

# Study plan

## Name of study plan: Stavební inženýrství, obor Konstrukce pozemních staveb

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Civil Engineering

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 do nástupu do studia 2022-23

Name of the block: Compulsory courses

Minimal number of credits of the block: 44

The role of the block: Z

Code of the group: NC20160100

Name of the group: Obor K Konstrukce pozemních staveb, 1. semestr

Requirement credits in the group: In this group you have to gain 23 credits

Requirement courses in the group: In this group you have to complete at least 5 courses

Credits in the group: 23

Note on the group:

| Code    | Name of the course / Name of the group of courses<br>(in case of groups of courses the list of codes of their members)<br>Tutors, authors and guarantors (gar.)    | Completion | Credits | Scope | Semester | Role |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|-------|----------|------|
| 101MA04 | <b>Mathematics PS</b><br>Michal Beneš, Ivana Pultarová, Jan Chleboun, Petr Mayer, Jan Lama, Ondřej Zindulka, Iva Malechová <b>Jan Chleboun</b> Jan Chleboun (Gar.) | Z,ZK       | 5       | 2P+2C | Z        | z    |
| 124PS03 | <b>Building Structures</b><br>Vladimír Žára, Hana Gattermayerová <b>Vladimír Žára</b> Vladimír Žára (Gar.)                                                         | Z,ZK       | 4       | 2P+2C | Z        | z    |
| 132NAK  | <b>Numerical Analysis of Structures</b><br>Božek Patzák, Jan Voříšek, Tomáš Krejčí <b>Božek Patzák</b> Božek Patzák (Gar.)                                         | Z,ZK       | 5       | 2P+2C | Z        | z    |
| 133B03C | <b>Concrete Structures 3C</b><br>Jan Vítek, Lukáš Vráblík <b>Lukáš Vráblík</b> Jan Vítek (Gar.)                                                                    | Z,ZK       | 5       | 2P+2C | Z        | z    |
| 134O02C | <b>Steel Structures 2C</b><br>Martina Eliášová <b>Martina Eliášová</b> Martina Eliášová (Gar.)                                                                     | Z,ZK       | 4       | 2P+2C | Z        | z    |

### Characteristics of the courses of this group of Study Plan: Code=NC20160100 Name=Obor K Konstrukce pozemních staveb, 1. semestr

|         |                                  |      |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------|----------------------------------|------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 101MA04 | Mathematics PS                   | Z,ZK | 5 | After elementary tools of linear algebra (matrix, determinant, Gaussian elimination) are recalled, iterative methods for solving systems of linear algebraic equations are in the focus. Then, the finite difference method and the finite element method are presented and their applications to problems based on differential equations are shown.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 124PS03 | Building Structures              | Z,ZK | 4 | The subject is focused on the complex design of load-bearing structures, their interaction with the surrounding environment. In the first part of the subject, the attention is focused on the issue of the mutual interaction of load-bearing structures and the negative interactions between load-bearing and non-load-bearing systems. The effects of non-force loads, temperature and volume changes, properties of structural materials are discussed. The second part of the subject is focused on the design of load-bearing structures with regard to the effects of wind, the effects of non-rigid support of walkable structures and the issue of expansion of non-load-bearing structures. The last part is devoted to the specific action of water and the protection of the building from its effects. |
| 132NAK  | Numerical Analysis of Structures | Z,ZK | 5 | Variational principles of mechanics. Method of weighted residuals, conditions of convergence (continuity, integrity). Principles of FEM. Isoparametric elements, area coordinates, numerical integration. Application of method to selected 1D and 2D problems (Elasticity, heat transfer, consolidation). Algorithmic aspects of the method.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 133B03C | Concrete Structures 3C           | Z,ZK | 5 | Extension of knowledge in the design of prestressed concrete structures. Introduction to special hybrid and thin-walled structures. Modern materials and design solutions for the future.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 134O02C | Steel Structures 2C              | Z,ZK | 4 | Deepening of knowledge received from courses 133NNK and 134OK01. Amplifying of theoretical knowledge in the field of steel grade selection, toughness, global analysis of structures, buckling of structural systems, joint classification, and high strength steel and demanding composite steel and concrete structures. Complementation of knowledge from fire resistance of steel and composite structures and detailed design of industrial buildings and crane girders. Design of masts, towers, chimneys, tanks, silos and pipelines, technological structures, pre-stressed steel structures and basis of design from aluminium alloys and stainless steel, and cable and membrane structures.                                                                                                               |

Code of the group: NC20160200

Name of the group: obor Konstrukce pozemních staveb, 2. semestr

Requirement credits in the group: In this group you have to gain 21 credits

Requirement courses in the group: In this group you have to complete at least 5 courses

Credits in the group: 21

Note on the group:

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

**Characteristics of the courses of this group of Study Plan: Code=NC20160200 Name=obor Konstrukce pozemních staveb, 2. semestr**

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

Name of the block: Compulsory elective courses

Minimal number of credits of the block: 6

The role of the block: PV

Code of the group: NC20190100\_2

Name of the group: obor Konstrukce pozemních staveb, povinn volitelné p edm ty. 1. a 2. semestr

Requirement credits in the group: In this group you have to gain at least 6 credits

Requirement courses in the group: In this group you have to complete at least 2 courses

Credits in the group: 6

Note on the group:

[1:2][2:4]

| Code    | Name of the course / Name of the group of courses<br>(in case of groups of courses the list of codes of their members)<br>Tutors, authors and guarantors (gar.)                                                              | Completion | Credits | Scope | Semester | Role |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|-------|----------|------|
| 102YFPL | <b>Solid State Physics in Civil Engineering</b><br>Jiří Konfršt Jiří Konfršt Jiří Konfršt (Gar.)                                                                                                                             | Z          | 2       | 1P+1C | Z        | PV   |
| 122YTSD | <b>Technology of Component Production</b><br>Rostislav Šulc Rostislav Šulc Rostislav Šulc (Gar.)                                                                                                                             | Z          | 2       | 1P+1C | Z,L      | PV   |
| 124YBM1 | <b>Building Information Modeling (BIM) for Building Structures 1</b><br>Pavel Chour, Renáta Hoánková, Jakub Veselka, Petr Matjka, Petr Pánek, Stanislav Frolík, Kateřina Šenfeld, Hana Kabrhelová Jan Ržika Jan Ržika (Gar.) | Z          | 4       | 1P+3C | Z        | PV   |
| 124YDSR | <b>Demolitions of Buildings and Material Recycling</b><br>Šárka Šilarová Šárka Šilarová Šárka Šilarová (Gar.)                                                                                                                | Z          | 2       | 1P+1C | Z        | PV   |

