Study plan

Name of study plan: obor Konstrukce a dopravní stavby, zaměření Dopravní stavby

Faculty/Institute/Others:
Department:
Branch of study guaranteed by the department: Structural and Transportation Engineering
Garantor of the study branch: prof. Ing. Jiří Máca, CSc.
Program of study: Civil Engineering
Type of study: Follow-up master full-time
Required credits: 90
Elective courses credits: 0
Sum of credits in the plan: 90
Note on the plan: tento studijní plán platí od nástupu 2017

Name of the block: Compulsory courses
Minimal number of credits of the block: 18
The role of the block: Z

Code of the group: NK20160100
Name of the group: obor Konstrukce a dopravní stavby, 1. semestr
Requirement credits in the group: In this group you have to gain at least 15 credits
Requirement courses in the group: In this group you have to complete at least 3 courses
Credits in the group: 15
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
101MA04	**Mathematics 4** *Jan Chleboun, Ivana Pultarová, Michal Beneš, Jan Lamač, Iva Malechová* ***Jan Chleboun*** *Jan Chleboun (Gar.)*	Z,ZK	5	2P+2C	Z	z
132NAK	**Numerical Analysis of Structures** *Bořek Patzák, Jan Vořířek, Edita Dvořáková, Tomáš Krejčí* ***Bořek Patzák*** *Bořek Patzák (Gar.)*	Z,ZK	5	2P+2C	Z	z
135GET	**Geotechnics** *Jan Pruška, Jan Kos, Matouš Hilar, Jan Valenta, Jan Salák, Alexandr Butovič, Jan Masopust* ***Jan Valenta*** *Jan Pruška (Gar.)*	Z,ZK	5	2P+2C		z

Characteristics of the courses of this group of Study Plan: Code=NK20160100 Name=obor Konstrukce a dopravní stavby, 1. semestr

101MA04	Mathematics 4	Z,ZK	5
132NAK	Numerical Analysis of Structures	Z,ZK	5
Variational principles of mechanics. Method of weighted residuals, conditions of convergence (continuity, integrity). Principles of FEM. Isoparametric elements, area coordinates, numerical integration. Application of method to selected 1D and 2D problems (Elasticity, heat transfer, consolidation). Algorithmic aspects of the method.			
135GET	Geotechnics	Z,ZK	5
Advanced design approaches for selected types of foundation pits and footings, design based on soil - structure interaction.			

Code of the group: NK20160200
Name of the group: obor Konstrukce a dopravní stavby, 2. semestr
Requirement credits in the group: In this group you have to gain at least 3 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 3
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
132EADK	**Experimental Analysis and Diagnostics K** *Michal Polák, Tomáš Plachý* ***Michal Polák*** *Michal Polák (Gar.)*	KZ	3	1P+2C	L	z

Characteristics of the courses of this group of Study Plan: Code=NK20160200 Name=obor Konstrukce a dopravní stavby, 2. semestr

132EADK	Experimental Analysis and Diagnostics K	KZ	3

Name of the block: Povinné předměty zaměření
Minimal number of credits of the block: 32
The role of the block: PZ

Code of the group: NK20160102
Name of the group: obor Konstrukce a dopravní stavby, zaměření Dopravní stavby, 1. semestr
Requirement credits in the group: In this group you have to gain at least 14 credits
Requirement courses in the group: In this group you have to complete at least 3 courses
Credits in the group: 14
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
135DYGK	**Dynamics of geotechnical structures** *Jan Pruška* ***Jan Pruška*** *Jan Pruška (Gar.)*	Z,ZK	4	2P+1C		PZ
136S03D	**Road construction 3D** *Michal Uhlík* ***Michal Uhlík*** *Michal Uhlík (Gar.)*	Z,ZK	5	2P+2C		PZ
137Z02D	**Railway structures 2D** *Leoš Horníček, Hana Krejčiříková* ***Leoš Horníček*** *Hana Krejčiříková (Gar.)*	Z,ZK	5	2P+2C		PZ

Characteristics of the courses of this group of Study Plan: Code=NK20160102 Name=obor Konstrukce a dopravní stavby, zaměření Dopravní stavby, 1. semestr

135DYGK	Dynamics of geotechnical structures	Z,ZK	4
136S03D	Road construction 3D	Z,ZK	5
137Z02D	Railway structures 2D	Z,ZK	5
Track design of individual types of railway stations, structural elements of railway stations, equipment for passenger and freight transport, connection to the European railway network, modernisation and optimisation of railway lines, design of tram and metro lines, ecological impacts of rail transport.			

Code of the group: NK20160202
Name of the group: obor Konstrukce a dopravní stavby, zaměření Dopravní stavby, 2. semestr
Requirement credits in the group: In this group you have to gain at least 18 credits
Requirement courses in the group: In this group you have to complete at least 4 courses
Credits in the group: 18
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
133B03D	**Concrete Structures 3D** *Michal Drahorád, Roman Šafář* ***Roman Šafář*** *Roman Šafář (Gar.)*	Z,ZK	5	2P+2C	L	PZ
134O02D	**Steel Structures 2D** *Martina Eliášová* ***Martina Eliášová*** *Martina Eliášová (Gar.)*	Z,ZK	5	2P+2C	L	PZ
136S04D	**Road construction 4D** *Ludvík Vébr, František Luxemburk, Jan Valentin* ***Jan Valentin*** *Jan Valentin (Gar.)*	Z,ZK	4	2P+1C	L	PZ
137Z03D	**Railway Structures 3D** *Hana Krejčiříková, Martin Lidmila* ***Martin Lidmila*** *Martin Lidmila (Gar.)*	Z,ZK	4	2P+1C	L	PZ

