COURSE DESCRIPTION CARD - SYLLABUS

Course name
Theory of probability

Course

Field of study
Power Engineering

Year/Semester
1/1

Area of study (specialization)

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	0	0
Tutorials	**Projects/seminars**	
15	0	

Number of credit points

3

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 starting this subject should have 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 the basics of matrix algebra. The student is able to use the calculator and is able to use the relevant literature, draw on knowledge from various sources, including properly selected information from the Internet. The student understands the need for lifelong learning, is able to think in a creative way.

Course objective

knowledge of probabilistic and statistical methods and the ability to use them to analyze experimental data and to solve practical engineering problems

Course-related learning outcomes

Knowledge

The student has extended general knowledge in the field of mathematics covering the concepts and laws of probability theory, has knowledge of the methods of statistical inference, in particular in the field of estimation and testing of hypotheses needed to analyze and solve technical problems.

Skills

Student is able to determine the basic characteristics of random variables with discrete and continuous distributions. Student is able to apply known methods of statistical inference (including hypothesis testing) to solve practical problems (engineering, technical, including energy)

Social competences

The student is ready for critical assessment and analysis of issues.

The student understands the need for continuous training. Is ready to think and act in an entrepreneurial way. The student is active and involved in solving technical problems using probabilistic tools.

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 exam.

Exercises: Assessment of knowledge and skills acquired in the classes is verified on the basis of 4 written tests.

Programme content

LECTURE

1. Combinatorics. Evets.

2. Probability space.

3. Axiomatic definition of probability, classical probability.

4. Conditional probability, Bayesian model.

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

6. Discrete random variable. Discrete distributions.

7. Continuous random variable. Continuous distributions.

8. The two-dimensional random variable (Lecture). The independence of random variables.

9. Elements of descriptive statistics.

10. Point estimation.

11. Confidence intervals.

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

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

14. Analysis of variance.

15. Correlation coefficients (Pearson, Spearman, Kendall, multiple correlation). Significance test.

16. Linear regression. Testing the significance of regression.

17. Non-parametric tests

EXERCISES

1. Conditional probability, Bayesian model.

2. Discrete random variable. Discrete distributions.

3. Continuous random variable. Continuous distributions.

4. Elements of descriptive statistics.

5. Confidence intervals.

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

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

8. Linear regression. Testing the significance of regression.

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. During the lecture they receive tasks that they solve during the lecture with the participation of the lecturer. Each presentation of a new topic is preceded by a reminder of the content related to the discussed topic (content known to students in other subjects).

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

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	75	3,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for exercises, preparation for tests, preparation for the exam) [1]	25	1,0

[1] delete or add other activities as appropriate