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: Practice / Lecture
Recommended course-load (hours):
Per week: 1 **/** 3 **Per study period:** 14 **/** 42
Course method:

Number of ECTS credits: 4

Recommended semester/trimester of the course: I. (Bachelor)

Course level:

Prerequisities:

Conditions for course completion:
Obtaining the prescribed minimum number of points for solving practical test tasks in the middle (30%) and at the end of the semester (70%). The possibility of obtaining points for activity and solving tasks during the semester. Credits will be awarded only to students who achieve a grade of at least E in each part of the assessment. Grading scale: A (91-100%), B (81-90%), C (71-80%), D (61- 70%), E (51-60%).

Learning outcomes:
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.
Week 1 – Introduction to the Pycharm/PyScripter environment, operators, basic information, resources.
Week 2 – Basic commands, variables, assigning values to variables, types of variables, changing the type of variables, functions.
Week 3 – Conditionals (IF), Conditional Branching (IF), String operations and String methods,

input and output redirection.

Week 4 – For and while loop, range function, simple mathematical algorithms and algorithms with strings. Cycles with a defined number of repetitions (FOR). Cycles with an undefined number of repetitions (WHILE).

Week 5 – Data types (simple types, sequences, sets, maps), data types, int, float, str, list, data operations and simple algorithms, working with files - reading from a file, writing to a file.

Week 6 – Exceptions and errors - syntactic, logical and runtime errors, exceptions, exception capture and generation and input data analysis, repetition.

Week 7 – 1st credit report

Week 8 – VPL - Procedures of visual programming

Week 9 – ModelBuilder - creation of models with iterators, parametric models

Week 10 – ModelBuilder - export of models to Python scripts

Week 11 – Creating scripts for ArcGIS

Week 12 – Parametric scripts, calling scripts from ArcToolbox, creating help

Week 13 – 2nd credit report

Recommended literature:

Course language:

Notes:

Course assessment

Total number of assessed students: 21

Course assessment is visible only in case of include the course to some study plan.

Provides: Mgr. Jozef Bogľarský, Mgr. Anastasiia Enderova, prof. Mgr. Jaroslav Hofierka, PhD.

Date of last modification: 10.02.2020

Approved: