Study plan

Name of study plan: Building Structures

Faculty/Institute/Others:
Department:
Branch of study guaranteed by the department: Welcome page
Garantor of the study branch:
Program of study: Civil Engineering
Type of study: Bachelor full-time
Required credits: 240
Elective courses credits: 0
Sum of credits in the plan: 240
Note on the plan:

Name of the block: Compulsory courses
Minimal number of credits of the block: 210
The role of the block: Z

Code of the group: BD20150100
Name of the group: Building Structures, Compulsory Subjects, 1st semester
Requirement credits in the group: In this group you have to gain 28 credits
Requirement courses in the group: In this group you have to complete at least 5 courses
Credits in the group: 28
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
101CG01	**Constructive Geometry** *Hana Lakomá* ***Hana Lakomá*** *Hana Lakomá (Gar.)*	Z,ZK	5	2P+2C	Z	z
101MT01	**Mathematics 1** *František Bubeník, Kateřina Janžurová, Yuliya Namlyeyeva, Jozef Bobok* ***Yuliya Namlyeyeva*** *Yuliya Namlyeyeva (Gar.)*	Z,ZK	6	2P+3C	Z	z
123CS01	**Chemistry** ***Jana Nábělková***	Z,ZK	5	3P+1C	L	z
132ST01	**Structural Mechanics 1** *Michal Šejnoha* ***Michal Šejnoha*** *Michal Šejnoha (Gar.)*	Z,ZK	6	2P+2C	Z	z
154FS01	**Fieldwork Surveying** *Tomáš Křemen* ***Tomáš Křemen*** *Tomáš Křemen (Gar.)*	Z,ZK	6	2P+3C	Z	z

Characteristics of the courses of this group of Study Plan: Code=BD20150100 Name=Building Structures, Compulsory Subjects, 1st semester

101CG01	Constructive Geometry	Z,ZK	5

Description of space and main methods of the projection - multiview (Monge) projection as a basis for orientation in 3D CAD systems, axonometry, linear perspective. Surfaces in building practice - graphic laws of surfaces, geometric characteristics of surfaces, images of surfaces in appropriate projections, realization and application; visualization of surfaces in a graphic software. Namely: Cylinders and Cones, Hyperboloid of Revolution, Helical Surfaces, Quadrics. Curves in building practice - types of mathematical description, Frenet Frame, osculating circle.

101MT01	Mathematics 1	Z,ZK	6

1. Sequences of real numbers, fundamental concepts and definitions, limits of sequences and methods for their calculating, the number e. 2. Functions of a real variable, fundamental concepts and definitions, limits (proper and improper) and methods for their calculating, continuity. 3. Basic theorems for continuous functions and their applications: Bolzano's and Weierstrass's theorems, derivatives and their geometric and physical meaning, derivative rules, derivative of composite and inverse functions. 4. Derivatives of higher orders, differentials of the 1st and higher orders, Lagrange's theorem and its consequences, l'Hospital's rules. 5. An analysis of functions sequent on the properties of the 1st and 2nd derivatives (intervals of monotony, local extremes, convexity and concavity, points of inflection, asymptotes). 6. Global (absolute) extremes on compact intervals, word problems. Taylor's theorem, Taylor's polynomial and its applications. 7. Vector (linear) spaces, the vector space of ordered n-tuples, R2, R3, linear combinations, linear independence and dependence, bases, the dimension, subspaces. 8. Linear hull, matrices, the rank of a matrix, Gauss's algorithm. 9. Systems of linear algebraic equations, basic methods for solving, Gaussian elimination, Frobenius theorem. 10. Matrix multiplication, inverse matrices and their applications, matrix equations. 11. Determinants of the 2nd and 3rd orders, Sarrus's rule, inverse matrices by means of determinants, Cramer's rule. 12. Fundamental properties of geometric vectors. General form and parametric representation of a plane. Parametric equations of straight lines. A straight line as the intersection of two planes. 13. Relationship problems on straight lines and planes, deviations and distances of planes and straight lines. Application of analytic methods for solving geometric problems in the space.

123CS01	Chemistry	Z,ZK	5

Lectures deal with the basic chemical principles in the branches as general, inorganic, organic and physical chemistry. Instances of topics are composition, properties and behaviour of water, soil, air, wood, macromolecular compounds, inorganic binders, metals and other materials used in civil enginnering.

132ST01	Structural Mechanics 1	Z,ZK	6

The principal objective of the course is to familiarize students with basic principles of mechanics such as equilibrium and equivalency applied to statically determined structures 1. Concurrent forces - definition of force, basic theorems and axioms, equilibrium, equivalency 2. Concurrent forces - resultants by rectangular components 3. Statics of particles - free-body diagrams, equilibrium of rigid particles 4. General system of forces - resultant forces and resultant moments, cross product, scalar product 5. General system of forces - resolution of forces to a force and a couple 6. Parallel system of forces in two and three dimensions 7. Statics of rigid bodies - idealization of two and three-dimensional supports and connections 8. Statics of rigid bodies - equilibrium in two and three dimensions 9. Statics of rigid bodies - reaction forces of simple and compound statically determined structures 10. Statics of rigid bodies - reaction forces applying principle of virtual displacements and rotations 11. Analysis of trusses - definition, classification, zero force members 12. Analysis of trusses - application of the method of joints 13. Analysis of trusses - application of the method of sections

154FS01	Fieldwork Surveying	Z,ZK	6

Introduction to surveying, basic geodetic calculations, evaluation of precision and accuracy of a measurement, theory of errors, instrumentation, topographic survey, angular and distance measurements, determination of heights, photogrammetry, laser scanning, mapping, setting-out in construction, surveying for monitoring of displacements, cadastre of real estates.

Code of the group: BD20150200
Name of the group: Building Structures, Compulsory Subjects, 2nd semester
Requirement credits in the group: In this group you have to gain 28 credits
Requirement courses in the group: In this group you have to complete at least 5 courses
Credits in the group: 28
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
101MT02	**Mathematics 2** *František Bubeník, Yuliya Namlyeyeva* ***Yuliya Namlyeyeva*** *Yuliya Namlyeyeva (Gar.)*	Z,ZK	6	2P+3C	L	z
102PH01	**Physics** ***Alexey Sveshnikov***	Z,ZK	5	3P+1C	L	z
105SSU	**Social Sciences**	Z,ZK	6	4P+1C	L	z
123BM01	**Building Materials** *Alena Vimmrová* ***Alena Vimmrová*** *Alena Vimmrová (Gar.)*	Z,ZK	5	2P+2C	Z	z
132ST02	**Structural Mechanics 2** *Jan Vorel* ***Jan Vorel*** *Jan Vorel (Gar.)*	Z,ZK	6	2P+2C	L	z

Characteristics of the courses of this group of Study Plan: Code=BD20150200 Name=Building Structures, Compulsory Subjects, 2nd semester

101MT02	Mathematics 2	Z,ZK	6

1. Indefinite integral, primitive functions, tabular integrals. Fundamental methods for calculating indefinite integrals: per partes, substitutions. 2. Integration of rational functions (with simple imaginary roots in denominators at most one). 3. Selected special substitutions. 4. Definite integral, fundamental methods for calculating definite integrals: Newton- Leibniz`s formula, per partes, substitutions. 5. Improper integrals, convergence and divergence of improper integrals, methods of computation. 6. Geometrical and physical applications of integral calculus : area of a plane figure, volume of a solid of revolution, length of the graph of a function, static moments and the centre of gravity of a plane figure. 7. Functions of several variables. Definition domains, in case of two variables also level curves and graphs. Partial derivatives, partial derivatives of higher orders. 8. Directional derivatives. Gradient. Total differential. Derivatives and partial derivatives of functions defined implicitly. 9. Equations of tangent and normal lines of a plane curve and tangent planes and normal lines of a surface. 10. Local extrema and local extrema with respect to a set (constrained extrema). 11. Global extrema on a set. 12. Differential equations of the 1st order, separation of variables, homogeneous equations. Cauchy problems. 13. Linear differential equations of the 1st order, variation of a constant. Exact equations. Cauchy problems.

102PH01	Physics	Z,ZK	5

Principal goal of the lectures is to present those fundamentals of physics necessary for further special courses. 1. Atoms. Molecules. Ions. Phases. Structures of substances. 2. Kinematics. Coordinate system. Radiusvector.Velocity. Acceleration. 3. Dynamics. Force. Newton´s laws of motion. 4. Force field. Newton´s law of universal gravitation. Work. Energy. Conservation law. 5. Deformation. Stress and strain. 6. Tensile, compressive and shear stress. Hooke´s law. 7. Flow. Viscosity. Laminar and turbulent flow. Bernoulli´s equation. 8. Oscillations. Basic definitions and characteristics. 9. Elastic waves in fluids and solids. 10. Interference. Acoustic waves. 11. Equilibrium thermodynamics. Heat and temperature. Thermodynamic work. 12. Thermal expansion of substances. 13. Heat transfer: convection, conduction, radiation.

105SSU	Social Sciences	Z,ZK	6

The course Social Sciences encompasses a broader, multidisciplinary, framework (sociology, economy, marketing, politology, social anthropology, and media). The economics part of the course covers basic economic terms, demand, supply, market equilibrium and rational consumer choice. Firm and production function in short and long run as well as long run and short run cost are discussed. Market structures and markets for productive inputs and public goods are other topics. Also presented are macroeconomic aggregates and basics of macroeconomics. Social theories presented in the course are considered as an analytical reflection on the concepts and formal cognitive schemes of all social sciences. Students will get familiar with social theories/paradigms that are used to study and interpret social phenomena. Seminars will focus on everyday life, its interactions, and opinion polemics, which often interfere in negotiations about the direction and goals of society. The course also provides students with conceptual tools for their own further studies based on critical thinking.

123BM01	Building Materials	Z,ZK	5

Main aim of course is giving basic information about the structure and properties of the building materials and about their testing methods on the base of the contemporary knowledge and materials engineering approach. The laboratory work (exercise) consists in the testing of building materials from the point of view of physically - chemical properties and their quality control.

132ST02	Structural Mechanics 2	Z,ZK	6

The principal objective of the course is to familiarise students with the application of basic principles of mechanics to the determination of the distribution of internal forces in statically determined structures, cross-sectional properties and the elementary definition of stress.

