CONTENT

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ LHS/21	**Course name:** Aerial laser and hyperspectral scanning
Course type, scope and the method: **Course type:** 2 Lecture / 2 Practice	
Number of ECTS credits: 5	
Recommended course level: II. (Master)	
Learning outcomes: Knowledge: knowledge of theoretical and methodological aspects of aerial laser scanning and passive hyperspectral scanning and the possibilities of their application in practice; Skills: The student will acquire practical skills in advanced processing, analysis and visualization of digital lidar and hyperspectral data for use in geographic information systems; Competences: The student masters the key steps in the process of obtaining lidar and hyperspectral data, acquires the ability to critically evaluate the advantages and disadvantages of this data for various applications, creating team assignments will improve the ability of teamwork and the ability to present its results.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ ZKAR/21	**Course name:** Basics of Karstology and Speleology
Course type, scope and the method: **Course type:** 1 Lecture / 1 Practice	
Number of ECTS credits: 3	
Recommended course level: I., II. (Bachelor, Master)	
Learning outcomes: The student will gain theoretical and practical knowledge of karst and caves. The basis is an understanding of the functioning of the complexity of the karst area with mutually influencing natural components and, to a large extent, human activity. We will discuss the topics of human activity, its impact, environmental problems and natural threats in the karst. On the basis of practical demonstrations and field trips, the student will gain practical skills in working with various instruments and equipment and an overview of various computer programs and applications for the study of karst areas.	
Brief outline of the course: Karst as a concept, karstology as a science. Karst rocks, karst sediments and soils, process. Surface and underground karst forms. Karst hydrology and hydrography. Biospeleology - life in caves. Human life in the karst and its influence and land use. Expansion of karst and caves in Slovakia, expansion of karst and caves in the world. Basic techniques of mapping karst and caves, available computer programs and applications. Part of the course are practical demonstrations of devices for research of karst and caves, excursion to karst area and practical exercise in cave mapping.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ ZPRO/21	**Course name:** Basics of programming (Python)
Course type, scope and the method: **Course type:** 3 Practice	
Number of ECTS credits: 4	
Recommended course level: I. (Bachelor)	
Learning outcomes: 1 Knowledge: The student will gain knowledge of the basic structure of the Python programming language. The student will gain knowledge of basic and most used functions, libraries (eg ArcPy, PyGRASS) and commands in Python. Students will be familiar with the elements of visual programming using the ModelBuilder tool in ArcGIS Pro software, understand the meaning and use of scripts and Python in solving geospatial problems. Skills: The student will learn to create and implement scripts in Python for more efficient and faster solutions and subsequent analysis of geospatial tasks. Competences: The student is able to work with a high degree of independence with tools for creating scripts in the Python language and take full advantage of its functionality in the GIS software environment. In practice, the student is able to use the acquired knowledge and skills to simplify and automate tasks, helps to find more effective solutions, thereby increasing its added value	
Brief outline of the course: Introduction to PyScripter / PyCharm environment, basic features of Python language, syntax. Simple types (number, logical type), structured types (string operations and string methods, input and output redirection, list, dictionary, n-tuple, set) and control structures (FOR and WHILE cycles, conditional branching - IF). Working with ArcPy and PyGRASS libraries. Function definition (parameters, return value), function documentation. Types of errors and treatment of error conditions. Capturing and generating exceptions. Saving data to a file and reading data from a file. Troubleshooting using Python. Visual programming with ModelBuilder in ArcGIS Pro software. Creating scripts for geospatial data analysis.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ GIS/15	**Course name:** Geographic Information Systems
Course type, scope and the method: **Course type:** 2 Lecture / 2 Practice	
Number of ECTS credits: 6	
Recommended course level: I., II. (Bachelor, Master)	
Learning outcomes: The students gain knowledge on the intermediate level in the theory of geoinformation science, GIS, and Remote Sensing, GIS data models, methods of data processing and spatial analysis. They gain practical skills in processing of geographic data, management, analysis, and visualisation of the geographic data in a GIS project. Students acquire competence in defining a GIS project, suitable data models, methods of data acquisition, data processing, analysis and visualisation, presentation skills and skills in team work.	
Brief outline of the course: The course is focused on the following topics: geoinformatics as a scientific discipline, components of geographic information system, digital landscape representation and data models, GIS standards for coordinate systems and transformations, collection of geographic data for GIS (GNSS, photogrammetry, multispectral satellite imagery, lidar, radar) , data management in GIS, attribute and spatial demands, layer overlap, map algebra, spatial prediction, quality and uncertainty of geographic data, GIS web solutions, legislative aspects in GIS, GIS applications in practice. Exercises are focused on working in ArcGIS Pro: basic and advanced vectorization, data organization in the geodatabase, import / export of various data formats to GIS, creation of color compositions from satellite images, mapping, 3D visualization and animation of geographic data, geoprocessing, map algebra, spatial and attribute demands, spatial prediction, analysis of digital elevation models (DEM). Students learn the topics of the semester project in the middle of the semester and solve the assigned task in the team using the skills and knowledge acquired during the semester.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ GMP/21	**Course name:** Geomorphological mapping
Course type, scope and the method: **Course type:** 2 Practice	
Number of ECTS credits: 3	
Recommended course level: I. (Bachelor)	