|         |                                                                                                                                                            |      |   |       |   |    |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|-------|---|----|
| 124YKSD | <b>Complex Structural Detail</b><br><i>Ji í Pazderka, Radek Zigler Ji í Pazderka Ji í Pazderka (Gar.)</i>                                                  | Z    | 2 | 1P+1C | Z | PV |
| 124YZUK | <b>Loading Effects and their Impact on Building Structures</b><br><i>Tomáš ejka, Radek Zigler Radek Zigler Tomáš ejka (Gar.)</i>                           | Z    | 2 | 1P+1C | Z | PV |
| 132PRPM | <b>Deformation and Failure of Materials</b><br><i>Milan Jirásek, Petr Havlásek Milan Jirásek Milan Jirásek (Gar.)</i>                                      | Z,ZK | 5 | 2P+2C | Z | PV |
| 132YMMO | <b>Modern Methods of Optimization</b><br><i>Mat j Lepš, Jan Zeman Mat j Lepš Mat j Lepš (Gar.)</i>                                                         | Z    | 2 | 1P+1C | Z | PV |
| 132YSSK | <b>Reliability of Structures</b><br><i>Jaroslav Kruis Jaroslav Kruis Jaroslav Kruis (Gar.)</i>                                                             | Z    | 2 | 1P+1C | Z | PV |
| 133YBEX | <b>Concrete under Extreme Conditions</b><br><i>Petr Štemberk, Radek Štefan, Marek Foglar Radek Štefan Radek Štefan (Gar.)</i>                              | Z    | 2 | 1P+1C | Z | PV |
| 133YPRK | <b>Failures and Rehabilitation of Concrete Structures</b><br><i>Petr Štemberk, Yuliia Khmurovskaja, Jakub Žák Petr Štemberk Petr Štemberk (Gar.)</i>       | Z    | 2 | 1P+1C | Z | PV |
| 134YDKM | <b>Timber structures and bridges</b><br><i>Anna Kuklíková Anna Kuklíková Anna Kuklíková (Gar.)</i>                                                         | Z    | 2 | 1P+1C | Z | PV |
| 134YROK | <b>Extending the Life of Steel and Timber Structures</b><br><i>Karel Mikeš Karel Mikeš Karel Mikeš (Gar.)</i>                                              | Z    | 2 | 1P+1C | Z | PV |
| 134YSMK | <b>Stability and modelling of steel structures</b><br><i>Josef Machá ek, Michal Jandera Michal Jandera Josef Machá ek (Gar.)</i>                           | Z    | 2 | 1P+1C | Z | PV |
| 135YGSM | <b>Geotechnical Software for Numerical modelling</b><br><i>Daniel Turanský, Jan Pruška, Jan Ježek Alena Zemanová Jan Pruška (Gar.)</i>                     | Z    | 2 | 1P+1C | Z | PV |
| 210YDSM | <b>Diagnostics of Building Materials Properties</b><br><i>Ji í Litoš Ji í Litoš Ji í Litoš (Gar.)</i>                                                      | Z    | 2 | 1P+1C | Z | PV |
| 101YMCD | <b>Methods of Time Discretization</b><br><i>Petr Mayer František Bubeník František Bubeník (Gar.)</i>                                                      | Z    | 2 | 1P+1C | L | PV |
| 101YMST | <b>Mathematical statistics for technicians</b><br><i>Daniela Jarušková Daniela Jarušková (Gar.)</i>                                                        | Z    | 2 | 1P+1C | L | PV |
| 101YNUM | <b>Numerical Methods</b><br><i>Ivana Pultarová, Martin Ladecký, Liya Gaynutdinova Ivana Pultarová Ivana Pultarová (Gar.)</i>                               | Z    | 2 | 1P+1C | L | PV |
| 123YMPU | <b>Materials for Coatings</b><br><i>Miloš Jerman Miloš Jerman Miloš Jerman (Gar.)</i>                                                                      | Z    | 2 | 1P+1C | L | PV |
| 124YDPH | <b>Diagnosis and Surveying of Building Structures</b><br><i>Eva Burgetová Eva Burgetová Eva Burgetová (Gar.)</i>                                           | Z    | 2 | 1P+1C | Z | PV |
| 124YDRS | <b>Timber Buildings</b><br><i>Lukáš Velebil, Jan R ži ka, Jaroslav Vychytil, Marek Pokorný, Kamil Stan k, Milan Peukert Jan R ži ka Jan R ži ka (Gar.)</i> | Z    | 2 | 1P+1C | L | PV |
| 124YHVK | <b>Long Span Structures</b><br><i>Vladimír Ž ára Vladimír Ž ára Vladimír Ž ára (Gar.)</i>                                                                  | Z    | 2 | 1P+1C | L | PV |
| 124YIKS | <b>Interaction of structures and parts of structures</b><br><i>Radek Zigler</i>                                                                            | Z    | 2 | 1P+1C | L | PV |
| 124YPFS | <b>Precast concrete structures</b><br><i>Radek Zigler, Ji í Witzany Radek Zigler Radek Zigler (Gar.)</i>                                                   | Z    | 2 | 1P+1C | L | PV |
| 124YRHS | <b>Reconstruction of Historical Building Structures</b><br><i>Tomáš ejka, Radek Zigler, Ji í Witzany Ji í Witzany Ji í Witzany (Gar.)</i>                  | Z    | 2 | 1P+1C | L | PV |
| 126YBIM | <b>Building Information Modelling - Fundamentals</b><br><i>Petr Mat jka, Robert Bouška Robert Bouška Petr Mat jka (Gar.)</i>                               | Z    | 2 | 2C    | L | PV |
| 126YSP  | <b>Construction Cost Estimating Software</b>                                                                                                               | Z    | 2 | 2C    | L | PV |
| 132YNAK | <b>Nonlinear Analysis of Materials and Structures</b><br><i>Bo ek Patzák, Petr Kabele, Daniel Rypl Daniel Rypl Daniel Rypl (Gar.)</i>                      | Z    | 2 | 1P+1C | L | PV |
| 132YNA2 | <b>Numerical Analysis of Structures 2</b><br><i>Bo ek Patzák Bo ek Patzák Bo ek Patzák (Gar.)</i>                                                          | Z,ZK | 4 | 2P+1C | L | PV |
| 132YPM2 | <b>Computer Analysis of Structures 2</b><br><i>Ji í Máca, Petr Fajman Ji í Máca Petr Fajman (Gar.)</i>                                                     | Z    | 2 | 1P+1C | L | PV |
| 132YSAK | <b>Nonlinear Analysis of Materials and Structures</b><br><i>Daniel Rypl Daniel Rypl Daniel Rypl (Gar.)</i>                                                 | Z    | 2 | 1P+1C | L | PV |
| 133YATK | <b>Applied Theory of Structures</b><br><i>Lukáš Vráblík, Radek Hájek Lukáš Vráblík Lukáš Vráblík (Gar.)</i>                                                | Z,ZK | 4 | 2P+1C | L | PV |
| 133YMB  | <b>Concrete and Masonry Structures 1</b><br><i>Roman Chylík, Petr Bílý, Josef Novák Petr Bílý Petr Bílý (Gar.)</i>                                         | Z    | 2 | 1P+1C | L | PV |
| 133YPNB | <b>Fire desgn og concrete and mnsory structures</b><br><i>Radek Štefan, Martin Benýšek Radek Štefan Radek Štefan (Gar.)</i>                                | Z    | 2 | 1P+1C | L | PV |
| 133YVHB | <b>Ultrahigh Performance Concretes</b><br><i>Josef Fládr Josef Fládr Josef Fládr (Gar.)</i>                                                                | Z    | 2 | 1P+1C | L | PV |
| 134YHNK | <b>Stainless steel and aluminium structures</b><br><i>Josef Machá ek, František Wald František Wald Josef Machá ek (Gar.)</i>                              | Z    | 2 | 1P+1C | L | PV |
| 134YNDK | <b>Load-bearing timber roof constructions</b><br><i>Karel Mikeš Karel Mikeš Karel Mikeš (Gar.)</i>                                                         | Z    | 2 | 1P+1C | L | PV |
| 134YPOD | <b>Fire Resistance of Steel and Timber Structures</b><br><i>Zden k Sokol Zden k Sokol Zden k Sokol (Gar.)</i>                                              | Z    | 2 | 1P+1C | L | PV |
| 134YSDO | <b>Connections of steel and timber structures</b><br><i>Robert Jára, František Wald Robert Jára František Wald (Gar.)</i>                                  | Z,ZK | 4 | 2P+1C | L | PV |

|         |                                                                                                                                  |      |   |       |   |    |
|---------|----------------------------------------------------------------------------------------------------------------------------------|------|---|-------|---|----|
| 134YSKO | <b>Special steel structures</b><br><i>Jakub Dolejš Jakub Dolejš Jakub Dolejš (Gar.)</i>                                          | Z,ZK | 4 | 2P+1C | L | PV |
| 135YING | <b>Engineering geology</b><br><i>Milan Aue, Svatoslav Chamra Milan Aue (Gar.)</i>                                                | Z    | 2 | 1P+1C | L | PV |
| 135YTIG | <b>Field training in engineering geology</b><br><i>Svatoslav Chamra (Gar.)</i>                                                   | Z    | 2 | 1P+1C |   | PV |
| 135YVPZ | <b>Computer analysis in underground structures</b><br><i>Daniel Turanský, Jan Pruška, Jan Ježek Jan Pruška Jan Pruška (Gar.)</i> | Z    | 2 | 1P+1C | L | PV |

