COURSE DESCRIPTION CARD - SYLLABUS

Course name
Data analysis and visualization

Course

Field of study
Electrical engineering

Year/Semester
2/3

Area of study (specialization)
Drive Systems in Industry and Electromobility

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
	15	
Tutorials	Projects/seminars	

Number of credit points

1

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

Prerequisites

The student starting this course should have a basic knowledge of computer science and numerical methods.

The student starting this course should have a basic knowledge of the measurement of electrical and non-electrical electromagnetic devices.

Course objective

Acquainting with the basic issues and concepts related to the analysis and visualization of data in the field of electrical engineering. Acquiring basic skills necessary for the analysis and processing of measurement signals and their interpretation. Acquiring the ability to use selected computational packages for the analysis and visualization of measurement data. Acquiring the ability to create software that enables data analysis, interpretation and visualization.

Course-related learning outcomes

Knowledge

1. The student has an extended knowledge of advanced numerical methods used to solve complex technical problems in electrical engineering.

2. The student has an extended knowledge of high-level programming with the use of object-oriented programming elements.

3. The student has in-depth knowledge of the construction and design of complex electrical systems, in particular measurement and control systems, knows the basic processes occurring in the life cycle of technical systems.

4. The student has extended knowledge in the field of measurements of electrical quantities and selected non-electrical quantities; has in-depth knowledge of the preparation of the results of the experiment.

Skills

1. The student is able to obtain information from literature, databases and other sources, make their interpretation, evaluation, critical analysis and synthesis, as well as draw conclusions and formulate and exhaustively justify opinions.

2. The student is able to formulate and test hypotheses related to engineering problems and simple research problems, develop detailed documentation of the results of the experiment, design task, interpret the obtained results and draw conclusions.

3. The student is able to prepare and present a presentation on the implementation of a project or research task and conduct a discussion on a specialist issue, taking into account a diverse group of recipients.

Social competences

1. The student recognizes the importance of knowledge in solving cognitive and practical problems and understands that in technology, knowledge and skills quickly become obsolete, and therefore require constant replenishment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Laboratory: rewarding practical knowledge gained during previous laboratory exercises, checking practical programming skills in Python (final test), assessment of knowledge and skills related to the implementation of individual and group programming projects.

Obtaining additional points for activity during classes, especially for: the ability to cooperate as part of a team practically carrying out a detailed task in the laboratory, the use of elements and techniques that go beyond the material of the lecture and laboratory exercises, aesthetic diligence of completed projects.

Programme content

Python programming basics, Anaconda system support. Basic Python libraries: NumPy, pandas, Matplotlib, SciPy, Scikit-learn. Data structures, reading and writing data, file formats. Support for arrays and vectors. Operations of joining, binding and transforming data. Charts and data visualization, charts: bar, line, point. Data aggregation and operations performed on groups. Examples of measurement data analysis in the time domain as well as frequency domain.

Teaching methods

Laboratory: performing laboratory exercises in teams under the supervision of the teacher.

Bibliography

Basic

1. W. McKinney, Python w analizie danych. Przetwarzanie danych za pomocą pakietów Pandas i NumPy oraz środowiska IPython. Wydanie II, Helion, 2018

2. W. McKinney, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython, 2nd Edition, William McKinney, 2018

3. M. Gągolewski, A. Cena, M. Bartoszuk :Przetwarzanie i analiza danych w języku Python, Wydawnictwo Naukowe PWN, 2016

4. J. Grus, Data science od podstaw. Analiza danych w Pythonie. Wydanie II, Helion, 2020

5. J. Grus, Data Science from Scratch: First Principles with Python, 2nd Edition, O'Reilly Media, 2019

6. T. P. Zieliński, Cyfrowe przetwarzanie sygnałów. WKŁ Warszawa 2005

7. A. Biernat: Analiza sygnałów diagnostycznych maszyn elektrycznych, Politechnika Warszawska, 2015

Additional

1. M. Krauss, E. Woschni, Systemy pomiarowo-informacyjne PWN Warszawa 1979

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	15	0,5
Student's own work (literature studies, preparation for laboratory classes) [1]	10	0,5

[1] delete or add other activities as appropriate