Learning outcomes:

Knowledge:
• get to know the possibilities and use of geomorphological mapping,
• theoretical knowledge from working with instrumentation in the field,
• acquisition of knowledge at the level of synthesis from the field of geology and sub-spheres of geography.

Skills:
• compare and analyze different types of geomorphological maps of different scales, types of relief and country of origin,
• be able to create graphical outputs in a GIS environment. acquiring practical skills with working with instrumentation in the field,
• ability to transform from a mental (visual) environment to a thematic map,
• obtain, analyze and interpret data from field mapping,
• evaluate the basic phenomena directly in the field,
• map in the field and create a thematic map,
• evaluation of phenomena and processes in written and graphical form in the GIS environment.

Competences:
• be able to independently apply the acquired knowledge from geology and partial spheres of geography in practice,
• independently geomorphologically map a small area with the creation of a geomorphological map and its explanations,
• independent use of methods and devices for obtaining field data, their analysis and subsequent interpretation,
• plan and organize work subtasks during field mapping and processing of obtained information,
• the ability to independently interpret the knowledge gained by studying the subjects of physical geography in a particular area, to formulate conclusions.

Brief outline of the course:
The course deals with the issue of geomorphological mapping, geomorphological map and its importance. It deals with the history of geomorphological mapping, map works in Slovak and foreign professional literature, theory and practice of field research and mapping, compilation of explanations to the geomorphological map for various types of relief. In addition, with the help of graphical software tools, we work with morphometric and morphographic characteristics of the relief, morphogenetic and morphodynamic interpretation of the geomorphological map. In addition to the above theoretical basis, the exercise also includes a practical mapping of the relief in the field to a scale of 1:10 000 in the vicinity of Košice, which results in a geomorphological map, which is a semester output with evaluation.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ MZGD/21	**Course name:** Geospatial data collection methods
Course type, scope and the method: **Course type:** 2 Lecture / 2 Practice	
Number of ECTS credits: 6	
Recommended course level: I. (Bachelor)	

Learning outcomes:

Knowledge: The student will gain knowledge of the basic principles of ground geodetic measurements and digital processing of geodata in order to create topographic maps. Gains an overview of methods for measuring lengths, angles and heights in the field, determining the relative position of points on the calculation and display area and placement in coordinate systems. They will get acquainted with the possibilities of determining areas and volumes and plotting the measured data using a geographic information system.

Skills: The student will learn to obtain geospatial data using ground measurements, can locate them in different coordinate systems and represent them using GIS. Can evaluate the quality of data and determine the optimal procedure for the collection and primary processing of geospatial data.

Competences: The student is able to analyze with a high degree of independence the possibilities for the collection and processing of geospatial data and to propose a procedure for obtaining location information about landscape objects. He will get acquainted with basic professional terminology in the field of geodesy, which will enable him to communicate and collaborate with other experts in the field of geospatial data collection and processing.

Brief outline of the course:

Lectures: Units of measure - length measures, angular measures; Coordinate systems; Angle measurement; Length measurement; Position of points; Height measurement; Map materials for field measurements; Detailed measurement methods; Field measurement documentation; Determination of areas and volumes.

