



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematics

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### Course

Field of study

Safety Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

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### Number of hours

Lecture

10

Tutorials

Laboratory classes

12

Projects/seminars

Other (e.g. online)

### Number of credit points

5

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### Lecturers

Responsible for the course/lecturer:

dr hab. Małgorzata Migda

Responsible for the course/lecturer:

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### Prerequisites

Basics of mathematics - secondary school level. Logical and scientific thinking, efficient calculating.

### Course objective

The subject is aimed at introducing basic terms from the area of mathematics such as linear algebra and differential calculus; giving skills and competences for solving fundamental mathematic topics and for using mathematics in management.



## Course-related learning outcomes

### Knowledge

Student has knowledge of selected aspects of higher mathematics: linear algebra, mathematical analysis, differential calculus. He knows the formulas, graphs and properties of elementary functions; the concept of derivative of function and the geometric sense of a derivative at a point, the basic rules of differentiation.

### Skills

Student is able to calculate determinants, determine the rank of a matrix, apply a matrix calculus to solve systems of linear equations. Is able to use differential calculus in engineering practice. Can use basic knowledge of mathematics as a tool in management.

### Social competences

Student understand necessity of systematic work and developing of their skills. Student is able to solve problems and work in team. Student is able search out some information in literature

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: two homework and a written test on the last lecture.

Classes: evaluation of two written tests and the direct activity during the classes.

## Programme content

Elements of linear algebra: matrices, inverse matrix, row of matrix, systems of linear equations (Cramer Theorem, method of Gaussian Elimination, Kronecker-Capelli Theorem). Applications of matrices in economics.

Elementary functions (formulas, graphs, properties). Sequences, monotonic sequences, the limit of a sequence, the arithmetic of limits. Continuity, limits of functions, asymptote. Derivative and its geometric interpretation, monotonicity intervals, extrema, L'Hospital's rule, application of the derivative in economics.

## Teaching methods

- lecture with multimedia presentation accompanied with examples presented on the blackboard, theory presented with connections of current knowledge from previous lectures and with questions to the group of students;

- classes: solving problems on the board, initiating discussion about the solutions.

## Bibliography

### Basic

1. I. Foltyńska, Z. Ratajczak, Z. Szafranski, Matematyka dla studentów uczelni technicznych, cz. I-II, Wydawnictwo Politechniki Poznańskiej.



2. Podręczniki z serii Matematyka dla studentów politechnik, Oficyna Wyd. GiS:

-- M. Gewert, Z. Skoczylas: Analiza matematyczna 1, Analiza matematyczna 2, Definicja, twierdzenia, wzory.

- M. Gewert, Z. Skoczylas, Analiza matematyczna 1, Przykłady i zadania.

- T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Definicja, twierdzenia, wzory.

- T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Przykłady i zadania.

3. J. Banaś, Podstawy matematyki dla ekonomistów, WNT 2005.

Additional

W. Krywicki, L. Włodarski, Analiza matematyczna w zadaniach, cz. I, Wydawnictwo Naukowe PWN.

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	110	5,0
Classes requiring direct contact with the teacher	30	2,0
Student's own work (literature studies, preparation for classes, preparation for tests, homeworks preparation) <sup>1</sup>	80	3,0

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