

# Study plan

## Name of study plan: obor Konstrukce a dopravní stavby, zaměření Inženýrské konstrukce

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	<b>Mathematics 4</b> Jan Chleboun, Ivana Pultarová, Michal Beneš, Jan Lama, Iva Malechová Jan Chleboun Jan Chleboun (Gar.)	Z,ZK	5	2P+2C	Z	z
132NAK	<b>Numerical Analysis of Structures</b> Božek Patzák, Jan Voříšek, Edita Dvořáková, Tomáš Krejčí Božek Patzák Božek Patzák (Gar.)	Z,ZK	5	2P+2C	Z	z
135GET	<b>Geotechnics</b> Jan Pruška, Jan Kos, Matouš Hilar, Jan Valenta, Jan Salák, Alexandr Butoví, Jan Masopust Jan Valenta Jan Valenta (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
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	<b>Experimental Analysis and Diagnostics K</b> 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
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Name of the block: Povinné předměty zaměřené  
 Minimal number of credits of the block: 32  
 The role of the block: PZ

Code of the group: NK20160101

Name of the group: obor Konstrukce a dopravní stavby, zaměřené Inženýrské konstrukce, 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
132DY02	<b>Dynamics of structures 2</b> Jiří Máca, Karel Pohl Jiří Máca (Gar.)	Z,ZK	4	2P+1C	Z	PZ
133B03K	<b>Concrete Structures 3K</b> Jan Vítek, Lukáš Vráblík Jan Vítek (Gar.)	Z,ZK	5	2P+2C	Z	PZ
134O02K	<b>Steel Structures 2K</b> Martina Eliášová Martina Eliášová (Gar.)	Z,ZK	5	2P+2C	Z	PZ

Characteristics of the courses of this group of Study Plan: Code=NK20160101 Name=obor Konstrukce a dopravní stavby, zaměřené Inženýrské konstrukce, 1. semestr

132DY02	Dynamics of structures 2	Z,ZK	4
133B03K	Concrete Structures 3K	Z,ZK	5
134O02K	Steel Structures 2K	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.

Code of the group: NK20160201

Name of the group: obor Konstrukce a dopravní stavby, zaměřené Inženýrské konstrukce, 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
133B04K	<b>Concrete Structures 4K</b> Jan Vítek, Lukáš Vráblík Lukáš Vráblík (Gar.)	Z,ZK	4	2P+1C	L	PZ
134OCM2	<b>Steel Bridges 2</b> Pavel Ryjáček Pavel Ryjáček (Gar.)	Z,ZK	4	2P+1C	L	PZ
136S03K	<b>Road construction 3K</b> Michal Uhlík, Ludvík Věbr Michal Uhlík (Gar.)	Z,ZK	5	2P+2C	L	PZ
137Z02K	<b>Railway structures 2K</b> Martin Lidmila, Leoš Horníček, Hana Krejčíková	Z,ZK	5	2P+2C	L	PZ

Characteristics of the courses of this group of Study Plan: Code=NK20160201 Name=obor Konstrukce a dopravní stavby, zaměřené Inženýrské konstrukce, 2. semestr

133B04K	Concrete Structures 4K	Z,ZK	4
134OCM2	Steel Bridges 2	Z,ZK	4
136S03K	Road construction 3K	Z,ZK	5
137Z02K	Railway structures 2K	Z,ZK	5

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 výbava matematická

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	<b>Mathematics 4 - Selective Course</b> Aleš Nekvinda <b>Aleš Nekvinda</b> Aleš Nekvinda (Gar.)	Z,ZK	5	2P+2C	Z	v