**Characteristics of the courses of this group of Study Plan: Code=NC20190100\_2 Name=obor Konstrukce pozemních staveb, povinn volitelné p edm ty. 1. a 2. semestr**

|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |   |  |  |  |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---|--|--|--|
| 102YFPL | <b>Solid State Physics in Civil Engineering</b><br>Solids, crystal structure, atomic shell theory, valence layer chemical bonds, dislocation disturbances, critical crack energy, vibration of masses, systems natural frequency of vibration and damped vibration, basics concepts of fracture mechanics, types of fracture, electron microscopes, scanning tunneling microscope, atomic force microscope, diffraction, diffraction methods, semiconductors, p-n junction, photovoltaic effect, solar cells, heat and moisture transport.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Z    | 2 |  |  |  |
| 122YTSD | <b>Technology of Component Production</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Z    | 2 |  |  |  |
| 124YBM1 | <b>Building Information Modeling (BIM) for Building Structures 1</b><br>Building information model (BIM) - basic principles of creating a building information model in the field of civil engineering, specifics of BIM modeling. The subject uses the Autodesk Revit software base. Building information model in the life cycle of the building - information required during the design part, during construction and during use of the finished building.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Z    | 4 |  |  |  |
| 124YDSR | <b>Demolitions of Buildings and Material Recycling</b><br>The use of construction waste from demolitions from the production of building materials and from other sectors in the construction industry with the aim of: significantly reducing the volumes of landfilled materials, reducing the consumption of primary raw materials, a new perspective on the design of buildings and structures in accordance with a closed life cycle. Legislation, levels of recycling in developed countries, recycling in CR, possibilities of recycling buildings and structures, design of structures from the point of view of sustainable development, minimization of landfills, examples and demonstrations of recycling technologies, low-waste technologies                                                                                                                                                                                                                                                                                                                                      | Z    | 2 |  |  |  |
| 124YKSD | <b>Complex Structural Detail</b><br>The aim of the course is to extend the knowledge gained in previous courses - it is intended for students who have already reached advanced level of knowledge about structural problems in buildings. The content of the course is focused on the complex solution of construction details, following all legislative requirements and taking into account the maximum efficiency and durability of the chosen solution.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Z    | 2 |  |  |  |
| 124YZUK | <b>Loading Effects and their Impact on Building Structures</b><br>Division of load from history-load point of view, loading effects and forced and non-forced influences. Occurrence-probability of individual load, combination of load, load-connection with the solution of civil engineering. Interaction of static and dynamic loading effects in specialization of building structures, interaction of shortterm and longterm effects of load. Computation models of load.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Z    | 2 |  |  |  |
| 132PRPM | <b>Deformation and Failure of Materials</b><br>Viscoelasticity, models for concrete creep. Theory of plasticity, principles of limit and incremental analysis. Fracture mechanics. Damage mechanics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Z,ZK | 5 |  |  |  |
| 132YMMO | <b>Modern Methods of Optimization</b><br>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 |  |  |  |
| 132YSSK | <b>Reliability of Structures</b><br>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 |  |  |  |
| 133YBEX | <b>Concrete under Extreme Conditions</b><br>The course is focused on concrete and concrete structures under extreme conditions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Z    | 2 |  |  |  |
| 133YPRK | <b>Failures and Rehabilitation of Concrete Structures</b><br>The course focuses on the description of failures of concrete structures, explanation of the causes of these failures and the design of remedial measures. Methods of strengthening existing concrete structures are also discussed. Surface repairs, strengthening of contactors, strengthening of structural elements to the effects of bending moment and shear, and foundation structures are discussed. The course appropriately combines theoretical approaches with common practice.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Z    | 2 |  |  |  |
| 134YDKM | <b>Timber structures and bridges</b><br>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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Z    | 2 |  |  |  |
| 134YROK | <b>Extending the Life of Steel and Timber Structures</b><br>Materials used for bearing structures. Developments in the area of regulations and standardization. Causes of defects, malfunctions, survey of objects, static assumptions of reconstruction. Possibilities of strengthening, strengthening of steel and timber structures and strengthening of connections. Using of computers in reconstructions and development of numerical models.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Z    | 2 |  |  |  |
| 134YSMK | <b>Stability and modelling of steel structures</b><br>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. | Z    | 2 |  |  |  |
| 135YGSM | <b>Geotechnical Software for Numerical modelling</b><br>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.                                                                                                                                                                                                                                                                                                                                                                                            | Z    | 2 |  |  |  |
| 210YDSM | <b>Diagnostics of Building Materials Properties</b><br>Failures of building materials, mechanical, thermal, chemical and other influences on the development of failures of building materials. Diagnostics of their occurrence. Basics of experimental measurement and instrumentation of tested elements and structures. Theory of experiment, measurement and processing of results. Testing machines and equipment. Deformation measuring instruments. Destructive testing of mechanical properties. Non-destructive test methods. Test methodology for various materials (concrete, mortar, metallic elements, wood, glass, plastics, composites and others).                                                                                                                                                                                                                                                                                                                                                                                                                              | Z    | 2 |  |  |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                   |      |   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------|---|
| 101YMCD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Methods of Time Discretization                    | Z    | 2 |
| The course is devoted to a universal and very effective method for solving problems involving time, the so-called evolutionary problems, especially for partial differential equations with a time variable. This method represents a modern approach to modeling and solving engineering tasks. These problems, both linear and non-linear, model events in many engineering fields, such as heat conduction, oscillations, also in rheology and other parts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                   |      |   |
| 101YMST                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Mathematical statistics for technicians           | Z    | 2 |
| Inferential statistics. Theory of probability. Random variables and its characteristics. Basic methods of mathematical statistics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                   |      |   |
| 101YNUM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Numerical Methods                                 | Z    | 2 |
| Numerical computing in applied mathematics: course for beginners.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                   |      |   |
| 123YMPU                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Materials for Coatings                            | Z    | 2 |
| Students will gain an overview of how to protect building structures from corrosion and other harmful influences such as UV radiation, acid rain, etc. Students will also learn about methods and technologies of surface treatment. The course consists of 6 lectures and 6 exercises. In the lectures, students will learn about both historical and more importantly modern surface treatments for different types of structures. In the exercises, students will perform a surface treatment on a fragment of a structure and will be able to check the quality of the work done by themselves in the last exercise by means of a tear-off test.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                   |      |   |
| 124YDPH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Diagnosis and Surveying of Building Structures    | Z    | 2 |
| Course sets out key considerations and implications which require structure assessment. The course provides an objective framework and methodical and systematic approach to surveying (structural diagnosis, preliminary and comprehensive survey, visual inspection, site inspections, laboratory tests, investigation kits, types of defects and damages, symptoms, manifestation, significance, criticality, reason for failures case studies)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                   |      |   |
| 124YDRS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Timber Buildings                                  | Z    | 2 |
| The aim is to present a complex overview on energy efficient timber structures. Basic theoretical and design principals are presented. The lectures are focused on following technologies of timber structures: (i) heavy timber skeleton systems, (ii) light timber structures based on 2x4, (iii) CLT, (iv) log house. All technologies of timber structures are presented in structural and building physics context of low energy and passive buildings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                   |      |   |
| 124YHVK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Long Span Structures                              | Z    | 2 |
| The subject deals with the analysis of structural solutions applied in building designs by the world's best architects. Although attention will be focused mainly on the solution of load-bearing structures, we will also pay attention to the wider context of the design. Reading existing constructions is a natural way to learn the principles of their design. And naturally we will learn from the best. An extensive database of completed buildings, including more than 5,000 buildings, will enable us to take a trip into history and the present on all the world's continents.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                   |      |   |
| 124YIKS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Interaction of structures and parts of structures | Z    | 2 |
| As part of the course, students will learn about the interaction of load-bearing and non-load-bearing subsystems of buildings - for example, the interaction of layers of external contact insulation systems (ETICS), the interaction of the back and face ribs, vaults with the original masonry structure, interaction of the attic with the load-bearing structure of the walls and roof, interaction of ceramic moldings and concreting, etc. Part of the course will be familiarization with the optimization of the mutual interaction of building structures and their parts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                   |      |   |
| 124YPFS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Precast concrete structures                       | Z    | 2 |
| Residential houses made of precast concrete panels, of which approx. 82 thousand were built in the period 1960-1995 do not meet the required extent of the current dynamically developing society and in many cases require the implementation of regeneration and modernization interventions enabling their full use. The course is focused on the current issues of renewal, reconstruction and modernization of precast houses, modernization of apartments in precast houses, on the issue of freeing parterres of precast houses for services, shops, offices, fitness centers, etc. Renovation, modernization, or regenerations require the removal of functionally inadequate completion structures, technical equipment, installations and, in some cases, even demanding interventions in supporting structures. As part of the construction of communication networks, modernization of urban development, etc., it is necessary in some cases to carry out partial or complete demolition of a precast panel building. As part of the regeneration of precast panel housing estates, an extension is also carried out, or completion of precast houses. The implementation of the mentioned plans requires a survey and diagnostics of supporting and peripheral structures, joints of parts and an evaluation of the structural-technical condition and an assessment of the residual life of precast panel structures and buildings. |                                                   |      |   |
| 124YRHS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Reconstruction of Historical Building Structures  | Z    | 2 |
| In the period from the second half of the 19th century by 1960, more than 250 thousand of two- to five-story brick apartment (mainly rental) houses in traditional brick technology were constructed in the Czech Republic. Brick buildings from this period were built according to regulations, building codes and laws from the turn of the 19th and 20th centuries. Multi-storey brick tenement houses do not meet the current thermal, acoustic and other requirements, the requirements of a dynamically developing society to the required extent, and in many cases require regeneration and modernization interventions, including the replacement of non-compliant and out-of-date structures and equipment enabling their further use. The course is focused on the current issue of renewal, reconstruction and modernization of brick multi-storey rental apartment buildings, on historical structures and materials, the issue of degradation and aging of structures and materials of historic brick residential buildings, their residual life, failures and reconstruction of historical buildings and their parts. Furthermore, the course is focused on the issue of improving the well-being of the internal environment, the replacement of finishing structures, opening fillings, etc. as an integral part of the modernization of these buildings.                                                                        |                                                   |      |   |
| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                   |      |   |
| 126YSP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Construction Cost Estimating Software             | Z    | 2 |
| 132YNAK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Nonlinear Analysis of Materials and Structures    | Z    | 2 |
| Students become acquainted with the concepts of linear stability and calculation of elastoplastic load capacity. Linear stability - evaluation of the critical load and buckling shape. Analysis of structures according to the 2nd order theory - equilibrium conditions on a deformed structure, initial stress matrix. Elastoplastic analysis of structures - evaluation of the limit load capacity, distribution of internal forces at the limit state - static incremental method, kinematic method. Solving stability and elastoplasticity problems by means of a general-purpose finite element program.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                   |      |   |
| 132YNA2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Numerical Analysis of Structures 2                | Z,ZK | 4 |
| Advanced course on finite element method. Formulation of plate elements suitable for thin and thick plates, plates on elastic foundation. Introduction to nonlinear problems: geometrical and material nonlinearity, solution methods, implementation aspects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                   |      |   |
| 132YPM2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Computer Analysis of Structures 2                 | Z    | 2 |
| Limit state of frames. Stability analysis of structures. Second order theory. Beams and gridwork girders on elastic foundation. Plate and wall structures. Dynamic analysis of structures. Verification of results.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                   |      |   |
| 132YSAK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Nonlinear Analysis of Materials and Structures    | Z    | 2 |
| Students become acquainted with the concepts of linear stability and calculation of elastoplastic load capacity. Linear stability - evaluation of the critical load and buckling shape. Analysis of structures according to the 2nd order theory - equilibrium conditions on a deformed structure, initial stress matrix. Elastoplastic analysis of structures - evaluation of the limit load capacity, distribution of internal forces at the limit state - static incremental method, kinematic method. Solving stability and elastoplasticity problems by means of a general-purpose finite element program.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                   |      |   |
| 133YATK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Applied Theory of Structures                      | Z,ZK | 4 |
| Detailed introduction to theoretical approaches to the effects of creep and shrinkage on structures. Principles of time-dependent analysis. Methods for the analysis of thin-walled concrete structures, stability theory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                   |      |   |

