



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Selected issues in mathematics

### Course

Field of study

Year/Semester

Transport

1/2

Area of study (specialization)

Profile of study

-

general academic

Level of study

Course offered in

First-cycle studies

polish

Form of study

Requirements

part-time

compulsory

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

18

0

0

Tutorials

Projects/seminars

9

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

dr inż. Barbara Popowska

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### Prerequisites

The student starting this subject should have basic knowledge of mathematics.

He should have the ability to solve basic problems in mathematical analysis, set theory and logic, the ability to use a calculator and the ability to obtain information from indicated sources.

They should also understand the need to expand their competences and be ready to cooperate as part of the team. Moreover, in terms of social competences, the student must present such attitudes as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.



### Course objective

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

### Course-related learning outcomes

#### Knowledge

The student has an extended and deepened knowledge of mathematics useful for formulating and solving complex technical tasks concerning various means of transport

The student knows the basic techniques, methods and tools used in the process of solving tasks in the field of transport, mainly of an engineering nature engineering

#### Skills

The student is able, when formulating and solving tasks in the field of transport, to apply appropriately selected methods, including analytical, simulation or experimental methods

#### Social competences

The student is aware of the importance of knowledge in solving engineering problems, knows examples and understands the causes of malfunctioning transport systems that have led to serious financial and social losses or to serious loss of health and even life

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Lecture:

Assessment of knowledge and skills on the basis of a written exam in the form of 10-15 questions (test and open) with different scores. Passing threshold 50% of points.

#### Tutorials:

Assessment of knowledge and skills on the basis of four written tests from consecutive parts of the material. Passing threshold of 50% of points for all papers

### Programme content

#### Lecture:

1. Probabilistic space
2. Classic, geometric, conditional, total probability, Bayesian formula, independence
3. One-dimensional discrete random variables
4. One-dimensional continuous random variables
5. Discrete distributions



6. Continuous distributions
7. Central Limit Theorems
8. Two-dimensional discrete random variable
9. Elements of descriptive statistics
10. Point estimation
11. Interval estimation
12. Verification of parametric statistical hypotheses for one population
13. Verification of parametric statistical hypotheses for two populations
14. Verification of nonparametric hypotheses
15. Correlation and regression.

Exercises:

1. Foundations of probability: classical probability, conditional probability, total probability, Bayesian formula.
2. Discrete and continuous random variables - functional and numerical characteristics
3. Selected discrete distributions
4. Selected continuous distributions
5. Basics of descriptive statistics
6. Estimation theory
7. Necessary sample size
8. The theory of hypothesis verification

### Teaching methods

Educational methods used:

a) lectures:

- a lecture with a multimedia presentation supplemented with examples given on the blackboard
- an interactive lecture with the formulation of questions to a group of students
- introducing a new topic preceded by reminding related content known to students from other subjects

b) exercises:



- exercises are solving example tasks on the board and initiating discussions on solutions

## Bibliography

### Basic

W. Kryszewski, (1998) Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, tom I i II, PWN, Warszawa

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

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

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

### Additional

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

Plucińska Agnieszka, Edmund Pluciński (2000) Probabilistyka, WNT.

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

## Breakdown of average student's workload

	Hours	ECTS
Total workload	70	3,0
Classes requiring direct contact with the teacher	27	1,0
Student's own work (literature studies, preparation for tutorials, preparation for tests and the final exam) <sup>1</sup>	43	2,0

<sup>1</sup> delete or add other activities as appropriate