



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Programming in data analysis

### Course

Field of study

Aerospace Engineering

Area of study (specialization)

Aeronautical engineering

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

2/2

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

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Tutorials

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Laboratory classes

30

Projects/seminars

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Other (e.g. online)

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### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

dr inż. Przemysław Grzymisławski

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Wydział Inżynierii Środowiska i Energetyki

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

### Prerequisites

Knowledge: The student has a basic knowledge of the basics of computer science and data analysis

Skills: The student can deal with specific problems appearing while writing scripts for data analysis; can find information on the internet and use it to solve your problem

Social competencies: Student is able to define priorities that are important in solving the tasks set before him. The student demonstrates independence in solving problems, acquiring and improving his knowledge and skills.



## Course objective

The aim of the course is to provide students with information on the analysis of data and programs and tools used in data analysis. Students gain knowledge and skills in creating programs (scripts) that automate data analysis.

## Course-related learning outcomes

### Knowledge

Student has knowledge in the field of mathematics, including algebra, analysis, theory of differential equations, necessary for numerically solving boundary problems, inverse problems, optimization, statistical analysis - K2\_W02

Student has detailed knowledge of programming languages used in programming engineering applications, databases, on-board systems, and network applications - K2\_W10

### Skills

Student has the ability to self-study using modern teaching tools, such as remote lectures, websites and databases, didactic programs, e-books - K2\_U03

Student can obtain information from literature, the Internet, databases and other sources. Can integrate the information obtained and interpret conclusions and create and justify opinions - K2\_U04

Student can use formulas and tables, technical and economic calculations using a spreadsheet programming tools of own authorship, specialized software - K2\_U05

### Social competences

Student understands the need to learn throughout life; he can inspire and organize the learning process of other people - K2A\_K01

Student is ready to critically evaluate the knowledge and content received, recognize the importance of knowledge in solving cognitive and practical problems and consult experts in the case of difficulties in solving the problem - K2A\_K02

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Practical exam on laboratories

## Programme content

Introduction to programming in the Python environment; presentation and discussion of the main data analysis libraries (NumPy, SciPy, Pandas, Matplotlib); data types; functions - creation, arguments, universality, using own functions in external files; types of input files and their loading; filtering results; operations on lists, matrices, dataframes; charts - data selection, chart creation, chart description, chart types, selection of the appropriate data type; operations on graphic files - file comparison, merging, marking and tracking the point; creation of interactive charts; Python scripts in the ParaView environment



## Teaching methods

Presentation, discussion, practical examples to solve

## Bibliography

Basic

<https://www.python.org/>, <https://matplotlib.org/>, <https://www.numpy.org/devdocs/>,  
<https://docs.scipy.org/doc/>, <http://pandas.pydata.org/>

Additional

<https://pillow.readthedocs.io/en/stable/>, <https://bokeh.pydata.org/en/latest/>,  
<https://www.paraview.org/>

## Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	34	1,4
Student's own work (literature studies, preparation for tests/exam, preparation for laboratory classes/tutorials) <sup>1</sup>	16	0,6

<sup>1</sup> delete or add other activities as appropriate