Characteristics of the courses of this group of Study Plan: Code=NK20160202 Name=obor Konstrukce a dopravní stavby, zaměření Dopravní stavby, 2. semestr

133B03D	Concrete Structures 3D	Z,ZK	5
134O02D	Steel Structures 2D	Z,ZK	5
Deepening of knowledge received from courses 133NNK and 134OK01. Amplifying of theoretical knowledge in the field of steel grade selection, toughness, global analysis of structures, buckling of structural systems, joint classification, and high strength steel and demanding composite steel and concrete structures. Complementation of knowledge from fire resistance of steel and composite structures and detailed design of industrial buildings and crane girders. Design of masts, towers, chimneys, tanks, silos and pipelines, technological structures, pre-stressed steel structures and basis of design from aluminium alloys and stainless steel, and cable and membrane structures.			
136S04D	Road construction 4D	Z,ZK	4
137Z03D	Railway Structures 3D	Z,ZK	4

Name of the block: Elective courses
Minimal number of credits of the block: 0
The role of the block: V

Code of the group: NF20150100
Name of the group: volitelná výběrová matematika
Requirement credits in the group:
Requirement courses in the group:
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
101YMAV	**Mathematics 4 - Selective Course** *Aleš Nekvinda* ***Aleš Nekvinda*** *Aleš Nekvinda (Gar.)*	Z,ZK	5	2P+2C	Z	V

Characteristics of the courses of this group of Study Plan: Code=NF20150100 Name=volitelná výběrová matematika

101YMAV	Mathematics 4 - Selective Course	Z,ZK	5

Name of the block: Compulsory elective courses
Minimal number of credits of the block: 6
The role of the block: S

Code of the group: NK20160100_1
Name of the group: obor Konstrukce a dopravní stavby, povinně volitelné předměty, zimní semestr
Requirement credits in the group: In this group you have to gain at least 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:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
102YFPL	**Solid State Physics in Civil Engineering** *Jiří Konfršt, Jaroslava Drchalová, Alexey Sveshnikov, Olga Kapičková* ***Jiří Konfršt*** *Jiří Konfršt (Gar.)*	Z	2	1P+1C	Z	S
132YDDS	**Dynamics of Transport Structures** *Michal Polák* ***Michal Polák*** *Michal Polák (Gar.)*	Z	2	1P+1C	Z	S
132YMMO	**Modern Methods of Optimization** *Matěj Lepš, Jan Zeman* ***Jan Zeman*** *Matěj Lepš (Gar.)*	Z	2	1P+1C	Z	S
132YSEI	**Seismic Engineeering** *Jiří Máca* ***Jiří Máca*** *Jiří Máca (Gar.)*	Z	2	1P+1C	Z	S
132YSSK	**Reliability of Structures** *Jaroslav Kruis* ***Jaroslav Kruis*** *Jaroslav Kruis (Gar.)*	Z	2	1P+1C	Z	S
133YBEX	*Radek Štefan, Petr Štemberk, Marek Foglar* ***Radek Štefan*** *Radek Štefan (Gar.)*	Z	2	1P+1C	Z	S
133YBM2	**Concrete Bridges 2** *Michal Drahorád, Jan Vítek* ***Jan Vítek*** *Jan Vítek (Gar.)*	Z	2	1P+1C	Z	S
133YPRK	**Failures and Rehabilitation of Concrete Structures** *Petr Štemberk, Martin Petřík, Yuliia Khmurovska* ***Petr Štemberk***	Z	2	1P+1C	Z	S
134YDKM	**Timber structures and bridges** *Anna Kuklíková* ***Anna Kuklíková*** *Anna Kuklíková (Gar.)*	Z	2	1P+1C		S
134YROK	**Extending the Life of Steel and Timber Structures** *Karel Mikeš* ***Karel Mikeš*** *Karel Mikeš (Gar.)*	Z	2	1P+1C		S
134YSMK	**Stability and modelling of steel structures** *Josef Macháček, Michal Jandera* ***Michal Jandera*** *Josef Macháček (Gar.)*	Z	2	1P+1C		S
135YGSM	*Jan Pruška, Jan Ježek, Daniel Turanský, Jan Faltýnek Jan Pruška (Gar.)*	Z	2	1P+1C	Z	S
135YZAL	**Basics of mining** *Jiří Barták* ***Jan Salák***	Z	2	1P+1C		S
136YEES	**Environmental Aspects and Esthetics of Road Structures** *Ludvík Vébr*	Z	2	1P+1C		S
136YLET	**Airports** *Ludvík Vébr, Petr Pánek* ***Petr Pánek*** *Petr Pánek (Gar.)*	Z	2	1P+1C		S
137YDKP	**Diagnostics of rail transport construction** *Hana Krejčiříková, Vít Lojda* ***Vít Lojda*** *Hana Krejčiříková (Gar.)*	Z	2	1P+1C	Z	S
220YLPG	**Geotechnical laboratory** *Jiří Svoboda, Jiří Šťástka, Radek Vašíček* ***Radek Vašíček*** *Jiří Svoboda (Gar.)*	Z	2	2C	Z	S

Characteristics of the courses of this group of Study Plan: Code=NK20160100_1 Name=obor Konstrukce a dopravní stavby, povinně volitelné předměty, zimní semestr

