COURSE DESCRIPTION CARD - SYLLABUS

Course name
Probabilistic methods

Course

Field of study
Computing

Year/Semester
1/2

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
16

Laboratory classes
16

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

5

Lecturers

Responsible for the course/lecturer:
dr hab. Marek Mika

Responsible for the course/lecturer:

Prerequisites

The student starting this course should have basic knowledge of mathematical analysis, logic and theory of multiplicity, and linear algebra. She/he she should also have the ability to obtain information from indicated sources and be ready to work within the team.

Course objective

Provide students with the basic issues of probability calculation and examples of their applications in computer science.

Course-related learning outcomes

Knowledge

1.Knowledge of the axiomatic definition of probability, the concept of conditional probability and the related theorems.

2. Knowledge of discrete and continuous random variables.

3. Basic knowledge about the use of theory of probability in computer science.

Skills

1. The ability to formally describe a space of elementary random events and to calculate the associated probability, in particular using classical and conditional probabilities.

2. The ability to formally describe a random variable, present its probability distribution and calculate its moments.

3. The ability to analyze a simple algorithm using randomness.

Social competences

1. The ability to work in a group in order to solve the problem more effectively.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge and skills are verified by an exam consisting of three complex tasks, each of which has no more than 10 points. The score of particular tasks (points) is given in the content of these tasks. To pass the exam, the student must obtain more than 50% of the points. Exercises are evaluated on the basis of the current activity of students, in particular, solving tasks at the board and a short final test containing 20-40 both closed and open questions.

Programme content

The lecture program includes the following issues:

Axiomatic definition of probability, conditional probability. The concept of a random variable, discrete and continuous random variables. Moments of random variables. Examples of probability distributions: binomial, Poisson, geometric, exponential, normal. Random two-dimensional variables, linear regression. Examples of pseudo-random number generators and good practices of their use.

The exercises program includes the following issues:

Axiomatic definition of probability, conditional probability. The concept of a random variable, discrete and continuous random variables. Moments of random variables. Examples of probability distributions: binomial, Poisson, exponential, normal. Random two-dimensional discrete variables. Analysis of a sample algorithm using randomness.

Teaching methods

1.Lecture: multimedia presentation, illustrated with examples given on the board; discussion.

2. Exercises: tasks solved at the board, group work, discussion.

Bibliography

Basic

1. J. Bartoset al.: Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach część 1 PWN 2020

2. U. Eli: Metody probabilistyczne i obliczenia. Algorytmy randomizowane i analiza probabilistyczna WNT 20092.

Additional

1. A. Plucińska, E. Pluciński: Probabilistyka. PWN 2020

2. M. Heller: Filozofia przypadku. Copernicus Center Press 2013

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	34	1,4
Student's own work (literature studies, preparation for exercises, preparation for test and exam, individual task solving) [1]	91	3,6

[1] delete or add other activities as appropriate