Study plan

Name of study plan: Geodézie a kartografie, specializace Geomatika

Faculty/Institute/Others:
Department:
Branch of study guaranteed by the department: Welcome page
Garantor of the study branch:
Program of study: Geodesy and Cartography
Type of study: Follow-up master full-time
Required credits: 120
Elective courses credits: 0
Sum of credits in the plan: 120
Note on the plan: platí pro nástup od akad. roku 2023/24

Name of the block: Compulsory courses
Minimal number of credits of the block: 54
The role of the block: Z

Code of the group: NH20230001
Name of the group: Geodézie a kartografie, spec. Geomatika, 1. semestr
Requirement credits in the group: In this group you have to gain at least 26 credits
Requirement courses in the group: In this group you have to complete at least 6 courses
Credits in the group: 26
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
101MM4G	**Mathematics 4G** *Jozef Bobok* ***Jozef Bobok*** *Jozef Bobok (Gar.)*	Z,ZK	4	2P+2C	Z	z
155DPRZ	**Remote Sensing** *Karel Pavelka* ***Eva Matoušková*** *Karel Pavelka (Gar.)*	Z,ZK	5	2P+2C	Z	z
155GPL2	**Survey Sketches 2** *Zdeněk Valenta* ***Zdeněk Valenta*** *Zdeněk Valenta (Gar.)*	KZ	2	2C	Z	z
155KAT3	**Cartography 3** *Jiří Cajthaml, Tomáš Janata, Petra Justová, Josef Münzberger* ***Jiří Cajthaml*** *Jiří Cajthaml (Gar.)*	Z,ZK	5	2P+2C	Z	z
155TGD3	**Theoretical geodesy 3** *Jan Holešovský* ***Jan Holešovský*** *Jan Holešovský (Gar.)*	Z,ZK	5	2P+2C	Z	z
155UZPR	**Introduction to Spatial Data Processing** *Martin Landa* ***Martin Landa*** *Martin Landa (Gar.)*	Z,ZK	5	2P+2C	Z	z

Characteristics of the courses of this group of Study Plan: Code=NH20230001 Name=Geodézie a kartografie, spec. Geomatika, 1. semestr

101MM4G	Mathematics 4G	Z,ZK	4
https://mat.fsv.cvut.cz/bobok/			
155DPRZ	Remote Sensing	Z,ZK	5
The subject is focused on explanation of physical bases allowing to use remote sensing, on technical explanation of methods of data collection/measurement, on behavior of individual materials/land covers as an interaction with electromagnetic radiation, and on possibility to use RS for many applications.			
155GPL2	Survey Sketches 2	KZ	2
Students will learn about the preparation of geometric plans through practical exercises. It is mainly about the orientation of changes for updating the cadastral register by various measuring technologies and the subsequent processing of geometric plans as a technical basis for the introduction of these changes into the cadastral register in locations with different technical conditions - analogue cadastral map, digital cadastral map (DKM, KMD, etc.)			
155KAT3	Cartography 3	Z,ZK	5
Advanced cartography, web map services and applications, dynamic maps, spatial data formats, data sources, standardization, web maps, trends in cartography.			
155TGD3	Theoretical geodesy 3	Z,ZK	5
Vector and scalar description of gravitational field of the Earth. Properties of gravitational potential and its derivatives for basic bodies. Description of gravity field of the Earth. Normal gravity field of normal bodies. Approximation of the shape of the Earth in form of geoid or level ellipsoid. Stokes´ and Molodensky´s solution of the shape of the Earth. Consequences of this procedures for geodesy (geoid, quasigeoid, heights). Construction and models of (quasi)geoid. Physical priciples of gravity surveying.			
155UZPR	Introduction to Spatial Data Processing	Z,ZK	5
The course focuses on automated processing of geospatial data. Practical exercises are divided into two parts. In the first part, the Python scripting language is used for data processing in combination with GeoPandas, Rasterio, Fiona and other libraries. The second part of the course is focused on geospatial data management in object-relational database systems and their processing using spatial SQL. Free connection to the courses Informatics 2 - Database Systems, Informatics 3 - Object-oriented programming, GIS1 and GIS2.			