102YFPL	Solid State Physics in Civil Engineering	Z	2
Solids, crystal structure, chemical bonds, electron microscopes, scanning tunneling microscope, atomic force microscope, diffraction, diffraction methods, semiconductors, p-n junction, photovoltaic effect, solar cells, heat and moisture transport.			
132YDDS	Dynamics of Transport Structures	Z	2
Understanding of the problems of the Dynamics of transport structures (especially of road bridges, railway bridges and footbridges), explanation of experimental and theoretical analysis procedures - the arrangement of an experiment "in situ?, monitored parameters, measuring line, modal analysis, the monitoring systems for observation of building structure dynamics behaviour and of traffic flow characteristics, numerical methods for solving dynamical interaction between building structure and moving load, modelling of structures, traffic flow and pedestrians, dynamical wind effects, practical examples.			
132YMMO	Modern Methods of Optimization	Z	2
The course is aimed at an overview of numerical optimization methods applicable not only in the Civil Engineering area. The emphasis is put more on the introduction of driving principles, however, practical applications in MATLAB environment are also conducted during exercises.			
132YSEI	Seismic Engineeering	Z	2
132YSSK	Reliability of Structures	Z	2
The course is devoted to the reliability of elements and systems. Element reliability is time dependent while the reliability of systems is of type strength-load. Complicated cases are solved by the FORM method. Two simulation methods are introduced: Monte Carlo and LHS.			
133YBEX		Z	2
133YBM2	Concrete Bridges 2	Z	2
133YPRK	Failures and Rehabilitation of Concrete Structures	Z	2
134YDKM	Timber structures and bridges	Z	2
Timber structures focused to national strategy of sustainable development. New timber-based materials. Structural systeme of houses and bridges. Repairing and strengthtening. Fire design. Production, protection, erection and maintenance. Design and evaluation of bridges, roofs structures in normal temperature and in fire.			
134YROK	Extending the Life of Steel and Timber Structures	Z	2
134YSMK	Stability and modelling of steel structures	Z	2
Subject YSMK covers two parts. The first one deals with stability and strength of steel plates, the second one with stability and strengths of steel frame structures. In the first part the historic collapses of steel structures are analysed including the importance of imperfections for a design of thin plated structures. Presented are principles of theory of buckling, linear and nonlinear theory of buckling of thin plates. The results are applied to the 4th class cross sections in harmony with Eurocode. Buckling due to normal, shear and local loadings including their combination is analysed in a detail. In the end the application of the results is shown together with design of necessary stiffeners. The second part is focused on member and structure stability. Possible global analysis methods are presented together with methods for compression and bending interaction for slender members. In detail, specific cases of lateral torsional buckling are explained including also tapered members.			
135YGSM		Z	2
Students get acquainted with the Finite Element Method, the currently dominant tool for numerical modeling in Geotechnics. Emphasis is placed on introducing the basic principles of the Finite Element Method and their subsequent application to selected problems of Geotechnical Engineering. The course summarises the types of finite elements used in geotechnical applications, material models suitable for the description of soil deformation, and selected specifics associated with numerical modeling in geotechnics. This knowledge is further applied in the modeling of foundation, embedded walls, and stability problems.			
135YZAL	Basics of mining	Z	2
Basic conceptions of mining, mining act, quarrying, methods of mining, shooting			
136YEES	Environmental Aspects and Esthetics of Road Structures	Z	2
Prognosis of the traffic demands. Development of the road network in the Czech Republic, in relation to the European Union. Benefits of the high-capacity communications. The Environmental Impact Assessment methodology. Current legislation in the Czech Republic. The multi-criterial assessment of variants. Financing of the transport infrastructure. Evaluation of the car traffic effects, the amount of traffic accidents, noise, exhalation, vibration. Means for reducing the environmental impacts. Road constructions aesthetics and the spatial impression of the route in the landscape. Current important road structures in the Czech Republic.			
136YLET	Airports	Z	2
Types of airports, organization, data about airports, legislature, choice notions, movement of aeroplanes, flight and touch - down, assesment longitude RWY,aerodrome code, geometric characteristics , ACN / PCN, protective zone, visual aids, traffic processes at the airport, structureof terminals and aprons, proposal airport.			
137YDKP	Diagnostics of rail transport construction	Z	2
Diagnostics of the railway track - Czech regulation 177/1995 as amended, regulations for assessing the operability of the lines, means of diagnostics of the railway superstructure and switches, railway substructure - ballast bed. Measurement of other track parameters. Examples of defects and shortcomings of the railway track.			
220YLPG	Geotechnical laboratory	Z	2
A course dealing with practical exercise on geotechnical tests in laboratory and in-situ activities (The Josef underground laboratory, http://ceg.fsv.cvut.cz). It focuses on laboratory determination of soil and rock parametres neccessary for geotechnical calculations and design - basic physical and hydrophysical properties, strength and deformation parametres.			

Code of the group: NK20170200_1
Name of the group: obor Konstrukce a dopravní stavby, povinně volitelné předměty, letní semestr
Requirement credits in the group: In this group you have to gain at least 4 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 4
Note on the group: volitelný předmět

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
101YMCD	**Methods of Time Discretization** *František Bubeník* ***František Bubeník*** *František Bubeník (Gar.)*	Z	2	1P+1C	L	S
101YMST	**Mathematical statistics for technicians** *Daniela Jarušková Daniela Jarušková (Gar.)*	Z	2	1P+1C	L	S
101YNUM	**Numerical Methods** *Ivana Pultarová, Martin Ladecký* ***Ivana Pultarová*** *Ivana Pultarová (Gar.)*	Z	2	1P+1C	L	S
126YBIM	**Building Information Modelling - Fundamentals** *Robert Bouška, Petr Matějka* ***Robert Bouška*** *Robert Bouška (Gar.)*	Z	2	2C		S