Exercises: Aids for measuring vertical and horizontal direction, geodetic instruments and their description, preparation for measurement, methods for measuring horizontal and vertical angles, measurement with magnetic instruments; Direct length measurement, electronic rangefinders; trigonometric methods of determining the position of points, determining the coordinates of points by polygons; leveling devices and aids, geometric leveling, trigonometric cant measurement; selected elements and methods of positional and height delineation

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ GNS/15	**Course name:** Global Navigation Satellite Systems
Course type, scope and the method: **Course type:** 2 Lecture / 2 Practice	
Number of ECTS credits: 5	
Recommended course level: II. (Master)	
Learning outcomes: To acquire basic theoretical knowledge and practical experience of the global navigation satellite systems (GNSS) for a data collection methodology for geoinformatics.	
Brief outline of the course: GNSS in the context of geography and geoinformatics. GNSS, their nature and division. GPS - operating principle, the principles and characteristics; structure of GPS and its applications; surveying GPS technology, GPS instrumentation, data collection and transmission observed GPS data. The European satellite navigation system Galileo; positioning, navigation and timing services of the system Galileo; Galileo infrastructure; structure and applications of Galileo. Overview of other GNSS (GLONASS, BNSS, EGNOS, WAAS, MSAS, QZSS, IRNSS etc.).	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ EXH/21	**Course name:** Human Geography Excursion
Course type, scope and the method: **Course type:** 6-day Practice	
Number of ECTS credits: 3	
Recommended course level: I. (Bachelor)	

Learning outcomes:

Knowledge: The student will verify the knowledge about the spatial distribution of human-geographical phenomena in a broader spatial context in the field, and will gain new knowledge that can be applied in further study and practice. The student is acquainted with the basic patterns and laws of distribution of population, settlements, territorial administration, logistics and transport infrastructure, cultural, educational, medical institutions and other public services, agriculture, forestry, industry, tourism and other economic activities in the country, even in the natural connection with physical-geographical or historical-geographical conditions.

Skills: Students build the ability to understand the functioning of selected human geographic phenomena directly in the field, to identify the causes of the location of selected production and non-production activities in the country. At the same time, they gain experience in organizing ex-courses, which they can use in pedagogical or professional practice.

Competences: The student is competent to actively participate, to carry out professional interpretation and discussion on a pre-prepared topic directly in the field, builds organizational competencies. Through the development of a project on a given topic, the student builds competencies in the field of teamwork.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ HGS1/21	**Course name:** Human Geography of Slovakia
Course type, scope and the method: **Course type:** 2 Lecture / 1 Practice	
Number of ECTS credits: 5	
Recommended course level: I. (Bachelor)	

Learning outcomes:

The aim of the course is to provide Knowledge: Students will gain comprehensive knowledge of individual areas of human geography in Slovakia and in its regions. The student will get acquainted with key information from the field of HG SR and also the basic spatial differentiation of the studied HG phenomena in the regions of Slovakia. Graduates of the course will gain current knowledge about the current state and development of economic sectors in Slovakia.

Skills: Upon successful completion of this course, students will be able to identify the basic principles and patterns of distribution of the population, settlements and economic sectors in Slovakia. Students can use basic methods used in geography to evaluate the basic demographic and economic indicators available for the Slovak Republic.

Competences: The student is able to lead individual and professional team work, apply geographical methods, which student became acquainted with during his studies to evaluate the distribution and development of selected HG phenomena in a particular area within the Slovak Republic. Based on suitable data, the student is able to prepare an analysis of the current state and also forecasts of the future development of selected demographic and economic indicators for the Slovak Republic.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ ZEX1/21	**Course name:** International Excursion 1
Course type, scope and the method: **Course type:** 10-day Practice	
Number of ECTS credits: 4	
Recommended course level: I. (Bachelor)	

Learning outcomes:

Knowledge: Students confront their geographical knowledge with the observed reality directly in the field, in connection with phenomena that cannot be observed in Slovakia. They gain new knowledge in the field of regional geography, physical, human geography and geopolitics, which they can use during further study.

Skills: Students build the ability to understand other cultures, the functioning of society, but also other physical-geographical or human-geographical phenomena abroad. At the same time, they gain primary experience in organizing excursions, which they can use in pedagogical or professional practice.

