



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematics

### Course

Field of study

Logistics

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

12

Laboratory classes

Tutorials

12

Projects/seminars

Other (e.g. online)

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

Ph.D., Eng., Mariola Skorupka

Responsible for the course/lecturer:

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Faculty of Automatic Control, Robotics and  
Electrical Engineering

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### Prerequisites

The student should have knowledge of sequences, matrix calculus and its application, differential calculus of functions of one and many variables in the first semester.

### Course objective

Acquainting with problems of integral calculus of functions of one and many variables and ordinary



differential equations. Developing students' skills to solve simple mathematical problems by using different types of equations.

### Course-related learning outcomes

#### Knowledge

1. The student has knowledge of the indefinite integral and methods of integration. [P6S\_WG\_04]
2. The student has knowledge of definite integrals and calculation methods. [P6S\_WG\_04]
3. The student has knowledge of the multiple integral and knows how to calculate it. [P6S\_WG\_04]
4. The student has knowledge of the type of ordinary differential equations and methods of solving them. [P6S\_WG\_04]

#### Skills

1. The student can calculate the indefinite integral - integration before substitution and through parts. [P6S\_UO\_02, P6S\_UW\_03]
2. The student is able to calculate the definite integral, determine the area, curve arc length, volume and surface area of a rotational solid. [P6S\_UO\_02, P6S\_UW\_03]
3. The student is able to calculate multiple integrals in Cartesian and polar coordinates. [P6S\_UO\_02, P6S\_UW\_03]
4. The student recognize the type and solve the ordinary differential equation. [P6S\_UO\_02, P6S\_UW\_03]
5. The student is able to obtain the above information from literature and other sources. Is able to integrate obtained information, interpret and draw conclusions from it. [P6S\_UO\_02, P6S\_UW\_03]

#### Social competences

1. The student is aware of the level of its knowledge in the field of aviation engineering research. [P6S\_KO\_02]
2. The student is aware of the deepening and expansion of knowledge in order to solve new technical problems. [P6S\_KO\_02]
3. The student is able to properly set priorities for the implementation of tasks specified by himself or others, including is able to think and act strictly in the area of description of processes in technical and exact sciences. [P6S\_KO\_02]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Lecture: Knowledge acquired as part of the lecture is verified by a 60-minute exam conducted in the exam session. Passing threshold: 50% of exam points and student activity during classes. Lecture for the grade. Exam issues, on the basis of which questions are developed. They will be sent via e-mail using the university e-mail system.



2. Knowledge acquired during the exercises is verified by two tests carried out during 7 and 14 classes and activity during classes. Each test consists of the same number of points. Passing threshold: 50% of points – the sum of points obtained from tests and activity during classes.

### Programme content

Lecture:

INTEGRAL CALCULUS OF ONE VARIABLE FUNCTION: indefinite integral - basic methods of integration and integration of functions: faithful, irrational and trigonometric

DEFINITE INTEGRAL: Riemann integral and its application and improper integrals.

MULTI-DIMENSIONAL INTEGRAL: calculating, exchanging the order of integration of variables double integral for polar coordinates, the use of double integral in Cartesian and polar coordinates.

ORDINARY DIFFERENTIAL EQUATIONS: definition of ordinary differential equation, general and special solution, with separated variables, 1st order linear differential equation.

Exercises:

INTEGRAL CALCULUS OF ONE VARIABLE FUNCTION: indefinite integral - basic methods of integration and integration of functions: faithful, irrational and trigonometric.

DEFINITE INTEGRAL: Riemann integral and its application and improper integrals.

MULTI-DIMENSIONAL INTEGRAL: exchanging the order of integration of variables double integral for polar coordinates, the use of double integral in Cartesian and polar coordinates.

ORDINARY DIFFERENTIAL EQUATIONS: differential equation with separated variables, 1st order linear differential equation

### Teaching methods

1. Lecture: multimedia presentation, illustrated with examples given on the board. Conducted in an interactive way with the formulation of questions to a group of students. Initiating discussions during the lecture.

2. Exercises: solving tasks given by the teacher on the board along with analyzing the next stages. The method of solving the task by students on the board is reviewed by the tutor. Completed with tasks for independent solution at home.

### Bibliography

Basic

1. W. Kryszicki, L. Włodarski, *Analiza matematyczna w zadaniach*, T. 1-2, PWN, Warszawa 2011.

2. I. Foltyńska, Z. Ratajczak, Z. Szafranski, *Matematyka dla studentów uczelni technicznych*, T. 1-3, Wydawnictwo Politechniki Poznańskiej, Poznań 2004.



3. M. Gewert, Z. Skoczylas, Analiza matematyczna 2/Definicje, twierdzenia, wzory/ Oficyna Wydawnicza GiS, Wrocław 2011.

4. M. Gewert, Z. Skoczylas, Analiza matematyczna 2/Przykłady i zadania/ Oficyna Wydawnicza GiS, Wrocław 2011.

Additional

1. W. Stankiewicz, J. Wojtowicz, Zadania z matematyki dla wyższych uczelni technicznych, T. 1-2, PWN, Warszawa 2003.

2. M. Lassek, Matematyka dla studentów technicznych, T. 1-2, Wydawnictwo Wspierania procesu edukacji, Warszawa 2004.

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for exercises and lecture, preparation for passing the ezercises and exam the lecture) <sup>1</sup>	70	2,5

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