132KMAT	*Michal Šejnoha* ***Michal Šejnoha*** *Michal Šejnoha (Gar.)*	Z,ZK	5	2P+2C		S
132YDSK	**Diagnostics of Building Structures** *Michal Polák* ***Michal Polák*** *Michal Polák (Gar.)*	Z	2	1P+1C	L	S
132YMCK	**Micromechanics of Cement-Based Composites** *Vít Šmilauer* ***Vít Šmilauer*** *Vít Šmilauer (Gar.)*	Z	2	1P+1C	L	S
132YNAK	**Nonlinear Analysis of Materials and Structures** *Bořek Patzák, Petr Kabele, Daniel Rypl* ***Petr Kabele*** *Petr Kabele (Gar.)*	Z	2	1P+1C	L	S
132YNA2	**Numerical Analysis of Structures 2** *Bořek Patzák* ***Bořek Patzák*** *Bořek Patzák (Gar.)*	Z,ZK	4	2P+1C	L	S
132YUPM	**General Principles of Mechanics** *Milan Jirásek* ***Milan Jirásek*** *Milan Jirásek (Gar.)*	Z,ZK	4	2P+1C	L	S
133YATK	**Applied Theory of Structures** *Lukáš Vráblík, Radek Hájek* ***Lukáš Vráblík*** *Lukáš Vráblík (Gar.)*	Z,ZK	4	2P+1C	L	S
133YPNB	**Fire desgn og concrete and mnsory structures** *Radek Štefan, Jaroslav Procházka* ***Michaela Frantová***	Z	2	1P+1C	L	S
133YRZM	**Reconstruction and strengthening of bridges** *Roman Šafář Roman Šafář (Gar.)*	Z	2	1P+1C	L	S
133YVHB	*Josef Fládr, Jan Vítek, Alena Kohoutková, Petr Bílý* ***Josef Fládr*** *Josef Fládr (Gar.)*	Z	2	1P+1C	L	S
134YHNK	**Stainless steel and aluminium structures** *Josef Macháček, František Wald* ***František Wald*** *František Wald (Gar.)*	Z	2	1P+1C		S
134YNDK	**Load-bearing timber roof constructions** *Karel Mikeš* ***Karel Mikeš*** *Karel Mikeš (Gar.)*	Z	2	1P+1C		S
134YPOD	**Fire Resistance of Steel and Timber Structures** *Zdeněk Sokol* ***Zdeněk Sokol*** *Zdeněk Sokol (Gar.)*	Z	2	1P+1C	L	S
134YSDO	**Connections of steel and timber structures** *František Wald, Robert Jára* ***Robert Jára*** *František Wald (Gar.)*	Z,ZK	4	2P+1C	L	S
134YSKO	**Special steel structures** *Jakub Dolejš* ***Jakub Dolejš*** *Jakub Dolejš (Gar.)*	Z,ZK	4	2P+1C		S
135YGEM	**Geotechnical monitoring** *Jan Záleský* ***Jan Záleský*** *Jan Záleský (Gar.)*	Z	2	1P+1C	L	S
135YGZP	**Environmental Geotechnics** *Ivan Vaníček* ***Jan Valenta*** *Ivan Vaníček (Gar.)*	Z	2	1P+1C		S
135YMPK	**Mechanics of underground structures** *Jan Pruška, Alexandr Butovič, Jiří Barták* ***Jan Pruška*** *Jan Pruška (Gar.)*	Z	2	1P+1C	L	S
135YZKS	**Soil structures** *Ivan Vaníček* ***Ivan Vaníček*** *Ivan Vaníček (Gar.)*	Z	2	1P+1C	L	S
136YMVZ	**Pavement mechanics** *Ludvík Vébr* ***Ludvík Vébr*** *Ludvík Vébr (Gar.)*	Z	2	1P+1C		S
136YPPK	**Intersection Highway Design** *Michal Uhlík* ***Michal Uhlík*** *Michal Uhlík (Gar.)*	KZ	2	2C	L	S
137YEAD	**Ecological Aspects of Transport** *Petra Váňová, Lenka Lomoz*	Z	2	1P+1C	Z	S
137YAZS	**Project - Progressive application of substructure** *Martin Lidmila* ***Martin Lidmila*** *Martin Lidmila (Gar.)*	KZ	2	2C	L	S

Characteristics of the courses of this group of Study Plan: Code=NK20170200_1 Name=obor Konstrukce a dopravní stavby, povinně volitelné předměty, letní semestr

101YMCD	Methods of Time Discretization	Z	2
101YMST	Mathematical statistics for technicians	Z	2
101YNUM	Numerical Methods	Z	2
126YBIM	Building Information Modelling - Fundamentals	Z	2
Subject deals with Building Information Modeling (BIM) topic as with the modern tool for management and operation of construction projects. It is oriented to handling basic relevant software (Autodesk Revit, Autodesk Navisworks) and especially to understanding meaning of BIM in current construction business and its future and importance in specific phases of construction projects.			
132KMAT		Z,ZK	5
132YDSK	Diagnostics of Building Structures	Z	2
132YMCK	Micromechanics of Cement-Based Composites	Z	2
132YNAK	Nonlinear Analysis of Materials and Structures	Z	2
Students acquaint self with the concepts of linear stability and calculation of elastoplastic load capacity. Linear stability - evaluation of the critical load and buckling shape. Analysis of structures according to the 2nd order theory - equilibrium conditions on a deformed structure, initial stress matrix. Elastoplastic analysis of structures - evaluation of the limit load capacity, distribution of internal forces at the limit state - static incremental method, kinematic method. Solving stability and elastoplasticity problems by means of a general-purpose finite element program.			
132YNA2	Numerical Analysis of Structures 2	Z,ZK	4
Advanced course on finite element method. Formulation of plate elements suitable for thin and thick plates, plates on elastic foundation. Introduction to nonlinear problems: geometrical and material nonlinearity, solution methods, implementation aspects.			
132YUPM	General Principles of Mechanics	Z,ZK	4
Tensors, differential operators and their application in mechanics, Gauss and Green theorems. General structure of the basic equations of linear and nonlinear statics, energy and duality. Principle of virtual work (power), variational principles (Lagrange, Castigliano, Hellinger-Reissner, Hu-Washizu) and their application to continuous and discrete models of beams, frames, plates, walls and three-dimensional bodies.			
133YATK	Applied Theory of Structures	Z,ZK	4