Competences: The student builds the basics of competencies to actively participate in the professional preparation of the excursion, to implement professional interpretation and discussion on a pre-prepared topic directly in the field, builds basic organizational competencies.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ ZDPZ/21	**Course name:** Introduction to Remote Sensing
Course type, scope and the method: **Course type:** 2 Lecture / 2 Practice	
Number of ECTS credits: 6	
Recommended course level: I. (Bachelor)	
Learning outcomes: 1. knowledge of theoretical and methodological aspects of remote sensing of the Earth and the possibilities of their application; 2. practical skills in processing, analysis and visualization of digital data from remote sensing in the GIS environment and other software for use in geographic information systems; 3. ability to critically evaluate the advantages and disadvantages of remote sensing methods and sensors for different applications; 4. ability to work in a team and independently, presentation of work results	
Brief outline of the course: • The course focuses on the following topics: Remote Sensing (RS) as a scientific discipline and historical context, physical principles of remote sensing - electromagnetic radiation, spectrum, interaction of the landscape with electromagnetic radiation, spectral behavior of objects in the landscape, satellite, aviation, unmanned and terrestrial remote sensing sensors, main principles and use of passive remote sensing methods (multispectral, thermal, hyperspectral scanning, photogrammetry) and active remote sensing methods (radar, lidar / laser scanning, sonar), access and sources of remote sensing data on the Internet (eg Copernicus) and applications of Remote sensing. • Exercises are focused on working in various software, especially ArcGIS Pro, Quantum GIS, Multispec, LAStools, Photomod Lite and include: searching and obtaining satellite multispectral data on the Internet, radiometric and atmospheric correction of multispectral images and color compositions from them, supervised and unsupervised classification of multispectral images and evaluation of its quality, processing of aerial stereo images and orthorectification, conversion of thermal record to earth surface temperature, filtration and classification of lidar data (from laser scanning), analysis of radar record. Students learn the topics of the semester project in the middle of the semester and solve the assigned task in the team using the skills and knowledge acquired during the semester.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ ISU/21	**Course name:** Land Information Systems
Course type, scope and the method: **Course type:** 1 Lecture / 2 Practice	
Number of ECTS credits: 5	
Recommended course level: II. (Master)	

Learning outcomes:

Knowledge: The student will gain knowledge of the basic structure and components of information systems about the geographical area. He will get an overview of the used information systems about the territory in public administration, engineering network administrators, industrial enterprises and service providers. They will get acquainted with the individual types of data used and with the most frequently performed spatial analyzes. Gain an overview of web GIS and its importance for the communication of geographic information via the Internet, existing map servers, geoportals and web GIS tools used to interpret geographic information. They will understand the importance of the integration of information systems about the territory with non-geographic information systems and the legislative framework for publishing geospatial data on the Internet.

Skills: The student will learn to obtain and work with geospatial data and information used in information systems about the territory in various software environments and publish them on the Internet in the form of webGIS or other online tools.

Competences: The student is able to analyze with a high degree of independence the possibilities of deploying an information system about the territory in organizations using geospatial data and design a suitable hardware and software solution and determine the appropriate type of data. In these tasks he can communicate and cooperate with other experts, formulate opinions and recommendations in the creation and use of information systems about the territory.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ LOS/18	**Course name:** Linux and open source GIS
Course type, scope and the method: **Course type:** 2 Practice	
Number of ECTS credits: 3	
Recommended course level: I., II. (Bachelor, Master)	
Learning outcomes: The student will gain knowledge about open source software, its history, availability, license terms of its use and installation. At the same time, he will acquire practical skills in the basic control of the Linux operating system and selected open-source GIS software, especially GRASS GIS and QGIS. The student will be competent to work with geospatial data, perform basic spatial analysis and create map outputs in individual open-source GIS software.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ HGV/21	**Course name:** Methods of human geographical research
Course type, scope and the method: **Course type:** 3 Practice	
Number of ECTS credits: 3	
Recommended course level: I. (Bachelor)	

Learning outcomes:

Knowledge: The student is acquainted with the basic methods of human geographic research, including data collection, analysis, evaluation and interpretation. The student understands what methods can be used for specific research goals.

Skills: The student is oriented in the applicability of various methods in human geographic research and is able to compile a methodological framework for a specific research goal. During the course, the student gained practical experience with selected methods of data collection, analysis and evaluation.