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

101YMAV	Mathematics 4 - Selective Course	Z,ZK	5
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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, povinn volitelné p edm ty, 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	<b>Solid State Physics in Civil Engineering</b> Ji í Konfršt, Jaroslava Drchalová, Alexey Sveshnikov, Olga Kapi ková Ji í Konfršt Ji í Konfršt (Gar.)	Z	2	1P+1C	Z	s
132YDDS	<b>Dynamics of Transport Structures</b> Michal Polák <b>Michal Polák</b> Michal Polák (Gar.)	Z	2	1P+1C	Z	s
132YMMO	<b>Modern Methods of Optimization</b> Mat j Lepš, Jan Zeman <b>Jan Zeman</b>	Z	2	1P+1C	Z	s
132YSEI	<b>Seismic Engineering</b> Ji í Máca Ji í Máca Ji í Máca (Gar.)	Z	2	1P+1C	Z	s
132YSSK	<b>Reliability of Structures</b> Jaroslav Kruis <b>Jaroslav Kruis</b> Jaroslav Kruis (Gar.)	Z	2	1P+1C	Z	s
133YBEX	<b>Concrete under severe conditions</b> Radek Štefan, Petr Štemberk, Marek Foglar Petr Štemberk (Gar.)	Z	2	1P+1C	Z	s
133YBM2	<b>Concrete Bridges 2</b> Jan Vitek, Michal Drahorád Jan Vitek (Gar.)	Z	2	1P+1C	Z	s
133YPRK	<b>Failures and Rehabilitation of Concrete Structures</b> Petr Štemberk, Martin Pet ík <b>Petr Štemberk</b>	Z	2	1P+1C	Z	s
134YDKM	<b>Timber structures and bridges</b> Anna Kuklíková <b>Anna Kuklíková</b> Anna Kuklíková (Gar.)	Z	2	1P+1C		s
134YROK	<b>Extending the Life of Steel and Timber Structures</b> Karel Mikeš <b>Karel Mikeš</b> Karel Mikeš (Gar.)	Z	2	1P+1C		s
134YSMK	<b>Stability and modelling of steel structures</b> Josef Machá ek, Michal Jandera <b>Michal Jandera</b> Josef Machá ek (Gar.)	Z	2	1P+1C		s
135YGSM	<b>Geotechnical software for numerical models</b> Jan Pruška, Jan Ježek, Jan Faltýnek Jan Pruška (Gar.)	Z	2	1P+1C	Z	s
135YZAL	<b>Basics of mining</b> Ji í Barták <b>Jan Salák</b>	Z	2	1P+1C		s
136YEES	<b>Environmental Aspects and Esthetics of Road Structures</b> Ludvík Vébr, Zuzana ížková <b>Zuzana ížková</b> Zuzana ížková (Gar.)	Z	2	1P+1C		s
136YLET	<b>Airports</b> Ludvík Vébr, Petr Pánek <b>Petr Pánek</b>	Z	2	1P+1C		s
137YDKP	<b>Diagnostics of rail transport construction</b> Hana Krej í íková <b>Hana Krej í íková</b> Hana Krej í íková (Gar.)	Z	2	1P+1C	Z	s
220YLPG	<b>Geotechnical laboratory</b> Ji í Svoboda, Ji í Š ástka, Radek Vaší ek <b>Radek Vaší ek</b> Radek Vaší ek (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, povinn volitelné p edm ty, zimní semestr

102YFPL	Solid State Physics in Civil Engineering	Z	2
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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 Engineering	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	Concrete under severe conditions	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 systems of houses and bridges. Repairing and strengthening. 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	Geotechnical software for numerical models	Z	2
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, structure of terminals and aprons, proposal airport.			
137YDKP	Diagnostics of rail transport construction	Z	2
220YLPG	Geotechnical laboratory	Z	2
A course dealing with practical exercise on geotechnical tests in laboratory and in-situ activities (The Josef underground laboratory, <a href="http://ceg.fsv.cvut.cz">http://ceg.fsv.cvut.cz</a> ). It focuses on laboratory determination of soil and rock parameters necessary for geotechnical calculations and design - basic physical and hydrophysical properties, strength and deformation parameters.			

Code of the group: NK20170200\_1

Name of the group: obor Konstrukce a dopravní stavby, povinn volitelné p edm ty, 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) <i>Tutors, authors and guarantors (gar.)</i>	Completion	Credits	Scope	Semester	Role
101YMCD	<b>Methods of Time Discretization</b> <i>František Bubeník František Bubeník František Bubeník (Gar.)</i>	Z	2	1P+1C	L	s
101YMST	<b>Mathematical statistics for technicians</b> <i>Daniela Jarušková Daniela Jarušková (Gar.)</i>	Z	2	1P+1C	L	s
101YNUM	<b>Numerical Methods</b> <i>Ivana Pultarová, Martin Ladecký Ivana Pultarová Ivana Pultarová (Gar.)</i>	Z	2	1P+1C	L	s
126YBIM	<b>Building Information Modelling - Fundamentals</b> <i>Robert Bouška, Petr Mat jka Robert Bouška Robert Bouška (Gar.)</i>	Z	2	2C		s
132KMAT	<b>Composite Materials</b> <i>Michal Šejnoha Michal Šejnoha Michal Šejnoha (Gar.)</i>	Z,ZK	5	2P+2C		s
132YDSK	<b>Diagnostics of Building Structures</b> <i>Michal Polák</i>	Z	2	1P+1C	L	s
132YMCK	<b>Micromechanics of Cement-Based Composites</b> <i>Vít Šmilauer Vít Šmilauer Vít Šmilauer (Gar.)</i>	Z	2	1P+1C	L	s
132YNAK	<b>Nonlinear Analysis of Materials and Structures</b> <i>Bo ek Patzák, Petr Kabele, Daniel Rypl Petr Kabele Petr Kabele (Gar.)</i>	Z	2	1P+1C	L	s
132YNA2	<b>Numerical Analysis of Structures 2</b> <i>Bo ek Patzák Bo ek Patzák Bo ek Patzák (Gar.)</i>	Z,ZK	4	2P+1C	L	s

