COURSE DESCRIPTION CARD - SYLLABUS

Course name

Probability and statistics

Course

Field of study

Automatic Control and Robotics

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish language

Requirements

compulsory

Number of hours

Lecture

30

Tutorials

15

Laboratory classes

0

Projects/seminars

0

Other (e.g. online)

0

Number of credit points

4

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 and entrepreneurial way.

Course objective

- knowledge of probabilistic methods and the ability to use them to solve practical engineering problems.

-application of methods and tools of mathematical statistics for data analysis.

Course-related learning outcomes

Knowledge

1. Student has basic general knowledge in mathematics including the concepts and laws of probability theory.

2. The student knows the elements of descriptive statistics.

3. Knows methods of statistical inference, in particular in the field of estimation and testing of hypotheses.

Skills

1. Student is able to determine the basic characteristics of random variables with discrete and continuous distributions.

2. Student is able to apply known methods of statistical inference to solve practical problems (engineering, technical)

3. Student is able to obtain information from literature, databases and other sources, e.g. the Internet.

Social competences

1. The student is ready to critically assess his knowledge.

2. Student understands the need for continuous training.

3. The student is ready to think and act in an entrepreneurial manner.

4. The student is active and involved in solving technical problems using statistical 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 test.

Exercises: Assessment of knowledge and skills acquired in the classes is verified on the basis of 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

Lecture: The lecture conducted with a multimedia presentation supplemented by 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 solve them 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).

Exercises: Students from the all year receive electronically a list of tasks that are solved in the next exercises. The theory, formulas and charts they need are provided electronically. Tasks are solved on the board, with active participation of students. Students are taught by the teacher how to use calculators (using statistical functions) . 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

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	100	4,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, calculation of tasks presented in the exercises, calculation of tasks presented in the lecture, preparation for tests in the exercises, preparation for passing the lecture) [1]	50	2,0

[1] delete or add other activities as appropriate