Competences: The student is competent to independently compile a methodological framework for specific human geographic research. Thanks to practical experience with the application of selected methods, he has an overview of their time intensity, thanks to which he is able to better manage the time management of the research.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ FGV/21	**Course name:** Methods of physical geographical research
Course type, scope and the method: **Course type:** 3 Practice	
Number of ECTS credits: 3	
Recommended course level: I. (Bachelor)	
Learning outcomes: Knowledge: • acquisition of theoretical knowledge of information from work with instrumentation in the field, • acquisition of knowledge at the level of synthesis from the field of geology and sub-spheres of geography. Skills: • acquisition of practical skills with working with instrumentation in the field, • ability to transform from a mental (visual) environment into a thematic map, • obtain, analyze and interpret data from field mapping, • evaluate the basic phenomena directly in the field, • map in terrain and create a thematic map, • evaluation of phenomena and processes in written and graphical form in the GIS environment. Competences: • independent field work and mapping of natural phenomena, • independent use of methods and devices for obtaining field data, their analysis and subsequent interpretation, • plan and organize partial work tasks during field mapping and processing of obtained information, • ability to independently interpret knowledge gained subjects of physical geography in a particular territory, formulate conclusions.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ MLK/21	**Course name:** Migration and human capital
Course type, scope and the method: **Course type:** 1 Lecture / 1 Practice	
Number of ECTS credits: 3	
Recommended semester/trimester of the course: 2.	
Recommended course level: II. (Master)	

Learning outcomes:

Knowledge: The student will deepen their knowledge of migration, its spatial forms, motivations and selectivity. They will get acquainted with the concepts of stages of urban development and differential urbanization, which evaluate urban development on the basis of migration. They will gain knowledge about human capital as an important factor in regional and local development and the patterns of its spatial distribution at the intra-regional, interregional and international level.

Skills: The student will deepen the skills of data processing (harmonization, synchronization) of various character. Can apply advanced indicators and methods, apply appropriate graphic and cartographic methods at different spatial levels. The student is able to present the results and lead a discussion about them.

Competences: The student is competent to lead independent and team professional work in the field of migration and human capital. Within it, it is able to apply appropriate advanced methods of data processing and analysis using appropriate indicators. He can interpret the results objectively and visualize them appropriately graphically. He is able to approach the evaluation of results critically, he distinguishes correlations and causality.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ PHR/11	**Course name:** Natural hazards and risks
Course type, scope and the method: **Course type:** 2 Lecture / 1 Practice	
Number of ECTS credits: 4	
Recommended course level: II. (Master)	

Learning outcomes:

After this subject graduation the student should to be fammiliar with all important natural hazards, that influence human beying and consequences huge economic and social damage. The student should know all different origin factors and should be able to evaluate model situation and case studies.

At the same time, he will acquire practical skills in working with GIS in modeling and evaluation of natural threats in model areas, acquire communication skills in working with a partner in solving model crisis situations and will work with various databases of highly up-to-date information and data.

Brief outline of the course:

The subject deals with hazards and risk as f.e. earthquakes and secondar hazards, tsunami, volcanoes and volcanism, relief forms, volcanic hazards and case studies. In next semester weeks we are deals with other types of hazards that are typical for Slovakia also, landslides, rock collapses, subsidence, foods, avalanches and collapses in karstic or non-karstic areas. Many hazards are really important but not well known - so we are talking about soil hazards (devaluation and erosion) also. In long term period and importance for human beying these hazards are the most important.

During the semester we will pay attention on these topics:

1. main terms, tektonic movements
2. earthquakes and secondary hazards
3. tsunami as a natural hazards and risk for a human
4. volcanoes and volcanism, relief forms, volcanic hazards and case studies
5. Water and wind erosion
6. Landslides and other dynamic processes
7. Subsidence, karstification and liquification of sediments
8. Avalanches
9. Floods as an very important hazard for human settlements
10. Natural fires
11. Atmospheric natural hazards and classification
12. Huricanes