Code of the group: BD20150300
Name of the group: Building structures, Compulsory Subjects, 3rd semester
Requirement credits in the group: In this group you have to gain 30 credits
Requirement courses in the group: In this group you have to complete at least 5 courses

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
101MT03	**Mathematics 3** *František Bubeník, Yuliya Namlyeyeva, Ondřej Zindulka, Martin Hála **Ondřej Zindulka** Ondřej Zindulka (Gar.)*	Z,ZK	6	3P+2C		z
124BS01	**Building Structures 1** ***Eva Burgetová***	Z,ZK	7	4P+2C	Z	z
132TELA	**Theory of Elasticity** *Jan Vorel **Jan Vorel** Jan Vorel (Gar.)*	Z,ZK	6	3P+2C	Z	z
135GSM	**Geology and Soil Mechanics** ***Jan Valenta***	Z,ZK	7	4P+2C		z
142WEE	**Water and Environmental Engineering** *Petr Nowak, Petr Sklenář, David Zumr, Václav David, Tomáš Dostál, Martina Sobotková, Martin Šanda, Milan Zukal, Ladislav Satrapa, ... **Milan Zukal** Milan Zukal (Gar.)*	Z,ZK	4	3P+1C		z

Characteristics of the courses of this group of Study Plan: Code=BD20150300 Name=Building structures, Compulsory Subjects, 3rd semester

101MT03	Mathematics 3	Z,ZK	6

1.Linear differential equations of the n-th order, initial value problems. Homogeneous equations: fundamental system, general solution. Fundamental system for equation with constant coefficients. Descriptive statistics. 2. Reduction of order. Nonhomogeneous equations: variation of parameters, method of undetermined coefficients. Descriptive statistics: box-plot, outliers. Bivariate data. 3. Dot product of functions in C([a,b]), orthogonality of functions. Setup of a boundary value problem, examples. Bivariate descriptive statistics. Linear regression. 4. Problem u''+au=f, u(0)=u(pi)=0, eigenvalues and eigenfunctions. Orthogonality of eigenfunctions. Solvability (as it depends on "a"). Some other problems. Introduction to probability theory. Classical probability. 5. Double integral, Fubini Theorem, substitution, polar coordinates. Conditional probability; independent events. 6. Applications of double integral. Discrete random variables. 7. Triple Riemann integral, Fubini Theorem, substitution, cylindrical and spherical coordinates. applications of double and triple integral. Binomial distribution. 8. Applications of triple integral. Continuous random variables. 9.Line integral of a scalar field, applications. Continuous random variable: expected value and variance. 10. Line integral of a vector field, Green Theorem. Normal distribution. 11. Conservative fields. Applications of normal distribution. 12. Applications of line integrals. Inferential statistics.

124BS01	Building Structures 1	Z,ZK	7

Integrated approach to design of building structures considering complex of performance requirements. Requirements on buildings, sub structures and elements. 1.Basic classification and development of building structure; 2.Requirement on building structures, structural systems, space rigidity, interaction load and non-load structures; 3.Structural Systems for Single- and Multistorey Buildings. High Rise Buildings. 4.Structural Systems for Long Span Structures. Superstructures. 5.Vertical load bearing structures (performance, requirements, design principles, walls, columns); 6.Floor structures (performance, requirements, design principles) 7.Vaults, timber floors, RC floor structures, steel and composite steel and RC floor structures); 8.Overhanging structures (performance, requirements, design principles of balconies, canopies, cornices); 9.Staircase structure.; 10.Expansion joints in load bearing structures; 11.Foundations; 12.Basement structures;

132TELA	Theory of Elasticity	Z,ZK	6

Basic assumptions and basic equations of theory of elasticity. Assumptions on deformation and stress distribution in beams. Tension and compression, pure bending, bending moments in two planes, combination of axial and bending stresses. Core of a cross section. Differential equation of elasticity curve. Shear stresses in flexural beams. Free torsion. Elastic-plastic and plastic state of cross-section. Stability of beams. 2D problems, walls and plates.

135GSM	Geology and Soil Mechanics	Z,ZK	7

Basic course of Geology and Soil Mechanics for Civil Engineers. Introduction to geological processes, structural geology and hydrogeology. Soil behaviour description, introduction to multi-phase media, soil classification, compressibility and strength, soil testing, earth pressures, assessment of stability and deformation, applications in civil engineering.

142WEE	Water and Environmental Engineering	Z,ZK	4

In the course students will obtain basic knowledge about water and environmental management. The focuses on practical knowledge with close relation to other disciplines of civil engineering. The subject is taught in form of lectures and tutorials. The stress is laid on presentations with case studies (positive and negative) using all audio visual forms. Lectures of this course are divided into two parts Water Engineering and Environmental Engineering.

Code of the group: BD20170400
Name of the group: Building structures, Compulsory Subjects, 4th semester
Requirement credits in the group: In this group you have to gain 30 credits
Requirement courses in the group: In this group you have to complete at least 6 courses
Credits in the group: 30
Note on the group: 133FSTD divided

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
126ECM	**Economics and Management** *Aleš Tomek, Martin Časenský, Radan Tomek **Aleš Tomek** Aleš Tomek (Gar.)*	Z,ZK	7	4P+2C		z
132SM3E	**Structural Mechanics 3** *Jan Zeman **Jan Zeman** Jan Zeman (Gar.)*	Z,ZK	5	2P+2C	L	z
133FSTC	**Fundamentals of Structural Design - Concrete** *Petr Štemberk, Yuliia Khmurovska **Petr Štemberk***	Z,ZK	4	2P+1C	L	z
134FSTT	**Fundamentals of Structural Design - Steel** *Zdeněk Sokol **Zdeněk Sokol** Zdeněk Sokol (Gar.)*	Z,ZK	3	2P+1C	L	z

136TSUP	**Transp. Structures and Urban Planning** *Leoš Horníček, Jan Valentin, Jiří Kugl, Václav Jetel, Ivan Horký, Ludvík Vébr* ***Jan Valentin*** *Jan Valentin (Gar.)*	Z,ZK	6	5P+1C		z
141HYAE	**Hydraulics** *Václav Matoušek* ***Václav Matoušek*** *Václav Matoušek (Gar.)*	Z,ZK	5	2P+2C	L	z

Characteristics of the courses of this group of Study Plan: Code=BD20170400 Name=Building structures, Compulsory Subjects, 4th semester

126ECM	Economics and Management	Z,ZK	7

A-Z of construction engineering and management both at the corporate and project level. All participants, processes and aspects of the construction industry are introduced. Course concentrates on all major topics of company and project management, e.g. business development and marketing, bidding, planning and controlling of all vital processes, financial management, cost control, risk management, etc. Lectures are based on the real practice experience of all course's lecturers and various case studies are studied and solved. Online Building Industry Game (BIG) will be played by all course participants through the whole semester (a computer simulation of a realistic business environment where participants play the role of contractors, competing in a market with variable demand for construction work). In this online game, developed and directly operated by the California Polytechnic State University, students act as contractors, managing both, their companies and projects.

132SM3E	Structural Mechanics 3	Z,ZK	5

Deflections by the principle of virtual work. Statically indeterminate planar frames and trusses, force method. Slope deflection method and Cross (moment distribution) method for frames. Secondary moments in trusses. Prerequisities:Statically determinate planar frames, trusses and gridworks (balconies), reactions, internal forces diagrams. Active knowledge and expedience is required in solving examples. Reasonable minimum is 8 credits in structural mechanics

133FSTC	Fundamentals of Structural Design - Concrete	Z,ZK	4

The course is focused on design of concrete structures based on ultimate state design method. The focal topics are design of reinforced concrete members for basic types of straining (bending, shear, combination of normal forces and bending moments) including determination of load effects; introduction to serviceability limit states. Other topics are technology of production and material properties of concrete and their testing, properties of steel reinforcement and interaction of reinforcement and concrete. The prerequisite courses are Structural mechanics, Theory of Elasticity, Building materials, Building structures.

134FSTT	Fundamentals of Structural Design - Steel	Z,ZK	3

The course is focused on design of steel, steel and concrete concrete composite load-bearing structures. The students will learn how to design of simple structural elements (beams, columns, trusses) and structural bolted and welded connections.

136TSUP	Transp. Structures and Urban Planning	Z,ZK	6

Introduction to the transportation engineering with the focus on road and railroad infrastructure. Rail transport and its advantages and disadvantages. Railway track and tram track construction. Noise and anti-noise measures. Road design and principles, Environmental aspects of road infrastructure. Pavement design (thickness design) and principles of the pavement structure functions. Crossings and junctions. Construction materials for highway and rail road engineering. Introduction to urban zoning and planning including urbanism. Relationships of urban planning and environmental, economic, culture-social, space and operational aspects of landscape and urban areas. Information to planning tools, procedures and used applications.

141HYAE	Hydraulics	Z,ZK	5

Physical properties of water. Hydrostatics - pressure in a gravitational field, applications of the Pascal's law (hydraulic jack), hydrostatic forces, loading of construction by liquids, buoyancy force. Basics of hydrodynamics - characteristics, regimes and types of water flow, hydraulic resistance, application of basic equations. Pressure flow in pipes - energy losses due to friction, minor losses, simple cases of pipe computations, pipe systems with pump, formation of a water hammer. Steady flow in open channels - uniform flow, hydraulic design of a channel, critical flow, longitudinal profiles of water level. Hydraulics of structures - outflow from an orifice and from a pipe system, flow through culverts and bridge openings. Forces due to water in motion. Water flow measurement. Groundwater flow - types, effects, filtration law, solving of a seepage.

Code of the group: BD20150500
Name of the group: Building structures, Compulsory Subjects, 5th semester
Requirement credits in the group: In this group you have to gain 30 credits
Requirement courses in the group: In this group you have to complete at least 5 courses
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**
124BPH	**Building Physics** *Jiří Nováček, Zbyněk Svoboda* ***Jiří Nováček*** *Zbyněk Svoboda (Gar.)*	Z,ZK	6	3P+2C	Z	z
132STA	**Structural Analysis** *Jan Zeman, Petr Řeřicha, Benjamin Werner* ***Jan Zeman*** *Petr Řeřicha (Gar.)*	Z,ZK	5	2P+2C	Z	z
133CM01	**Concrete and Masonry Structures 1** *Petr Bílý, Iva Broukalová* ***Iva Broukalová*** *Iva Broukalová (Gar.)*	Z,ZK	6	3P+2C	Z	z
134ST01	**Steel Structures** *Zdeněk Sokol* ***Zdeněk Sokol*** *Zdeněk Sokol (Gar.)*	Z,ZK	6	3P+2C	Z	z
135FS01	**Foundation of Structures** *Jan Záleský, Jan Kos* ***Daniel Jirásko*** *Jan Záleský (Gar.)*	Z,ZK	7	3P+3C	Z	z

Characteristics of the courses of this group of Study Plan: Code=BD20150500 Name=Building structures, Compulsory Subjects, 5th semester

124BPH	Building Physics	Z,ZK	6

Basic review of the thermal protection of buildings, building acoustics and daylighting (heat transfer, thermal conductivity, thermal resistence and thermal transmitance, multidimensional heat transfer, thermal bridges and thermal joints, difusion of water vapour and vapour condensation, mould growth, transient heat transfer, risk of overheating, low-energy, passive and zero-energy buildings, sound in the living and working environment, perception and description of sound: intensity, frequency, time factor, information value, interindividual sensitivity, point, line and plane sound sources, sound power level, directivity factor, sound propagation in the free field conditions, sound propagation in the diffuse field conditions, definable and indefinable sounds, airborne and structureborne sound, definition, measurement, evaluation and the limits, sound reduction index of double structures, mass-air-mass resonance, standing waves in a cavity, definition, measurement, evaluation, the sun and the environment, basics of spherical astronomy, horizons and equatorial coordinates, calculating of the sun azimuth and altitude, daylight and lighting, visual perception, basics of photometry, daylight factor and calculation models of the sky, methods for determining daylight factor, influence of environment on a daylighting: photometric characteristics of shielding barriers, technical characteristics of lighting openings).

132STA	Structural Analysis	Z,ZK	5
Displacement method for planar frames and gridworks. Extreme effects of live load, influence lines. Stress and strain tensors, traction vector, principal stresses an directions, material strength. Finite element principles and techniques, error of the finite element solutions. Prerequisities: The force and slope deflection methods for statically indeterminate planar frames and trusses, elementary elasticity, stresses and strains in beams, Hooke's law. 13 credits in structural mechanics and elasticity is a reasonable minimum to enter the course.			
133CM01	Concrete and Masonry Structures 1	Z,ZK	6
Structural design of concrete structures; prerequisite course 133FSTC Fundamentals of Structural Design - Concrete. Calculation models, methods of analysis (focus on simplified and empirical methods), reinforcing and detailing for particular structures and structural elements: slabs, frames, shear walls, staircase, basement and retaining walls, foundations.			
134ST01	Steel Structures	Z,ZK	6
The purpose of this course is to learn basic principles and general arrangement and structural detailing of multi-storey buildings and single-storey buildings. Brief information about structural analysis, load, design codes and structural stability is also given. The course gives some examples of large span, tall and industrial buildings.			
135FS01	Foundation of Structures	Z,ZK	7
Basic design methods for shallow footings, piles, retaining structures, foundation pits, sheet pile walls, anchors and soil improvement. Principles of monitoring in foundation engineering. Use of Eurocode 7. Selected case histories.			

