COURSE DESCRIPTION CARD - SYLLABUS

Course name
Statistics for Engineers

Course

Field of study
Mathematics in Technology

Year/Semester
2/4

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
dr hab. Karol Andrzejczak, prof. PP

Responsible for the course/lecturer:

Prerequisites

Student knows the basic concepts and theorems in mathematical analysis, linear algebra and probability theory. He can apply basic discrete and continuous distributions. He can use computer assistance in calculations. Student is aware of the level of his knowledge in relation to the conducted research.

Course objective

The aim of the course is to familiarize students with selected issues of statistical inference and to perform statistical calculations and visualization of results in Matlab, as well as to acquire the ability to apply the acquired knowledge in solving engineering problems with computer support.

Course-related learning outcomes

Knowledge

Student has an extended and deepened knowledge of various areas of higher mathematics and a detailed knowledge of the use of statistical methods and tools in solving engineering problems;

has an extended and in-depth knowledge of the estimation and verification of hypotheses concerning the parameters of probabilistic models;

has a systematic knowledge of mathematical terminology and selected issues in the field of engineering sciences related to the field of study, also in a foreign language.

Skills

Student is able to use the knowledge of mathematical statistics in engineering issues;

is able to formulate a technical problem and carry out detailed research using statistical, analytical or simulation methods as well as interpret the obtained results and draw appropriate conclusions.

Social competences

The student is aware of the level of his knowledge in the field of research covering engineering, natural, economic and exact sciences;

is aware of deepening and expanding his knowledge in order to solve newly emerging technical problems.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: assessment of knowledge and skills on the basis of a written test at the last lecture in the form of 15-20 questions (test and open) with different scores. Passing threshold 45% of points.

Laboratory classes: assessment of knowledge and skills on the basis of two written tests. The sets consist of 4-6 differently scored tasks, depending on the degree of their difficulty. For ongoing activity, a student can get up to 15% of the total number of points. The pass mark is 50% of the total number of test and activity points.

Programme content

Update: August 31, 2020

Lectures:

• distributions of random variables used in statistics;

• population and sample, location and dispersion measures;

• central limit theorems and their engineering applications;

• point and interval estimation;

• the necessary sample size;

• testing hypotheses on expectation, variance and structure ratio in one population;

• tests for comparing expectation, variance, and structure indices in two populations;

• correlation, sample correlation coefficient, linear correlation coefficient testing, test for two correlation coefficients;

• regression, linear regression model, regression significance tested;

• non-parametric tests: independence test, goodness of fit test, sample randomness test.

Laboratory exercises: solving statistical problems with computer aided in the field of engineering applications of theories and models presented in lectures.

Teaching methods

Lectures:

• multimedia presentations supplemented with examples given on the board; lecture materials provided to students;

• an interactive lecture with questions to students and discussion development;

• introducing a new topic, preceded by a reminder of related content, known to students in other subjects.

Laboratory classes:

• use of computer software that allows students to perform tasks;

• introducing a new topic, preceded by a reminder of related content, known to students in other subjects;

• sets of tasks are made available to students electronically in advance, which enables students to prepare themselves better for classes.

Bibliography

Basic

D. Bobrowski, K. Maćkowiak-Łybacka, (2006) Wybrane metody wnioskowania statystycznego, Wydawnictwo Politechniki Poznanskiej.

Jay L. Devore, Probability and Statistics for Engineering and the Sciences.

J. Koronacki, J. Mielniczuk (2001) Statystyka dla studentów kierunków technicznych i przyrodniczych. WNT, Warszawa.

W. Krysicki i in., (1998) Rachunek prawdopodobienstwa i statystyka matematyczna w zadaniach, tom I i II, PWN, Warszawa.

Additional

D. Bobrowski, (1986) Probabilistyka w zastosowaniach technicznych, Wydawnictwo Naukowo Techniczne.

K. Andrzejczak, (1997) Statystyka elementarna z wykorzystaniem systemu Statgraphics. Wyd. PP.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	60	2,5
Student's own work (literature studies, preparation for laboratory classes, preparation for tests) [1]	40	1,5

[1] delete or add other activities as appropriate