COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [N1Bud1>MAT]

Course

Field of study
Civil Engineering

Year/Semester
1/1

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
20

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

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Prerequisites

Knowledge: Student has knowledge of mathematics at the secondary school level - [PRK 4] Skills: Student is able to solve problems and has the ability to use mathematical tools to solve tasks in the field of secondary school. Has the ability to think logically - derivation of new facts basing on known - [PRK 4] 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 knows formulas, diagrams and properties of elementary functions and knows the meaning of a limit of function - [K1_W01]

2. Student knows the meaning of derivative of a function and its geometric and physical interpretation. It knows rules of derivations of functions, meaning of indefinite integral of function and basic method of integration and geometric interpretation of definite integral - [K1_W01]
3. 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. Student uses notation of limit for study of behavior of function on ends of domain intervals - [K1_U01]
2. Student analyses properties of functions with applications of differential calculus methods - [K1_U01]
3. Student apply integral calculus in engineering practice - [K1_U02, K1_U07]
4. Student builds mathematical models of simple phenomena and processes in nature - [K1_U09, K1_U10]
5. 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:
An overview of the functions of one independent variable. Trigonometric and cyclometric functions. Numerical sequences. The number of Euler.
Limits of functions (at point, left-sided, right-handed, incorrect, in infinite). Continuity of functions. Asymptotes.
Differential calculus of functions of one variable with selected applications (the de L"Hospital rule, function study, optimization tasks).
Integral calculus of functions of one variable:
Indefinite integral - definition of indefinite integral and primary function, properties, basic formulas, integration by substitution and by parts, examples;
Definite integral - definition, geometrical interpretation, Newton-Leibnitz formula, properties, basic formulas, integration by substitution and parts. Examples and applications.
Matrix calculus - definition of matrices, their types and arithmetic; determinant of the square matrix and its properties (Laplace theorem, Sarrus scheme, calculating the determinant by the elementary operations method using the Laplace development); inverse matrix and methods of finding it.
Systems of linear equations (matrix notation, Cramer"s theorem, matrix method of Gauss elimination).

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 the school,
- 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 1, Oficyna Wydawnicza GiS, Wrocław 2005.
2. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Oficyna Wydawnicza GiS, Wrocław 2007.
3. 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	127	5,00
Classes requiring direct contact with the teacher	42	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	85	3,50