Code of the group: NH20230002
Name of the group: Geodézie a kartografie, spec. Geomatika, 2. semestr
Requirement credits in the group: In this group you have to gain at least 16 credits
Requirement courses in the group: In this group you have to complete at least 4 courses
Credits in the group: 16
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
155FTG2	**Photogrammetry 2** *Karel Pavelka, Jan Pacina* ***Karel Pavelka*** *Karel Pavelka (Gar.)*	Z,ZK	5	2P+2C	L	z
155PKAR	**Project - Cartography** *Jiří Cajthaml, Tomáš Janata* ***Jiří Cajthaml*** *Jiří Cajthaml (Gar.)*	KZ	5	3C	L	z
155TG4	**Theoretical geodesy 4** *Jakub Kostelecký* ***Jakub Kostelecký*** *Leoš Mervart (Gar.)*	Z,ZK	5	2P+2C	L	z
155VTTG	**Fieldwork Training in Theoretical Geodesy** *Zdeněk Vyskočil* ***Zdeněk Vyskočil*** *Zdeněk Vyskočil (Gar.)*	KZ	1	2C	L	z

Characteristics of the courses of this group of Study Plan: Code=NH20230002 Name=Geodézie a kartografie, spec. Geomatika, 2. semestr

155FTG2	Photogrammetry 2	Z,ZK	5
Aerial photogrammetry. Relative and absolute orientation of aerial photos. Analogue, analytic and digital interpreting devices, computer support. Photogrammetric methods in mapping. Orthophoto, its accuracy. Photo triangulation, AAT, block and bundle adjustments, analytical photogrammetry. Digital photogrammetry, digital orthophoto, digital photogrammetric stations, optical correlation systems, aerial laser scanning, using of drones (RPAS).			
155PKAR	Project - Cartography	KZ	5
Map creation in GIS, geodatabase, data model, symbology, compositional elements of maps, geographical nomenclature, errors in maps.			
155TG4	Theoretical geodesy 4	Z,ZK	5
Theoretical Geodesy 4 introduces students to the field of space geodesy, i.e. using satellite observations of the Earth to define and maintain global coordinate systems, the Earth orientation parameters, models of the Earth's gravity field and ocean topography. The outputs of space geodesy form the basis from which one of the most widely used measurement techniques in geodesy GNSS is based.			
155VTTG	Fieldwork Training in Theoretical Geodesy	KZ	1
Landsurveying in terrain is intended for the practice of measurement methods of geodesy and data processing work in the creation of a point field. Includes tasks: Long Range Triangulation and Trilateration (TRG) Determining the course of the quasi-geoid (GEO) Remeasurement and adjustment of height points with very precise leveling (VPN) Azimuth determination using the gyrotheodolite, gravimetric measurements			

Code of the group: NH20230003
Name of the group: Geodézie a kartografie, spec. Geomatika, 3. semestr
Requirement credits in the group: In this group you have to gain at least 12 credits
Requirement courses in the group: In this group you have to complete at least 3 courses
Credits in the group: 12
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
155MSPD	**Modern Methods of Spatial Data Acquisition** *Karel Pavelka, Jan Pacina* ***Karel Pavelka*** *Karel Pavelka (Gar.)*	Z,ZK	5	2P+2C	Z	z
155PKAZ	**Law in Cadastre and Surveying** *Iveta Bláhová* ***Iveta Bláhová*** *Iveta Bláhová (Gar.)*	ZK	2	2P	Z	z
155VFG	**Photogrammetry -Project** *Karel Pavelka, Jindřich Hodač* ***Karel Pavelka*** *Karel Pavelka (Gar.)*	KZ	5	3C	Z	z

Characteristics of the courses of this group of Study Plan: Code=NH20230003 Name=Geodézie a kartografie, spec. Geomatika, 3. semestr

155MSPD	Modern Methods of Spatial Data Acquisition	Z,ZK	5
The course focuses on new modern and unconventional methods of geospatial data collection and presentation. Contains information on terrestrial, aerial and mobile laser scanning, about remote sensing and its methods, about hyperspectral imaging. Further, it focuses on the progressive method in geomathics - on RPAS. It informs about types, usage,legislation as well as about sensors and software for automatically processing for image data. Finally, geophysical methods and virtual reality technologies are presented.			

