

I061	<b>Computational Thinking and Programming I</b>	L	P	S	ECTS 5
		2	2	0	

**Course objective.** The main aim of this course is to introduce complex programming techniques and thinking, utilization of high level programming languages. Students will be familiarized with the advanced concept of programming and programming considerations.

**Prerequisites.** Undergraduate mathematics or computer science study programme.

**Course content.**

1. Basic data types in Python: boolean type, whole numbers, the sliding point and complex numbers, alphanumeric characters. Arithmetic, logical and relational operators. Initialize variables.
2. Branching. Loop. Functions.
3. Lists. Strings. Dictionaries.
4. Exceptions. Debugging. Testing program.
5. Classes and objects. The organization of the program.
6. Manage files. The construction of the module. Parse text files.
7. Using Python library Matplotlib and Pandas for data visualization and analysis.

**LEARNING OUTCOMES**

No.	LEARNING OUTCOMES
1.	Use strings as a data structure for processing alphanumeric data.
2.	Apply data structure lists and dictionaries in solving the problem.
3.	Design and implement a class.
4.	Apply the concept of inheritance and bridging (overload) in the design range.
5.	Eliminate errors in the program and test software solutions.
6.	Use the available programming libraries for data display and analysis.

**RELATING THE LEARNING OUTCOMES, ORGANIZATION OF THE EDUCATIONAL PROCESS AND ASSESSMENT OF THE LEARNING OUTCOMES**

TEACHING ACTIVITY	ECTS	LEARNING OUTCOME **	STUDENT ACTIVITY*	EVALUATION METHOD	POINTS	
					min	max
Attending lectures and exercises	1	1-6	The presence at lectures, discussions, teamwork and independent work on assignments	Attendance lists, tracking activities	3	10
Assignments	2	1-6	Solving problems	Verification of correct answers (evaluation)	17	30
Written exam (Mid-terms)	2	1-6	Preparing for written exams	Verification of correct answers (evaluation)	30	60
TOTAL	5				50	100

**Teaching methods and knowledge assessment.** In lectures, students will learn programming with a focus on the use of available data structures. In exercises, students solve programming tasks where they use data structures and algorithms. During the semester, students solve assignments, which consist of programming tasks. The theoretical and practical knowledge will be examined in the written exam. Satisfactory scores on programming assignments and quizzes can replace written exam.

**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. H. P. Langtangen, *Python Scripting for Computational Science*, Springer, 2005.
2. J. Payne, *Beginning Python: Using Python 2.6 and Python 3.1*, Wiley Publishing, 2010.