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ EXF/21	**Course name:** Physical Geography Excursion
Course type, scope and the method: **Course type:** 6-day Practice	
Number of ECTS credits: 3	
Recommended course level: I. (Bachelor)	
Learning outcomes: Knowledge: The student will gain knowledge about different types of countries, mutual relations between FG spheres and their differentiation. Skills: The student will gain experience in distinguishing the phenomena of the country in analyzing the relationships between the various components in the real country. Competences: The student will be able to independently identify different types of countries and forms, will be able to analyze the basic processes taking place in the country, as well as the causes of these processes. Gains the ability to confront theoretical knowledge with real knowledge.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ FGS1/21	**Course name:** Physical Geography of Slovakia
Course type, scope and the method: **Course type:** 2 Lecture / 1 Practice	
Number of ECTS credits: 5	
Recommended course level: I. (Bachelor)	
Conditions for course completion:	
Learning outcomes: Knowledge: • Mastering the characteristics of individual components of the physical and geographical sphere of Slovakia, • understanding the links and relationships between individual natural components and the basic topography of Slovakia with respect to known phenomena, • understanding the relationships between individual natural components of Slovakia and their impact on human-geographical conditions. Skills: • spatial data processing in GIS for individual geomorphological units of Slovakia, • create thematic maps, work with thematic databases, • spatial orientation of physical and geographical phenomena on the map. Competences: • to work independently with relevant sources of literature (in the processing of the semester task), • to present the processed task on the basis of previously acquired skills and knowledge	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ PAM1/21	**Course name:** Spatial analyses and modelling
Course type, scope and the method: **Course type:** 2 Lecture / 2 Practice	
Number of ECTS credits: 6	
Recommended course level: II. (Master)	

Learning outcomes:

Knowledge: The student will gain knowledge and overview in the concepts of spatial analysis and modeling of spatial phenomena using geodata in the geographic information system. They will get acquainted with the theoretical and methodological basis of selected spatial analyzes and approaches to modeling spatial phenomena.

Skills: The student will learn to prepare spatial data for spatial analysis and modeling of spatial phenomena. They will get acquainted with specialized software tools, modules and extensions for GIS. Can perform spatial analyzes and model selected spatial phenomena, evaluate the suitability of their use and interpret the results of spatial analysis and modeling of spatial phenomena.

Competences: The student is able to design a procedure for the analysis of spatial phenomena using geodata with a high degree of independence and evaluate the suitability of the methods used in their analysis.

Brief outline of the course:

Lectures:

Basic concepts of spatial analysis, their definition and classification; Point field analysis and spatial autocorrelation, distance analyzes; Graph theory and network analysis; Nuclear density analysis; Geographically weighted regression; Trend surface and multivariate spline; Geostatistical concept of spatial dependence; Spatio-temporal analysis and modeling, TimeGIS; Solar radiation modeling; Water flow and erosion modeling; Cellular automata; Fluid dynamics modeling

Exercises: Software tools for spatial analysis and modeling; Point field analysis and spatial autocorrelation, distance analyzes; Graph theory and network analysis; Nuclear density analysis; Geographically weighted regression; Trend surface and multivariate spline; Geostatistical concept of spatial dependence; Spatio-temporal analysis and modeling, TimeGIS; Solar radiation modeling; Water flow and erosion modeling; Cellular automata; Fluid dynamics modeling

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ BLS/21	**Course name:** Unmanned Aerial Vehicles
Course type, scope and the method: **Course type:** 1 Lecture / 2 Practice	
Number of ECTS credits: 4	
Recommended course level: II. (Master)	

Learning outcomes:

Knowledge: The student will gain knowledge and general overview of the conditions of the UAS flight, which includes the following areas:

- Aviation law and air traffic control procedures
- General knowledge of aircraft
- Aircraft performance and flight planning
- Aeronautical meteorology
- Operating procedures
- Flight basics

Furthermore, the student will gain knowledge about the parameters of cameras and data processing from images based on the structure-from-motion algorithm.

Skills: The student will learn to prepare the UAS for flight, can plan an flight mission, can perform imaging using UAS, can process data from UAS using specialized software and can evaluate the quality of such data.

Competences: The student is able to design a procedure for performing aerial measurement work using UAS based on close range photogrammetry, process and analyze photos from non-surveying cameras and evaluate the quality of data, especially orthophotomosaics and point clouds.

Brief outline of the course:

Lectures:

Aviation law and air traffic control procedures; General knowledge of aircraft and UAS specifics; Aeronautical meteorology; Operating procedures; Flight basics and flight planning; Image processing using a structure-from-motion algorithm, Algorithms for automatic image structure recognition; evaluation of data quality obtained based on photogrammetry from UAS, UAS applications

Exercises: part of the exercises is carried out in the field, which involves performing several types of flights using a flight plan, some exercises are carried out in professional classrooms - pre-flight preparation, data processing in specialized software, individual work and consultations for the semester assignment, presentation of the semestral work.