1.	Field of study	Geography
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2020/2021 (winter term), 2021/2022 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

Module: Optional module II: Programming for GIS (Pyton II)

Module code: 04-GF-S2-1120

1. Number of the ECTS credits: 4

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
04-GF-S2-1120_1	The major educational outcome of this computer laboratory is implementation of programing skills by exercise basic procedural programming and also object oriented programming methods. High level programming language will be used for data analysis and visualization useful not only in geosciences but in wider spectrum of scientific problems.	KGG2_K01 KGG2_U01 KGG2_U02 KGG2_U03 KGG2_U04 KGG2_W02	2 3 3 2 3 4
04-GF-S2-1120_2	Students are able to develop simple script useful with data preprocessing for geoscience data analysis. Students are familiar with Machine Learning (ML) in neural network (NN) with open source programming libraries like Keras and TensorFlow Toolkits in Python programing language. Students are familiar with the different types of data used in geosciences. After course students will be able to develop computer applications dedicated to solve complex calculations. . Students understand and uses general English terminology associated with the computer application programming processes. Student will be able use free software to develop their scripts and programs on any operating system.	KGG2_K01 KGG2_K02 KGG2_U01 KGG2_U02 KGG2_U03 KGG2_U04 KGG2_W02	1 1 3 3 2 2 4

3. Module description

Description	The exercises will help student to understand computer programming and advantages from developing their own programs focused on solving particular problem which are not possible or vary hard to solve without advanced and expensive software. Practice also will help student to optimize their methods at solving complicated scientific problem not only in geoscience but with all sciences where data processing is often required. After participating in this module Student should be able call himself programmer at least on the medium level.

Prerequisites	The course is provided in English therefore students attending it should be able to understand written and spoken English. Students should be able to communicate their thoughts and ideas in English as the course has an interactive character and discussion is a vivid part of educational process. Additionally, those wishing to participate in the course should be familiar with computer usage; being familiar with Google Colaboratory or PyCharm. Experience with Python 3, C++, Visual Basic or other programing language will be additional advantage.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
04-GF-S2-1120_w_1	Computer science project	Students will write few scripts at wider spectrum of complexity of problems to solve. This will allow students to practice basic programming structures in one of the high-level programming languages. This will help students to exercise their skills in computational thinking and solving different programming problems. Students will do practical exercise with big data sets coming out from Internet databases, local databases and plain text or binary files. Working alone and in groups containing 2-3 students is planned.	04-GF-S2-1120_1, 04-GF-S2-1120_2

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
04-GF-S2-1120_fs_1	laboratory classes	Students work with computers alone and in groups. Teaching will be conduct using the Problem Based Learning (PBL) methodology. Lecturer in mentor role will help student solve their key problems.	30	Students will use one of freeware IDE (Integrated Development Environment) available in cloud or installed locally to write scripts focused on solving particular problem often encountered during data processing. Students will be working with databases and datasets of different kind including text and binary files, images etc. Student will get several homework, which should provide them the opportunity to consolidate knowledge and apply information they have learned. Students will be obliged to improve their knowledge based on the recommended literature	70	04-GF-S2-1120_w_1