POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

pl. M. Skłodowskiej-Curie 5, 60-965 Poznań

COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematics

Field of study	Year/Semester
Management and Production Engineering	1/2
Area of study (specialization)	Profile of study
	general academic
Level of study	Course offered in
First-cycle studies	polish
Form of study	Requirements
full-time	compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30		
Tutorials	Projects/seminars	
30		

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

PhD Kinga Cichoń

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Faculty of Automatic Control, Robotics and Electrical Engineering

60-965 Poznań, ul Piotrowo 3A

Responsible for the course/lecturer:

Prerequisites

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

Course objective

Acquainting with problems of differential and integral calculus of functions of many variables and

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

Course-related learning outcomes

Knowledge

The student has knowledge of indefinite and definite integrals and calculation methods.

The student has knowledge of the multiple integral and knows how to calculate it.

The student has knowledge of the type of ordinary differential equations and methods of solving them.

The student has knowledge of the Laplace transform and its application to differential equations.

The student has knowledge of scalar, vector and mixed products.

Skills

The student is able to calculate the definite integral, determine the area, curve arc length, volume and surface area of a rotational solid.

The student is able to calculate multiple integrals in Cartesian and polar coordinates.

The student can recognize the type and solve the ordinary differential equation.

The student can apply the Laplace transform in differential equations.

The student can apply products in space.

Social competences

The student is aware of the level of its knowledge in the field of aviation engineering research.

The student is aware of the deepening and expansion of knowledge in order to solve new technical problems.

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.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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.

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.

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Programme content

LECTURE:

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

INTEGRATED: 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, complete equation, Bernoulli equation, 2nd order linear differential equation with constant coefficients.

LAPLACE TRANSFORMATION: definition of the Laplace transformation and its application for solving differential equations.

SPACE GEOMETRY: scalar, vector and mixed product definition and their application.

EXERCISES:

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

INTEGRATED: Riemann integral and its application and improper integrals.

MULTI-DIMENSIONAL INTEGRAL: normal area, double integral - calculation, conversion of integration order, conversion of variables in double integral to polar coordinates, use of double integral in Cartesian and polar coordinates.

ORDINARY DIFFERENTIAL EQUATIONS: ordinary differential equations with separated variables, homogeneous equation, ordinary heterogeneous 1st order linear differential equation, 2nd order ordinary differential heterogeneous equation with constant coefficients.

Teaching methods

Lecture: conducted using a visualizer, theory illustrated with examples. Conducted in an interactive way with the formulation of questions to a group of students. Initiating discussions during the lecture.

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. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, T. 1-2, PWN, Warszawa 2011.

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2. I. Foltyńska, Z. Ratajczak, Z. Szafrański, 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.

5. F. Leja, Rachunek różniczkowy i całkowy, PWN, Warszawa 2008.

6. G. M. Fichtenholz, Rachunek różniczkowy i całkowy, PWN, Warszawa, 1986.

7. J. Morchało, Z. Ratajczak, J. Werbowski, Równania różniczkowe w zastosowaniach, Wyd. Politechniki Poznańskiej, Poznań, 1995.

Additional

1. W. Żakowski, Matematyka, T. 1-2, WNT, Warszawa 2003.

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

3. 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
Classes requiring direct contact with the teacher	70	3
Student's own work (literature studies, preparation for exercises and lecture, preparation for passing the ezercises and exam the lecture) [1]	30	1

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[1] delete or add other activities as appropriate