132YUPM	<b>General Principles of Mechanics</b> <i>Milan Jirásek Milan Jirásek Milan Jirásek (Gar.)</i>	Z,ZK	4	2P+1C	L	s
133YATK	<b>Applied Theory of Structures</b> <i>Lukáš Vráblík, Radek Hájek Lukáš Vráblík (Gar.)</i>	Z,ZK	4	2P+1C	L	s
133YPNB	<b>Fire design of concrete and masonry structures</b> <i>Radek Štefan, Jaroslav Procházka Michaela Frantová</i>	Z	2	1P+1C	L	s
133YRZM	<b>Reconstruction and strengthening of bridges</b> <i>Roman Šafář Roman Šafář (Gar.)</i>	Z	2	1P+1C	L	s
133YVHB	<b>High-performance Concretes</b> <i>Josef Fládr, Jan Vítek, Alena Kohoutková, Petr Bílý Michaela Frantová</i>	Z	2	1P+1C	L	s
134YHNK	<b>Stainless steel and aluminum structures</b> <i>Josef Macháček, František Wald František Wald Josef Macháček (Gar.)</i>	Z	2	1P+1C		s
134YNDK	<b>Load-bearing timber roof constructions</b> <i>Karel Mikeš Karel Mikeš Karel Mikeš (Gar.)</i>	Z	2	1P+1C		s
134YPOD	<b>Fire Resistance of Steel and Timber Structures</b> <i>Zdeněk Sokol Zdeněk Sokol Zdeněk Sokol (Gar.)</i>	Z	2	1P+1C	L	s
134YSDO	<b>Connections of steel and timber structures</b> <i>František Wald, Robert Jára Robert Jára František Wald (Gar.)</i>	Z,ZK	4	2P+1C	L	s
134YSKO	<b>Special steel structures</b> <i>Jakub Dolejš Jakub Dolejš Jakub Dolejš (Gar.)</i>	Z,ZK	4	2P+1C		s
135YGEM	<b>Geotechnical monitoring</b> <i>Jan Záleský Jan Záleský Jan Záleský (Gar.)</i>	Z	2	1P+1C	L	s
135YGZP	<b>Environmental Geotechnics</b> <i>Ivan Vaníček Jan Valenta Ivan Vaníček (Gar.)</i>	Z	2	1P+1C		s
135YMPK	<b>Mechanics of underground structures</b> <i>Jan Pruška, Alexandr Butoví, Jiří Barták Jan Pruška Jan Pruška (Gar.)</i>	Z	2	1P+1C	L	s
135YZKS	<b>Soil structures</b> <i>Ivan Vaníček Ivan Vaníček Ivan Vaníček (Gar.)</i>	Z	2	1P+1C	L	s
136YMVZ	<b>Pavement mechanics</b> <i>Ludvík Vébr Ludvík Vébr</i>	Z	2	1P+1C		s
136YPPK	<b>Intersection Highway Design</b> <i>Michal Uhlík Michal Uhlík Michal Uhlík (Gar.)</i>	KZ	2	2C	L	s
137YEAD	<b>Ecological Aspects of Transport</b> <i>Petra Váňová, Lenka Lomoz</i>	Z	2	1P+1C	Z	s
137YAZS	<b>Project - Progressive application of substructure</b> <i>Martin Lidmila</i>	KZ	2	2C	L	s