Code of the group: BD20150600
Name of the group: Building structures, Compulsory Subjects, 6th semester
Requirement credits in the group: In this group you have to gain 30 credits
Requirement courses in the group: In this group you have to complete at least 5 courses
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
124BC01	**Non-loadbearing Construction** *Vladimír Žďára* ***Vladimír Žďára*** *Vladimír Žďára (Gar.)*	Z,ZK	7	2P+3C	L	z
124SDP1	**Structural Design, Project 1** *Hana Gattermayerová, Martin Jiránek, Tomáš Vlach* ***Tomáš Vlach*** *Hana Gattermayerová (Gar.)*	KZ	6	4C	L	z
125BSE	**Buildings Services Systems** *Hana Kabrhelová, Ilona Koubková, Stanislav Frolík, Karel Kabele, Michal Kabrhel* ***Hana Kabrhelová*** *Karel Kabele (Gar.)*	Z,ZK	5	2P+2C	L	z
133CM02	**Concrete and Masonry Structures 2** *Iva Broukalová, Jan Vítek, Radek Hájek* ***Iva Broukalová*** *Jan Vítek (Gar.)*	Z,ZK	7	4P+2C	L	z
134TS01	**Timber Structures** *Petr Kuklík* ***Petr Kuklík*** *Petr Kuklík (Gar.)*	Z,ZK	5	3P+1C	L	z

Characteristics of the courses of this group of Study Plan: Code=BD20150600 Name=Building structures, Compulsory Subjects, 6th semester

124BC01	Non-loadbearing Construction	Z,ZK	7
Course is focused on complex approach to practice design of the building envelope, flat and sloped roofing, doors and windows, partition walls, floor structures and ceilings. This course introduces theoretical foundations and computational approaches about two fields of building design: building physics and structure interaction. Integrated design of the nonbearing structures together with other building systems.			
124SDP1	Structural Design, Project 1	KZ	6
Converting an architectural study of a smaller or medium-sized building for housing, administration, education, culture or sports into a detailed design of a building structure based on static analysis, interaction of load-bearing and non-load-bearing elements and building physics. Focus on complex approach to practic design, analysis and optimalization of a building structures. Design of variants of the load-bearing system, preliminary static analysis (calculation of load-bearing elements - slabs, columns, walls, etc), calculation of foundations, design of structures on the building envelope with respect to thermal protection of buildings, building physics, fire protection of buildings and protection against water and soil moisture. Elaboration of detailed drawings including floor plans, sections and details. Public presentation.			
125BSE	Buildings Services Systems	Z,ZK	5
Introductory Course of Building Services is focused on sanitary installations, gas supply system and heating systems. Sanitary installations - introduction, hydraulic pipes, water supply facilities, balance water needs. Internal water supply systems - installation, materials, calculation, waste water and disposal, sewage systems, internal drainage, types of fixtures. Gas - external pipelines, connections, balance of gas, internal pipeline systems, flue gas. Central heating and design of heating surfaces. Calculation of heat balance. Heating system. Preparation of hot water. Heat sources - boiler, electric heating, district heating, renewable sources.			
133CM02	Concrete and Masonry Structures 2	Z,ZK	7
Design of concrete structures on serviceability. Limit states approach. Stress control, cracking and crack width analysis, allowable crack width in concrete structures. Deformation of reinforced concrete structures, numerical and simplified analysis, criteria of acceptance. Prestressed concrete. Introduction, basic principles, design philosophy, prestress losses, technology of prestressing, pre-tensioning and post-tensioning, verification of serviceability and ultimate limit states. Masonry structures, introduction, terminology, design of structural elements, reinforced masonry. Strengthening of masonry structures. Precast concrete structures, design situations, specific problems. Strut and tie models. Joints. Industrial halls. Composite concrete-concrete structures. Introduction to concrete bridges and introduction to engineering structures.			
134TS01	Timber Structures	Z,ZK	5
The course is focused on basic rules for mechanical resistance, serviceability, durability of timber structures in normal temperature and in fire.			

Code of the group: BD20160700
Name of the group: Building structures, Compulsory Subjects, 7th semester
Requirement credits in the group: In this group you have to gain 22 credits
Requirement courses in the group: In this group you have to complete at least 6 courses
Credits in the group: 22
Note on the group: rozdělení 124BS02

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
122TCD	**Technology of Construction** *Čeněk Jarský, Alexander Kravcov, Mária Párová* ***Čeněk Jarský*** *Čeněk Jarský (Gar.)*	Z,ZK	6	4P+2C	Z	z
123MED	**Material Engineering** *Alena Vimmrová, Jan Fořt, Igor Medveď* ***Alena Vimmrová*** *Igor Medveď (Gar.)*	Z,ZK	5	2P+2C	Z	z
124BS2D	**Building Structures 2D** *Vladimír Žďára* ***Vladimír Žďára*** *Vladimír Žďára (Gar.)*	Z,ZK	3	2P+1C	Z	z
124PDRD	**Failures, Deterioration, Renovations** *Eva Burgetová* ***Eva Burgetová*** *Eva Burgetová (Gar.)*	Z,ZK	3	2P+1C	L	z
125BSE2	**Buildings Services Systems 2** *Hana Kabrhelová, Ilona Koubková, Stanislav Frolík, Michal Kabrhel, Daniel Adamovský, Zuzana Veverková* ***Hana Kabrhelová*** *Daniel Adamovský (Gar.)*	Z,ZK	5	2P+2C	Z	z
100ODPR	**Industrial Training (3 weeks)** *Jan Růžička, Petr Hájek* ***Michal Jandera*** *Michal Jandera (Gar.)*	Z	0	6C	Z,L	z

Characteristics of the courses of this group of Study Plan: Code=BD20160700 Name=Building structures, Compulsory Subjects, 7th semester

122TCD	Technology of Construction	Z,ZK	6
Goal: To learn students to know construction processes and their design and to create a model of the building process of a project for planning and management of its implementation Contents: 1. Introduction to construction technology, construction processes, basic terminology. 2. Earthworks, excavation of rock classes, types of excavation, shoring, compaction, drainage. 3. Production and transport of concrete mixture. Formwork and traditional system, placement of reinforcement, storage and compaction of fresh concrete, curing of fresh concrete. 4. Construction Equipment (equipment for mining, transportation and compaction of rocks, concrete transport equipment, lifting equipment, tower and mobile cranes, trucks, elevators, hoists, trays, tools for finishing work). 6. Excursion to construction site. 7. Finishing works in building industry. Plasters, facings, paintings, soffits, wallpapers floors. 8. Facades, fronts. Internal installations, sewerage, water, gas, electricity mains. 9. Health and safety at work. Environmental protection during construction. Quality requirements for construction processes. 10. Implementation of buildings and projects. Main concepts and terms. Technological, spatial and time analysis of the building process, 11. Technological stages and their characteristics for homogenous and non homogenous buildings.Long term and short term construction planning and scheduling. Construction technology design. 12. Flow method in building industry, use of construction technology network analysis for project management. Use of computers in project planning and management. 13. Principles of design of site facilities and equipment			
123MED	Material Engineering	Z,ZK	5
Subject gives information on principles of designing and development of new types of materials having directed properties for specific building applications and structures.			
124BS2D	Building Structures 2D	Z,ZK	3
124PDRD	Failures, Deterioration, Renovations	Z,ZK	3
Characteristic failures of buildings and their lifetime, analyses of loading impacts and influences from point of failure view, non-force impacts, building-technical survey of buildings, degradation and corrosion processes, historical structures (foundations, vaults, ceilings, roof trusses), failures and reconstruction of masonry, concrete, reinforced concrete, wooden, steel and prefabricated structures, protection of buildings against increased moisture effects.			
125BSE2	Buildings Services Systems 2	Z,ZK	5
Introduction to the indoor environmental quality, building ventilation and basic artificial lighting and electrical installation. Lectures topics: Microenvironment and its constituents. Microenvironment-health requirements. Design of air-handling systems - basics, criteria. Ventilation systems - Principles of natural and mechanical ventilation. Heat recovery. Parts of air handling systems. Fundamentals of air-conditioning systems. Natural and Combined lighting. Electricity distribution. Electrical installations. Tutorials focused on practical design of ventilation and basic light and electrical systems.			
100ODPR	Industrial Training (3 weeks)	Z	0

Code of the group: BD20150800
Name of the group: Building structures, Compulsory Subjects, 8th semester
Requirement credits in the group: In this group you have to gain 12 credits
Requirement courses in the group: In this group you have to complete at least 2 courses
Credits in the group: 12
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
124FSHB	**Fire Safety and Healthy Buildings** *Martin Jiránek, Zuzana Rácová, Vladimír Mózer, Veronika Kačmaříková, Petr Hejtmánek* ***Vladimír Mózer*** *Martin Jiránek (Gar.)*	Z,ZK	6	3P+2C	L	z
126CMAN	**Construction Management** *Aleš Tomek, Radan Tomek* ***Aleš Tomek*** *Aleš Tomek (Gar.)*	Z,ZK	6	3P+2C	L	z

Characteristics of the courses of this group of Study Plan: Code=BD20150800 Name=Building structures, Compulsory Subjects, 8th semester

124FSHB	Fire Safety and Healthy Buildings	Z,ZK	6
Constituents of indoor microclimate, hazardous substances (VOCs, HFRs, heavy metals, moulds, microbes, aerosols, radionuclides, etc.), their sources and health effects. Influence of building structures and materials on quality of indoor microclimate. Design of buildings with respect to optimisation of indoor microclimate. Analysis of fire - course of fire, burning process, fire loading; legislation and European Standards; fire safety solutions - fire project, requirement for fire resistance of buildings, escape ways, distance separation, fire-fighting equipment; fire behaviour of the most used materials (wood, steel, concrete, plastics); protection of building materials against fire (brickwork, concreting, plasters and sprays, coatings, impregnates of wood, encasements, glued facings of mineral fibres); sandwiches from fire point of view; influence of claddings on the course fire; passive protection of building structures - fire walls, fire glazed structures, fire ceiling, draft stops and seals; repressive measures - electric fire signalling, stationary extinguishing devices, smoke extract, hydrant systems.			

126CMAN	Construction Management	Z,ZK	6

Course is oriented mainly on practical applications of corporate construction management systems. It includes corporate strategy, corporate finance and budgeting, marketing and methods of business development, etc. Sustainable profitability of the construction business and the best practice at both - field and corporate level is explained.