155PKAZ	Law in Cadastre and Surveying	ZK	2
Public and private, substantive and procedural law. Overview of legal regulations governing the cadastre of real estate (CN) and land surveying. Predecessors of surveying and cadastral authorities in the past. Surveying and cadastral authorities today. Thing, thing in the legal sense, division of things, immovable things, part of a thing and accessories of a thing. Land, parcel of land, land in jurisprudence, building, building in jurisprudence, small buildings, temporary buildings, building, unit. Origin of the CN and its predecessors, the Cadastral Act and implementing regulations, definition and purpose of the CN. Content of the CN, cadastral register, registration of rights in the CN, basic provisions. Rights entered into the CN by deposit, title deed, proposal for deposit, annexes to the proposal, deposit procedure. Deposit procedure, record, note. Administration of the CN, entries of other data, acceptance of data, time limits for entry in the CN, deposit of documents in the collection of documents, revision of the CN, correction of errors, obligations of owners and other beneficiaries, municipalities and public authorities. Surveying activities and geometrical plans, publicity of the CN, provision of CN data, offences, common, transitional and final provisions of the Cadastral Act. Real estate contracts. Previous legislation on land surveying, Land Surveying Act, introductory provisions, surveying activities. Rights and obligations in carrying out surveying activities, verification of results of surveying activities, geodetic reference systems and state mapping works, offences. Visit to the land register in the building of the Surveying and Cadastral Authorities in Prague Kobylisy.			
155VFG	Photogrammetry -Project	KZ	5
practical metrical documentation of historical objects and sites, technology of documentation and data processing by modern methods			

Name of the block: Compulsory elective courses
Minimal number of credits of the block: 36
The role of the block: S

Code of the group: NH20230001_1
Name of the group: Geodézie a kartografie, spec. Geomatika, PV předměty, 1. semestr
Requirement credits in the group: In this group you have to gain at least 4 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 4
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors, **authors** and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
128TG	**Graph Theory** *Jiří Demel **Jiří Demel** Jiří Demel (Gar.)*	Z,ZK	4	2P+2C	Z	S
155YCN1	**Real Estate Valuation** *Eliška Housarová **Eliška Housarová** Eliška Housarová (Gar.)*	Z,ZK	4	2P+2C	Z	S
155YGEI	**Geoinformatics** *Jiří Cajthaml, Tomáš Janata, Lena Halounová, Tomáš Bayer, Markéta Potůčková **Tomáš Bayer** Tomáš Bayer (Gar.)*	Z,ZK	4	2P+2C	Z	S

Characteristics of the courses of this group of Study Plan: Code=NH20230001_1 Name=Geodézie a kartografie, spec. Geomatika, PV předměty, 1. semestr

128TG	Graph Theory	Z,ZK	4
Graph theory - basic elements, graph tasks formulations, basic algorithms with recognition of calculation efficiency. Connectivity, strong connectivity, trees, spanning trees, flows in networks, matchings, eulerian trails, hamiltonian paths, independent sets, cliques, coloring, plannar graphs.			
155YCN1	Real Estate Valuation	Z,ZK	4
Real estate valuation is a very large field that intersects various areas such as construction, insurance, government, banking and land registry. During the lectures we will cover the basic concepts of real estate, methods of real estate valuation, for what purpose and when to use them. Market valuation - cost, comparative and income methods. Administrative valuation of real estate, valuation of easements and valuation of real estate in special cases such as loans, inheritance, community property, for insurance companies, etc.			
155YGEI	Geoinformatics	Z,ZK	4

Code of the group: NH20230002_1
Name of the group: Geodézie a kartografie, spec. Geomatika, PV předměty, 2. semestr
Requirement credits in the group: In this group you have to gain at least 14 credits
Requirement courses in the group: In this group you have to complete at least 3 courses
Credits in the group: 14
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors, **authors** and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
101STAG	**Statistics** *Jana Nosková **Jana Nosková** Jana Nosková (Gar.)*	Z,ZK	5	2P+2C	L	S
128YNAA	**Design and Analysis of Algorithms** *Jiří Demel **Jiří Demel** Jiří Demel (Gar.)*	Z,ZK	4	2P+2C	L	S
155ADKI	**Algorithms in Digital Cartography and GIS** *Tomáš Bayer **Tomáš Bayer** Tomáš Bayer (Gar.)*	Z,ZK	5	2P+2C	L	S
155FGIS	**Free Software GIS** *Martin Landa, Ondřej Pešek, Linda Karlovská **Martin Landa** Lena Halounová (Gar.)*	Z,ZK	5	2P+2C	L	S

