COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [N1MiBM2>MAT2]

Course

Field of study
Mechanical Engineering

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
8

Laboratory classes
0

Other
0

Tutorials
16

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

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Prerequisites

The student has knowledge and skills in mathematics completed in the first semester of studies.

Course objective

Learning about the applications of mathematical tools and methods to solve simple technical problems and indicating the possibilities of using mathematics in more complex problems.

Course-related learning outcomes

Knowledge:
1. The student has the knowledge in mathematics including selected sections of mathematical analysis, algebra and analytic geometry.
2. Has knowledge of the use of mathematical apparatus to describe mechanical problems.
3. Has knowledge of the application of appropriate computational techniques supporting the engineer's work while understanding their limitations.

Skills:
1. The student is able to use mathematical methods in the analysis of mechanical problems.

Social competences:
1. The student is aware of the need to deepen and expand knowledge.
2. Is aware of the importance of mathematics in solving mechanical problems and is able to seek the opinion of experts in case of difficulties in solving a problem independently.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Tutorials:
Assessment of knowledge and skills related to solving tasks based on tests (at least two). Assessment of the student's preparation for tutorials (questions from previously indicated issues/tasks discussed during the lecture) based on tests. The condition for receiving a positive grade is to obtain at least 50% of the possible points.
Lecture: The knowledge acquired during the lecture is verified on the basis of an written examination. The condition for receiving a positive grade is to obtain at least 50% of the possible points in the above exam.
Grading system:
- 0%-50% - 2.0,
- 50%-60% - 3.0,
- 60%-70% - 3.5,
- 70%-80% - 4.0,
- 80%-90% - 4.5,
- 90%-100% - 5.0.

Programme content

1. DIFFERENTIAL CALCULUS OF FUNCTIONS OF MANY VARIABLES
Partial derivatives, extrema of functions of two and three variables, complete differential and its applications.
2. ORDINARY DIFFERENTIAL EQUATIONS OF THE FIRST AND SECOND ORDER
Ordinary differential equations of the first and second order. Types of equations and solving methods. Applications.
3. INTEGRAL CALCULUS OF FUNCTIONS OF MANY VARIABLES
Double integral in the rectangle and in the normal region, double integral in polar coordinates. Triple integral. Applications of double and triple integrals.

Course topics

1. DIFFERENTIAL CALCULUS OF FUNCTIONS OF MANY VARIABLES:
(a) domain of functions of two variables;
(b) first and second order partial derivatives;
(c) extrema of functions of two and three variables.
2. ORDINARY DIFFERENTIAL EQUATIONS OF I and II ORDER - types of equations and methods of solving equations according to type.

3. For independent work by students on the basis of the materials provided - double and triple integrals (this material is not compulsory for the exam).

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Teaching methods

Lecture: presentation using a visualizer and a whiteboard,
Tutorials: solving tasks on the board with discussion of the obtained solutions and interpretation of the results.

Bibliography

Basic:
1. M. Gewert, Z. Skoczylas: Analiza matematyczna I i II, Algebra liniowa I i II
2. I. Foltyńska, Z. Ratajczak, Z. Szafrański: Matematyka dla studentów uczelni technicznych, cz.1, cz.2, cz.3, Wyd. Poznań: Politechnika Poznańska

Additional:
1. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, cz.1, cz.2, Wydawnictwo Naukowe PWN, Warszawa

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	26	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	74	3,00