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: BD20170700_2
Name of the group: Building Structures, Optional Subjects, 7-8th semester
Requirement credits in the group: In this group you have to gain at least 8 credits
Requirement courses in the group: In this group you have to complete at least 2 courses
Credits in the group: 8
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
101MPRS	**Probability and Statistics** *Daniela Jarušková* ***Daniela Jarušková*** *Daniela Jarušková (Gar.)*	ZK	4	2P+2C		PV
102PHS	**Physics - Seminar** *Jiří Novák, Jiří Konfršt* ***Jiří Konfršt*** *Jiří Novák (Gar.)*	Z	2	2C		PV
124BIMR	**BIM - Revit Architecture** *Pavel Chour, Renáta Hoďánková* ***Pavel Chour*** *Renáta Hoďánková (Gar.)*	KZ	2	1P+1C	Z,L	PV
124CADE	**CAD 1 (E)** *Pavel Chour* ***Pavel Chour*** *Pavel Chour (Gar.)*	KZ	3	3C	Z,L	PV
124EDC	**Civil Engineering in Developing Countries** *Jan Tilinger* ***Jan Tilinger*** *Jan Tilinger (Gar.)*	Z,ZK	4	2P+2C	L,Z	PV
128CGR	**Computer Graphics** *Tomáš Vaníček* ***Tomáš Vaníček*** *Tomáš Vaníček (Gar.)*	Z,ZK	4	2P+2C	Z,L	PV
128CS1	**C# Programming and Application Development** *Miroslav Sůra* ***Miroslav Sůra*** *Miroslav Sůra (Gar.)*	Z,ZK	4	2P+2C	Z,L	PV
128CS2	**C# 2 - Advanced Application Development** *Miroslav Sůra* ***Miroslav Sůra*** *Miroslav Sůra (Gar.)*	Z,ZK	4	2P+2C	Z,L	PV
128YIND	**Computer Use Fundamentals** *Miroslav Sůra* ***Miroslav Sůra*** *Miroslav Sůra (Gar.)*	Z	2	2C	L,Z	PV
129ACM1	**Architectural CAD Modelling 1** *Vojtěch Dvořák, Anna Marie Černá* ***Vojtěch Dvořák*** *Vojtěch Dvořák (Gar.)*	KZ	3	3C	Z,L	PV
129ACM2	**Architectural CAD Modelling 2** *Vojtěch Dvořák, Anna Marie Černá* ***Vojtěch Dvořák*** *Vojtěch Dvořák (Gar.)*	KZ	3	3C	Z,L	PV
129CTA	**Composition and Theory of Architecture** *Lenka Popelová* ***Lenka Popelová*** *Lenka Popelová (Gar.)*	KZ	2	2C	L,Z	PV
132MMO	**Modern Methods of Optimization** *Jan Zeman, Matěj Lepš* ***Jan Zeman*** *Jan Zeman (Gar.)*	Z	2	1P+1C	Z	PV
133CASD	**Computer Aided Structural Design** *Josef Novák* ***Josef Novák*** *Josef Novák (Gar.)*	Z	2	1P+1C	Z,L	PV
133YBBD	**Basis of Bridges Design** *Roman Lenner* ***Roman Šafář*** *Roman Šafář (Gar.)*	Z	2	1P+1C	Z	PV
133YCB	**Concrete Bridges** *Roman Lenner* ***Roman Lenner*** *Roman Lenner (Gar.)*	Z,ZK	4	2P+2C	L	PV
134FSTS	**Fire Design of Steel, Concrete and Timber Str.** *František Wald* ***František Wald*** *František Wald (Gar.)*	Z	2	1P+1C		PV
134GSTR	**Glass Structures** *Martina Eliášová* ***Martina Eliášová*** *Martina Eliášová (Gar.)*	Z	2	1P+1C		PV
134TBS	**Timber Based Structures** *Petr Kuklík* ***Jakub Dolejš*** *Petr Kuklík (Gar.)*	Z	2	1P+1C	Z	PV
137TENV	**Rail Traffic and Environment** *Leoš Horníček, Jiří Pospíšil, Lenka Lomoz* ***Leoš Horníček*** *Leoš Horníček (Gar.)*	Z,ZK	2	1P+1C	Z	PV
143ENE	**Environmental Engineering** *David Zumr, Tomáš Dostál, Martina Sobotková, Martin Šanda, Nina Elizabeth Noreika* ***Martin Šanda*** *Tomáš Dostál (Gar.)*	Z,ZK	4	2P+1C	Z,L	PV
143ESP	**Soil Physics for Engineers** *David Zumr, Jakub Jeřábek, Milena Císlerová, Tailin Li* ***David Zumr*** *Milena Císlerová (Gar.)*	Z,ZK	4	2P+2C	Z	PV
143SSP	**Soil Science and Soil Physics** *Martin Šanda, Michal Sněhota* ***Martin Šanda*** *Martin Šanda (Gar.)*	Z,ZK	4	2P+2C	Z	PV
144BT1	**Balneotechnology** *Bohumil Šťastný* ***Jana Nábělková*** *Jana Nábělková (Gar.)*	ZK	2	2P	Z	PV
144WS	**Drinking Water Management** *Kateřina Slavíčková, Filip Horký, Jana Nábělková* ***Filip Horký*** *Kateřina Slavíčková (Gar.)*	KZ	2	2P	Z	PV

Characteristics of the courses of this group of Study Plan: Code=BD20170700_2 Name=Building Structures, Optional Subjects, 7-8th semester

101MPRS	Probability and Statistics	ZK	4
The goal is to get a basic knowledge in probability and inferential statistics. Probability. Discrete and continuous random variables. Normal distribution. Asymptotic distribution of a mean. Multivariate distribution. Independence and correlation. Parameter estimation. Hypothesis testing. Simple linear regression.			
102PHS	Physics - Seminar	Z	2
This course serves as a supplementary one for 102PH01. Students will solve many problems which provide better understanding of the topics discussed in the lectures.			
124BIMR	BIM - Revit Architecture	KZ	2
The seminar introduces the basic principles of building design as an information model. Teaching takes place on the Autodesk platform. Teaching is focused on the interpretation of the principle of modeling building elements, their relationships and properties. During the exercise, students will create a simple BIM model, they will learn to work with other SW - data export and import, they will learn basic principles of creating 2D documentation, scheduling, 3D presentation - render, animation.			
124CADE	CAD 1 (E)	KZ	3
The seminar familiarizes students with the AutoCAD drawing software. This includes working with 2D & 3D geometry, wire models, prints, SGC/ACIS/Parasolid geometry models, meshes, Bool operations, solid objects creation methods and advanced edits and modifications of the model.			
124EDC	Civil Engineering in Developing Countries	Z,ZK	4
IFor a long time, organizations operating in developing and climatically or culturally diverse regions have been struggling with the lack of construction experts who would be able to work in a setting that is culturally, climatically, socially and economically different. The aim of the course is to provide students with basic information about the specifics of work in such regions. Within the subject we will deal with constructional approaches with respect to different climate, use of non-standard procedures, materials and organizational approaches and other factors different from the standards in the Europe or Czech Republic (e.g. building requirements, seismic activity, tsunami, animals, insects, monsoon rain , absence of networks, etc.). Moreover, the students will get acquainted with other specifics of working abroad, especially with the basics of multicultural communication, climatology, safety and health protection and specifics of preparation and organization of projects. Selected topics will be introduced by experienced specialists. As a part of the subject curriculum, students will create a project according to their own choice or in cooperation with non-profit organizations operating abroad. The subject is taught in English and students work in international interdisciplinary teams.			
128CGR	Computer Graphics	Z,ZK	4
Foundation of using various types of computer graphics programs. Grid graphics, digital photography, vector drawing, 3D modelling, visualisation. Based computer graphics algorithms.			
128CS1	C# Programming and Application Development	Z,ZK	4
Students will become acquainted with one of the actually most popular programming language from C-family languages containing next to C# also a well-known Java. The simple syntax of C# enables to study the language incrementally by developing real applications since the very beginning. Thus students can develop their own applications after a very short time of study. Thanks to this fact students can pursue themes like advanced use of objects, some of design patterns and application architecture, or user class libraries.			
128CS2	C# 2 - Advanced Application Development	Z,ZK	4
Students will get more familiar with one (C#) of the most popular programming language of the C-family languages, where next to C# also the Java is a member. Students will pursue themes like advanced usage and design of objects, user class libraries and re-use of objects in application development, as well as design patterns and application architecture.			
128YIND	Computer Use Fundamentals	Z	2
1) Office utilities (OpenOffice, Microsoft Office): word processing, spreadsheets, databases. 2) Word, Excel, automation. 3) Other problem-oriented programs, user interfaces. 4) Information systems (IS), basic principles, what IS's are or are not. (5) Computer-aided processes and activities).			
129ACM1	Architectural CAD Modelling 1	KZ	3
The students are acquainted with the possibilities of BIM using ArchiCAD software. Basic tools, functions and principles are demonstrated. Students practice the newly acquired knowledge on a simplified BIM model of a family house or another appropriate building or structure. Objective of this course is to teach prospective architects and civil engineers an effective method of creation BIM model that is base for 2D and 3D documentation (including VR model, IFC etc.).			
129ACM2	Architectural CAD Modelling 2	KZ	3
The subject enhances and develops skills acquired in the basic course 129ACM1. The course is focused on methods and tools for creating of complicated shapes and library elements.			
129CTA	Composition and Theory of Architecture	KZ	2
Seminars are focused on the composition of architecture, which will be analyzed through the basic ordering principles, pattern making process and application of the theoretical concepts. The selected basic composition principles will be studied through examples typical for a particular historical period. Students may also analyze an urban space. The aim of the course is to be able to understand the multilayered role of geometry, basic ordering compositional principles and theory of form in connection with architectural and urban design. The seminar will focus on some patterns of composition, which are commonly used and have many qualities, for which they have been frequently and repeatedly used. Some of these patterns have an obvious historical and cultural background that not only architects but also engineers will be able to understand. The methods taught can help especially the students of architecture to develop their own design skills. The seminar is also intended to make students familiar with the architecture of Prague; the given compositional categories will be practised on the examples that can be studied in situ.			
132MMO	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.			
133CASD	Computer Aided Structural Design	Z	2
133YBBD	Basis of Bridges Design	Z	2
The course of Bases of Bridge Design is focused on principal problems related to design of bridges - spatial arrangement and equipment of road and railway bridges, types of bridge structures and technologies of construction of concrete bridges. During seminars, design of a road, single-span, cast-in situ, prestressed concrete slab bridge is carried out.			
133YCB	Concrete Bridges	Z,ZK	4
The course of Concrete Bridges is focused on design and construction of this type of bridge structures. Lectures are devoted to spatial arrangement and equipment of road and railway bridges, bridge substructure, effects and realization of prestressing, types of concrete bridge structures and technologies of their construction. During seminars, design of a two-span continuous cast-in-situ single-track railway bridge is carried out.			
134FSTS	Fire Design of Steel, Concrete and Timber Str.	Z	2
The course is focused on basic principles of design of structural elements exposed to fire. The principles of loads applied at fire and methods for evaluating gas temperature and temperature of structural elements are explained. The design methods for simple steel, composite and timber structures are given.			
134GSTR	Glass Structures	Z	2
The course is intending to introduce the students the field of structural applications of glass and to give them some specific skills for calculation and detailing of for basic glass structures: panes beams and fins, columns and walls, point-supported glass, as well as for glazing systems such as glass facades, canopies and roofs, stairs and floors. On this purpose the properties of glass as structural material will be presented in comparison with other basic building materials, together with selected examples of glass/glazing applications. Design details and connecting technology, relevant technical regulations, specification and current methods applied in design will be described. Worked examples will accompany the lectures for better understanding, and design project will help to fix specific knowledge.			
134TBS	Timber Based Structures	Z	2
Examples of timber structures and bridges. Structural systems and details. Recommended design.			

