



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Statistics and machine learning for data analysis [S1ETI2>SiUMwAD]

Course

Field of study

Education in Technology and Informatics

Year/Semester

4/7

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

1,00

Coordinators

Lecturers

Prerequisites

Knowledge: knowledge of the programming basics in the chosen language. Skills: logical thinking, use of information obtained from the library and the Internet, programming in any programming language. Social competencies: understanding the need to learn and acquire new knowledge.

Course objective

The purpose of the course is to familiarize students with topics related to methods of data processing and analysis, their implementation in the Python/Matlab environment, as well as example of applications in engineering problems.

Course-related learning outcomes

Knowledge:

1. The student should know the basic concepts of digital data processing.
2. The student should know the basic applications of visualization methods and statistical analysis of digital data.

Skills:

1. The student is able to acquire information on visualization and processing of digital data.
2. The student is able to use the selected data processing or analysis method in the selected

programming environment.
digital data processing/analysis for selected engineering problem .

Social competences:

1. The student is aware of the importance of non-technical aspects of engineering activities.
2. The student is able to set priorities for the implementation of specific tasks.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Credit for the lecture based on the points earned on the test in the last class. Passing requires obtaining more than 50% of the points: >50% - dst, >60% - dst plus, >70% - db, >80% - db plus, >90% points - bdb.

Programme content

The curriculum includes the fundamentals and examples of digital data processing related to the application of statistical data analysis as well as machine learning techniques

Course topics

Lecture:

1. Data visualization.
2. Elements of statistics in data analysis - selected probability distributions, estimation of parameters and characteristics of distributions.
3. Application of statistical tests in data analysis.
4. Regression analysis.
5. k-nearest neighbor method.
6. Cluster analysis.
7. Selected machine learning techniques and examples of their application in data analysis.
8. Final test.

Teaching methods

Lecture: multimedia presentation illustrated with examples in Python/Matlab.

Bibliography

Basic:

1. W. Kryszicki, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach. Cz. 2 Statystyka matematyczna, Wydawnictwo Naukowe PWN, Warszawa 2007 [in Polish].
2. M. Gągolewski, M. Bartoszek, A. Cena, Przetwarzanie i analiza danych w języku Python, Wydawnictwo Naukowe PWN, Warszawa 2016 [in Polish].

Additional:

1. C.O. Wilke, Fundamentals of Data Visualization. A Primer on Making Informative and Compelling Figures, Wydawnictwo O'Reilly Media 2019.
2. J. Schwabish, Lepsze wizualizacje danych, Wydawnictwo Naukowe PWN, Warszawa 2024 [in Polish].

Breakdown of average student's workload

	Hours	ECTS
Total workload	28	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	13	0,50