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------|---|
| 133YMVB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Concrete and Masonry Structures 1              | Z    | 2 |
| The content of the subject will be selected problems from the following areas: Reinforcement of discontinuities of reinforced concrete structures. Introduction to nonlinear modeling of reinforced concrete structures. Preparation of input data for numerical models. Design of structures using MATLAB. Presentation of selected programs for the design of concrete structures.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                |      |   |
| 133YPNB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Fire design of concrete and masonry structures | Z    | 2 |
| The course is focused on fire resistance of concrete and masonry structures: concrete and concrete structures exposed to fire, design rules, thermal analysis, loads, design principles, design methods, material properties of concrete and steel reinforcement at high temperatures, fire design of masonry structures.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                |      |   |
| 133YVHB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Ultrahigh Performance Concretes                | Z    | 2 |
| The aim of the course is to present a special type of concrete that achieves great strength and high durability, which enables the realization of very thin structures. The components of high performance concrete are presented and the main differences in composition of ordinary concrete and HPC. A large part of the lectures is devoted to the components of high performance concrete, the composition and the method of manufacturing, which are subsequently accompanied by laboratory exercises, where the students can experience the theoretical knowledge in practical use.                                                                                                                                                                                                                                                                                                                                                                                                          |                                                |      |   |
| 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. Structures of aluminium alloys: Introduction and practice in designing of aluminium structures. Structures of stainless steel: Evolution of stainless steel materials/structures and examples of realized structures. Stainless steels suitable for structures are described in a detail, including their properties. Dissimilarities in assessments of members under common loadings with respect to low-carbon steels is described for both ultimate and serviceability limit states. In the end the possibilities concerning connections of stainless steel members, erection and installation of stainless steel members are described.                                                                                                                                                                                                         |                                                |      |   |
| 134YNDK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Load-bearing timber roof constructions         | Z    | 2 |
| System of roofs structures. Creation of numerical models for assessment of internal forces and deformations for main different roof systems and structures. Analysis of the static function and behaviour of main individual elements and their design. Historic structures and their reconstruction. Designing typical structural details based on carpentry joints. We will discuss also using modern methods of joining elements of timber structures.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                |      |   |
| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                |      |   |
| 135YING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Engineering geology                            | Z    | 2 |
| Engineering geological survey methods. Geological and engineering geological maps and profiles. Foundation soils in terms of engineering geology and hydrogeology. Aggressive waters. Rock mass - areas of discontinuities, their evaluation. Deposits of natural building materials. Landslides and slope protection. Engineering geological survey for different types of civil engineering structures. Challenges of urban geology. Engineering geology in environmental design and protection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                |      |   |
| 135YTIG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Field training in engineering geology          | Z    | 2 |
| The 135YTIG course is 1 week of field-based, small-group, practical learning. For more than 20 years, 3 universities from the Czech Republic and 1 university from the Slovak Republic have been cooperating in the organization of the field course. This ensures a great variability of geological and geotechnical sites. Thus, students can learn about interesting geological and geotechnical issues in relation to civil engineering and geotechnical structures directly in the field at various locations in both republics. Course framework. Creation of engineering geological surface maps, underground mapping and measurements; tectonic measurements in the rock mass and their processing; documentation of borehole, probe, rock outcrop (defile), fracture wall; probing technique, selection of field geotechnical tests, geophysical methods; basic hydrogeological measurements; sampling. The exact content of the course corresponds to the character of the sites visited. |                                                |      |   |
| 135YVPZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Computer analysis in underground structures    | Z    | 2 |
| Numerical methods in CAD/CAM in geomechanics. Basic types of constitutive models of soil and rock mass behavior. Summary of PC geotechnical software both in the field of conventional methods and in numerical modelling domain. Practical solutions of selected geotechnical problems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                |      |   |

Name of the block: 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 výb rová 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<br>(in case of groups of courses the list of codes of their members)<br>Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|-------|----------|------|
| 101YMAV | Mathematics 4 - Selective Course<br>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 výb rová matematika

|              |                                  |      |   |
|--------------|----------------------------------|------|---|
| 101YMAV      | Mathematics 4 - Selective Course | Z,ZK | 5 |
| To be added. |                                  |      |   |

Name of the block: Povinn volitelné p edm ty, doporu ení S1

Minimal number of credits of the block: 10

The role of the block: S1

Code of the group: NC20160100\_1

Name of the group: obor Konstrukce pozemních staveb, volitelný projekt, 1. semestr

Requirement credits in the group: In this group you have to gain 5 credits

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

Credits in the group: 5

Note on the group:

| Code    | Name of the course / Name of the group of courses<br>(in case of groups of courses the list of codes of their members)<br>Tutors, authors and guarantors (gar.) | Completion | Credits | Scope | Semester | Role |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|-------|----------|------|
| 122P03C | <b>Structural Design 3C</b><br>Pavel Neumann Rostislav Šulc Pavel Neumann (Gar.)                                                                                | KZ         | 5       | 4C    | Z        | S1   |
| 124P03C | <b>Structural Design 3C</b><br>Tomáš ejka, Jiří Pazderka, Radek Zigler, Kamil Stan k, Martin Jiránek Jiří Pazderka Jiří Pazderka (Gar.)                         | KZ         | 5       | 4C    | Z        | S1   |
| 132P03C | <b>Structural Design 3C</b><br>Pavel Tesárek, Jan Zeman, Petr Kabele, Aleš Jíra, Michal Šejnoha, Jan Sýkora, Michael Somr Aleš Jíra                             | KZ         | 5       | 4C    | Z        | S1   |
| 133P03C | <b>Structural Design 3C</b><br>Iva Broukalová Jitka Vašková (Gar.)                                                                                              | KZ         | 5       | 4C    | Z        | S1   |
| 134P03C | <b>Structural Design 3C</b><br>Michal Jandera Michal Jandera (Gar.)                                                                                             | KZ         | 5       | 4C    | Z        | S1   |
| 135P03C | <b>Structural Design 3C</b><br>Jan Salák, Jan Pruška, Jan Kos Jan Pruška                                                                                        | KZ         | 5       | 4C    | Z        | S1   |

