COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [S1TOZ1>MAT2]

Course

Field of study
Circular System Technologies

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
30

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

Student should have basic knowledge on the high school level.

Course objective

The aim of the subject is presentation of a basic knowledge of calculus, linear algebra, ordinary differential equations and selected topics in vector analysis and approximation theory. The scope of material is closely connected with other specialized courses and is going to allow student to comprehend analysed problems.

Course-related learning outcomes

Knowledge:
1. has general knowledge concerning basic ideas, rules and mathematical theories - k_w02.
2. general knowledge concerning higher maths techniqes necessary to describe simple problems appearing in scientific and engineering problems - k_w02.

Skills:
1. ability to analyse problem as well as to find their solutions based on known theorems and methods - k_u13.

Social competences:
1. being concious of self-learning need for whole life - k_k01.
2. being concious of developing both, professional and personal competences - k_k01.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Written exam from lecture part. Written tests within the term.

Programme content

1. Calculus:
- multivariable functions, second degree surfaces and their equations,
- partial derivatives and extreme points of multivariable functions,
- curvilinear systems of coordinates (polar, cylindrical, spherical),
- differential operators (divergence, gradient, curl and Laplace operator) and their chemical and physical meaning,
- double integral (cartesian and polar system of coordinates),
- triple integral (cartesian, cylindrical and spherical system of coordinates).
2. Topics in approximation theory:
- definition of a norm, vector and function norms and their applications,
- approximation, interpolation and extrapolation,
- linear regresion,
- approximation of a continuous and discreet data using elementary functions,
- cubic splines and their applications.
3. Ordinary differential equations:
- an idea of ODE"s and their applications in modelling of physical and chemical processes,
- chosen methods for solving the first and second order ODE"s,
- ordinary initial problems (IP"s) and ordinary boundary problems (BP"s) and their applications in modelling of physical and chemical processes.

Teaching methods

Lecture: traditional form given on the blackboard with discussion.
Lab classes: solving problems and exercises.

Bibliography

Basic
1. M. Lassak, Matematyka dla studiów technicznych, Wyd. Supremum, Warszawa 2014
2. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach cz. 1 i 2, PWN, Warszawa 2005
3. M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne, GiS, Wrocław 2016
4. M. Gewert, Z. Skoczylas, Analiza matematyczna 1, GiS, Wrocław 2020
5. M. Gewert, Z. Skoczylas, Algebra i geometria analityczna, GiS, Wrocław 2020
Additional
1. E. Majchrzak, B. Mochnacki, Metody numeryczne, Wyd. Politechniki Śląskiej, Gliwice 2004
2. M. Gewert, Z. Skoczylas, Elementy analizy wektorowej, GiS, Wrocław 2004
3. E. Kasperska, A. Kasperski, B. Piątek, Przewodnik do ćwiczeń z algebry z elementami logiki matematycznej i teorii mnogości, Wyd. Politechniki Śląskiej, Gliwice 2016

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	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)	75	3,00