COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [N1Bud1>MAT2]

Course

Field of study
Civil 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
20

Laboratory classes
0

Other (e.g. online)
0

Tutorials
10

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Knowledge: Student has knowledge of mathematics from the first semester of the first-cycle studies [K1_W01] Skills: Student is able to solve problems and has the ability to use mathematical tools to solve tasks from the first semester of the first-cycle studies. Has the ability to think logically - derivation of new facts basing on known - [K1_U01] Social competencies: The student understands the need for continuous improvement of competences (language, professional and social) and knows the importance of higher mathematics methods in the description of physical and technical issues. Can independently search for information in the literature.

Course objective

The main aim is the understanding of basic notions and methods theory in order to apply them to solving technical problems and indication of the possibility of the application of mathematics in more complex issues.

Course-related learning outcomes

Knowledge:
1.Student has knowledge of the elements of linear algebra (complex numbers) - [K1_W01]

2. Student has knowledge of the actions on vectors in three-dimensional space and basic geometric structures (line, plane) - [K1_W01]
3. Student has basic knowledge of partial derivatives and total differential of functions of two variables and knowledge of methods of solving ordinary differential equations of the first and second order - [K1_W01]
4. The student has knowledge of the use of appropriate computational techniques, supporting the work of an engineer, while understanding certain limitations - [K1_W01]

Skills:
1. The student knows how to use analytical methods to formulate and solve tasks in the field of measuring physical quantities - [K1_U05]
2. The student is able to calculate partial derivatives and local extremes of functions of two variables - [K1_U05]
3. The student is able to solve simple ordinary differential equations of the first and second order - [K1_U03]
4. The student has the ability to self-education - [K1_U02]

Social competences:
1. The student is aware of the importance of compliance with the principles of professional ethics - [K1_K01]
2. The student understands the need for critical knowledge assessment and continuous education. It is able to think and act in a creative and enterprising way - [K1_K03]
3. Student is aware of the social role of a technical university graduate (understands the need to formulate and provide the public with information and opinions on technical achievements and other aspects of engineering activities) - [K1_K07]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lectures: written or oral exam in theory and tasks.
Classes: evaluation of written tests during the semester and the direct activity during the classes.
Getting extra points related with activity (presentations of examples of applications of mathematics, use of literature, discussion of problems, presenting reports concerning applications of the theory and diligence of the study).

Programme content

The update 2020/2021.
Issues:
Complex numbers and their applications - description and different forms (algebraic, trigonometric, exponential); geometric interpretation; activities in a set of complex numbers (Moivre"s formula, complex element); polynomials (the basic theorem of algebra).
Elements of analytic geometry in three-dimensional space:
- vectors, actions on vectors (addition/subtraction, multiplication by number, scalar product, vector product, mixed product of ordered three of vectors) and their applications;
- mathematical plane, straight, straight and plane.
Functions of several variables - definition, domain, partial derivatives; geometric interpretation of the function of two variables; local extrema of the functions of two variables; a complete differential of the function of two variables and its applications.
Integral calculus of functions of several variables - definition of a normal area; definition of double integral and geometric interpretation; conversion of double integral into iterated integral, replacement of the integration order. Examples and applications of double integral (area of plane area; static moment, inertia and deviation of cross-sections of beams ...).
Examples and applications of the triple integral (solid volume, a mass).
First order differential equations - definition, general and specific solutions; Cauchy"s problem. Selected types of equations and methods of solving them.
Second order ordinary differential equations importable to first order differential equations - selected types of equations and methods of solving.

Course topics

none

Teaching methods

1) Lectures:
- interactive lecture with questions to students or specific students,
- using partially a multimedia presentation (e.g. examples, animations),
- theory presented in connection with the current knowledge of students,
- presenting a new topic preceded by a reminder of related content known to students from other subjects,
- taking into account various aspects of the issues presented (economic, ecological, social),
- student activity is taken into account during the course of the assessment.
2) Classes:
- solving sample tasks on the blackboard,
- initiate discussion on solutions,
- homework / additional tasks.

Bibliography

Basic
1. M. Gewert, Z. Skoczylas, Analiza matematyczna 2, Oficyna Wydawnicza GiS, Wrocław 2006.
2. M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne, Oficyna Wydawnicza GiS, Wrocław 2005.
3. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Oficyna Wydawnicza GiS, Wrocław 2007.
4. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, cz.1, cz.2, Wydawnictwo naukowe PWN, Warszawa 2010.
Additional
1. I. Foltyńska, Z. Ratajczak, Z. Szafrański: Matematyka dla studentów uczelni technicznych, cz.1, cz.2, cz.3, Wydawnictwo Politechniki Poznańskiej, Poznań 2004.

Breakdown of average student's workload

	Hours	ECTS
Total workload	85	3,00
Classes requiring direct contact with the teacher	32	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	53	2,00