

Subject card

Subject name and code	Computer Programming, PG_00207538						
Field of study	Medical Physics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		3.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Krzysztof Dorywalski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	45.0	0.0	0.0	45
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	45		0.0		45.0	90
Subject objectives	The aim of the course is to acquire knowledge and skills in programming using a selected high-level language.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[FIZMEDL3_U05] Can program and use specialised software for calculations and data analysis, including in the field of imaging diagnostics, radiotherapy and biomedical signal analysis.	The student can formulate a simple numerical algorithm to solve a given problem. - The student can write and run a computer program in Python, processing numerical and text data. - The student can apply structured and object-oriented programming approaches to develop programs ready for testing and documentation. - The student can write a program that reads from and writes to alphanumeric files. - The student can test a program, identify and correct errors, and prepare documentation describing the program's functionality.	[SU5] implementation of a problem task [SU6] demonstration of practical skills
	[FIZMEDL3_K02] He is ready to constantly update his knowledge in physics and medical physics to solve cognitive and practical problems independently and to use the opinions and assistance of experts.	The student can: - independently search for and analyze up-to-date knowledge sources in programming and computational tools in medical physics; - adapt programming solutions to new practical problems; - utilize expert guidance and educational materials to improve analytical and programming skills.	[SK5] implementation of a problem task [SK6] demonstration of practical skills
	[FIZMEDL3_W05] Knows and understands to an advanced degree the key computational and programming techniques to an extent that enables their application in solving physical and medical problems, as well as in the presentation of results and data analysis.	Student: - has knowledge of structured and object-oriented programming in a selected high-level language (Python) - knows data types, control statements, arithmetic and logical operators in Python; - understands object-oriented programming concepts and can apply them in practical tasks; - knows and can use computational packages and tools for symbolic calculations; - knows and can use user software packages for data analysis and results presentation.	[SW5] implementation of a problem task
Subject contents	1. Introduction to Python and the Spyder IDE. 2. Data types, arithmetic and logical operators, conditional and control statements. 3. Complex data types: lists, tuples, dictionaries. 4. Procedural programming: functions, modules, basic work with packages. 5. Reading from and writing to alphanumeric files. 6. Elements of object-oriented programming: classes, objects, methods. 7. Basics of computational and data visualization packages.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	no applicable	0.0%	20.0%
	no applicable	51.0%	80.0%

Recommended reading	Basic literature	A.1. Used during classes: Instructions and materials provided by the instructor. A.2. Recommended for self-study: Eric Matthes, Python Crash Course, 3rd Edition, No Starch Press, 2022. Al Sweigart, Automate the Boring Stuff with Python, No Starch Press, 2019. Mark Reed, Python Programming for Beginners, Independently Published, 2022. Python Documentation: https://docs.python.org/3/ Online materials on computational and data visualization packages, e.g., NumPy and Matplotlib.
	Supplementary literature	R. Johansson, Numerical Python: Scientific Computing and Data Science Applications with Numpy, SciPy and Matplotlib. Apress 2024
	eResources addresses	
Example issues/ example questions/ tasks being completed	Write a Python program that: 1. Reads experimental measurement data from a CSV file (e.g., time, temperature, voltage). 2. Performs basic data analysis: calculates mean values, standard deviations, minimum and maximum values for each column. 3. Creates plots showing relationships between the data (e.g., temperature vs. voltage).	
Work placement	Not applicable	

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