137TENV	Rail Traffic and Environment	Z,ZK	2
Basic principles for designing of railway and tramway structures, European railway network, rail transport, environmental impacts - acoustics, traffic noise and vibrations, noise control, modelling and attenuation of traffic noise. Contents: 1. Railway Structures 1 (Brief history of railways, European railway network, Czech Railway Network, railway structures - railway substructure) 2. Railway Structures 2 (Railway structures; railway superstructure, track layout, other track properties) 3. Traffic Effect on Environment (Transport - basic information and characteristics, transport statistics, external costs of transport, positive and negative effects of railway transportation, accidents caused by traffic, waste from railway traffic) 4. Urban Rail Transit (Light Rail Transit, Light Rail Rapid Transit, Rail Rapid Transit, Monorail) 5. Tramway Lines 1 (Genesis of electric tramway, contemporary tramways) 6. Tramway Lines 2 (Track parameters and structure, track geometry, super elevation and gauge, substructure, superstructure) 7. Traffic Noise (What is sound, noise and vibration, sound propagation, sound levels, decibels, sound sources, types of traffic noise, sound measurement) 8. Noise Measurement Equipment (Practical demonstration of an acoustic camera Bionic-L, practical demonstration of an sound level meter)			
143ENE	Environmental Engineering	Z,ZK	4
General information about interaction between human beings and their environment. Information about water quality and pollution, flood hazard, air and soil pollution, landscape utilization and protection, soil erosion, climate change, sustainability, waste production and disposal, energy production and consumption. Questions of ethics, philosophy and globalization are discussed together. The topics are given on basic information level, respecting various backgrounds of the students.			
143ESP	Soil Physics for Engineers	Z,ZK	4
Engineering description of water movement and solute transport in a soil profile. Hydraulic characteristics of porous media. Retention function approximation, retention curve and hydraulic conductivity estimation.Field vs laboratory measurements. Basics of modelling. Basics of transport processes.			
143SSP	Soil Science and Soil Physics	Z,ZK	4
Upon completion of this course, the student will have a working knowledge of the principles and practices of soil science with focus on soil hydrology and soil chemistry.			
144BT1	Balneotechnology	ZK	2
Water treatment, design and operation of circulation water for swimmnig pool, natural and artificial complexes for water recreation and spas.			
144WS	Drinking Water Management	KZ	2
Water treatment and water supply			

Name of the block: Povinná tělesná výchova, sportovní kurzy
Minimal number of credits of the block: 0
The role of the block: PT

Code of the group: BTV_POV
Name of the group: Povinná tělesná výchova
Requirement credits in the group:
Requirement courses in the group: In this group you have to complete at least 2 courses
Credits in the group: 0
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**
TV1	**Physical Education**	Z	0	0+2	Z	PT
TV2	**Physical Education**	Z	0	0+2	L	PT

Characteristics of the courses of this group of Study Plan: Code=BTV_POV Name=Povinná tělesná výchova

TV1	Physical Education	Z	0
TV2	Physical Education	Z	0

Name of the block: Jazyky
Minimal number of credits of the block: 4
The role of the block: J

Code of the group: BD20180100_1
Name of the group: Building Structures, language courses, 1st semester
Requirement credits in the group: In this group you have to gain 2 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 2
Note on the group: jen A a N

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**
104YC1A	**English 1** *Lucie Simerová* ***Petra Martincová***	Z	2	2C	Z,L	J
104CZL1	**Czech/Foreign language 1** ***Sandra Giormani***	Z	2	2C	Z,L	J
104YC1N	**German 1** ***Svatava Boboková-Bartíková***	Z	2	2C		J

Characteristics of the courses of this group of Study Plan: Code=BD20180100_1 Name=Building Structures, language courses, 1st semester

104YC1A	English 1	Z	2
104CZL1	Czech/Foreign language 1	Z	2
Czech courses are intended for international students. The course is aimed to provide training in basic language means necessary for communication in everyday situations. After successful completion the student gains a credit. End of course level according to CEFR: A1 (Beginners) - A2 (Elementary)			
104YC1N	German 1	Z	2

Code of the group: BD20180200_1
Name of the group: Building Structures, language courses, 2nd semester
Requirement credits in the group: In this group you have to gain 2 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 2
Note on the group: jen A a N

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
104YC2A	**English 2** *Renáta Nivenová, Petra Martincová, Šárka Chroustová, Věra Čermáková, Petra Florianová, Sandra Giormani, Svatava Boboková-Bartíková, Hana Horká, Michaela Németh, ...* ***Svatava Boboková-Bartíková*** *Svatava Boboková-Bartíková (Gar.)*	Z,ZK	2	2C		J
104CL2	**Czech/Foreign Language 2** *Sandra Giormani, Svatava Boboková-Bartíková, Naděžda Bonaventurová* ***Sandra Giormani*** *Svatava Boboková-Bartíková (Gar.)*	Z,ZK	2	2C	L	J
104YC2N	**German 2** *Helena Chromá, Svatava Boboková-Bartíková* ***Olga Sedláčková*** *Svatava Boboková-Bartíková (Gar.)*	Z,ZK	2	2C		J

Characteristics of the courses of this group of Study Plan: Code=BD20180200_1 Name=Building Structures, language courses, 2nd semester

104YC2A	English 2	Z,ZK	2
104CL2	Czech/Foreign Language 2	Z,ZK	2
This course accents the communicative approach to language teaching. Therefore, individual lessons are primarily centred around an underlying topic that is complemented by the communicative language function. Further appropriate language aspects (i.e. grammar, lexis, pronunciation, skills) arise from the given communicative need. Basic communication in common situations is further enriched by communicative skills in a more specific university environment. The Czech course is intended for students in the English Programme, who have already gained some basic knowledge in the Czech language, i.e. they are at A1/A2 level. The course is aimed to provide training in language means necessary for communication in everyday situations and at university. After successful completion the student gains a credit and exam. End of course level according to CEFR: A2			
104YC2N	German 2	Z,ZK	2

Name of the block: Povinně volitelné předměty, doporučení S1
Minimal number of credits of the block: 18
The role of the block: S1

Code of the group: BD20150700_1
Name of the group: Building Structures, Project, 7. semester
Requirement credits in the group: In this group you have to gain 6 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 6
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
124SDP2	**Structural Design, Project 2** *Tomáš Vlach, Václav Kupilík* ***Tomáš Vlach*** *Tomáš Vlach (Gar.)*	KZ	6	4C	L	S1
133SDP2	**Structural Design, Project 2** ***Iva Broukalová***	KZ	6	4C	Z	S1
134SDP2	**Structural Design, Project 2** ***Michal Jandera*** *Zdeněk Sokol (Gar.)*	KZ	6	4C	Z	S1
135SDP2	**Structural Design, Project 2** ***Michal Jandera*** *Jan Salák (Gar.)*	KZ	6	4C	Z	S1

Characteristics of the courses of this group of Study Plan: Code=BD20150700_1 Name=Building Structures, Project, 7. semester

124SDP2	Structural Design, Project 2	KZ	6
Focus on complex approach to practice design, analysis and optimalization of advanced multistorey or longspan building structures, or their reconstruction. Analysis of load, functional and technologic requirements, design of load-bearing system alternatives including foundations, preliminary bearing elements dimensions calculation, choice of most suitable version. Preliminary statical design of chosen version, technical report and drawings.			
133SDP2	Structural Design, Project 2	KZ	6
Structural design of given structure (building). Preliminary design of the structure. Technical documentation, drawings. Detailed design of chosen structural elements includes analysis, reinforcement design, reinforcement drawings.			
134SDP2	Structural Design, Project 2	KZ	6
Focus on complex approach to practical design, analysis and optimization of multi-storey or long-span building structures, or their reconstruction. Analysis of load, functional and technological requirements, design of load-bearing system alternatives including foundations, preliminary bearing elements dimensions calculation, choice of most suitable version. Detailed structural design of chosen version, calculation, technical report and drawings. Check of bearing and non-bearing structures interaction and assembly techniques. Public presentation. You may register for a topic on the website of the department https://ocel-drevo.fsv.cvut.cz or contact the supervisor directly.			
135SDP2	Structural Design, Project 2	KZ	6
Focus on complex approach to practic design, analysis and optimalization of multi-storey or long-span building structures, or their reconstruction. Analysis of load, functional and technologic requirements, design of load-bearing system alternatives including foundations, preliminary bearing elements dimensions calculation, choice of most suitable version. Detailed statical design of chosen version, calculation, technical report and drawings. Check of bearing and non-bearing structures interaction and assembly techniques. Public presentation.			

Code of the group: BD20150800_1
Name of the group: Building Structures, Bachelor Project
Requirement credits in the group: In this group you have to gain 12 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 12
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
102BPRO	**Bachelor Project**	Z	12	10C	L,Z	S1
122BPRO	**Bachelor Project** ***Rostislav Šulc***	Z	12	10C	L,Z	S1
123BPRO	**Bachelor Project** *Alena Vimmrová*	Z	12	10C	L,Z	S1
124BPRO	**Bachelor Project**	Z	12	10C	L,Z	S1
125BPRO	**Bachelor Project** ***Hana Kabrhelová*** *Karel Kabele (Gar.)*	Z	12	10C	L,Z	S1
132BPRO	**Bachelor Project**	Z	12	10C	L,Z	S1
133BPRO	**Bachelor Thesis**	Z	12	10C	L,Z	S1
134BPRO	**Bachelor Project** *Jiří Mareš, Michal Jandera* ***Michal Jandera*** *Michal Jandera (Gar.)*	Z	12	10C	L,Z	S1
135BPRO	**Bachelor Project**	Z	12	10C	L,Z	S1

Characteristics of the courses of this group of Study Plan: Code=BD20150800_1 Name=Building Structures, Bachelor Project

102BPRO	Bachelor Project	Z	12
in accordance with the thesis proposal			
122BPRO	Bachelor Project	Z	12
The bachelor's thesis ends the bachelor study. The student demonstrates that he / she can apply the knowledge gained during the study on a specific project. The work may take the form of theoretical or project. Students consult the issue with the thesis supervisors and experts from the predetermined departments.			
123BPRO	Bachelor Project	Z	12
In accordance with the thesis proposal			
124BPRO	Bachelor Project	Z	12
125BPRO	Bachelor Project	Z	12
Final project concluded by bachelor theses defense and state exam.			
132BPRO	Bachelor Project	Z	12
in accordance with a thesis proposal			
133BPRO	Bachelor Thesis	Z	12
in accordance with the thesis proposal			
134BPRO	Bachelor Project	Z	12
In this course, student formulates a bachelor's thesis that is necessary to reach the bachelor's degree.			
135BPRO	Bachelor Project	Z	12
Individual assignment in accordance with the thesis proposal			

List of courses of this pass:

Code	Name of the course	Completion	Credits
100ODPR	Industrial Training (3 weeks)	Z	0
101CG01	Constructive Geometry	Z,ZK	5
Description of space and main methods of the projection - multiview (Monge) projection as a basis for orientation in 3D CAD systems, axonometry, linear perspective. Surfaces in building practice - graphic laws of surfaces, geometric characteristics of surfaces, images of surfaces in appropriate projections, realization and application; visualization of surfaces in a graphic software. Namely: Cylinders and Cones, Hyperboloid of Revolution, Helical Surfaces, Quadrics. Curves in building practice - types of mathematical description, Frenet Frame, osculating circle.			
101MPRS	Probability and Statistics	ZK	4
The goal is to get a basic knowledge in probability and inferential statistics. Probability. Discrete and continuous random variables. Normal distribution. Asymptotic distribution of a mean. Multivariate distribution. Independence and correlation. Parameter estimation. Hypothesis testing. Simple linear regression.			
101MT01	Mathematics 1	Z,ZK	6
1. Sequences of real numbers, fundamental concepts and definitions, limits of sequences and methods for their calculating, the number e. 2. Functions of a real variable, fundamental concepts and definitions, limits (proper and improper) and methods for their calculating, continuity. 3. Basic theorems for continuous functions and their applications: Bolzano's and Weierstrass's theorems, derivatives and their geometric and physical meaning, derivative rules, derivative of composite and inverse functions. 4. Derivatives of higher orders, differentials of the 1st and higher orders, Lagrange's theorem and its consequences, l'Hospital's rules. 5. An analysis of functions sequent on the properties of the 1st and 2nd derivatives (intervals of monotony, local extremes, convexity and concavity, points of inflection, asymptotes). 6. Global (absolute) extremes on compact intervals, word problems. Taylor's theorem, Taylor's polynomial and its applications. 7. Vector (linear) spaces, the vector space of ordered n-tuples, R2, R3, linear combinations, linear independence and dependence, bases, the dimension, subspaces. 8. Linear hull, matrices, the rank of a matrix, Gauss's algorithm. 9. Systems of linear algebraic equations, basic methods for solving, Gaussian elimination, Frobenius theorem. 10. Matrix multiplication, inverse matrices and their applications, matrix equations. 11. Determinants of the 2nd and 3rd orders, Sarrus's rule, inverse matrices by means of determinants, Cramer's rule. 12. Fundamental properties of geometric vectors. General form and parametric representation of a plane. Parametric equations of straight lines. A straight line as the intersection of two planes. 13. Relationship problems on straight lines and planes, deviations and distances of planes and straight lines. Application of analytic methods for solving geometric problems in the space.			
101MT02	Mathematics 2	Z,ZK	6
1. Indefinite integral, primitive functions, tabular integrals. Fundamental methods for calculating indefinite integrals: per partes, substitutions. 2. Integration of rational functions (with simple imaginary roots in denominators at most one). 3. Selected special substitutions. 4. Definite integral, fundamental methods for calculating definite integrals: Newton- Leibniz`s formula, per partes, substitutions. 5. Improper integrals, convergence and divergence of improper integrals, methods of computation. 6. Geometrical and physical applications of integral calculus : area of a plane figure, volume of a solid of revolution, length of the graph of a function, static moments and the centre of gravity of a plane figure. 7. Functions of several variables. Definition domains, in case of two variables also level curves and graphs. Partial derivatives, partial derivatives of higher orders. 8. Directional derivatives. Gradient. Total differential. Derivatives and partial derivatives of functions defined implicitly. 9. Equations of tangent and normal lines of a plane curve and tangent planes and normal lines of a surface. 10. Local extrema and local extrema with respect to a set (constrained extrema). 11. Global extrema on a set. 12. Differential equations of the 1st order, separation of variables, homogeneous equations. Cauchy problems. 13. Linear differential equations of the 1st order, variation of a constant. Exact equations. Cauchy problems.			
101MT03	Mathematics 3	Z,ZK	6
1.Linear differential equations of the n-th order, initial value problems. Homogeneous equations: fundamental system, general solution. Fundamental system for equation with constant coefficients. Descriptive statistics. 2. Reduction of order. Nonhomogeneous equations: variation of parameters, method of undetermined coefficients. Descriptive statistics: box-plot, outliers. Bivariate data. 3. Dot product of functions in C([a,b]), orthogonality of functions. Setup of a boundary value problem, examples. Bivariate descriptive statistics. Linear regression. 4. Problem u''+au=f, u(0)=u(pi)=0, eigenvalues and eigenfunctions. Orthogonality of eigenfunctions. Solvability (as it depends on "a"). Some other problems. Introduction to probability theory. Classical probability. 5. Double integral, Fubini Theorem, substitution, polar coordinates. Conditional probability; independent events. 6. Applications of double integral. Discrete random variables. 7. Triple Riemann integral, Fubini Theorem, substitution, cylindrical and spherical coordinates. applications of double and triple integral. Binomial distribution. 8. Applications of triple integral. Continuous random variables. 9.Line integral of a scalar field, applications. Continuous random variable: expected value and variance. 10. Line integral of a vector field, Green Theorem. Normal distribution. 11. Conservative fields. Applications of normal distribution. 12. Applications of line integrals. Inferential statistics.			
102BPRO	Bachelor Project	Z	12
in accordance with the thesis proposal			
102PH01	Physics	Z,ZK	5
Principal goal of the lectures is to present those fundamentals of physics necessary for further special courses. 1. Atoms. Molecules. Ions. Phases. Structures of substances. 2. Kinematics. Coordinate system. Radiusvector.Velocity. Acceleration. 3. Dynamics. Force. Newton´s laws of motion. 4. Force field. Newton´s law of universal gravitation. Work. Energy. Conservation law. 5. Deformation. Stress and strain. 6. Tensile, compressive and shear stress. Hooke´s law. 7. Flow. Viscosity. Laminar and turbulent flow. Bernoulli´s equation. 8. Oscillations. Basic definitions and characteristics. 9. Elastic waves in fluids and solids. 10. Interference. Acoustic waves. 11. Equilibrium thermodynamics. Heat and temperature. Thermodynamic work. 12. Thermal expansion of substances. 13. Heat transfer: convection, conduction, radiation.			
102PHS	Physics - Seminar	Z	2
This course serves as a supplementary one for 102PH01. Students will solve many problems which provide better understanding of the topics discussed in the lectures.			
104CL2	Czech/Foreign Language 2	Z,ZK	2
This course accents the communicative approach to language teaching. Therefore, individual lessons are primarily centred around an underlying topic that is complemented by the communicative language function. Further appropriate language aspects (i.e. grammar, lexis, pronunciation, skills) arise from the given communicative need. Basic communication in common situations is further enriched by communicative skills in a more specific university environment. The Czech course is intended for students in the English Programme, who have already gained some basic knowledge in the Czech language, i.e. they are at A1/A2 level. The course is aimed to provide training in language means necessary for communication in everyday situations and at university. After successful completion the student gains a credit and exam. End of course level according to CEFR: A2			
104CZL1	Czech/Foreign language 1	Z	2
Czech courses are intended for international students. The course is aimed to provide training in basic language means necessary for communication in everyday situations. After successful completion the student gains a credit. End of course level according to CEFR: A1 (Beginners) - A2 (Elementary)			
104YC1A	English 1	Z	2
104YC1N	German 1	Z	2
104YC2A	English 2	Z,ZK	2
104YC2N	German 2	Z,ZK	2

105SSU	Social Sciences	Z,ZK	6
The course Social Sciences encompasses a broader, multidisciplinary, framework (sociology, economy, marketing, politology, social anthropology, and media). The economics part of the course covers basic economic terms, demand, supply, market equilibrium and rational consumer choice. Firm and production function in short and long run as well as long run and short run cost are discussed. Market structures and markets for productive inputs and public goods are other topics. Also presented are macroeconomic aggregates and basics of macroeconomics. Social theories presented in the course are considered as an analytical reflection on the concepts and formal cognitive schemes of all social sciences. Students will get familiar with social theories/paradigms that are used to study and interpret social phenomena. Seminars will focus on everyday life, its interactions, and opinion polemics, which often interfere in negotiations about the direction and goals of society. The course also provides students with conceptual tools for their own further studies based on critical thinking.			
122BPRO	Bachelor Project	Z	12
The bachelor's thesis ends the bachelor study. The student demonstrates that he / she can apply the knowledge gained during the study on a specific project. The work may take the form of theoretical or project. Students consult the issue with the thesis supervisors and experts from the predetermined departments.			
122TCD	Technology of Construction	Z,ZK	6
Goal: To learn students to know construction processes and their design and to create a model of the building process of a project for planning and management of its implementation Contents: 1. Introduction to construction technology, construction processes, basic terminology. 2. Earthworks, excavation of rock classes, types of excavation, shoring, compaction, drainage. 3. Production and transport of concrete mixture. Formwork and traditional system, placement of reinforcement, storage and compaction of fresh concrete, curing of fresh concrete. 4. Construction Equipment (equipment for mining, transportation and compaction of rocks, concrete transport equipment, lifting equipment, tower and mobile cranes, trucks, elevators, hoists, trays, tools for finishing work). 6. Excursion to construction site. 7. Finishing works in building industry. Plasters, facings, paintings, soffits, wallpapers floors. 8. Facades, fronts. Internal installations, sewerage, water, gas, electricity mains. 9. Health and safety at work. Environmental protection during construction. Quality requirements for construction processes. 10. Implementation of buildings and projects. Main concepts and terms. Technological, spatial and time analysis of the building process, 11. Technological stages and their characteristics for homogenous and non homogenous buildings.Long term and short term construction planning and scheduling. Construction technology design. 12. Flow method in building industry, use of construction technology network analysis for project management. Use of computers in project planning and management. 13. Principles of design of site facilities and equipment			
123BM01	Building Materials	Z,ZK	5
Main aim of course is giving basic information about the structure and properties of the building materials and about their testing methods on the base of the contemporary knowledge and materials engineering approach. The laboratory work (exercise) consists in the testing of building materials from the point of view of physically - chemical properties and their quality control.			
123BPRO	Bachelor Project	Z	12
In accordance with the thesis proposal			
123CS01	Chemistry	Z,ZK	5
Lectures deal with the basic chemical principles in the branches as general, inorganic, organic and physical chemistry. Instances of topics are composition, properties and behaviour of water, soil, air, wood, macromolecular compounds, inorganic binders, metals and other materials used in civil enginnering.			
123MED	Material Engineering	Z,ZK	5
Subject gives information on principles of designing and development of new types of materials having directed properties for specific building applications and structures.			
124BC01	Non-loadbearing Construction	Z,ZK	7
Course is focused on complex approach to practice design of the building envelope, flat and sloped roofing, doors and windows, partition walls, floor structures and ceilings. This course introduces theoretical foundations and computational approaches about two fields of building design: building physics and structure interaction. Integrated design of the nonbearing structures together with other building systems.			
124BIMR	BIM - Revit Architecture	KZ	2
The seminar introduces the basic principles of building design as an information model. Teaching takes place on the Autodesk platform. Teaching is focused on the interpretation of the principle of modeling building elements, their relationships and properties. During the exercise, students will create a simple BIM model, they will learn to work with other SW - data export and import, they will learn basic principles of creating 2D documentation, scheduling, 3D presentation - render, animation.			
124BPH	Building Physics	Z,ZK	6
Basic review of the thermal protection of buildings, building acoustics and daylighting (heat transfer, thermal conductivity, thermal resistence and thermal transmitance, multidimensional heat transfer, thermal bridges and thermal joints, difusion of water vapour and vapour condensation, mould growth, transient heat transfer, risk of overheating, low-energy, passive and zero-energy buildings, sound in the living and working environment, perception and description of sound: intensity, frequency, time factor, information value, interindividual sensitivity, point, line and plane sound sources, sound power level, directivity factor, sound propagation in the free field conditions, sound propagation in the diffuse field conditions, definable and indefinable sounds, airborne and structureborne sound, definition, measurement, evaluation and the limits, sound reduction index of double structures, mass-air-mass resonance, standing waves in a cavity, definition, measurement, evaluation, the sun and the environment, basics of spherical astronomy, horizons and equatorial coordinates, calculating of the sun azimuth and altitude, daylight and lighting, visual perception, basics of photometry, daylight factor and calculation models of the sky, methods for determining daylight factor, influence of environment on a daylighting: photometric characteristics of shielding barriers, technical characteristics of lighting openings).			
124BPRO	Bachelor Project	Z	12
124BS01	Building Structures 1	Z,ZK	7
Integrated approach to design of building structures considering complex of performance requirements. Requirements on buildings, sub structures and elements. 1.Basic classification and development of building structure; 2.Requirement on building structures, structural systems, space rigidity, interaction load and non-load structures; 3.Structural Systems for Single- and Multistorey Buildings. High Rise Buildings. 4.Structural Systems for Long Span Structures. Superstructures. 5.Vertical load bearing structures (performance, requirements, design principles, walls, columns); 6.Floor structures (performance, requirements, design principles) 7.Vaults, timber floors, RC floor structures, steel and composite steel and RC floor structures); 8.Overhanging structures (performance, requirements, design principles of balconies, canopies, cornices); 9.Staircase structure.; 10.Expansion joints in load bearing structures; 11.Foundations; 12.Basement structures;			
124BS2D	Building Structures 2D	Z,ZK	3
124CADE	CAD 1 (E)	KZ	3
The seminar familiarizes students with the AutoCAD drawing software. This includes working with 2D & 3D geometry, wire models, prints, SGC/ACIS/Parasolid geometry models, meshes, Bool operations, solid objects creation methods and advanced edits and modifications of the model.			
124EDC	Civil Engineering in Developing Countries	Z,ZK	4
IFor a long time, organizations operating in developing and climatically or culturally diverse regions have been struggling with the lack of construction experts who would be able to work in a setting that is culturally, climatically, socially and economically different. The aim of the course is to provide students with basic information about the specifics of work in such regions. Within the subject we will deal with constructional approaches with respect to different climate, use of non-standard procedures, materials and organizational approaches and other factors different from the standards in the Europe or Czech Republic (e.g. building requirements, seismic activity, tsunami, animals, insects, monsoon rain , absence of networks, etc.). Moreover, the students will get acquainted with other specifics of working abroad, especially with the basics of multicultural communication, climatology, safety and health protection and specifics of preparation and organization of projects. Selected topics will be introduced by experienced specialists. As a part of the subject curriculum, students will create a project according to their own choice or in cooperation with non-profit organizations operating abroad. The subject is taught in English and students work in international interdisciplinary teams.			
124FSHB	Fire Safety and Healthy Buildings	Z,ZK	6
Constituents of indoor microclimate, hazardous substances (VOCs, HFRs, heavy metals, moulds, microbes, aerosols, radionuclides, etc.), their sources and health effects. Influence of building structures and materials on quality of indoor microclimate. Design of buildings with respect to optimisation of indoor microclimate. Analysis of fire - course of fire, burning			