155IN4G	**Informatics 4** *Jan Pytel* ***Jan Pytel*** *Jan Pytel (Gar.)*	Z,ZK	5	2P+2C	L	S
155YWEK	**Web Cartography** *Jiří Cajthaml, Tomáš Janata, Petra Justová, František Mužík* ***Jiří Cajthaml*** *Jiří Cajthaml (Gar.)*	Z,ZK	5	2P+2C	L	S
155YZPZ	**Processing of Remote Sensing Data** *Eva Matoušková, Tomáš Bouček*	Z,ZK	5	2P+2C	L	S

Characteristics of the courses of this group of Study Plan: Code=NH20230002_1 Name=Geodézie a kartografie, spec. Geomatika, PV předměty, 2. semestr

101STAG	Statistics	Z,ZK	5
Advanced methods of mathematical statistics. Sequential tests, bayesian and robust methods. Software R-project.			
128YNAA	Design and Analysis of Algorithms	Z,ZK	4
Design and analysis of alorithms. Models of a computation. Proofs of correctness, time complexity of algorithms. Basic data structures. P and NP classes of problems.			
155ADKI	Algorithms in Digital Cartography and GIS	Z,ZK	5
Automation of digital cartography tasks using rule-based strategies. Implementation of selected cartographic problems in a chosen programming language. Preparation and design of graphical outputs in Qt library.			
155FGIS	Free Software GIS	Z,ZK	5
Free and open source software in geoinformation technologies. Emphasis is placed on the framework orientation in the issue. A comprehensive overview of available tools, their use and deployment in practical applications is provided during the course. In the exercises, students are introduced to desktop tools such as GRASS GIS, QGIS, SAGA or gvSig, GDAL, PROJ, PDAL libraries and other similar tools. Part of the course focuses on active scripting and developing plugins using the Python programming language. In addition, the students will get a general introduction to publishing geographic data and implementing GIS analyses in the Internet environment, GeoServer and MapServer, pygeoapi and OWSLib libraries, publishing platforms such as Gisquick, GeoNode and Margin Maps. Also mentioned are the issues of freely available geographic data, open geodata, and active data collection for the OpenStreetMap community project. Automation of deployment using Ansible and Docker technologies is mentioned in passing. Teaching is implemented on the open source platform GIS.lab.			
155IN4G	Informatics 4	Z,ZK	5
In the course, students are introduced to techniques how to handle big amount of data. The course starts with data preprocessing by command tools before import into DB. The focus is related to relation databases, NoSQL databases, ElasticSearch, R and cloud.			
155YWEK	Web Cartography	Z,ZK	5
155YZPZ	Processing of Remote Sensing Data	Z,ZK	5
Digital image data processing collected mainly by satellite apparatuses. Practical methods of image data processing, their interpretation and classification. Individual themes depend on goals and themes of individual diploma thesis. 1. The Diploma Thesis (DT) topic analysis 2. Suitable source material selection 3. Geometric corrections of the processed data and their accuracy 4. Radiometric corrections of the processed data 5. Enhancement of individual bands 6. Multi-channel enhancement for DT - new channels calculation 7. Calculation of new channels by transformation to other systems - IHS, PCA, PCCA, 8. Classification pixel per pixel focused on DT goal 9. Image segmentation with various number of channels 10. Object oriented classification 11. Comparison of results - total, user's, producer's accuracy 12. Post-classification procedures to improve accuracy 13. Outputs - statistical, image, GIS types			

Code of the group: NH20230003_1
Name of the group: Geodézie a kartografie, spec. Geomatika, PV předměty, 3. semestr
Requirement credits in the group: In this group you have to gain at least 18 credits
Requirement courses in the group: In this group you have to complete at least 4 courses
Credits in the group: 18
Note on the group:

Code	**Name of the course / Name of the group of courses** ***(in case of groups of courses the list of codes of their members)*** *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
101PJS	**Statistics** *Jana Nosková* ***Jana Nosková*** *Jana Nosková (Gar.)*	KZ	5	3C	Z	S
143YKIG	**GIS in Landscape Engineering** *Josef Krása* ***Josef Krása*** *Josef Krása (Gar.)*	KZ	4	3C	Z	S
155YDPD	**Visualization and Distribution of Spatial Data** *David Zahradník* ***David Zahradník*** *David Zahradník (Gar.)*	Z,ZK	5	2P+2C	Z	S
155YFD	**Photogrammetric Documentation of Historical Buildings and Sites** *Jindřich Hodač* ***Jindřich Hodač*** *Jindřich Hodač (Gar.)*	KZ	4	3C	Z	S
155YOPR	**Object Oriented Programming** *Jan Pytel* ***Jan Pytel*** *Jan Pytel (Gar.)*	Z,ZK	5	2P+2C	Z	S
155YSKN	**Information System of Cadastre of Real Estate** *Petr Souček* ***Petr Souček*** *Petr Souček (Gar.)*	KZ	5	1P+2C	Z	S
155YUSU	**Introduction to Machine Learning in Remote Sensing** *Martin Landa, Ondřej Pešek, Tomáš Bayer* ***Martin Landa*** *Martin Landa (Gar.)*	Z,ZK	5	2P+2C	Z	S
155YV3D	**Visualization of 3D Models with Modern Technologies** *Karel Pavelka, Jiří Cajthaml, František Mužík, Karel Pavelka, Vojtěch Cehák, Pavel Tobiáš, Michal Janovský* ***Karel Pavelka*** *Karel Pavelka (Gar.)*	Z,ZK	5	2P+2C	Z	S

Characteristics of the courses of this group of Study Plan: Code=NH20230003_1 Name=Geodézie a kartografie, spec. Geomatika, PV předměty, 3. semestr

101PJS	Statistics	KZ	5
Students solve one particular problem of probability, mathematical statistics, geodesis or data analysis using advanced packages of software R-project.			

143YKIG	GIS in Landscape Engineering	KZ	4
Basic tasks of landscape engineering and their connection to geoinformation technologies (agriculture, water management, landscape planning).			
155YDPD	Visualization and Distribution of Spatial Data	Z,ZK	5
This course focuses on the digital modelling of a historic city and the subsequent presentation of the results on the web. Students will learn about the various tools and techniques used in digital modeling and spatial visualization. The main objective is to create a historical city model using Blender and then present it on a web page.			
155YFD	Photogrammetric Documentation of Historical Buildings and Sites	KZ	4
This course is organized in a project-based manner. Students will gain an overview of the methods and technologies currently used in the measurement documentation of historical objects and archaeological sites. The students will learn in detail about the production of various types of measurement documentation (2D building plans, 3D models, 2D photogrammetric outputs - photoplan, orthophoto, etc.) and the specifics of this type of work. Students will acquire theoretical knowledge and practical skills that will enable them to use individual documentation methods and technologies in their practice in projects in the field of heritage conservation. The course includes several lectures/seminars with invited practitioners (surveyor, archaeologist, conservationist..). In the practical part, students will prepare a measurement documentation of a part of a selected object (including data collection in the field). Students of the Faculty of Architecture also participate in this practical part within the "sister" course Monument Conservation III.			
155YOPR	Object Oriented Programming	Z,ZK	5
This course extends "Informatics 3" course by object-oriented techniques demonstrated in C++ and Python programming languages.			
155YSKN	Information System of Cadastre of Real Estate	KZ	5
The aim of the course is to familiarize students with the Information System of the Cadastre of Real Estate (ISKN) and its connection to other information systems of the state administration, especially to the system of Basic Registers as defined by Act No. 111/2009 Coll.			
155YUSU	Introduction to Machine Learning in Remote Sensing	Z,ZK	5
Machine learning is an integral part of data analysis and predictive modelling in many fields, including remote sensing. The aim of the course is to acquire basic knowledge of machine learning algorithms and principles of model generalization and practical design of process lines. In the course, students work independently on assigned examples of machine learning applications using remote sensing data. A prerequisite for the course is correct generalization of the trained model, including theoretical evaluation of overfitting and underfitting. In the projects, students create their own Python scripts and critically evaluate the results.			
155YV3D	Visualization of 3D Models with Modern Technologies	Z,ZK	5

Name of the block: Povinně volitelné předměty, doporučení S1
Minimal number of credits of the block: 30
The role of the block: S1

Code of the group: NH20230004
Name of the group: Geodézie a kartografie, spec. Geomatika, diplomová práce
Requirement credits in the group: In this group you have to gain at least 30 credits
Requirement courses in the group: In this group you have to complete at least 1 course
Credits in the group: 30
Note on the group:

Code	Name of the course / Name of the group of courses *(in case of groups of courses the list of codes of their members)* *Tutors,* ***authors*** *and guarantors (gar.)*	Completion	Credits	Scope	Semester	Role
154DPM	**Diploma Thesis** ***Martin Štroner*** *Martin Štroner (Gar.)*	Z	30	24C	Z,L	S1
155DPM	**Diploma Thesis** *Eva Matoušková, Jiří Cajthaml, Tomáš Janata, Jan Holešovský, Jindřich Hodač, Zdeněk Vyskočil, Lena Halounová, Jan Pytel, Petr Souček, ...* ***Jiří Cajthaml*** *Jiří Cajthaml (Gar.)*	Z	30	24C	Z,L	S1

Characteristics of the courses of this group of Study Plan: Code=NH20230004 Name=Geodézie a kartografie, spec. Geomatika, diplomová práce

154DPM	Diploma Thesis	Z	30
Final thesis, prepared according to the assignment.			
155DPM	Diploma Thesis	Z	30
in accordance with the thesis proposal			

List of courses of this pass:

Code	Name of the course	Completion	Credits
101MM4G	Mathematics 4G https://mat.fsv.cvut.cz/bobok/	Z,ZK	4
101PJS	Statistics	KZ	5
Students solve one particular problem of probability, mathematical statistics, geodesis or data analysis using advanced packages of software R-project.			
101STAG	Statistics	Z,ZK	5
Advanced methods of mathematical statistics. Sequential tests, bayesian and robust methods. Software R-project.			

