COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics - probability calculus [N1EiT1>MATRP]

Course

Field of study
Electronics and Telecommunications

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

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Prerequisites

A student starting this subject should have a basic knowledge of mathematics secondary school level. He should also be able to perform basic operations algebraic and solving equations and inequalities. In addition, the student should understand the need for further training.

Course objective

Providing students with basic knowledge of the theory of probability theory regarding methods determining the probabilities of random events, examples of random variables, methods determining the parameters of random variables and the possibility of using selected distributions random variables to describe random phenomena.

Course-related learning outcomes

Knowledge:
1. Knows the basic concepts and theorems of the probability theory and examples continuous and discrete random variables.
2. Has knowledge of the theory of probability regarding the possibility of applying selected ones distributions of random variables to model appropriate random phenomena.

Skills:
1. Can obtain information from literature.
2. Applies appropriate theorems to determine the probabilities of random events, lists examples of random variables, determines the parameters of discrete and continuous random variables, uses appropriate types of distributions of random variables to analyze random phenomena.

Social competence:
He knows the limitations of his own knowledge and skills, understands the need for further training.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Skills acquired during practical classes, related to the application of knowledge to solving tasks, are verified on the basis of a colloquium, which is carried out at recent practice sessions. The condition for receiving a positive evaluation is to obtain at least 50% of the possible points from the mentioned colloquium.
Grading scale:
- 0%-50% - 2.0,
- 50%-60% - 3.0,
- 60%-70% - 3.5,
- 70%-80% - 4.0,
- 80%-90% - 4.5,
- 90%-100% - 5.0.

Exam in test form, grading scale as above.

Programme content

Lecture
1. Elements of combinatorics (permutation, variation with repetitions, variation without repetitions, combination).
2. Random events and probability (elementary event space, classic definition probabilities, general definition of probability, probabilistic space, event random, probability properties, geometric probability, probability conditional, total probability theorem, Bayes formula, independence of events random).
3. Random variables and their distributions (definition of a random variable, properties of random variables, distribution random variable, distribution function of random variable and its properties, review of selected type distributions discrete (one-point distribution, two-point distribution, Bernoulli distribution (binomial), Poisson distribution, geometric distribution, Pascal distribution (negative binomial), distribution hypergeometric), density function of random variable, review of selected distributions of continuous type (uniform distribution, exponential distribution, normal (Gaussian) distribution, gamma distribution, beta distribution, Cauchy distribution), independent random variables and their properties).
4. Expected value and moments of a random variable (definition and properties of the expected value random variable, moments of a random variable, quantiles of a random variable, variance of a random variable, variance properties, parameters of selected types of distributions of random variables, random variables multidimensional, covariance and its properties, correlation coefficient and its properties).
5. Limit theorems (laws of large numbers, central limit theorem).

Exercises
1. Elements of combinatorics (determining the number of all possibilities of random phenomena).
2. Random events and probability (determining the probabilities of random events, checking the independence of random events).
3. Random variables and their distributions (determining distributions of discrete type random variables, determination of distribution functions of discrete and continuous random variables, determination of functions density of random variables, application of selected types of distributions for determination

probability of random events).
4. Expected value and moments of a random variable (determining: expected value of variables random variables, moments of random variables, variance of random variables, covariance of vectors random variables, correlation coefficient of vectors of random variables).
5. Limit theorems (application of the central limit theorem to determining probabilities of random events).

Teaching methods

Lecture: traditional lecture - theory presented in connection with the current knowledge of students.
Exercises: blackboard exercises - solving previously shared tasks with help host.

Bibliography

Basic
1. A. Plucińska, E. Pluciński, Probabilistyka: statystyka matematyczna, procesy stochastyczne, rachunek prawdopodobieństwa, Warszawa, Wydawnictwo Naukowe PWN SA, 2017.
2. W. Krysicki, J. Bartos, W. Dyczka, K. Królikowska, M. Wasilewski, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach część 1: Rachunek prawdopodobieństwa, Warszawa, Wydawnictwo Naukowe PWN, 2012.
Complementary
1. W. Kordecki, Rachunek prawdopodobieństwa i statystyka matematyczna: definicje, twierdzenia, wzory, Wrocław, Oficyna Wydawnicza GiS, 2010.
2. W. Feller, Wstęp do rachunku prawdopodobieństwa część 1, Warszawa, Państwowe Wydawnictwo Naukowe, 2006.
3. H. Jasiulewicz, W. Kordecki, Rachunek prawdopodobieństwa i statystyka matematyczna: przykłady i zadania, Wrocław, Oficyna Wydawnicza GiS, 2003.

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	5,00
Classes requiring direct contact with the teacher	35	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	75	3,00