process, fire loading; legislation and European Standards; fire safety solutions - fire project, requirement for fire resistance of buildings, escape ways, distance separation, fire-fighting equipment; fire behaviour of the most used materials (wood, steel, concrete, plastics); protection of building materials against fire (brickwork, concreting, plasters and sprays, coatings, impregnates of wood, encasements, glued facings of mineral fibres); sandwiches from fire point of view; influence of claddings on the course fire; passive protection of building structures - fire walls, fire glazed structures, fire ceiling, draft stops and seals; repressive measures - electric fire signalling, stationary extinguishing devices, smoke extract, hydrant systems.

124PDRD	Failures, Deterioration, Renovations	Z,ZK	3

Characteristic failures of buildings and their lifetime, analyses of loading impacts and influences from point of failure view, non-force impacts, building-technical survey of buildings, degradation and corrosion processes, historical structures (foundations, vaults, ceilings, roof trusses), failures and reconstruction of masonry, concrete, reinforced concrete, wooden, steel and prefabricated structures, protection of buildings against increased moisture effects.

124SDP1	Structural Design, Project 1	KZ	6

Converting an architectural study of a smaller or medium-sized building for housing, administration, education, culture or sports into a detailed design of a building structure based on static analysis, interaction of load-bearing and non-load-bearing elements and building physics. Focus on complex approach to practic design, analysis and optimalization of a building structures. Design of variants of the load-bearing system, preliminary static analysis (calculation of load-bearing elements - slabs, columns, walls, etc), calculation of foundations, design of structures on the building envelope with respect to thermal protection of buildings, building physics, fire protection of buildings and protection against water and soil moisture. Elaboration of detailed drawings including floor plans, sections and details. Public presentation.

124SDP2	Structural Design, Project 2	KZ	6

Focus on complex approach to practice design, analysis and optimalization of advanced multistorey or longspan building structures, or their reconstruction. Analysis of load, functional and technologic requirements, design of load-bearing system alternatives including foundations, preliminary bearing elements dimensions calculation, choice of most suitable version. Preliminary statical design of chosen version, technical report and drawings.

125BPRO	Bachelor Project	Z	12

Final project concluded by bachelor theses defense and state exam.

125BSE	Buildings Services Systems	Z,ZK	5

Introductory Course of Building Services is focused on sanitary installations, gas supply system and heating systems. Sanitary installations - introduction, hydraulic pipes, water supply facilities, balance water needs. Internal water supply systems - installation, materials, calculation, waste water and disposal, sewage systems, internal drainage, types of fixtures. Gas - external pipelines, connections, balance of gas, internal pipeline systems, flue gas. Central heating and design of heating surfaces. Calculation of heat balance. Heating system. Preparation of hot water. Heat sources - boiler, electric heating, district heating, renewable sources.

125BSE2	Buildings Services Systems 2	Z,ZK	5

Introduction to the indoor environmental quality, building ventilation and basic artificial lighting and electrical installation. Lectures topics: Microenvironment and its constituents. Microenvironment-health requirements. Design of air-handling systems - basics, criteria. Ventilation systems - Principles of natural and mechanical ventilation. Heat recovery. Parts of air handling systems. Fundamentals of air-conditioning systems. Natural and Combined lighting. Electricity distribution. Electrical installations. Tutorials focused on practical design of ventilation and basic light and electrical systems.

126CMAN	Construction Management	Z,ZK	6

Course is oriented mainly on practical applications of corporate construction management systems. It includes corporate strategy, corporate finance and budgeting, marketing and methods of business development, etc. Sustainable profitability of the construction business and the best practice at both - field and corporate level is explained.

126ECM	Economics and Management	Z,ZK	7

A-Z of construction engineering and management both at the corporate and project level. All participants, processes and aspects of the construction industry are introduced. Course concentrates on all major topics of company and project management, e.g. business development and marketing, bidding, planning and controlling of all vital processes, financial management, cost control, risk management, etc. Lectures are based on the real practice experience of all course's lecturers and various case studies are studied and solved. Online Building Industry Game (BIG) will be played by all course participants through the whole semester (a computer simulation of a realistic business environment where participants play the role of contractors, competing in a market with variable demand for construction work). In this online game, developed and directly operated by the California Polytechnic State University, students act as contractors, managing both, their companies and projects.

128CGR	Computer Graphics	Z,ZK	4

Foundation of using various types of computer graphics programs. Grid graphics, digital photography, vector drawing, 3D modelling, visualisation. Based computer graphics algorithms.

128CS1	C# Programming and Application Development	Z,ZK	4

Students will become acquainted with one of the actually most popular programming language from C-family languages containing next to C# also a well-known Java. The simple syntax of C# enables to study the language incrementally by developing real applications since the very beginning. Thus students can develop their own applications after a very short time of study. Thanks to this fact students can pursue themes like advanced use of objects, some of design patterns and application architecture, or user class libraries.

128CS2	C# 2 - Advanced Application Development	Z,ZK	4

Students will get more familiar with one (C#) of the most popular programming language of the C-family languages, where next to C# also the Java is a member. Students will pursue themes like advanced usage and design of objects, user class libraries and re-use of objects in application development, as well as design patterns and application architecture.

128YIND	Computer Use Fundamentals	Z	2

1) Office utilities (OpenOffice, Microsoft Office): word processing, spreadsheets, databases. 2) Word, Excel, automation. 3) Other problem-oriented programs, user interfaces. 4) Information systems (IS), basic principles, what IS's are or are not. (5) Computer-aided processes and activities).

129ACM1	Architectural CAD Modelling 1	KZ	3

The students are acquainted with the possibilities of BIM using ArchiCAD software. Basic tools, functions and principles are demonstrated. Students practice the newly acquired knowledge on a simplified BIM model of a family house or another appropriate building or structure. Objective of this course is to teach prospective architects and civil engineers an effective method of creation BIM model that is base for 2D and 3D documentation (including VR model, IFC etc.).

129ACM2	Architectural CAD Modelling 2	KZ	3

The subject enhances and develops skills acquired in the basic course 129ACM1. The course is focused on methods and tools for creating of complicated shapes and library elements.

129CTA	Composition and Theory of Architecture	KZ	2

Seminars are focused on the composition of architecture, which will be analyzed through the basic ordering principles, pattern making process and application of the theoretical concepts. The selected basic composition principles will be studied through examples typical for a particular historical period. Students may also analyze an urban space. The aim of the course is to be able to understand the multilayered role of geometry, basic ordering compositional principles and theory of form in connection with architectural and urban design. The seminar will focus on some patterns of composition, which are commonly used and have many qualities, for which they have been frequently and repeatedly used. Some of these patterns have an obvious historical and cultural background that not only architects but also engineers will be able to understand. The methods taught can help especially the students of architecture to develop their own design skills. The seminar is also intended to make students familiar with the architecture of Prague; the given compositional categories will be practised on the examples that can be studied in situ.

132BPRO	Bachelor Project	Z	12

in accordance with a thesis proposal

132MMO	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.

