# COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematical Probability

## Course

Field of study

Security Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

## Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

30

Projects/seminars

## Number of credit points

3

## Lecturers

Responsible for the course/lecturer:

Ph.D., Eng., Barbara Popowska

Mail to: barbara.popowska@put.poznan.pl

Phone: 61 665 2815

Faculty of Automatic Control, Robotics and Electrical Engineering

ul. Piotrowo 3A, 61-138 Poznań

Responsible for the course/lecturer:

## Prerequisites

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

Should have the ability to solve basic problems of mathematical analysis, set theory and logic, the ability to use the calculator and the ability to obtain information from specified sources.

He should also understand the need to expand his competences, be ready to cooperate within a team. In addition, in terms of social competences, students must present attitudes such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, and respect for other people.

## Course objective

The aim of the course is to familiarize students with selected issues of probability theory and mathematical statistics. Students acquire skills in applying probabilistic and statistical methods to describe technical issues.

## Course-related learning outcomes

### Knowledge

He knows the issues in mathematics and statistics in the field of solving practical engineering problems. [P6S_WG_04]

Knows the basic methods, techniques, tools and materials used in preparation for conducting scientific research and solving simple engineering tasks using information technology, information protection and computer support. [P6S_WK_04]

### Skills

Is able to properly choose the sources and information derived from them, making an assessment, critical analysis and synthesis of this information. [P6S_UW_01]

Is able to plan and carry out experiments, including computer measurements and simulations, interpret obtained results and draw conclusions. [P6S_UO_01]

### Social competences

Is able to see the cause-and-effect relationships in achieving the set goals and rank the significance of alternative or competitive tasks. [P6S_KK_01]

Is aware of the recognition of the importance of knowledge in solving problems in the field of security engineering and continuous improvement. [P6S_KK_02]

Is aware of the responsibility for own work and readiness to comply with the principles of teamwork and taking responsibility for jointly implemented tasks. [P6S_KR_02]

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Assessment of knowledge and skills based on a written exam in the form of test and open questions, variously scored. Passing threshold 50% of points.

Exercises:

Assessment of knowledge and skills based on two written tests (in the middle of the semester and at the end). Passing threshold 50% of points from both works.

## Programme content

Lecture:

1. Probabilistic space

2. Classic, geometric, conditional, total probability, Bayesian formula, independence

3. Discrete and continuous one-dimensional random variables

4. Discrete and continuous distributions

5. Central limit theorems

6. Elements of descriptive statistics

7. Point and interval estimation

8. Theory of hypothesis verification

Exercises:

1. Basics of probability: classical, geometric, conditional, total probability, Bayes formula, independence

2. Discrete and continuous random variables - functional and numerical characteristics

3. Selected discrete distributions

4. Selected continuous distributions

5. Basics of descriptive statistics

6. Theory of estimation

7. The necessary sample size

8. Theory of hypothesis verification

## Teaching methods

The teaching methods used:

a) lectures:

- lecture with multimedia presentation supplemented with examples given on the board

- lecture conducted in an interactive way with the formulation of questions for a group of students

- presenting a new topic preceded by a reminder of related content known to students in other subjects

b) exercises:

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

- student activity during classes is included in the final grade

-students receive an electronic version of the tasks prepared by the lecturer in advance

## 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 | 3,0 |
| Classes requiring direct contact with the teacher | 45 | 2,0 |
| Student's own work (literature studies, preparation for tutorials, preparation for tests and exam) [1] | 30 | 1,0 |

[1] delete or add other activities as appropriate