133YPNB	Fire desgn og concrete and mnsory structures	Z	2
Fire design of concrete structures. Nominal and parametric fire exposures. Verification methods of fire resistance. Mechanical, thermal and physical properties of concrete and steel at elevated temperatures. Design procedures: tabulated data or testing, simplified calculation methods, advanced calculation methods. Shear torsion and anchorage of reinforcement. Spalling of concrete. Addition rules for high strength concrete. Calculation of fire design of concrete and masonry structures.			
133YRZM	Reconstruction and strengthening of bridges	Z	2
133YVHB		Z	2
134YHNK	Stainless steel and aluminium structures	Z	2
Subject YHNK covers two parts: the first concerns design of structures from aluminium alloys, the second deals with stainless steel structures. The first part covers introduction and practice in designing of aluminium structures. The second part covers evolution of stainless steel materials/structures and examples of realized structures. Stainless steels suitable for structures are described in a detail, including their properties. Dissimilarities in assessments of members under common loadings with respect to low-carbon steels is described for both ultimate and serviceability limit states. In the end the possibilities concerning connections of stainless steel members, erection and installation of stainless steel members are described.			
134YNDK	Load-bearing timber roof constructions	Z	2
134YPOD	Fire Resistance of Steel and Timber Structures	Z	2
The class gives introduction to fire modeling, fire safety and fire resistance of steel, steel-concrete composite and timber structural elements.			
134YSDO	Connections of steel and timber structures	Z,ZK	4
The subject allows insight and ability to apply the knowledge related to structural connections and its application by software.			
134YSKO	Special steel structures	Z,ZK	4
The course follows the basic education in the field of steel structures. It focuses on a design of some special construction types, includes parts: High-strength steel construction, Crane supporting structures, Silos and Rope structures.			
135YGEM	Geotechnical monitoring	Z	2
135YGZP	Environmental Geotechnics	Z	2
135YMPK	Mechanics of underground structures	Z	2
135YZKS	Soil structures	Z	2
136YMVZ	Pavement mechanics	Z	2
Rise and development of road pavement mechanics, fundamental data for designing, characteristics of traffic load, thermic and water relation of subbase,load-bearing capacity of subgrade, road pavement materials, pavement design methods - partition, development and possibilities. Stress and transformation analysis on road pavement construction and subgrade, pavement design specificity for different constructional types, road pavements with special loads.			
136YPPK	Intersection Highway Design	KZ	2
Design of interchange and roundabaut. Accident rate on grade intersections. Fundamentals of safe proposal, psychological preference, safety audit.			
137YEAD	Ecological Aspects of Transport	Z	2
Negative impacts of noise and vibration on human. Assessment of varied transport noise Acoustic levels. Noise maps. Noise study. Traffic noise characteristics of different transport means. Propagation of noise. Ways of environment protection before adverse impacts of transport noise (urban, architectural, traffic-organizing, technical)			
137YAZS	Project - Progressive application of substructure	KZ	2

Name of the block: Povinně volitelné předměty, doporučení S1
Minimal number of credits of the block: 34
The role of the block: S1

Code of the group: NK20160200_2
Name of the group: obor Kostrukce a dopravní stavby, volitelný diplomový seminář
Requirement credits in the group: In this group you have to gain 4 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 4
Note on the group:

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
101DISE	**Diploma Seminar** *Aleš Nekvinda, Jozef Bobok* ***Iva Malechová***	Z	4	4C	L	S1
132DISE	**Diploma Seminar** *Michal Polák, Tomáš Plachý, Matěj Lepš, Jan Zeman, Jiří Máca, Michal Šejnoha, Milan Jirásek, Jan Vorel, Petr Havlásek, ...* ***Bořek Patzák***	Z	4	4C	L	S1
133DISE	**Diploma Seminar** *Michal Drahorád, Roman Šafář, Lukáš Vráblík, Petr Štemberk, Marek Foglar, Jan Vítek, Hana Hanzlová*	Z	4	4C	L	S1
134DISE	**Diploma Seminar** *Josef Macháček* ***Michal Jandera*** *Josef Macháček (Gar.)*	Z	4	4C		S1
135DISE	**Diploma Seminar** *Jan Pruška* ***Jan Pruška*** *Jan Pruška (Gar.)*	Z	4	4C		S1
136DISE	**Diploma Seminar** *Michal Uhlík, Ludvík Vébr, Petr Mondschein, Jan Hradil, František Luxemburk, Jan Valentin, Petr Pánek, Petr Slabý, Jaromíra Ježková* ***Jan Valentin***	Z	4	4C		S1
137DISE	**Diploma Seminar** *Leoš Horníček, Hana Krejčiříková, Ondřej Bret, Martin Lidmila, Lenka Lomoz*	Z	4	4C	L	S1
220DISE	**Diploma Seminar** *Jiří Svoboda, Radek Vašíček, Jaroslav Pacovský* ***Radek Vašíček*** *Jaroslav Pacovský (Gar.)*	Z	4	4C		S1