Characteristics of the courses of this group of Study Plan: Code=NC20160100\_1 Name=obor Konstrukce pozemních staveb, volitelný projekt, 1. semestr

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----|---|
| 122P03C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Structural Design 3C | KZ | 5 |
| 124P03C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Structural Design 3C | KZ | 5 |
| The student processes selected parts of the project documentation of either the new construction of an advanced building (assignment "N") or the refurbishment of an older building (assignment "R"). In the first phase, the student proposes a design solution concept and a basic solution of broader relationships (N) or processes a simplified documentation of the current state of the building and an analysis of broader relationships (R). It also optimizes variants of the construction solution (N) or evaluates the construction and technical condition of the specified object - STP (R). In the next phase, he will carry out a conceptual design of construction details (N) or an analysis of faults and their causes - STP (R). It also processes selected parts of the project documentation of the building or its parts (N) or drafts selected rehabilitation measures (R) |                      |    |   |
| 132P03C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Structural Design 3C | KZ | 5 |
| Students develop individual projects under supervision of teachers from the Department of Mechanics. Project topics are presented at the department website. Students may propose own topics - in this case, suitability of the topic and feasibility of the project will be evaluated by the project supervisor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |    |   |
| 133P03C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Structural Design 3C | KZ | 5 |
| The subject is focused on concrete and masonry structures. The assignment can be: elaboration of the structural design documentation, the analysis of the given problem requiring subject matter search and literature retrieval, the numerical analysis of the selected element or part of the structure, the preparation, execution and evaluation of experiments, etc. Collaboration of several students on one assignments is also possible. Consultation with participating departments K124 and K135 is not mandatory for all students. The extent of outputs depends on the type of assignment and the decision of the leading teacher.                                                                                                                                                                                                                                                     |                      |    |   |
| 134P03C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Structural Design 3C | KZ | 5 |
| Design of steel / timber load bearing building structure according to external requirements in relation to interaction of load bearing and final completion structural elements. The project is assigned by the seminar leader.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                      |    |   |
| 135P03C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Structural Design 3C | KZ | 5 |
| Design, static calculation and drawing documentation of the building substructure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |    |   |

Code of the group: NC20160200\_1

Name of the group: obor Konstrukce pozemních staveb, volitelný projekt, 2. semestr

Requirement credits in the group: In this group you have to gain 5 credits

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

Credits in the group: 5

Note on the group:

| Code    | Name of the course / Name of the group of courses<br>(in case of groups of courses the list of codes of their members)<br>Tutors, authors and guarantors (gar.)        | Completion | Credits | Scope | Semester | Role |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|-------|----------|------|
| 122P04C | <b>Structural Design 4C</b><br>Pavel Neumann Rostislav Šulc                                                                                                            | KZ         | 5       | 4C    | L        | S1   |
| 124P04C | <b>Structural Design 4C</b><br>Tomáš ejka, Jiří Pazderka, Radek Zigler, Kamil Stan k, Jan Tywoniak, Tereza Pavl , Karel Kabele Jiří Pazderka Radek Zigler (Gar.)       | KZ         | 5       | 4C    | L        | S1   |
| 132P04C | <b>Structural Design 4C</b><br>Bo ek Patzák, Pavel Tesárek, Jan Zeman, Petr Fajman, Aleš Jíra, Michal Šejnoha, Martin Došká , Jan Vorel, Martin Horák, ..... Aleš Jíra | KZ         | 5       | 4C    | L        | S1   |
| 133P04C | <b>Structural Design 4C</b><br>Jitka Vašková                                                                                                                           | KZ         | 5       | 4C    | L        | S1   |

|         |                                                                                                                                                              |    |   |    |   |    |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|----|---|----|
| 134P04C | <b>Structural Design 4C</b><br><i>Michal Jandera Michal Jandera (Gar.)</i>                                                                                   | KZ | 5 | 4C | L | S1 |
| 135P04C | <b>Structural Design 4C</b><br><i>Jan Pruška Jan Salák (Gar.)</i>                                                                                            | KZ | 5 | 4C | L | S1 |
| 210P04C | <b>Structural Design 4C</b><br><i>Jiří Litoš, Jan Novák, Radoslav Sovják, Jan Havelka, Pavel Reiterman, Vladimír Šána Jan Havelka Radoslav Sovják (Gar.)</i> | KZ | 5 | 4C | L | S1 |
| 220P04C | <b>Structural Design 4C</b><br><i>Radek Vaší ek</i>                                                                                                          | KZ | 5 | 4C | L | S1 |

**Characteristics of the courses of this group of Study Plan: Code=NC20160200\_1 Name=obor Konstrukce pozemních staveb, volitelný projekt, 2. semestr**

|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |    |   |  |  |  |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|--|--|--|
| 122P04C | Structural Design 4C<br>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 static design of chosen version, calculation, technical report and drawings. Check of bearing and non-bearing structures interaction and assembly techniques. Public presentation.                                                                                                                                                                                                                                                                                                                                 | KZ | 5 |  |  |  |
| 124P04C | Structural Design 4C<br>The student processes selected parts of the project documentation of either the new construction of an advanced building (assignment "N") or the refurbishment of an older building (assignment "R"). In the first phase, the student proposes a design solution concept and a basic solution of broader relationships (N) or processes a simplified documentation of the current state of the building and an analysis of broader relationships (R). It also optimizes variants of the construction solution (N) or evaluates the construction and technical condition of the specified object - STP (R). In the next phase, he will carry out a conceptual design of construction details (N) or an analysis of faults and their causes - STP (R). It also processes selected parts of the project documentation of the building or its parts (N) or drafts selected rehabilitation measures (R) | KZ | 5 |  |  |  |
| 132P04C | Structural Design 4C<br>Students develop individual projects under supervision of teachers from the Department of Mechanics. Project topics are presented at the department website. Students may propose own topics - in this case, suitability of the topic and feasibility of the project will be evaluated by the project supervisor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | KZ | 5 |  |  |  |
| 133P04C | Structural Design 4C<br>The subject is focused on concrete and masonry structures. The assignment can be: elaboration of the structural design documentation, the analysis of the given problem requiring subject matter search and literature retrieval, the numerical analysis of the selected element or part of the structure, the preparation, execution and evaluation of experiments, etc. Collaboration of several students on one assignments is also possible. Consultation with participating departments K124 and K135 is not mandatory for all students. The extent of outputs depends on the type of assignment and the decision of the leading teacher.                                                                                                                                                                                                                                                     | KZ | 5 |  |  |  |
| 134P04C | Structural Design 4C<br>Design of steel / timber load bearing building structure according to external requirements in relation to interaction of load bearing and final completion structural elements. The project is assigned by the seminar leader.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | KZ | 5 |  |  |  |
| 135P04C | Structural Design 4C<br>Design, static calculation and drawing documentation of the building substructure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | KZ | 5 |  |  |  |
| 210P04C | Structural Design 4C<br>The specific topic will be determined in consultation with your supervisor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | KZ | 5 |  |  |  |
| 220P04C | Structural Design 4C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | KZ | 5 |  |  |  |