128TG	Graph Theory	Z,ZK	4
Graph theory - basic elements, graph tasks formulations, basic algorithms with recognition of calculation efficiency. Connectivity, strong connectivity, trees, spanning trees, flows in networks, matchings, eulerian trails, hamiltonian paths, independent sets, cliques, coloring, plannar graphs.			
128YNAA	Design and Analysis of Algorithms	Z,ZK	4
Design and analysis of alorithms. Models of a computation. Proofs of correctness, time complexity of algorithms. Basic data structures. P and NP classes of problems.			
143YKIG	GIS in Landscape Engineering	KZ	4
Basic tasks of landscape engineering and their connection to geoinformation technologies (agriculture, water management, landscape planning).			
154DPM	Diploma Thesis	Z	30
Final thesis, prepared according to the assignment.			
155ADKI	Algorithms in Digital Cartography and GIS	Z,ZK	5
Automation of digital cartography tasks using rule-based strategies. Implementation of selected cartographic problems in a chosen programming language. Preparation and design of graphical outputs in Qt library.			
155DPM	Diploma Thesis	Z	30
in accordance with the thesis proposal			
155DPRZ	Remote Sensing	Z,ZK	5
The subject is focused on explanation of physical bases allowing to use remote sensing, on technical explanation of methods of data collection/measurement, on behavior of individual materials/land covers as an interaction with electromagnetic radiation, and on possibility to use RS for many applications.			
155FGIS	Free Software GIS	Z,ZK	5
Free and open source software in geoinformation technologies. Emphasis is placed on the framework orientation in the issue. A comprehensive overview of available tools, their use and deployment in practical applications is provided during the course. In the exercises, students are introduced to desktop tools such as GRASS GIS, QGIS, SAGA or gvSig, GDAL, PROJ, PDAL libraries and other similar tools. Part of the course focuses on active scripting and developing plugins using the Python programming language. In addition, the students will get a general introduction to publishing geographic data and implementing GIS analyses in the Internet environment, GeoServer and MapServer, pygeoapi and OWSLib libraries, publishing platforms such as Gisquick, GeoNode and Margin Maps. Also mentioned are the issues of freely available geographic data, open geodata, and active data collection for the OpenStreetMap community project. Automation of deployment using Ansible and Docker technologies is mentioned in passing. Teaching is implemented on the open source platform GIS.lab.			
155FTG2	Photogrammetry 2	Z,ZK	5
Aerial photogrammetry. Relative and absolute orientation of aerial photos. Analogue, analytic and digital interpreting devices, computer support. Photogrammetric methods in mapping. Orthophoto, its accuracy. Photo triangulation, AAT, block and bundle adjustments, analytical photogrammetry. Digital photogrammetry, digital orthophoto, digital photogrammetric stations, optical correlation systems, aerial laser scanning, using of drones (RPAS).			
155GPL2	Survey Sketches 2	KZ	2
Students will learn about the preparation of geometric plans through practical exercises. It is mainly about the orientation of changes for updating the cadastral register by various measuring technologies and the subsequent processing of geometric plans as a technical basis for the introduction of these changes into the cadastral register in locations with different technical conditions - analogue cadastral map, digital cadastral map (DKM, KMD, etc.)			
155IN4G	Informatics 4	Z,ZK	5
In the course, students are introduced to techniques how to handle big amount of data. The course starts with data preprocessing by command tools before import into DB. The focus is related to relation databases, NoSQL databases, ElasticSearch, R and cloud.			
155KAT3	Cartography 3	Z,ZK	5
Advanced cartography, web map services and applications, dynamic maps, spatial data formats, data sources, standardization, web maps, trends in cartography.			
155MSPD	Modern Methods of Spatial Data Acquisition	Z,ZK	5
The course focuses on new modern and unconventional methods of geospatial data collection and presentation. Contains information on terrestrial, aerial and mobile laser scanning, about remote sensing and its methods, about hyperspectral imaging. Further, it focuses on the progressive method in geomathics - on RPAS. It informs about types, usage,legislation as well as about sensors and software for automatically processing for image data. Finally, geophysical methods and virtual reality technologies are presented.			
155PKAR	Project - Cartography	KZ	5
Map creation in GIS, geodatabase, data model, symbology, compositional elements of maps, geographical nomenclature, errors in maps.			
155PKAZ	Law in Cadastre and Surveying	ZK	2
Public and private, substantive and procedural law. Overview of legal regulations governing the cadastre of real estate (CN) and land surveying. Predecessors of surveying and cadastral authorities in the past. Surveying and cadastral authorities today. Thing, thing in the legal sense, division of things, immovable things, part of a thing and accessories of a thing. Land, parcel of land, land in jurisprudence, building, building in jurisprudence, small buildings, temporary buildings, building, unit. Origin of the CN and its predecessors, the Cadastral Act and implementing regulations, definition and purpose of the CN. Content of the CN, cadastral register, registration of rights in the CN, basic provisions. Rights entered into the CN by deposit, title deed, proposal for deposit, annexes to the proposal, deposit procedure. Deposit procedure, record, note. Administration of the CN, entries of other data, acceptance of data, time limits for entry in the CN, deposit of documents in the collection of documents, revision of the CN, correction of errors, obligations of owners and other beneficiaries, municipalities and public authorities. Surveying activities and geometrical plans, publicity of the CN, provision of CN data, offences, common, transitional and final provisions of the Cadastral Act. Real estate contracts. Previous legislation on land surveying, Land Surveying Act, introductory provisions, surveying activities. Rights and obligations in carrying out surveying activities, verification of results of surveying activities, geodetic reference systems and state mapping works, offences. Visit to the land register in the building of the Surveying and Cadastral Authorities in Prague Kobylisy.			
155TG4	Theoretical geodesy 4	Z,ZK	5
Theoretical Geodesy 4 introduces students to the field of space geodesy, i.e. using satellite observations of the Earth to define and maintain global coordinate systems, the Earth orientation parameters, models of the Earth's gravity field and ocean topography. The outputs of space geodesy form the basis from which one of the most widely used measurement techniques in geodesy GNSS is based.			
155TGD3	Theoretical geodesy 3	Z,ZK	5
Vector and scalar description of gravitational field of the Earth. Properties of gravitational potential and its derivatives for basic bodies. Description of gravity field of the Earth. Normal gravity field of normal bodies. Approximation of the shape of the Earth in form of geoid or level ellipsoid. Stokes´ and Molodensky´s solution of the shape of the Earth. Consequences of this procedures for geodesy (geoid, quasigeoid, heights). Construction and models of (quasi)geoid. Physical priciples of gravity surveying.			
155UZPR	Introduction to Spatial Data Processing	Z,ZK	5
The course focuses on automated processing of geospatial data. Practical exercises are divided into two parts. In the first part, the Python scripting language is used for data processing in combination with GeoPandas, Rasterio, Fiona and other libraries. The second part of the course is focused on geospatial data management in object-relational database systems and their processing using spatial SQL. Free connection to the courses Informatics 2 - Database Systems, Informatics 3 - Object-oriented programming, GIS1 and GIS2.			
155VFG	Photogrammetry -Project	KZ	5
practical metrical documentation of historical objects and sites, technology of documentation and data processing by modern methods			

