30
In accordance with a thesis proposal.			
133P03C	Structural Design 3C	KZ	5
The subject is focused on concrete and masonry structures. The assignment can be: elaboration of the structural design documentation, the analysis of the given problem requiring subject matter search and literature retrieval, the numerical analysis of the selected element or part of the structure, the preparation, execution and evaluation of experiments, etc. Collaboration of several students on one assignments is also possible. Consultation with participating departments K124 and K135 is not mandatory for all students. The extent of outputs depends on the type of assignment and the decision of the leading teacher.			

133P04C	Structural Design 4C	KZ	5
The subject is focused on concrete and masonry structures. The assignment can be: elaboration of the structural design documentation, the analysis of the given problem requiring subject matter search and literature retrieval, the numerical analysis of the selected element or part of the structure, the preparation, execution and evaluation of experiments, etc. Collaboration of several students on one assignments is also possible. Consultation with participating departments K124 and K135 is not mandatory for all students. The extent of outputs depends on the type of assignment and the decision of the leading teacher.			
133YATK	Applied Theory of Structures	Z,ZK	4
Detailed introduction to theoretical approaches to the effects of creep and shrinkage on structures. Principles of time-dependent analysis. Methods for the analysis of thin-walled concrete structures, stability theory.			
133YBEX	Concrete under Extreme Conditions	Z	2
The course is focused on concrete and concrete structures under extreme conditions.			
133YMVB	Concrete and Masonry Structures 1	Z	2
The content of the subject will be selected problems from the following areas: Reinforcement of discontinuities of reinforced concrete structures. Introduction to nonlinear modeling of reinforced concrete structures. Preparation of input data for numerical models. Design of structures using MATLAB. Presentation of selected programs for the design of concrete structures.			
133YPNB	Fire desgn og concrete and mnsory structures	Z	2
The course is focused on fire resistance of concrete and masonry structures: concrete and concrete structures exposed to fire, design rules, thermal analysis, loads, design principles, design methods, material properties of concrete and steel reinforcement at high temperatures, fire design of masonry structures.			
133YPRK	Failures and Rehabilitation of Concrete Structures	Z	2
The course focuses on the description of failures of concrete structures, explanation of the causes of these failures and the design of remedial measures. Methods of strengthening existing concrete structures are also discussed. Surface repairs, strengthening of contactors, strengthening of structural elements to the effects of bending moment and shear, and foundation structures are discussed. The course appropriately combines theoretical approaches with common practice.			
133YVHB	Ultrahigh Performance Concretes	Z	2
The aim of the course is to present a special type of concrete that achieves great strength and high durability, which enables the realization of very thin structures. The components of high performance concrete are presented and the main differences in composition of ordinary concrete and HPC. A large part of the lectures is devoted to the components of high performance concrete, the composition and the method of manufacturing, which are subsequently accompanied by laboratory exercises, where the students can experience the theoretical knowledge in practical use.			
134DK02	Timber Structures 2	Z,ZK	4
Lectures on a design of timber elements and structures - static action, choice of computational models and methods, design of details and joints, fire resistance			
134DPM	Diploma Thesis	Z	30
Design of steel / timber load bearing building structure according to external requirements in relation to interaction of load bearing and final completion structural elements. A study focused on research of load bearing structures may be also the topic of the the project. The project is assigned by a final project superisor individually.			
134O02C	Steel Structures 2C	Z,ZK	4
Deepening of knowledge received from courses 133NNK and 134OK01. Amplifying of theoretical knowledge in the field of steel grade selection, toughness, global analysis of structures, buckling of structural systems, joint classification, and high strength steel and demanding composite steel and concrete structures. Complementation of knowledge from fire resistance of steel and composite structures and detailed design of industrial buildings and crane girders. Design of masts, towers, chimneys, tanks, silos and pipelines, technological structures, pre-stressed steel structures and basis of design from aluminium alloys and stainless steel, and cable and membrane structures.			
134P03C	Structural Design 3C	KZ	5
Design of steel / timber load bearing building structure according to external requirements in relation to interaction of load bearing and final completion structural elements. The project is assigned by the seminar leader.			
134P04C	Structural Design 4C	KZ	5
Design of steel / timber load bearing building structure according to external requirements in relation to interaction of load bearing and final completion structural elements. The project is assigned by the seminar leader.			
134YDKM	Timber structures and bridges	Z	2
Timber structures focused to national strategy of sustainable development. New timber-based materials. Structural systeme of houses and bridges. Repairing and strengthtening. Fire design. Production, protection, erection and maintenance. Design and evaluation of bridges, roofs structures in normal temperature and in fire.			
134YHNK	Stainless steel and aluminium structures	Z	2
Subject YHNK covers two parts: the first concerns design of structures from aluminium alloys, the second deals with stainless steel structures. Structures of aluminium alloys: Introduction and practice in designing of aluminium structures. Structures of stainless steel: Evolution of stainless steel materials/structures and examples of realized structures. Stainless steels suitable for structures are described in a detail, including their properties. Dissimilarities in assessments of members under common loadings with respect to low-carbon steels is described for both ultimate and serviceability limit states. In the end the possibilities concerning connections of stainless steel members, erection and installation of stainless steel members are described.			
134YNDK	Load-bearing timber roof constructions	Z	2
System of roofs structures. Creation of numerical models for assessment of internal forces and deformations for main different roof systems and structures. Analysis of the static function and behaviour of main individual elements and their design. Historic structures and their reconstruction. Designing typical structural details based on carpentry joints. We will discuss also using modern methods of joining elements of timber structures.			
134YNSK	Design of Glass Structures	Z,ZK	2
The subject is intended for students of the master's program Civil Engineering, deepens the knowledge acquired in the subject 134YNKS. Extension of theoretical knowledge in the field of stability of glass beams, columns and walls. Principles of designing structural elements made of glass according to normative documents, experimental verification of material properties of glass, safety glass, use of software support for designing.			
134YPMK	Design of Membrane Structures	Z	2
134YPOD	Fire Resistance of Steel and Timber Structures	Z	2
The class gives introduction to fire modeling, fire safety and fire resistance of steel, steel-concrete composite and timber structural elements.			
134YROK	Extending the Life of Steel and Timber Structures	Z	2
Materials used for bearing structures. Developments in the area of regulations and standardization. Causes of defects, malfunctions, survey of objects, static assumptions of reconstruction. Possibilities of strengthening, strengthening of steel and timber structures and strengthening of connections. Using of computers in reconstructions and development of numerical models.			
134YSMK	Stability and modelling of steel structures	Z	2
Subject YSMK covers two parts. The first one deals with stability and strength of steel plates, the second one with stability and strengths of steel frame structures. In the first part the historic collapses of steel structures are analysed including the importance of imperfections for a design of thin plated structures. Presented are principles of theory of buckling, linear and nonlinear theory of buckling of thin plates. The results are applied to the 4th class cross sections in harmony with Eurocode. Buckling due to normal, shear and local loadings including their combination is analysed in a detail. In the end the application of the results is shown together with design of necessary stiffeners. The second part is focused on member			