Name of the block: Povinn volitelné p edm ty, doporu ení S2

Minimal number of credits of the block: 30

The role of the block: S2

Code of the group: NC20160300\_1

Name of the group: obor Konstrukce pozemních staveb, 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<br>(in case of groups of courses the list of codes of their members)<br><i>Tutors, authors and guarantors (gar.)</i>                                                              | Completion | Credits | Scope | Semester | Role |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|-------|----------|------|
| 122DPM | <b>Diploma Thesis</b><br><i>Rostislav Šulc, Pavel Neumann, Alexander Ilkström Kravcov, Linda Veselá, Petr Šrytr, Jaroslav Synek, Vja eslav Usmanov, Ond ej Štrup, Martin Hlava, ..... Rostislav Šulc Miloslava Popenková (Gar.)</i> | Z          | 30      | 24C   | Z        | S2   |
| 123DPM | <b>Diploma Thesis</b><br><i>Miloš Jerman, Zdenka Bažantová, Alena Vimmrová, Zbyšek Pavlík, Milena Pavlíková, Ji í Mad ra, Martin Keppert, Eva Vejmelková, Jan Ko í, ..... Eva Vejmelková Eva Vejmelková (Gar.)</i>                  | Z          | 30      | 24C   | Z        | S2   |
| 124DPM | <b>Diploma Thesis</b><br><i>Tomáš Vlach, Tomáš ejka, Ji í Pazderka, Marek Pokorný, Kate ina Mertenová, Martin Jiránek Ji í Pazderka Ji í Pazderka (Gar.)</i>                                                                        | Z          | 30      | 24C   | Z        | S2   |
| 132DPM | <b>Diploma Thesis</b><br><i>Bo ek Patzák, Ji í Máca, Karel Pohl, Michal Polák, Pavel Padev t, Pavel Tesárek, Tomáš Plachý, Milan Jirásek, Petr Havlásek, ..... Aleš Jíra</i>                                                        | Z          | 30      | 24C   | Z        | S2   |
| 133DPM | <b>Diploma Thesis</b><br><i>Martin Tipka</i>                                                                                                                                                                                        | Z          | 30      | 24C   | Z        | S2   |



|        |                                                                                                                                                                                                          |   |    |     |   |    |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----|-----|---|----|
| 134DPM | <b>Diploma Thesis</b><br><i>Jakub Dolejš <b>Jakub Dolejš</b> Jakub Dolejš (Gar.)</i>                                                                                                                     | Z | 30 | 24C | Z | S2 |
| 135DPM | <b>Diploma Thesis</b><br><i>Jan Masopust, Jan Pruška <b>Jan Pruška</b> Jan Pruška (Gar.)</i>                                                                                                             | Z | 30 | 24C | Z | S2 |
| 210DPM | <b>Diploma Thesis</b><br><i>Jiří Litoš, Radoslav Sovják, Pavel Reiterman, Michal Mára, Jan Zatloukal, Jindřich Forn sek, Karel Kolář, Petr Konvalinka, Petr Máca <b>Jiří Litoš</b> Jiří Litoš (Gar.)</i> | Z | 30 | 24C | Z | S2 |
| 220DPM | <b>Diploma Thesis</b><br><i>Radek Vaší ek, Jiří Svoboda, Jaroslav Pacovský <b>Jiří Svoboda</b> Jiří Svoboda (Gar.)</i>                                                                                   | Z | 30 | 24C | Z | S2 |

**Characteristics of the courses of this group of Study Plan: Code=NC20160300\_1 Name=obor Konstrukce pozemních staveb, diplomová práce**

|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |   |    |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|---|----|
| 122DPM | Diploma Thesis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  | Z | 30 |
| 123DPM | Diploma Thesis<br>In accordance with the thesis proposal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  | Z | 30 |
| 124DPM | Diploma Thesis<br>The topics of diploma theses are based on the needs of practice or the scientific research activity of the department, the scope and difficulty corresponds to the student's knowledge acquired during the master's studies. The supervisor of the thesis can designate additional consultants to the student.                                                                                                                                                                                                |  |  |  | Z | 30 |
| 132DPM | Diploma Thesis<br>In accordance with the thesis proposal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  | Z | 30 |
| 133DPM | Diploma Thesis<br>In accordance with a thesis proposal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  | Z | 30 |
| 134DPM | Diploma Thesis<br>Design of steel / timber load bearing building structure according to external requirements in relation to interaction of load bearing and final completion structural elements. A study focused on research of load bearing structures may be also the topic of the the project. The project is assigned by a final project supervisor individually.                                                                                                                                                         |  |  |  | Z | 30 |
| 135DPM | Diploma Thesis<br>In the diploma thesis, the student deals with a topic chosen by the department from those regularly announced by the department. It addresses, for example, problems related to the design and construction of geotechnical structures, civil engineering structures, special foundations for industrial, transport, housing and water management structures, earth and rock structures in complex cases and waste disposal structures. The thesis builds on and develops the findings of the thesis project. |  |  |  | Z | 30 |
| 210DPM | Diploma Thesis<br>Students will get the opportunity to organize complex process of experimental work from the beginning of production, experimental investigation to of the data. Thesis are designed to fit scientific and research activity of the Experimental Centre                                                                                                                                                                                                                                                        |  |  |  | Z | 30 |
| 220DPM | Diploma Thesis<br>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 |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------|
| 101MA04 | <b>Mathematics PS</b><br>After elementary tools of linear algebra (matrix, determinant, Gaussian elimination) are recalled, iterative methods for solving systems of linear algebraic equations are in the focus. Then, the finite difference method and the finite element method are presented and their applications to problems based on differential equations are shown.                                                                                                                                                                                                                      | Z,ZK       | 5       |
| 101YMAV | <b>Mathematics 4 - Selective Course</b><br>To be added.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Z,ZK       | 5       |
| 101YMCD | <b>Methods of Time Discretization</b><br>The course is devoted to a universal and very effective method for solving problems involving time, the so-called evolutionary problems, especially for partial differential equations with a time variable. This method represents a modern approach to modeling and solving engineering tasks. These problems, both linear and non-linear, model events in many engineering fields, such as heat conduction, oscillations, also in rheology and other parts.                                                                                             | Z          | 2       |
| 101YMST | <b>Mathematical statistics for technicians</b><br>Inferential statistics. Theory of probability. Random variables and its characteristics. Basic methods of mathematical statistics.                                                                                                                                                                                                                                                                                                                                                                                                                | Z          | 2       |
| 101YNUM | <b>Numerical Methods</b><br>Numerical computing in applied mathematics: course for beginners.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Z          | 2       |
| 102YFPL | <b>Solid State Physics in Civil Engineering</b><br>Solids, crystal structure, atomic shell theory, valence layer chemical bonds, dislocation disturbances, critical crack energy, vibration of masses, systems natural frequency of vibration and damped vibration, basics concepts of fracture mechanics, types of fracture, electron microscopes, scanning tunneling microscope, atomic force microscope, diffraction, diffraction methods, semiconductors, p-n junction, photovoltaic effect, solar cells, heat and moisture transport.                                                          | Z          | 2       |
| 122DPM  | <b>Diploma Thesis</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Z          | 30      |
| 122P03C | <b>Structural Design 3C</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | KZ         | 5       |
| 122P04C | <b>Structural Design 4C</b><br>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. | KZ         | 5       |
| 122YTSD | <b>Technology of Component Production</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Z          | 2       |