155VTTG	Fieldwork Training in Theoretical Geodesy	KZ	1
Landsurveying in terrain is intended for the practice of measurement methods of geodesy and data processing work in the creation of a point field. Includes tasks: Long Range Triangulation and Trilateration (TRG) Determining the course of the quasi-geoid (GEO) Remeasurement and adjustment of height points with very precise leveling (VPN) Azimuth determination using the gyrotheodolite, gravimetric measurements			
155YCN1	Real Estate Valuation	Z,ZK	4
Real estate valuation is a very large field that intersects various areas such as construction, insurance, government, banking and land registry. During the lectures we will cover the basic concepts of real estate, methods of real estate valuation, for what purpose and when to use them. Market valuation - cost, comparative and income methods. Administrative valuation of real estate, valuation of easements and valuation of real estate in special cases such as loans, inheritance, community property, for insurance companies, etc.			
155YDPD	Visualization and Distribution of Spatial Data	Z,ZK	5
This course focuses on the digital modelling of a historic city and the subsequent presentation of the results on the web. Students will learn about the various tools and techniques used in digital modeling and spatial visualization. The main objective is to create a historical city model using Blender and then present it on a web page.			
155YFD	Photogrammetric Documentation of Historical Buildings and Sites	KZ	4
This course is organized in a project-based manner. Students will gain an overview of the methods and technologies currently used in the measurement documentation of historical objects and archaeological sites. The students will learn in detail about the production of various types of measurement documentation (2D building plans, 3D models, 2D photogrammetric outputs - photoplan, orthophoto, etc.) and the specifics of this type of work. Students will acquire theoretical knowledge and practical skills that will enable them to use individual documentation methods and technologies in their practice in projects in the field of heritage conservation. The course includes several lectures/seminars with invited practitioners (surveyor, archaeologist, conservationist..). In the practical part, students will prepare a measurement documentation of a part of a selected object (including data collection in the field). Students of the Faculty of Architecture also participate in this practical part within the "sister" course Monument Conservation III.			
155YGEI	Geoinformatics	Z,ZK	4
155YOPR	Object Oriented Programming	Z,ZK	5
This course extends "Informatics 3" course by object-oriented techniques demonstrated in C++ and Python programming languages.			
155YSKN	Information System of Cadastre of Real Estate	KZ	5
The aim of the course is to familiarize students with the Information System of the Cadastre of Real Estate (ISKN) and its connection to other information systems of the state administration, especially to the system of Basic Registers as defined by Act No. 111/2009 Coll.			
155YUSU	Introduction to Machine Learning in Remote Sensing	Z,ZK	5
Machine learning is an integral part of data analysis and predictive modelling in many fields, including remote sensing. The aim of the course is to acquire basic knowledge of machine learning algorithms and principles of model generalization and practical design of process lines. In the course, students work independently on assigned examples of machine learning applications using remote sensing data. A prerequisite for the course is correct generalization of the trained model, including theoretical evaluation of overfitting and underfitting. In the projects, students create their own Python scripts and critically evaluate the results.			
155YV3D	Visualization of 3D Models with Modern Technologies	Z,ZK	5
155YWEK	Web Cartography	Z,ZK	5
155YZPZ	Processing of Remote Sensing Data	Z,ZK	5
Digital image data processing collected mainly by satellite apparatuses. Practical methods of image data processing, their interpretation and classification. Individual themes depend on goals and themes of individual diploma thesis. 1. The Diploma Thesis (DT) topic analysis 2. Suitable source material selection 3. Geometric corrections of the processed data and their accuracy 4. Radiometric corrections of the processed data 5. Enhancement of individual bands 6. Multi-channel enhancement for DT - new channels calculation 7. Calculation of new channels by transformation to other systems - IHS, PCA, PCCA, 8. Classification pixel per pixel focused on DT goal 9. Image segmentation with various number of channels 10. Object oriented classification 11. Comparison of results - total, user's, producer's accuracy 12. Post-classification procedures to improve accuracy 13. Outputs - statistical, image, GIS types			

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