Characteristics of the courses of this group of Study Plan: Code=NK20160200_2 Name=obor Kostrukce a dopravní stavby, volitelný diplomový seminář

101DISE	Diploma Seminar	Z	4
132DISE	Diploma Seminar	Z	4
in accordance with the specification			
133DISE	Diploma Seminar	Z	4
134DISE	Diploma Seminar	Z	4
Semestrial project of master study.			
135DISE	Diploma Seminar	Z	4
Individual geotechnical problem, solution variants, project work			
136DISE	Diploma Seminar	Z	4
137DISE	Diploma Seminar	Z	4
Processing and presentation of the technical themes, data completion for diploma work.			
220DISE	Diploma Seminar	Z	4
Preparatory works on diploma thesis elaboration. Literature review, study on problematics to be solved - practical cases in geotechnical laboratory and the Josef underground laboratory (http://ceg.fsv.cvut.cz).			

Code of the group: NK20160300_1
Name of the group: obor Konstrukce a dopravní stavby, diplomová práce
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 1 course
Credits in the group: 30
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
101DPM	**Diploma Thesis** *Michal Beneš, Daniela Jarušková, Milan Bořík, Jakub Šolc, Jana Nosková* ***Iva Malechová*** *Daniela Jarušková (Gar.)*	Z	30	24C	Z	S1
132DPM	**Diploma Thesis** *Bořek Patzák, Michal Polák, Tomáš Plachý, Matěj Lepš, Jan Zeman, Jiří Máca, Michal Šejnoha, Petr Kabele, Milan Jirásek, ...* ***Milan Jirásek***	Z	30	24C	Z	S1
133DPM	**Diploma Thesis** ***Michaela Frantová***	Z	30	24C	Z	S1
134DPM	**Diploma Thesis** *František Wald, Jakub Dolejš* ***Jakub Dolejš*** *Jakub Dolejš (Gar.)*	Z	30	24C	Z	S1
135DPM	**Dynamics of geotechnical structures** *Jan Pruška, Jan Masopust* ***Jan Pruška*** *Jan Pruška (Gar.)*	Z	30	24C	Z	S1
136DPM	**Diploma Thesis** ***Jan Valentin*** *Jan Valentin (Gar.)*	Z	30	24C	Z	S1
137DPM	**Diploma Thesis** *Hana Krejčiříková*	Z	30	24C	Z,L	S1
220DPM	**Diploma Thesis** *Jiří Svoboda, Radek Vašíček, Jaroslav Pacovský* ***Radek Vašíček*** *Jiří Svoboda (Gar.)*	Z	30	24C	Z	S1

Characteristics of the courses of this group of Study Plan: Code=NK20160300_1 Name=obor Konstrukce a dopravní stavby, diplomová práce

101DPM	Diploma Thesis	Z	30
132DPM	Diploma Thesis	Z	30
in accordance with the thesis proposal			
133DPM	Diploma Thesis	Z	30
in accordance with a thesis proposal			
134DPM	Diploma Thesis	Z	30
135DPM	Dynamics of geotechnical structures	Z	30
136DPM	Diploma Thesis	Z	30
137DPM	Diploma Thesis	Z	30
220DPM	Diploma Thesis	Z	30
Diploma thesis elaboration with possible use of geotechnical laboratory and underground facility the Josef underground laboratory (http://ceg.fsv.cvut.cz).			

List of courses of this pass:

Code	Name of the course	Completion	Credits
101DISE	Diploma Seminar	Z	4
101DPM	Diploma Thesis	Z	30
101MA04	Mathematics 4	Z,ZK	5
101YMAV	Mathematics 4 - Selective Course	Z,ZK	5
101YMCD	Methods of Time Discretization	Z	2
101YMST	Mathematical statistics for technicians	Z	2
101YNUM	Numerical Methods	Z	2
102YFPL	Solid State Physics in Civil Engineering	Z	2
	Solids, crystal structure, chemical bonds, electron microscopes, scanning tunneling microscope, atomic force microscope, diffraction, diffraction methods, semiconductors, p-n junction, photovoltaic effect, solar cells, heat and moisture transport.		
126YBIM	Building Information Modelling - Fundamentals	Z	2
	Subject deals with Building Information Modeling (BIM) topic as with the modern tool for management and operation of construction projects. It is oriented to handling basic relevant software (Autodesk Revit, Autodesk Navisworks) and especially to understanding meaning of BIM in current construction business and its future and importance in specific phases of construction projects.		
132DISE	Diploma Seminar	Z	4
	in accordance with the specification		
132DPM	Diploma Thesis	Z	30
	in accordance with the thesis proposal		
132EADK	Experimental Analysis and Diagnostics K	KZ	3
132KMAT		Z,ZK	5
132NAK	Numerical Analysis of Structures	Z,ZK	5
	Variational principles of mechanics. Method of weighted residuals, conditions of convergence (continuity, integrity). Principles of FEM. Isoparametric elements, area coordinates, numerical integration. Application of method to selected 1D and 2D problems (Elasticity, heat transfer, consolidation). Algorithmic aspects of the method.		
132YDDS	Dynamics of Transport Structures	Z	2
	Understanding of the problems of the Dynamics of transport structures (especially of road bridges, railway bridges and footbridges), explanation of experimental and theoretical analysis procedures - the arrangement of an experiment "in situ?, monitored parameters, measuring line, modal analysis, the monitoring systems for observation of building structure dynamics behaviour and of traffic flow characteristics, numerical methods for solving dynamical interaction between building structure and moving load, modelling of structures, traffic flow and pedestrians, dynamical wind effects, practical examples.		
132YDSK	Diagnostics of Building Structures	Z	2
132YMCK	Micromechanics of Cement-Based Composites	Z	2
132YMMO	Modern Methods of Optimization	Z	2
	The course is aimed at an overview of numerical optimization methods applicable not only in the Civil Engineering area. The emphasis is put more on the introduction of driving principles, however, practical applications in MATLAB environment are also conducted during exercises.		
132YNA2	Numerical Analysis of Structures 2	Z,ZK	4
	Advanced course on finite element method. Formulation of plate elements suitable for thin and thick plates, plates on elastic foundation. Introduction to nonlinear problems: geometrical and material nonlinearity, solution methods, implementation aspects.		
132YNAK	Nonlinear Analysis of Materials and Structures	Z	2
	Students acquaint self with the concepts of linear stability and calculation of elastoplastic load capacity. Linear stability - evaluation of the critical load and buckling shape. Analysis of structures according to the 2nd order theory - equilibrium conditions on a deformed structure, initial stress matrix. Elastoplastic analysis of structures - evaluation of the limit load capacity, distribution of internal forces at the limit state - static incremental method, kinematic method. Solving stability and elastoplasticity problems by means of a general-purpose finite element program.		
132YSEI	Seismic Engineeering	Z	2
132YSSK	Reliability of Structures	Z	2
	The course is devoted to the reliability of elements and systems. Element reliability is time dependent while the reliability of systems is of type strength-load. Complicated cases are solved by the FORM method. Two simulation methods are introduced: Monte Carlo and LHS.		
132YUPM	General Principles of Mechanics	Z,ZK	4
	Tensors, differential operators and their application in mechanics, Gauss and Green theorems. General structure of the basic equations of linear and nonlinear statics, energy and duality. Principle of virtual work (power), variational principles (Lagrange, Castigliano, Hellinger-Reissner, Hu-Washizu) and their application to continuous and discrete models of beams, frames, plates, walls and three-dimensional bodies.		
133B03D	Concrete Structures 3D	Z,ZK	5
133DISE	Diploma Seminar	Z	4
133DPM	Diploma Thesis	Z	30
	in accordance with a thesis proposal		
133YATK	Applied Theory of Structures	Z,ZK	4
133YBEX		Z	2
133YBM2	Concrete Bridges 2	Z	2
133YPNB	Fire desgn og concrete and mnsory structures	Z	2
	Fire design of concrete structures. Nominal and parametric fire exposures. Verification methods of fire resistance. Mechanical, thermal and physical properties of concrete and steel at elevated temperatures. Design procedures: tabulated data or testing, simplified calculation methods, advanced calculation methods. Shear torsion and anchorage of reinforcement. Spalling of concrete. Addition rules for high strength concrete. Calculation of fire design of concrete and masonry structures.		
133YPRK	Failures and Rehabilitation of Concrete Structures	Z	2