|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |    |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----|
| 123DPM  | Diploma Thesis<br>In accordance with the thesis proposal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Z    | 30 |
| 123YMPU | Materials for Coatings<br>Students will gain an overview of how to protect building structures from corrosion and other harmful influences such as UV radiation, acid rain, etc. Students will also learn about methods and technologies of surface treatment. The course consists of 6 lectures and 6 exercises. In the lectures, students will learn about both historical and more importantly modern surface treatments for different types of structures. In the exercises, students will perform a surface treatment on a fragment of a structure and will be able to check the quality of the work done by themselves in the last exercise by means of a tear-off test.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Z    | 2  |
| 124DPM  | Diploma Thesis<br>The topics of diploma theses are based on the needs of practice or the scientific research activity of the department, the scope and difficulty corresponds to the student's knowledge acquired during the master's studies. The supervisor of the thesis can designate additional consultants to the student.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Z    | 30 |
| 124P03C | Structural Design 3C<br>The student processes selected parts of the project documentation of either the new construction of an advanced building (assignment "N") or the refurbishment of an older building (assignment "R"). In the first phase, the student proposes a design solution concept and a basic solution of broader relationships (N) or processes a simplified documentation of the current state of the building and an analysis of broader relationships (R). It also optimizes variants of the construction solution (N) or evaluates the construction and technical condition of the specified object - STP (R). In the next phase, he will carry out a conceptual design of construction details (N) or an analysis of faults and their causes - STP (R). It also processes selected parts of the project documentation of the building or its parts (N) or drafts selected rehabilitation measures (R)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | KZ   | 5  |
| 124P04C | Structural Design 4C<br>The student processes selected parts of the project documentation of either the new construction of an advanced building (assignment "N") or the refurbishment of an older building (assignment "R"). In the first phase, the student proposes a design solution concept and a basic solution of broader relationships (N) or processes a simplified documentation of the current state of the building and an analysis of broader relationships (R). It also optimizes variants of the construction solution (N) or evaluates the construction and technical condition of the specified object - STP (R). In the next phase, he will carry out a conceptual design of construction details (N) or an analysis of faults and their causes - STP (R). It also processes selected parts of the project documentation of the building or its parts (N) or drafts selected rehabilitation measures (R)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | KZ   | 5  |
| 124PS03 | Building Structures<br>The subject is focused on the complex design of load-bearing structures, their interaction with the surrounding environment. In the first part of the subject, the attention is focused on the issue of the mutual interaction of load-bearing structures and the negative interactions between load-bearing and non-load-bearing systems. The effects of non-force loads, temperature and volume changes, properties of structural materials are discussed. The second part of the subject is focused on the design of load-bearing structures with regard to the effects of wind, the effects of non-rigid support of walkable structures and the issue of expansion of non-load-bearing structures. The last part is devoted to the specific action of water and the protection of the building from its effects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Z,ZK | 4  |
| 124YBM1 | Building Information Modeling (BIM) for Building Structures 1<br>Building information model (BIM) - basic principles of creating a building information model in the field of civil engineering, specifics of BIM modeling. The subject uses the Autodesk Revit software base. Building information model in the life cycle of the building - information required during the design part, during construction and during use of the finished building.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Z    | 4  |
| 124YDPH | Diagnosis and Surveying of Building Structures<br>Course sets out key considerations and implications which require structure assessment. The course provides an objective framework and methodical and systematic approach to surveying (structural diagnosis, preliminary and comprehensive survey, visual inspection, site inspections, laboratory tests, investigation kits, types of defects and damages, symptoms, manifestation, significance, criticality, reason for failures case studies)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Z    | 2  |
| 124YDRS | Timber Buildings<br>The aim is to present a complex overview on energy efficient timber structures. Basic theoretical and design principals are presented. The lectures are focused on following technologies of timber structures: (i) heavy timber skeleton systems, (ii) light timber structures based on 2x4, (iii) CLT, (iv) log house. All technologies of timber structures are presented in structural and building physics context of low energy and passive buildings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Z    | 2  |
| 124YDSR | Demolitions of Buildings and Material Recycling<br>The use of construction waste from demolitions from the production of building materials and from other sectors in the construction industry with the aim of: significantly reducing the volumes of landfilled materials, reducing the consumption of primary raw materials, a new perspective on the design of buildings and structures in accordance with a closed life cycle. Legislation, levels of recycling in developed countries, recycling in CR, possibilities of recycling buildings and structures, design of structures from the point of view of sustainable development, minimization of landfills, examples and demonstrations of recycling technologies, low-waste technologies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Z    | 2  |
| 124YHVK | Long Span Structures<br>The subject deals with the analysis of structural solutions applied in building designs by the world's best architects. Although attention will be focused mainly on the solution of load-bearing structures, we will also pay attention to the wider context of the design. Reading existing constructions is a natural way to learn the principles of their design. And naturally we will learn from the best. An extensive database of completed buildings, including more than 5,000 buildings, will enable us to take a trip into history and the present on all the world's continents.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Z    | 2  |
| 124YIKS | Interaction of structures and parts of structures<br>As part of the course, students will learn about the interaction of load-bearing and non-load-bearing subsystems of buildings - for example, the interaction of layers of external contact insulation systems (ETICS), the interaction of the back and face ribs. vaults with the original masonry structure, interaction of the attic with the load-bearing structure of the walls and roof, interaction of ceramic moldings and concreting, etc. Part of the course will be familiarization with the optimization of the mutual interaction of building structures and their parts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Z    | 2  |
| 124YKSD | Complex Structural Detail<br>The aim of the course is to extend the knowledge gained in previous courses - it is intended for students who have already reached advanced level of knowledge about structural problems in buildings. The content of the course is focused on the complex solution of construction details, following all legislative requirements and taking into account the maximum efficiency and durability of the chosen solution.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Z    | 2  |
| 124YPFS | Precast concrete structures<br>Residential houses made of precast concrete panels, of which approx. 82 thousand were built in the period 1960-1995 do not meet the required extent of the current dynamically developing society and in many cases require the implementation of regeneration and modernization interventions enabling their full use. The course is focused on the current issues of renewal, reconstruction and modernization of precast houses, modernization of apartments in precast houses, on the issue of freeing parterres of precast houses for services, shops, offices, fitness centers, etc. Renovation, modernization, or regenerations require the removal of functionally inadequate completion structures, technical equipment, installations and, in some cases, even demanding interventions in supporting structures. As part of the construction of communication networks, modernization of urban development, etc., it is necessary in some cases to carry out partial or complete demolition of a precast panel building. As part of the regeneration of precast panel housing estates, an extension is also carried out, or completion of precast houses. The implementation of the mentioned plans requires a survey and diagnostics of supporting and peripheral structures, joints of parts and an evaluation of the structural-technical condition and an assessment of the residual life of precast panel structures and buildings. | Z    | 2  |
| 124YRHS | Reconstruction of Historical Building Structures<br>In the period from the second half of the 19th century by 1960, more than 250 thousand of two- to five-story brick apartment (mainly rental) houses in traditional brick technology were constructed in the Czech Republic. Brick buildings from this period were built according to regulations, building codes and laws from the turn of the 19th and 20th centuries. Multi-storey brick tenement houses do not meet the current thermal, acoustic and other requirements, the requirements of a dynamically developing society to the required extent, and in many cases require regeneration and modernization interventions, including the replacement of non-compliant and out-of-date structures and equipment enabling their further use. The course is focused on the current issue of renewal, reconstruction and modernization of brick multi-storey rental apartment buildings, on historical structures and materials, the issue of degradation and aging of structures and materials of historic brick residential buildings, their residual life, failures and reconstruction of historical buildings and their parts. Furthermore, the course                                                                                                                                                                                                                                                                 | Z    | 2  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                |      |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|------|----|
| is focused on the issue of improving the well-being of the internal environment, the replacement of finishing structures, opening fillings, etc. as an integral part of the modernization of these buildings.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                |      |    |
| 124YZUK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Loading Effects and their Impact on Building Structures</b> | Z    | 2  |
| Division of load from history-load point of view, loading effects and forced and non.forced influences. Occurrence-probability of individual load, combination of load, load- connection with the solution of civil engineering. Interaction of static and dynamic loading effects in specialization of building structures, interaction of shortterm and longterm effects of load. Computation models of load.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                |      |    |
| 126YBIM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Building Information Modelling - Fundamentals</b>           | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                |      |    |
| 126YSP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Construction Cost Estimating Software</b>                   | Z    | 2  |
| 132DPM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Diploma Thesis</b>                                          | Z    | 30 |
| In accordance with the thesis proposal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                |      |    |
| 132DY01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Dynamics of structures 1</b>                                | Z,ZK | 5  |
| Principles of theory of vibration, dynamic loading. Free and forced vibration of single-degree-of-freedom systems. Damped vibration. Methods of dynamic analysis of muti-degreee-of-freedom systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                |      |    |
| 132EADC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Experimental Analysis and Diagnostics C</b>                 | KZ   | 3  |
| Experiments focused on monitoring of the amount of climatic loads on building and engineering structures (wind, snow, temperature loads), diagnostics of building and engineering structures, tests carried out on physical models of building and engineering structures (model similarity laws, seismic simulations on shake tables, wind tunnel simulations of wind effects, static load tests on physical models), monitoring of building and engineering structures, static load tests (building structures, engineering structures, bridges), dynamic load tests and experimental modal analysis (building structures, engineering structures, bridges, footbridges), effects of technical seismicity, evaluation of adverse effects of vibration on the human body, assessment of the influence of building vibrations on installed machines and devices). |                                                                |      |    |
| 132NAK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Numerical Analysis of Structures</b>                        | Z,ZK | 5  |
| Variational principles of mechanics. Method of weighted residuals, conditions of convergence (continuity, integrity). Principles of FEM. Isoparametric elements, area coordinates, numerical integration. Application of method to selected 1D and 2D problems (Elasticity, heat transfer, consolidation). Algorithmic aspects of the method.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                |      |    |
| 132P03C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Structural Design 3C</b>                                    | KZ   | 5  |
| Students develop individual projects under supervision of teachers from the Department of Mechanics. Project topics are presented at the department website. Students may propose own topics - in this case, suitability of the topic and feasibility of the project will be evaluated by the project supervisor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                |      |    |
| 132P04C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Structural Design 4C</b>                                    | KZ   | 5  |
| Students develop individual projects under supervision of teachers from the Department of Mechanics. Project topics are presented at the department website. Students may propose own topics - in this case, suitability of the topic and feasibility of the project will be evaluated by the project supervisor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                |      |    |
| 132PRPM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Deformation and Failure of Materials</b>                    | Z,ZK | 5  |
| Viscoelasticity, models for concrete creep. Theory of plasticity, principles of limit and incremental analysis. Fracture mechanics. Damage mechanics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                |      |    |
| 132YMMO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Modern Methods of Optimization</b>                          | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Numerical Analysis of Structures 2</b>                      | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Nonlinear Analysis of Materials and Structures</b>          | Z    | 2  |
| Students become acquainted with the concepts of linear stability and calculation of elastoplastic load capacity. Linear stability - evaluation of the critical load and buckling shape. Analysis of structures according to the 2nd order theory - equilibrium conditions on a deformed structure, initial stress matrix. Elastoplastic analysis of structures - evaluation of the limit load capacity, distribution of internal forces at the limit state - static incremental method, kinematic method. Solving stability and elastoplasticity problems by means of a general-purpose finite element program.                                                                                                                                                                                                                                                   |                                                                |      |    |
| 132YPM2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Computer Analysis of Structures 2</b>                       | Z    | 2  |
| Limit state of frames. Stability analysis of structures. Second order theory. Beams and gridwork girders on elastic foundation. Plate and wall structures. Dynamic analysis of structures. Verification of results.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                |      |    |
| 132YSAK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Nonlinear Analysis of Materials and Structures</b>          | Z    | 2  |
| Students become acquainted with the concepts of linear stability and calculation of elastoplastic load capacity. Linear stability - evaluation of the critical load and buckling shape. Analysis of structures according to the 2nd order theory - equilibrium conditions on a deformed structure, initial stress matrix. Elastoplastic analysis of structures - evaluation of the limit load capacity, distribution of internal forces at the limit state - static incremental method, kinematic method. Solving stability and elastoplasticity problems by means of a general-purpose finite element program.                                                                                                                                                                                                                                                   |                                                                |      |    |
| 132YSSK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Reliability of Structures</b>                               | 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                |      |    |
| 133B03C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Concrete Structures 3C</b>                                  | Z,ZK | 5  |
| Extension of knowledge in the design of prestressed concrete structures. Introduction to special hybrid and thin-walled structures. Modern materials and design solutions for the future.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                |      |    |
| 133B04C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Concrete Structures 4C</b>                                  | Z,ZK | 5  |
| Extension of knowledge in the field of design of reinforced concrete structures, when the emphasis is put on development of engineering sense. Within the scope of this subject, the student acquires ability to estimate arrangement of reinforcement in RC slabs of general shape, ability to define basic strut-and-tie models for given structural details, ability to provide optimum reinforcement at general point of RC slabs and RC walls based on normal forces distributions obtained with common engineering software. Also, the student learns the basic principles plastic design of RC structures and design of RC foundations.                                                                                                                                                                                                                    |                                                                |      |    |
| 133DPM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Diploma Thesis</b>                                          | Z    | 30 |
| In accordance with a thesis proposal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                |      |    |
| 133P03C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Structural Design 3C</b>                                    | KZ   | 5  |
| The subject is focused on concrete and masonry structures. The assignment can be: elaboration of the structural design documentation, the analysis of the given problem requiring subject matter search and literature retrieval, the numerical analysis of the selected element or part of the structure, the preparation, execution and evaluation of experiments, etc. Collaboration of several students on one assignments is also possible. Consultation with participating departments K124 and K135 is not mandatory for all students. The extent of outputs depends on the type of assignment and the decision of the leading teacher.                                                                                                                                                                                                                    |                                                                |      |    |

