COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics

Course

Field of study
Environmental Engineering

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
compulsory

Number of hours

Lecture
14

Laboratory classes
0

Other (e.g. online)
0

Tutorials
20

Projects/seminars
0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
dr Marian Liskowski

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Faculty of Control, Robotics and Electrical Engineering

Responsible for the course/lecturer:

Prerequisites

Basic knowledge of mathematics defined by the core curriculum of mathematics education at the advanced level in secondary school. Differential and integral calculus of functions of one variable.

Course objective

1. Equipping the student with skills related to the use of concepts and methods of mathematical analysis to describe and analyze problems in the field of technical sciences.

2. Developing skills related to searching for explicit information, finding connections between dispersed information and developing the skills of formulating conclusions based on various premises.

Course-related learning outcomes

Knowledge

1. The student knows the concept of a complex number.

2. The student knows the concept of a matrix and the determinant of a matrix.

3. The student knows the equations of the straight line and the plane (in space) in various forms.

4. The student has a basic knowledge of the partial derivatives and the total differential of functions of several variables.

5. The student has knowledge of selected applications of double integrals in geometry and mechanics.

6. The student knows the concept of number series.

Skills

1. The student can find solutions of simple polynomial equations in the set of complex numbers.

2. The student is able to use matrix operations to solve general systems of linear equations and is able to analyze the solvability of such systems.

3. The student uses mathematical formulas to describe basic geometric figures (straight line, plane) in three-dimensional space and analyzes their mutual position.

4. The student can apply partial derivatives to study local extremes and to indicate the direction of the fastest growth of the two variable function.

5. The student use a total differential of a function in approximate calculations.

6. The student can use the double integrals for calculations relating to engineering practice.

Social competences

1. The student is able to reflect and critically assess his own achievements.

2. The student is aware of the usefulness of mathematical competence in engineering practice.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during lectures is verified by means of a test consisting of 5 questions. Passing threshold: 60%.

Skills acquired during tutorials are verified on the basis of two tests. Each test includes 3 tasks of varying difficulty assessed in the points system. Passing threshold: 55%

Programme content

1. Complex numbers.

2. Matrix algebra. Systems of linear equations.

3. Vectors and solid analytic geometry.

4. Number series, the concept of convergence of the series, the study of convergence.

5. The concept of a function of several variables, differential calculus of function of two variables with selected applications in engineering practice (directional derivative, total differential, local extremes).

6. Integral calculus of functions of two variables with selected applications in engineering practice.

Teaching methods

Lecture: lecture conducted in an interactive way with the formulation of questions to students.

Tutorials: Solving example tasks on the board. Detailed review of the exercise. Initiate discussion on solutions.

Bibliography

Basic

1. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 (Definicje, twierdzenia, wzory), Oficyna Wydawnicza GiS, Wrocław, 2003

2. M. Gewert, Z. Skoczylas, Analiza matematyczna 2 (Definicje, twierdzenia, wzory), Oficyna Wydawnicza GiS, Wrocław, 2019

Additional

1. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1 (Przykłady i zadania), Oficyna Wydawnicza GiS, Wrocław, 2003

2. M. Gewert, Z. Skoczylas, Analiza matematyczna 2 (Przykłady i zadania), Oficyna Wydawnicza GiS, Wrocław, 2018

3. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka dla studentów uczelni technicznych, t. I, II i III, Wydawnictwo Politechniki Poznańskiej, Poznań, 2004

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	34	1,0
Student's own work (literature studies, preparation for tutorials, preparation for tests/exam) [1]	56	2,0

[1] delete or add other activities as appropriate