COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basics of statistics

Course

Field of study

Building Engineering

Area of study (specialization)

Structural Engineering

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

Number of hours

Lecture

10

Laboratory classes

10

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

dr Ewa Bakinowska

email: ewa.bakinowska@put.poznan.pl

tel. 61 665 2816

Faculty of Control, Robotics and Electrical Engineering

Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

The student has basic knowledge of combinatorics and theory of probability resulting from the school program. The student has basic knowledge of mathematical analysis (differential calculus of functions of one variable, differential calculus of functions of many variables, integral calculus of functions of one variable and basics of matrix algebra). He can operate a computer. He can think logically. The student is aware of the learning purpose.

Course objective

The aim of the course is to familiarize students with selected problems of probability and mathematical statistics. Students acquire the ability to use probabilistic and statistical methods to describe technical issues.

Course-related learning outcomes

Knowledge

The student knows the basic probability distributions. The student knows the basic concepts of mathematical statistics. The student knows various methods of statistical inference, including the estimation of parameters and testing of statistical hypotheses. Knows how to use them in solving technical problems. Knows the basics of software used for statistical calculations (program R).

Skills

The student knows how to use theoretical probability distributions. Student is able to analyze and interpret statistical data. The student is able to apply the methods and tools of mathematical statistics in engineering practice in solving technical problems.

Social competences

The student understands the purposefulness of statistical studies. The student understands the need and knows the possibilities of continuous training.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Assessment of knowledge and skills acquired during the lecture is verified on the basis of a written test.

Laboratories: The assessment of knowledge and skills acquired in laboratories is verified on the basis of written tests.

Programme content

LECTURE

1. Random variable, distribution function, expected value, variance.

2. Discrete random variable. Discrete distributions.

3. The continuous random variable. Continuous distributions.

4. Point estimation. (Lecture). Confidence intervals.

5. Tests of significance: expected value, variance, proportion (one population).

6. Tests of significance: expected value, variance, proportion (two populations).

7. Analysis of variance. Tests for multiple comparisons (Fisher test, Tukey test , Dunnett test)

8. Pearson correlation coefficients. Linear regression. Testing the significance of regression.

9. Introduction to the environment R.

LABORATORY CLASSES

1. Random variable, distribution function, expected value, variance.

2. Discrete random variable. Discrete distributions.

3. The continuous random variable. Continuous distributions.

4. Point estimation. (Lecture). Confidence intervals.

5. Tests of significance: expected value, variance, proportion (one population).

6. Tests of significance: expected value, variance, proportion (two populations).

7. Analysis of variance. Tests for multiple comparisons (Dunnett test)

8. Pearson correlation coefficients. Linear regression. Testing the significance of regression.

9. Introduction to the environment R. Carry out the above statistical analyses using R.

Teaching methods

The lecture conducted with a multimedia presentation supplemented with examples given on the board. The lecture was conducted in an interactive way with the formulation of current questions to a group of students. Students actively participate in the lecture. Each presentation of a new topic is preceded by a reminder of content related to the issue (content known to students in other subjects).

Laboratories: All students receive electronically a list of tasks that are solved in the nearest laboratories. The theory, formulas and charts they need are provided electronically. Tasks are solved by students using the R software and on the board with the active participation of students. Students are taught to use the R program by a teacher. Frequent tests activate students to work systematically.

Bibliography

Basic

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

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

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

4. W. Kordecki (2010) Rachunek prawdopodobieństwa i statystyka matematyczna, Definicje, twierdzenia, wzory, Oficyna Wydawnicza GiS.

5. H. Jasiulewicz, W. Kordecki, (2003) Rachunek prawdopodobieństwa i statystyka matematyczna, Przykłady i zadania Oficyna Wydawnicza GiS

6. T. Górecki (2011), Podstawy statystyki z przykładami w R, Wydawnictwo BTC

Additional

1. Plucińska A., Pluciński E., Probabilistyka, Wydawnictwo WNT, Warszawa

2. R. L. Scheaffer, J. T. McClave (1995) Probability and Statistics for Engineers, Duxbury

Breakdown of average student's workload

	Hours	ECTS
Total workload	58	2,0
Classes requiring direct contact with the teacher	20	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests, preparation for passing the lecture) [1]	38	1,0

[1] delete or add other activities as appropriate