GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Applied IT in Engineering, PG_00067188		
Field of study	Smart Renewable Energy Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Optional subject group Subject group related to scientific research 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	6.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Theoretical Physics and Quantum Informaton -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Patryk Jasik	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	45.0	15.0	0.0	75

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	75	9.0	66.0	150

Subject objectives

Familiarizing students with Python programming fundamentals, relevant tools and development environments, and the basics of working in cloud computing in the context of solving practical engineering, design, and research problems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W101] is able to make an in-depth identification of key objects and phenomena related to the field of study, as well as theories that describe them and applicable analytical and design methods	The student recognizes the need to use Python and its packages to write code that enables the solution of analytical, design, and research tasks.	[SW3] Assessment of knowledge contained in written work and projects
[K7_K01] is prepared to evaluate projects and operations in wind energy systems, demonstrating competencies in designing and optimizing renewable energy systems, including wind power	The student can use Python and dedicated programming environments and tools to carry out a project and produce a summary report of its results.	[SK5] Assessment of ability to solve problems that arise in practice
[K7_U01] is able to apply analytical thinking and solve technical problems related to renewable energy systems, including wind power, using engineering methodologies	The student knows how to create Python code to solve practical engineering, design, and research problems.	[SU1] Assessment of task fulfilment

Subject contents

Course content – lecture
Introduction to Git. Basic principles of code repositories. Creating, configuring, and managing development environments using Python with the Anaconda distribution. Creating, configuring, and managing virtual environments. Introduction to development tools: Jupyter Notebook, Microsoft Visual Studio, VS Code, PyCharm, and Google Colab. Introduction to Python: data types and control structures. Python as an object-oriented language. Selected Python packages: NumPy, Pandas, Matplotlib, SciPy, SymPy, and Scikit-learn. Introduction to cloud-based computing using Google Colab as an example. Exploratory data analysis in Python. Introduction to machine learning.

Prerequisites and co-requisites

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Two tests assessing practical programming skills.</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Individual project realization</td><td>60.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. James R. Parker,Python. An Introduction to Python Programming, Mercury Learning and Information
2. Krishna Kumar Mohbey, Brijesh Bakariya, An Introduction to Python Programming: A Practical Approach, BPB Publications
3. Wes McKinney, Python for Data Analysis. 3rd Edition, O'Reilly Media</td></tr>
<tr><td>Supplementary literature</td><td>1. Jake VanderPlas, Python Data Science Handbook. 2nd Edition, O'Reilly Media
2. Andreas C. MĂźller, Sarah Guido, Introduction to Machine Learning with Python. A Guide for Data Scientists, O'Reilly Media</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Example tasks for the practical programming skills tests:
Numerically and symbolically compute the given integral.
Solve the given differential equation using selected methods.
Write a program to check whether 2×2 matrices form a linear vector space over the field (K, +, *).
Plot the graph of a given function.
Solve the given system of equations.
Calculate the descriptive statistics for a chosen dataset.
Fill in missing data in a selected dataset.
Perform linear regression on a chosen dataset and evaluate its effectiveness.
Examine the characteristics of a chosen time series and change its sampling frequency.
Conduct a Fourier analysis of a chosen time series.

Guidelines for creating the project report:
Report title
Introduction motivation, objectives
Description of the data structure of the datasets, description of variables, data origin
Description of the data preparation process sequential steps
Exploratory data analysis assumptions adopted, a brief description of methods and chosen methodology
Data visualization tables, charts, graphs
Results, conclusions, and discussion
The report and all codes should be placed in a selected repository (e.g., GitLab, GitHub).</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.