**Characteristics of the courses of this group of Study Plan: Code=NK20170200\_1 Name=obor Konstrukce a dopravní stavby, povinné volitelné podle ročníku, 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 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.				Z	2
132KMAT	Composite Materials				Z,ZK	5
132YDSK	Diagnostics of Building Structures Understanding of the problems of diagnostics of building structures. Monitoring of building structures, utilization of static and dynamic experimental analysis in building structure diagnostics - the arrangement of an experiment, monitored parameters, measuring line, processing and evaluation of experimental results, detection and localization of the building structure damage, practical examples. Building structure crack analysis, material characteristics determination on existing structures, identification of building structure model.				Z	2
132YMCK	Micromechanics of Cement-Based Composites				Z	2
132YNAK	Nonlinear Analysis of Materials and Structures 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.				Z	2
132YNA2	Numerical Analysis of Structures 2 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.				Z,ZK	4
132YUPM	General Principles of Mechanics 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, Castiglione, Hellinger-Reissner, Hu-Washizu) and their application to continuous and discrete models of beams, frames, plates, walls and three-dimensional bodies.				Z,ZK	4
133YATK	Applied Theory of Structures				Z,ZK	4
133YPNB	Fire design of concrete and masonry structures 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.				Z	2
133YRZM	Reconstruction and strengthening of bridges				Z	2
133YVHB	High-performance Concretes Various types of high-performance concretes - their behaviour and properties. Design and analysis. Examples of practical application of high-performance concretes.				Z	2

134YHNC	Stainless steel and aluminium structures	Z	2
Subject YHNC 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 roundabout. 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: Povinn volitelné p edm ty, doporu ení 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 seminá

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	<b>Diploma Seminar</b> Aleš Někviada, Jozef Bobok <b>Iva Malechová</b>	Z	4	4C	L	S1
132DISE	<b>Diploma Seminar</b> Michal Polák, Tomáš Plachý, Ji í Máca, Mat j Lepš, Jan Zeman, Michal Šejnoha, Milan Jirásek, Jan Vorel, Petr Havlásek, ..... <b>Bo ek Patzák</b>	Z	4	4C	L	S1
133DISE	<b>Diploma Seminar</b> Jan Vítek, Lukáš Vráblík, Michal Drahorád, Petr Štemberk, Marek Foglar, Roman Šafá , Hana Hanzlová	Z	4	4C	L	S1
134DISE	<b>Diploma Seminar</b> Josef Machá ek <b>Michal Jandera</b> Josef Machá ek (Gar.)	Z	4	4C		S1
135DISE	<b>Diploma Seminar</b> <b>Jan Záleský</b>	Z	4	4C		S1
136DISE	<b>Diploma Seminar</b> Michal Uhlík, Ludvík Věbr, Petr Pánek, Petr Slabý, Jaromíra Ježková, Jan Hradil, František Luxemburk, Jan Valentin, Petr Mondschein <b>Jan Valentin</b>	Z	4	4C		S1
137DISE	<b>Diploma Seminar</b> Martin Lidmila, Leoš Horní ek, Hana Krej í íková, Ond ej Bret, Lenka Lomoz	Z	4	4C	L	S1
220DISE	<b>Diploma Seminar</b> Ji í Svoboda, Radek Vaší ek, Jaroslav Pacovský <b>Radek Vaší ek</b> 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 seminá

101DISE	Diploma Seminar	Z	4
132DISE	Diploma Seminar in accordance with the specification	Z	4
133DISE	Diploma Seminar	Z	4

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

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	<b>Diploma Thesis</b> Michal Beneš, Daniela Jarušková, Milan Bořík, Jakub Šolc, Jana Nosková <b>Iva Malechová</b> Daniela Jarušková (Gar.)	Z	30	24C	Z	S1
132DPM	<b>Diploma Thesis</b> Bořek Patzák, Michal Polák, Tomáš Plachý, Jiří Máca, Karel Pohl, Matěj Lepš, Jan Zeman, Michal Šejnoha, Petr Kabele, ..... <b>Milan Jirásek</b>	Z	30	24C	Z	S1
133DPM	<b>Diploma Thesis</b> <b>Michaela Frantová</b>	Z	30	24C	Z	S1
134DPM	<b>Diploma Thesis</b> František Wald, Jakub Dolejš <b>Jakub Dolejš</b> Jakub Dolejš (Gar.)	Z	30	24C	Z	S1
135DPM	<b>Diploma Thesis</b> Jan Masopust <b>Jan Salák</b>	Z	30	24C	Z	S1
136DPM	<b>Diploma Thesis</b> <b>Jan Valentin</b> Jan Valentin (Gar.)	Z	30	24C	Z	S1
137DPM	<b>Diploma Thesis</b> Hana Krejčíková	Z	30	24C	Z,L	S1
220DPM	<b>Diploma Thesis</b> Jiří Svoboda, Radek Vašíček, Jaroslav Pacovský <b>Radek Vašíček</b> 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 in accordance with the thesis proposal	Z	30
133DPM	Diploma Thesis in accordance with a thesis proposal	Z	30
134DPM	Diploma Thesis	Z	30
135DPM	Diploma Thesis Individual assignment in accordance with the thesis proposal	Z	30
136DPM	Diploma Thesis	Z	30
137DPM	Diploma Thesis	Z	30
220DPM	Diploma Thesis Diploma thesis elaboration with possible use of geotechnical laboratory and underground facility the Josef underground laboratory ( <a href="http://ceg.fsv.cvut.cz">http://ceg.fsv.cvut.cz</a> ).	Z	30

