



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Selected issues in mathematics [S1Trans1>WZM]

### Course

Field of study

Transport

Year/Semester

1/2

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

dr inż. Barbara Popowska

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### Lecturers

### 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:

Learning outcomes presented above are verified as follows:

Lecture:

Assessment of knowledge and skills on the basis of a written exam

Tutorials:

Assessment of knowledge and skills based on a written test.

### Programme content

Basics of probabilistics.

Discrete and continuous, one- and two-dimensional random variables

Basics of descriptive statistics.

Estimation theory.

Hypothesis verification theory.

### Course topics

LECTURE:

1. Probabilistic space. Axiomatic definition of probability, classical probability.
2. Conditional, total probability, Bayes' formula.
3. Discrete and continuous random variables. Functional characteristics.
4. Numerical characteristics of random variables.
5. Two-dimensional random variables
7. Central limit theorems.
9. Elements of descriptive statistics.
10. Point and interval estimation.
11. Significance tests for mean, variance, fraction (one population)
12. Significance tests for mean, variance, fractions (two populations)
13. Non-parametric tests
14. Correlation and regression.

EXERCISES

1. Conditional, total probability, Bayes' formula.
2. Discrete and continuous random variables.
3. Selected discrete distributions
4. Selected continuous distributions.
5. Elements of descriptive statistics.
6. Interval estimation.
7. Significance tests for mean, variance, fractions.

### 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. Krysicki , (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	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00