I028	Obligatory - Semester 5	**Programming and Software Engineering**	L+P+S 1+2+0	ECTS 4

Course objectives. Students will be taught the basic ideas of more complex programming techniques and programming in the general-purpose, interpreted high-level programming language such as Python. The main task is to introduce the students of mathematics to more advanced, but not necessarily more difficult, concepts in programming.

Course prerequisites. Introduction to Computer Science, Introduction to Programming.

Syllabus.
Object-oriented programming, structural programming in Python.
1. Operators and variables. Lists, ordered lists.
2. Strings. Dictionaries.
3. Branching. Loops. Functions.
4. Classes and objects. Program organization.
5. Exceptions. Iterators.
6. Reading and writing to external files. Modul construction. Parsing textual files.
7. Programming graphical user interface.
8. Program testing.
9. Numerical programming in Python. Floating point numbers, arithmetic, built-in mathematical functions, complex numbers, etc.

Expected learning outcomes.
After the completion of the course, students are expected to:
- demonstrate the knowledge and intelligence as the basis for the original work and development of ideas;
- apply their knowledge, understanding and ability to problem solving in a wider context in the area of software engineering;
- be capable of integrating new knowledge in the area of software engineering;
- be able to communicate their conclusions and supporting arguments to both experts and non-experts;
- possess the learning ability for continuing education and lifelong learning in this area.

Teaching methods and student assessment. Lectures will contain many examples with in-depth explanations. Exercises will be held in specialized computer-based laboratories where students will learn how to program in Python. The final exam will be held after the completion of lectures and exercises and it will contain practical tasks each student will have to complete independently.

Can the course be taught in English: Yes.

Basic literature:
1. M. L. Hetland, Beginning Python: From Novice to Professional, Apress, 2008.

Recommended literature:
1. M. Essert, Python, Odjel za matematiku, Sveučilište Josipa Jurja Strossmayera, Osijek, 2007. available on the website of the course.
2. H. P. Langtangen, Python Scripting for Computational Science, Springer, 2005.
3. J. Payne, Beginning Python: Using Python 2.6 and Python 3.1, Wiley Publishing, 2010.