132SM3E	Structural Mechanics 3	Z,ZK	5
Deflections by the principle of virtual work. Statically indeterminate planar frames and trusses, force method. Slope deflection method and Cross (moment distribution) method for frames. Secondary moments in trusses. Prerequisities:Statically determinate planar frames, trusses and gridworks (balconies), reactions, internal forces diagrams. Active knowledge and expedience is required in solving examples. Reasonable minimum is 8 credits in structural mechanics			
132ST01	Structural Mechanics 1	Z,ZK	6
The principal objective of the course is to familiarize students with basic principles of mechanics such as equilibrium and equivalency applied to statically determined structures 1. Concurrent forces - definition of force, basic theorems and axioms, equilibrium, equivalency 2. Concurrent forces - resultants by rectangular components 3. Statics of particles - free-body diagrams, equilibrium of rigid particles 4. General system of forces - resultant forces and resultant moments, cross product, scalar product 5. General system of forces - resolution of forces to a force and a couple 6. Parallel system of forces in two and three dimensions 7. Statics of rigid bodies - idealization of two and three-dimensional supports and connections 8. Statics of rigid bodies - equilibrium in two and three dimensions 9. Statics of rigid bodies - reaction forces of simple and compound statically determined structures 10. Statics of rigid bodies - reaction forces applying principle of virtual displacements and rotations 11. Analysis of trusses - definition, classification, zero force members 12. Analysis of trusses - application of the method of joints 13. Analysis of trusses - application of the method of sections			
132ST02	Structural Mechanics 2	Z,ZK	6
The principal objective of the course is to familiarise students with the application of basic principles of mechanics to the determination of the distribution of internal forces in statically determined structures, cross-sectional properties and the elementary definition of stress.			
132STA	Structural Analysis	Z,ZK	5
Displacement method for planar frames and gridworks. Extreme effects of live load, influence lines. Stress and strain tensors, traction vector, principal stresses an directions, material strength. Finite element principles and techniques, error of the finite element solutions. Prerequisities: The force and slope deflection methods for statically indeterminate planar frames and trusses, elementary elasticity, stresses and strains in beams, Hooke's law. 13 credits in structural mechanics and elasticity is a reasonable minimum to enter the course.			
132TELA	Theory of Elasticity	Z,ZK	6
Basic assumptions and basic equations of theory of elasticity. Assumptions on deformation and stress distribution in beams. Tension and compression, pure bending, bending moments in two planes, combination of axial and bending stresses. Core of a cross section. Differential equation of elasticity curve. Shear stresses in flexural beams. Free torsion. Elastic-plastic and plastic state of cross-section. Stability of beams. 2D problems, walls and plates.			
133BPRO	Bachelor Thesis	Z	12
in accordance with the thesis proposal			
133CASD	Computer Aided Structural Design	Z	2
133CM01	Concrete and Masonry Structures 1	Z,ZK	6
Structural design of concrete structures; prerequisite course 133FSTC Fundamentals of Structural Design - Concrete. Calculation models, methods of analysis (focus on simplified and empirical methods), reinforcing and detailing for particular structures and structural elements: slabs, frames, shear walls, staircase, basement and retaining walls, foundations.			
133CM02	Concrete and Masonry Structures 2	Z,ZK	7
Design of concrete structures on serviceability. Limit states approach. Stress control, cracking and crack width analysis, allowable crack width in concrete structures. Deformation of reinforced concrete structures, numerical and simplified analysis, criteria of acceptance. Prestressed concrete. Introduction, basic principles, design philosophy, prestress losses, technology of prestressing, pre-tensioning and post-tensioning, verification of serviceability and ultimate limit states. Masonry structures, introduction, terminology, design of structural elements, reinforced masonry. Strengthening of masonry structures. Precast concrete structures, design situations, specific problems. Strut and tie models. Joints. Industrial halls. Composite concrete-concrete structures. Introduction to concrete bridges and introduction to engineering structures.			
133FSTC	Fundamentals of Structural Design - Concrete	Z,ZK	4
The course is focused on design of concrete structures based on ultimate state design method. The focal topics are design of reinforced concrete members for basic types of straining (bending, shear, combination of normal forces and bending moments) including determination of load effects; introduction to serviceability limit states. Other topics are technology of production and material properties of concrete and their testing, properties of steel reinforcement and interaction of reinforcement and concrete. The prerequisite courses are Structural mechanics, Theory of Elasticity, Building materials, Building structures.			
133SDP2	Structural Design, Project 2	KZ	6
Structural design of given structure (building). Preliminary design of the structure. Technical documentation, drawings. Detailed design of chosen structural elements includes analysis, reinforcement design, reinforcement drawings.			
133YBBD	Basis of Bridges Design	Z	2
The course of Bases of Bridge Design is focused on principal problems related to design of bridges - spatial arrangement and equipment of road and railway bridges, types of bridge structures and technologies of construction of concrete bridges. During seminars, design of a road, single-span, cast-in situ, prestressed concrete slab bridge is carried out.			
133YCB	Concrete Bridges	Z,ZK	4
The course of Concrete Bridges is focused on design and construction of this type of bridge structures. Lectures are devoted to spatial arrangement and equipment of road and railway bridges, bridge substructure, effects and realization of prestressing, types of concrete bridge structures and technologies of their construction. During seminars, design of a two-span continuous cast-in-situ single-track railway bridge is carried out.			
134BPRO	Bachelor Project	Z	12
In this course, student formulates a bachelor's thesis that is necessary to reach the bachelor's degree.			
134FSTS	Fire Design of Steel, Concrete and Timber Str.	Z	2
The course is focused on basic principles of design of structural elements exposed to fire. The principles of loads applied at fire and methods for evaluating gas temperature and temperature of structural elements are explained. The design methods for simple steel, composite and timber structures are given.			
134FSTT	Fundamentals of Structural Design - Steel	Z,ZK	3
The course is focused on design of steel, steel and concrete concrete composite load-bearing structures. The students will learn how to design of simple structural elements (beams, columns, trusses) and structural bolted and welded connections.			
134GSTR	Glass Structures	Z	2
The course is intending to introduce the students the field of structural applications of glass and to give them some specific skills for calculation and detailing of for basic glass structures: panes beams and fins, columns and walls, point-supported glass, as well as for glazing systems such as glass facades, canopies and roofs, stairs and floors. On this purpose the properties of glass as structural material will be presented in comparison with other basic building materials, together with selected examples of glass/glazing applications. Design details and connecting technology, relevant technical regulations, specification and current methods applied in design will be described. Worked examples will accompany the lectures for better understanding, and design project will help to fix specific knowledge.			
134SDP2	Structural Design, Project 2	KZ	6
Focus on complex approach to practical design, analysis and optimization of multi-storey or long-span building structures, or their reconstruction. Analysis of load, functional and technological requirements, design of load-bearing system alternatives including foundations, preliminary bearing elements dimensions calculation, choice of most suitable version. Detailed structural design of chosen version, calculation, technical report and drawings. Check of bearing and non-bearing structures interaction and assembly techniques. Public presentation. You may register for a topic on the website of the department https://ocel-drevo.fsv.cvut.cz or contact the supervisor directly.			
134ST01	Steel Structures	Z,ZK	6
The purpose of this course is to learn basic principles and general arrangement and structural detailing of multi-storey buildings and single-storey buildings. Brief information about structural analysis, load, design codes and structural stability is also given. The course gives some examples of large span, tall and industrial buildings.			

134TBS	Timber Based Structures	Z	2
	Examples of timber structures and bridges. Structural systems and details. Recommended design.		
134TS01	Timber Structures	Z,ZK	5
	The course is focused on basic rules for mechanical resistance, serviceability, durability of timber structures in normal temperature and in fire.		
135BPRO	Bachelor Project	Z	12
	Individual assignment in accordance with the thesis proposal		
135FS01	Foundation of Structures	Z,ZK	7
	Basic design methods for shallow footings, piles, retaining structures, foundation pits, sheet pile walls, anchors and soil improvement. Principles of monitoring in foundation engineering. Use of Eurocode 7. Selected case histories.		
135GSM	Geology and Soil Mechanics	Z,ZK	7
	Basic course of Geology and Soil Mechanics for Civil Engineers. Introduction to geological processes, structural geology and hydrogeology. Soil behaviour description, introduction to multi-phase media, soil classification, compressibility and strength, soil testing, earth pressures, assessment of stability and deformation, applications in civil engineering.		
135SDP2	Structural Design, Project 2	KZ	6
	Focus on complex approach to practic design, analysis and optimalization of multi-storey or long-span building structures, or their reconstruction. Analysis of load, functional and technologic requirements, design of load-bearing system alternatives including foundations, preliminary bearing elements dimensions calculation, choice of most suitable version. Detailed statical design of chosen version, calculation, technical report and drawings. Check of bearing and non-bearing structures interaction and assembly techniques. Public presentation.		
136TSUP	Transp. Structures and Urban Planning	Z,ZK	6
	Introduction to the transportation engineering with the focus on road and railroad infrastructure. Rail transport and its advantages and disadvantages. Railway track and tram track construction. Noise and anti-noise measures. Road design and principles, Environmental aspects of road infrastructure. Pavement design (thickness design) and principles of the pavement structure functions. Crossings and junctions. Construction materials for highway and rail road engineering. Introduction to urban zoning and planning including urbanism. Relationships of urban planning and environmental, economic, culture-social, space and operational aspects of landscape and urban areas. Information to planning tools, procedures and used applications.		
137TENV	Rail Traffic and Environment	Z,ZK	2
	Basic principles for designing of railway and tramway structures, European railway network, rail transport, environmental impacts - acoustics, traffic noise and vibrations, noise control, modelling and attenuation of traffic noise. Contents: 1. Railway Structures 1 (Brief history of railways, European railway network, Czech Railway Network, railway structures - railway substructure) 2. Railway Structures 2 (Railway structures; railway superstructure, track layout, other track properties) 3. Traffic Effect on Environment (Transport - basic information and characteristics, transport statistics, external costs of transport, positive and negative effects of railway transportation, accidents caused by traffic, waste from railway traffic) 4. Urban Rail Transit (Light Rail Transit, Light Rail Rapid Transit, Rail Rapid Transit, Monorail) 5. Tramway Lines 1 (Genesis of electric tramway, contemporary tramways) 6. Tramway Lines 2 (Track parameters and structure, track geometry, super elevation and gauge, substructure, superstructure) 7. Traffic Noise (What is sound, noise and vibration, sound propagation, sound levels, decibels, sound sources, types of traffic noise, sound measurement) 8. Noise Measurement Equipment (Practical demonstration of an acoustic camera Bionic-L, practical demonstration of an sound level meter)		
141HYAE	Hydraulics	Z,ZK	5
	Physical properties of water. Hydrostatics - pressure in a gravitational field, applications of the Pascal's law (hydraulic jack), hydrostatic forces, loading of construction by liquids, buoyancy force. Basics of hydrodynamics - characteristics, regimes and types of water flow, hydraulic resistance, application of basic equations. Pressure flow in pipes - energy losses due to friction, minor losses, simple cases of pipe computations, pipe systems with pump, formation of a water hammer. Steady flow in open channels - uniform flow, hydraulic design of a channel, critical flow, longitudinal profiles of water level. Hydraulics of structures - outflow from an orifice and from a pipe system, flow through culverts and bridge openings. Forces due to water in motion. Water flow measurement. Groundwater flow - types, effects, filtration law, solving of a seepage.		
142WEE	Water and Environmental Engineering	Z,ZK	4
	In the course students will obtain basic knowledge about water and environmental management. The focuses on practical knowledge with close relation to other disciplines of civil engineering. The subject is taught in form of lectures and tutorials. The stress is laid on presentations with case studies (positive and negative) using all audio visual forms. Lectures of this course are divided into two parts Water Engineering and Environmental Engineering.		
143ENE	Environmental Engineering	Z,ZK	4
	General information about interaction between human beings and their environment. Information about water quality and pollution, flood hazard, air and soil pollution, landscape utilization and protection, soil erosion, climate change, sustainability, waste production and disposal, energy production and consumption. Questions of ethics, philosophy and globalization are discussed together. The topics are given on basic information level, respecting various backgrounds of the students.		
143ESP	Soil Physics for Engineers	Z,ZK	4
	Engineering description of water movement and solute transport in a soil profile. Hydraulic characteristics of porous media. Retention function approximation, retention curve and hydraulic conductivity estimation.Field vs laboratory measurements. Basics of modelling. Basics of transport processes.		
143SSP	Soil Science and Soil Physics	Z,ZK	4
	Upon completion of this course, the student will have a working knowledge of the principles and practices of soil science with focus on soil hydrology and soil chemistry.		
144BT1	Balneotechnology	ZK	2
	Water treatment, design and operation of circulation water for swimmnig pool, natural and artificial complexes for water recreation and spas.		
144WS	Drinking Water Management	KZ	2
	Water treatment and water supply		
154FS01	Fieldwork Surveying	Z,ZK	6
	Introduction to surveying, basic geodetic calculations, evaluation of precision and accuracy of a measurement, theory of errors, instrumentation, topographic survey, angular and distance measurements, determination of heights, photogrammetry, laser scanning, mapping, setting-out in construction, surveying for monitoring of displacements, cadastre of real estates.		
TV1	Physical Education	Z	0
TV2	Physical Education	Z	0

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