133YRZM	Reconstruction and strengthening of bridges	Z	2
133YVHB		Z	2
134DISE	Diploma Seminar	Z	4
	Semestrial project of master study.		
134DPM	Diploma Thesis	Z	30
134O02D	Steel Structures 2D	Z,ZK	5
	Deepening of knowledge received from courses 133NNK and 134OK01. Amplifying of theoretical knowledge in the field of steel grade selection, toughness, global analysis of structures, buckling of structural systems, joint classification, and high strength steel and demanding composite steel and concrete structures. Complementation of knowledge from fire resistance of steel and composite structures and detailed design of industrial buildings and crane girders. Design of masts, towers, chimneys, tanks, silos and pipelines, technological structures, pre-stressed steel structures and basis of design from aluminium alloys and stainless steel, and cable and membrane structures.		
134YDKM	Timber structures and bridges	Z	2
	Timber structures focused to national strategy of sustainable development. New timber-based materials. Structural systeme of houses and bridges. Repairing and strengthtening. Fire design. Production, protection, erection and maintenance. Design and evaluation of bridges, roofs structures in normal temperature and in fire.		
134YHNK	Stainless steel and aluminium structures	Z	2
	Subject YHNK covers two parts: the first concerns design of structures from aluminium alloys, the second deals with stainless steel structures. The first part covers introduction and practice in designing of aluminium structures. The second part covers evolution of stainless steel materials/structures and examples of realized structures. Stainless steels suitable for structures are described in a detail, including their properties. Dissimilarities in assessments of members under common loadings with respect to low-carbon steels is described for both ultimate and serviceability limit states. In the end the possibilities concerning connections of stainless steel members, erection and installation of stainless steel members are described.		
134YNDK	Load-bearing timber roof constructions	Z	2
134YPOD	Fire Resistance of Steel and Timber Structures	Z	2
	The class gives introduction to fire modeling, fire safety and fire resistance of steel, steel-concrete composite and timber structural elements.		
134YROK	Extending the Life of Steel and Timber Structures	Z	2
134YSDO	Connections of steel and timber structures	Z,ZK	4
	The subject allows insight and ability to apply the knowledge related to structural connections and its application by software.		
134YSKO	Special steel structures	Z,ZK	4
	The course follows the basic education in the field of steel structures. It focuses on a design of some special construction types, includes parts: High-strength steel construction, Crane supporting structures, Silos and Rope structures.		
134YSMK	Stability and modelling of steel structures	Z	2
	Subject YSMK covers two parts. The first one deals with stability and strength of steel plates, the second one with stability and strengths of steel frame structures. In the first part the historic collapses of steel structures are analysed including the importance of imperfections for a design of thin plated structures. Presented are principles of theory of buckling, linear and nonlinear theory of buckling of thin plates. The results are applied to the 4th class cross sections in harmony with Eurocode. Buckling due to normal, shear and local loadings including their combination is analysed in a detail. In the end the application of the results is shown together with design of necessary stiffeners. The second part is focused on member and structure stability. Possible global analysis methods are presented together with methods for compression and bending interaction for slender members. In detail, specific cases of lateral torsional buckling are explained including also tapered members.		
135DISE	Diploma Seminar	Z	4
	Individual geotechnical problem, solution variants, project work		
135DPM	Dynamics of geotechnical structures	Z	30
135DYGK	Dynamics of geotechnical structures	Z,ZK	4
135GET	Geotechnics	Z,ZK	5
	Advanced design approaches for selected types of foundation pits and footings, design based on soil - structure interaction.		
135YGEM	Geotechnical monitoring	Z	2
135YGSM		Z	2
	Students get acquainted with the Finite Element Method, the currently dominant tool for numerical modeling in Geotechnics. Emphasis is placed on introducing the basic principles of the Finite Element Method and their subsequent application to selected problems of Geotechnical Engineering. The course summarises the types of finite elements used in geotechnical applications, material models suitable for the description of soil deformation, and selected specifics associated with numerical modeling in geotechnics. This knowledge is further applied in the modeling of foundation, embedded walls, and stability problems.		
135YGZP	Environmental Geotechnics	Z	2
135YMPK	Mechanics of underground structures	Z	2
135YZAL	Basics of mining	Z	2
	Basic conceptions of mining, mining act, quarrying, methods of mining, shooting		
135YZKS	Soil structures	Z	2
136DISE	Diploma Seminar	Z	4
136DPM	Diploma Thesis	Z	30
136S03D	Road construction 3D	Z,ZK	5
136S04D	Road construction 4D	Z,ZK	4
136YEES	Environmental Aspects and Esthetics of Road Structures	Z	2
	Prognosis of the traffic demands. Development of the road network in the Czech Republic, in relation to the European Union. Benefits of the high-capacity communications. The Environmental Impact Assessment methodology. Current legislation in the Czech Republic. The multi-criterial assessment of variants. Financing of the transport infrastructure. Evaluation of the car traffic effects, the amount of traffic accidents, noise, exhalation, vibration. Means for reducing the environmental impacts. Road constructions aesthetics and the spatial impression of the route in the landscape. Current important road structures in the Czech Republic.		
136YLET	Airports	Z	2
	Types of airports, organization, data about airports, legislature, choice notions, movement of aeroplanes, flight and touch - down, assesment longitude RWY,aerodrome code, geometric characteristics , ACN / PCN, protective zone, visual aids, traffic processes at the airport, structureof terminals and aprons, proposal airport.		
136YMVZ	Pavement mechanics	Z	2
	Rise and development of road pavement mechanics, fundamental data for designing, characteristics of traffic load, thermic and water relation of subbase,load-bearing capacity of subgrade, road pavement materials, pavement design methods - partition, development and possibilities. Stress and transformation analysis on road pavement construction and subgrade, pavement design specificity for different constructional types, road pavements with special loads.		

136YPPK	Intersection Highway Design	KZ	2
	Design of interchange and roundabaut. Accident rate on grade intersections. Fundamentals of safe proposal, psychological preference, safety audit.		
137DISE	Diploma Seminar	Z	4
	Processing and presentation of the technical themes, data completion for diploma work.		
137DPM	Diploma Thesis	Z	30
137YAZS	Project - Progressive application of substructure	KZ	2
137YDKP	Diagnostics of rail transport construction	Z	2
	Diagnostics of the railway track - Czech regulation 177/1995 as amended, regulations for assessing the operability of the lines, means of diagnostics of the railway superstructure and switches, railway substructure - ballast bed. Measurement of other track parameters. Examples of defects and shortcomings of the railway track.		
137YEAD	Ecological Aspects of Transport	Z	2
	Negative impacts of noise and vibration on human. Assessment of varied transport noise Acoustic levels. Noise maps. Noise study. Traffic noise characteristics of different transport means. Propagation of noise. Ways of environment protection before adverse impacts of transport noise (urban, architectural, traffic-organizing, technical)		
137Z02D	Railway structures 2D	Z,ZK	5
	Track design of individual types of railway stations, structural elements of railway stations, equipment for passenger and freight transport, connection to the European railway network, modernisation and optimisation of railway lines, design of tram and metro lines, ecological impacts of rail transport.		
137Z03D	Railway Structures 3D	Z,ZK	4
220DISE	Diploma Seminar	Z	4
	Preparatory works on diploma thesis elaboration. Literature review, study on problematics to be solved - practical cases in geotechnical laboratory and the Josef underground laboratory (http://ceg.fsv.cvut.cz).		
220DPM	Diploma Thesis	Z	30
	Diploma thesis elaboration with possible use of geotechnical laboratory and underground facility the Josef underground laboratory (http://ceg.fsv.cvut.cz).		
220YLPG	Geotechnical laboratory	Z	2
	A course dealing with practical exercise on geotechnical tests in laboratory and in-situ activities (The Josef underground laboratory, http://ceg.fsv.cvut.cz). It focuses on laboratory determination of soil and rock parametres neccessary for geotechnical calculations and design - basic physical and hydrophysical properties, strength and deformation parametres.		

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