COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [S1Eltech1>Mat2]

Course

Field of study
Electrical 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
full-time

Requirements
compulsory

Number of hours

Lecture
45

Laboratory classes
0

Other (e.g. online)
0

Tutorials
30

Projects/seminars
0

Number of credit points

6,00

Coordinators

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Lecturers

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Prerequisites

Basic knowledge of mathematics defined by the core curriculum of mathematics education at the advanced level in secondary school. Differential and integral calculus of functions of one variable.

Course objective

Equipping the student with skills related to the use of concepts and methods of mathematical analysis of functions of several variables to describe and analyze problems in the field of technical sciences.

Course-related learning outcomes

Knowledge:
1. The student has a basic knowledge of the partial derivatives and the total differential of functions of several variables.

2. The student has knowledge of methods of calculation and applications of multiple integrals and line integrals to analyze physical problems.
3. The student has knowledge of power series representation and Fourier series representation of functions.
4. The student has knowledge of methods of solving selected ordinary differential equations.

Skills:
1. The student can apply partial derivatives to study local extremes and to indicate the direction of the fastest growth of the functions of two nad three variables.
2. The student can use a total differential of a function in approximate computations.
3. The student can calculate and apply multiple integrals and line integrals to describe and analyze some physical problems.
4. The student can solve simple ordinary differential equations of the first and second order.

Social competences:
1. The student is able to reflect and critically assess his own achievements.
2. The student is aware of the usefulness of mathematical competence in engineering practice.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Knowledge acquired during lectures is verified by means of a test consisting of 13 questions. Passing threshold: 60%.
Skills acquired during tutorials are verified on the basis of two tests. Each test includes 5 tasks of varying difficulty assessed in the points system. Passing threshold: 55%

Programme content

1. The concept of a function of several variables, domain, graph, limit of a function.
2. Differential calculus of the functions of two nad three variables, some applications in engineering practice (directional derivative, gradient, total differential, local extremes).
3. Double and triple integrals. Physical applications of the double integrals.
4. Line integrals with selected applications in engineering practice.
5. Power series, the concept of convergence of the series, the study of convergence. Fourier series. Expanding some functions into power series and Fourier series.
6. First order differential eqations. Second order differentisl equations. The Laplace transform and application to initial-value problems for fifferential equations with constant coefficients.

Teaching methods

Lecture: lecture conducted in an interactive way with the formulation of questions to students.
Tutorials: Solving example tasks on the board. Detailed review of task solutions . Initiate discussion on solutions.

Bibliography

Basic
1. W. Żakowski, Matematyka, T.2, WNT, Warszawa 2003
2. W. Leksiński, W. Żakowski, Matematyka T. 4, WNT, Warszawa 2003
3. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, T.1, T.2, PWN, Warszawa 2011
4. M. Gewert, Z. Skoczylas, Analiza matematyczna 2 (definicje, twierdzenia, wzory), Wydawnictwo GiS, Wrocław 2007
5. M. Gewert, Z. Skoczylas, Elementy analizy wektorowej (teoria, przykłady, zadania), Wydawnictwo GiS, Wrocław 2004
Additional
1. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka dla studentów uczelni technicznych, t.II i III, Wydawnictwo Politechniki Poznańskiej, Poznań 2004
2. M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne (teoria, przykłady, zadania), Wydawnictwo GiS, Wrocław 2006

Breakdown of average student's workload

	Hours	ECTS
Total workload	170	6,00
Classes requiring direct contact with the teacher	75	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	95	3,00