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

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| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                           |      |    |
| 135DPM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Diploma Thesis                                                                                            | Z    | 30 |
| In the diploma thesis, the student deals with a topic chosen by the department from those regularly announced by the department. It addresses, for example, problems related to the design and construction of geotechnical structures, civil engineering structures, special foundations for industrial, transport, housing and water management structures, earth and rock structures in complex cases and waste disposal structures. The thesis builds on and develops the findings of the thesis project.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                           |      |    |
| 135P03C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Structural Design 3C<br>Design, static calculation and drawing documentation of the building substructure | KZ   | 5  |
| 135P04C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Structural Design 4C<br>Design, static calculation and drawing documentation of the building substructure | KZ   | 5  |
| 135YGSM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Geotechnical Software for Numerical modelling                                                             | Z    | 2  |
| Students get acquainted with the Finite Element Method, the currently dominant tool for numerical modeling in Geotechnics. Emphasis is placed on introducing the basic principles of the Finite Element Method and their subsequent application to selected problems of Geotechnical Engineering. The course summarises the types of finite elements used in geotechnical applications, material models suitable for the description of soil deformation, and selected specifics associated with numerical modeling in geotechnics. This knowledge is further applied in the modeling of foundation, embedded walls, and stability problems.                                                                                                                                                                                                                                                                                                                                                        |                                                                                                           |      |    |
| 135YING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Engineering geology                                                                                       | Z    | 2  |
| Engineering geological survey methods. Geological and engineering geological maps and profiles. Foundation soils in terms of engineering geology and hydrogeology. Aggressive waters. Rock mass - areas of discontinuities, their evaluation. Deposits of natural building materials. Landslides and slope protection. Engineering geological survey for different types of civil engineering structures. Challenges of urban geology. Engineering geology in environmental design and protection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                           |      |    |
| 135YTIG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Field training in engineering geology                                                                     | Z    | 2  |
| The 135YTIG course is 1 week of field-based, small-group, practical learning. For more than 20 years, 3 universities from the Czech Republic and 1 university from the Slovak Republic have been cooperating in the organization of the field course. This ensures a great variability of geological and geotechnical sites. Thus, students can learn about interesting geological and geotechnical issues in relation to civil engineering and geotechnical structures directly in the field at various locations in both republics. Course framework. Creation of engineering geological surface maps, underground mapping and measurements; tectonic measurements in the rock mass and their processing; documentation of borehole, probe, rock outcrop (defile), fracture wall; probing technique, selection of field geotechnical tests, geophysical methods; basic hydrogeological measurements; sampling. The exact content of the course corresponds to the character of the sites visited. |                                                                                                           |      |    |
| 135YVPZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Computer analysis in underground structures                                                               | Z    | 2  |
| Numerical methods in CAD/CAM in geomechanics. Basic types of constitutive models of soil and rock mass behavior. Summary of PC geotechnical software both in the field of conventional methods and in numerical modelling domain. Practical solutions of selected geotechnical problems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                           |      |    |
| 135ZS02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Foundations 2                                                                                             | Z,ZK | 4  |
| The course deepens the knowledge from the previous course ZS1. It covers design principles, risks associated with the foundation of structures, deeper design of flat foundations, deeper design of deep foundations, negative casing friction of drilled piles, grouting (calculations and execution), construction pits, improvement of foundation soils.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                           |      |    |
| 210DPM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Diploma Thesis                                                                                            | Z    | 30 |
| Students will get the opportunity to organize complex process of experimental work from the beginning of production, experimental investigation to of the data. Thesis are designed to fit scientific and research activity of the Experimental Centre                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                           |      |    |
| 210P04C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Structural Design 4C<br>The specific topic will be determined in consultation with your supervisor.       | KZ   | 5  |
| 210YDSM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Diagnostics of Building Materials Properties                                                              | Z    | 2  |
| Failures of building materials, mechanical, thermal, chemical and other influences on the development of failures of building materials. Diagnostics of their occurrence. Basics of experimental measurement and instrumentation of tested elements and structures. Theory of experiment, measurement and processing of results. Testing machines and equipment. Deformation measuring instruments. Destructive testing of mechanical properties. Non-destructive test methods. Test methodology for various materials (concrete, mortar, metallic elements, wood, glass, plastics, composites and others).                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                           |      |    |
| 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> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                           |      |    |
| 220P04C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Structural Design 4C                                                                                      | KZ   | 5  |

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

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