	and structure stability. Possible global analysis methods are presented together with methods for compression and bending interaction for slender members. In detail, specific cases of lateral torsional buckling are explained including also tapered members.		
134YSOD	Connections of steel and timber structures	Z	2
	The subject allows insight and ability to apply the knowledge related to structural connections and its application by software.		
134YSOK	Special steel structures	Z	2
	Crane supporting structures - actions, design, detailing. Silos - actions, behaviour, silos with rigid and non-rigid section. Masts - division, detiling, design. Cable roofs - procedure of calculation.		
135DPM	Diploma Thesis	Z	30
	In the diploma thesis, the student deals with a topic chosen by the department from those regularly announced by the department. It addresses, for example, problems related to the design and construction of geotechnical structures, civil engineering structures, special foundations for industrial, transport, housing and water management structures, earth and rock structures in complex cases and waste disposal structures. The thesis builds on and develops the findings of the thesis project.		
135P03C	Structural Design 3C	KZ	5
	Design, static calculation and drawing documentation of the building substructure		
135P04C	Structural Design 4C	KZ	5
	Design, static calculation and drawing documentation of the building substructure		
135YGSM	Geotechnical Software for Numerical modelling	Z	2
	Students get acquainted with the Finite Element Method, the currently dominant tool for numerical modeling in Geotechnics. Emphasis is placed on introducing the basic principles of the Finite Element Method and their subsequent application to selected problems of Geotechnical Engineering. The course summarises the types of finite elements used in geotechnical applications, material models suitable for the description of soil deformation, and selected specifics associated with numerical modeling in geotechnics. This knowledge is further applied in the modeling of foundation, embedded walls, and stability problems.		
135YVPZ	Computer analysis in underground structures	Z	2
	Numerical methods in CAD/CAM in geomechanics. Basic types of constitutive models of soil and rock mass behavior. Summary of PC geotechnical software both in the field of conventional methods and in numerical modelling domain. Practical solutions of selected geotechnical problems.		
135ZS02	Foundations 2	Z,ZK	4
	The course deepens the knowledge from the previous course ZS1. It covers design principles, risks associated with the foundation of structures, deeper design of flat foundations, deeper design of deep foundations, negative casing friction of drilled piles, grouting (calculations and execution), construction pits, improvement of foundation soils.		
210YDSM	Diagnostics of Building Materials Properties	Z	2
	Failures of building materials, mechanical, thermal, chemical and other influences on the development of failures of building materials. Diagnostics of their occurrence. Basics of experimental measurement and instrumentation of tested elements and structures. Theory of experiment, measurement and processing of results. Testing machines and equipment. Deformation measuring instruments. Destructive testing of mechanical properties. Non-destructive test methods. Test methodology for various materials (concrete, mortar, metallic elements, wood, glass, plastics, composites and others).		
210YSB	Special Concretes	Z	2
	This course is aimed at expanding knowledge in the field of special concretes and composites for specific applications. The core of the course is to acquaint students with both the technological aspects of the production, testing and use of special concretes, as well as the applicable legislative framework for individual types of special concretes. Specific practical applications and experiences are also presented within the course.		

For updated information see http://bilakniha.cvut.cz/en/FF.html
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