### 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 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.	Z	2
126YBIM	Building Information Modelling - Fundamentals 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.	Z	2
132DISE	Diploma Seminar in accordance with the specification	Z	4
132DPM	Diploma Thesis in accordance with the thesis proposal	Z	30
132DY02	Dynamics of structures 2	Z,ZK	4
132EADK	Experimental Analysis and Diagnostics K	KZ	3
132KMAT	Composite Materials	Z,ZK	5
132NAK	Numerical Analysis of Structures	Z,ZK	5
132YDDS	Dynamics of Transport Structures 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.	Z	2
132YDSK	Diagnostics of Building Structures Understanding of the problems of diagnostics of building structures. Monitoring of building structures, utilization of static and dynamic experimental analysis in building structure diagnostics - the arrangement of an experiment, monitored parameters, measuring line, processing and evaluation of experimental results, detection and localization of the building structure damage, practical examples. Building structure crack analysis, material characteristics determination on existing structures, identification of building structure model.	Z	2
132YMCK	Micromechanics of Cement-Based Composites	Z	2
132YMMO	Modern Methods of Optimization 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.	Z	2
132YNA2	Numerical Analysis of Structures 2 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.	Z,ZK	4
132YNAK	Nonlinear Analysis of Materials and Structures 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.	Z	2
132YSEI	Seismic Engineering	Z	2
132YSSK	Reliability of Structures 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.	Z	2
132YUPM	General Principles of Mechanics 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.	Z,ZK	4
133B03K	Concrete Structures 3K	Z,ZK	5
133B04K	Concrete Structures 4K	Z,ZK	4
133DISE	Diploma Seminar	Z	4
133DPM	Diploma Thesis in accordance with a thesis proposal	Z	30
133YATK	Applied Theory of Structures	Z,ZK	4
133YBEX	Concrete under severe conditions	Z	2
133YBM2	Concrete Bridges 2	Z	2
133YPNB	Fire design of concrete and masonry structures 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.	Z	2
133YPRK	Failures and Rehabilitation of Concrete Structures	Z	2
133YRZM	Reconstruction and strengthening of bridges	Z	2
133YVHB	High-performance Concretes Various types of high-performance concretes - their behaviour and properties. Design and analysis. Examples of practical application of high-performance concretes.	Z	2
134DISE	Diploma Seminar Semestrial project of master study.	Z	4
134DPM	Diploma Thesis	Z	30
134O02K	Steel Structures 2K 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	Z,ZK	5



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.			
134OCM2	Steel Bridges 2	Z,ZK	4
134YDKM	Timber structures and bridges	Z	2
Timber structures focused to national strategy of sustainable development. New timber-based materials. Structural systems of houses and bridges. Repairing and strengthening. Fire design. Production, protection, erection and maintenance. Design and evaluation of bridges, roofs structures in normal temperature and in fire.			
134YHMK	Stainless steel and aluminium structures	Z	2
Subject YHMK 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	Diploma Thesis	Z	30
Individual assignment in accordance with the thesis proposal			
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	Geotechnical software for numerical models	Z	2
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
136S03K	Road construction 3K	Z,ZK	5
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 roundabout. 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
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)			
137Z02K	Railway structures 2K	Z,ZK	5

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 ( <a href="http://ceg.fsv.cvut.cz">http://ceg.fsv.cvut.cz</a> ).			
220DPM	Diploma Thesis	Z	30
Diploma thesis elaboration with possible use of geotechnical laboratory and underground facility the Josef underground laboratory ( <a href="http://ceg.fsv.cvut.cz">http://ceg.fsv.cvut.cz</a> ).			
220YLPG	Geotechnical laboratory	Z	2
A course dealing with practical exercise on geotechnical tests in laboratory and in-situ activities (The Josef underground laboratory, <a href="http://ceg.fsv.cvut.cz">http://ceg.fsv.cvut.cz</a> ). It focuses on laboratory determination of soil and rock parameters necessary for geotechnical calculations and design - basic physical and hydrophysical properties, strength and deformation parameters.			

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

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