



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematics

### Course

Field of study

Environmental Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

45

Laboratory classes

Other (e.g. online)

Tutorials

30

Projects/seminars

### Number of credit points

6

### Lecturers

Responsible for the course/lecturer:

Dr Małgorzata Zbąszyniak

Responsible for the course/lecturer:

### Prerequisites

Basic knowledge with range of secondary school. The ability to associate facts, information processing, reasoning, interpretation and ability to reflect. Student understands the need and knows the possibility of studying, improving language skills, professional, personal and social skills.

### Course objective

The recognizing methods and applications of mathematical analysis and linear algebra.

### Course-related learning outcomes

Knowledge

1. The student explains the basic mathematical laws and explains conditions for their application.



2. The student knows rules for finding derivative, indefinite and definite integrals and their applications.

#### Skills

1. The student uses the literature and also other sources of knowledge.
2. The student uses calculus in calculations resulting from the needs of engineering practice.
3. The student formulates simple conclusions on the basis of results.

#### Social competences

1. The sense of usefulness of mathematical competence in engineering practice.
2. The ability to work in a team.

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

LECTURE. A two-part written examination at the end of the semester:

- sat.1 theoretic knowledge (30%);
- sat.2 applications in practical exercises (70%).

Duration of test: 90 minutes.

Classes: tests during the semester (5x30 minutes).

#### Programme content

- Complex numbers.
- Elementary function and sequences of numbers.
- Differential and integral calculus. De L'Hospital rule. Trigonometric and rational integrals, partial fractions and quadratic expressions, miscellaneous substitutions. Areas, lengths of curves, the area and the volume of the surface of revolution obtained by revolving  $C$  about the  $x$ -axis. Mass, moments  $M_x$  and  $M_y$  and the center of mass. Integrals with infinite limits of integration.
- Functions of several variables. Partial derivatives, differentials, extrema of functions of several variables.

#### Teaching methods

Lecture with presentation supplemented by examples given on the board. Interactive lectures with problems and questions for students. The activity of students is taken into account in valuation of them. Discussion during lectures is expected.

Connections with other mathematical subjects are indicated.

Practical lessons. Solving of exemplary exercises on a blackboard. Discussion of solutions with relative comments.



## Bibliography

### Basic

1. W. Stankiewicz, J. Wojtowicz, Zadania z matematyki dla wyższych uczelni technicznych, PWN, część pierwsza i druga, Warszawa.
2. M. Gewert, Z. Skoczylas, Analiza matematyczna 1. Definicje, twierdzenia, wzory. Oficyna Wydawnicza GiS.
3. I. Foltińska, Z. Ratajczak, Z. Szafranski, Matematyka część I i II, Wydawnictwo Politechniki Poznańskiej.

### Additional

1. E. Swokowski, Calculus with analytic geometry, Prindle, Weber, Schmidt, Boston, Massachusetts.
2. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, PWN, Warszawa.

## Breakdown of average student's workload

	Hours	ECTS
Total workload	120	6
Classes requiring direct contact with the teacher	80	4
Student's own work (literature studies, preparation for tutorials, preparation for tests/exam) <sup>1</sup>	40	2

<sup>1</sup> delete or add other activities as appropriate

