COURSE DESCRIPTION CARD - SYLLABUS

Course name
Statistics in electric power engineering [S2Elenerg1>SwE]

Course

Field of study
Electrical Power Engineering

Year/Semester
1/2

Area of study (specialization)
Smart Grids

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

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

Course objective

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

Course-related learning outcomes

Knowledge:
the student knows various methods of statistical inference, including estimation of paramatres and testing statistical hypotheses. knows how to use them in solving technical problems, including power problems. has ordered and theoretically founded knowledge in the field of statistical analyzes supported by computer software: knows the basics of software used for statistical calculations (r

program).

Skills:
the student is able to use the methods and tools of mathematical statistics and software r in engineering practice, in solving technical problems.
he can analyze and forecast the effects of activities in the light of technical and environmental conditions.

Social competences:
the student is able to think and act in a creative and entrepreneurial manner; understands the need for actions to make the society aware of the development of the power industry, but also to reduce the risks it carries.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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. Descriptive statistics.
5. Tests of significance: expected value, variance, proportion (one population).
6. Tests of significance: expected value, variance, proportion (two populations).
7. Descriptive statistics.
8. Analysis of variance. Tests for multiple comparisons (Fisher test, Tukey test , Dunnett test)
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. Descriptive statistics.
5. Tests of significance: expected value, variance, proportion (one population).
6. Tests of significance: expected value, variance, proportion (two populations).
7. Pearson correlation coefficients. Linear regression. Testing the significance of regression.
8. Analysis of variance. Tests for multiple comparisons (Dunnett test)
9. Introduction to the environment R. Carry out the above statistical analyses using R.

Teaching methods

A lecture with a multimedia presentation supplemented with many examples. Interactive lecture 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 the content related to the discussed issue (content known to students from other subjects).
Laboratories: Students receive an electronic list of tasks that are solved in the laboratories. The needed theory, formulas and graphs are provided electronically. The tasks are
solved by students using the R software, with the active participation of the students.

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
3. Bakinowska E., (2011), A note on solving the likelihood equation in logistic model with the multinomial distribution, Biometrical Letters 48 No1 (23-32)

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00