Study program	Level of studies		**Second cycle**	
	Study program name		**Physics Education**	
Course name	**COMPUTATIONAL PHYSICS I**			
Course ID	Semester	Course status	ECTS credits	L+E
PCS7612	**I**	**MANDATORY**	**6**	**2+2**
Lecturer				
Aims and intended learning outcomes	The course aims to equip students with the fundamentals of programming through the Python language and to integrate this skill into problem-solving in physics. Students will develop a fundamental understanding of programming, grasp Python concepts, and apply them to various physical scenarios. The expectation is that they will acquire the ability to analyze physical problems and implement programming solutions using Python. The goal is to encourage independence, creativity, and critical thinking in students so that they can apply the acquired knowledge in a broader context of academic and research work. It is anticipated that the knowledge gained will serve as a foundation for further academic advancement and research in the field of physics.			

Course content

Markdown. Introduction to Python. Package installation. Logical expressions and operators. Variables and basic data types in Python. Functions and branching. For and While loops. Recursion. Symbolic computation in Python. Object-oriented programming (OOP). Algorithm complexity. Number representation. Errors, good programming practices, and debugging. Reading and writing data. Data visualization. Parallelization.

Student workload (hours)		Grading	
Lectures and Exercises	75	Assessment method	Points
Exam preparation	70	Test I	50
Written assignments	0	Test II	50
Other	5		
Total	150		
		Total	100

Literature

1. Kong, Qingkai, Timmy Siauw, and Alexandre Bayen. *Python programming and numerical methods: A guide for engineers and scientists*. Academic Press, 2020.
2. Johansson, Robert. *Numerical Python: Scientific Computing and Data Science Applications with Numpy, SciPy and Matplotlib*, Apress, Berkeley, CA, 2019.
3. Landau, Rubin H., Manuel J. Páez, and Cristian C. Bordeianu. *Computational physics: Problem solving with Python*. John Wiley & Sons, 2015.

Remarks

To pass the exam, a minimum score of 55% is required on each type of assessment. The exams are practical in nature, involving the solution of specific physics problems using a computer.