COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [S1TOZ1>MAT1]

Course

Field of study
Circular System Technologies

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
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

mgr inż. Marta Kańczurzewska
marta.kanczurzewska@put.poznan.pl

Lecturers

dr Alina Gleska

mgr inż. Marta Kańczurzewska
marta.kanczurzewska@put.poznan.pl

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:
Classes tests during the semester
Lectiure: Written exam in the calculation part

Programme content

The subject program includes the following topics:
1. Linear algebra:
- complex numbers
- vector and matrix calculus
2. Calculus:
- numerical sequences
- numerical functions
- differential calculus of functions of one variable
- indefinite integrals
- definite integrals

Course topics

The subject program includes the following topics:
1. Linear algebra:
- complex numbers: algebraic, trigonometric and expotential form of complexs numbers, calculations
- vector and matrix calculus: vectors, matrices, determinants and their properties, vector and scalar product, systems of linear equations and their applications
2. Calculus:
- numerical sequences: sequences, recursion, monotonicity, convergence, limits
- numerical functions: functions, monotonicity, injective function, inverse function, elementary functions: polynomials, rational functions, logarithmic and expotential functions, trigonometric functions, cyclometric functions,
hyperbolic functions and their inverses and properties, limit of a function, continuity of a function, asymptotes
- differential calculus of functions of one variable: the first and the second order derivative and its properties, monotonicity of a function, extreme points
and inflection points, de L"Hospital theorem, chemical and physical interpretation of a derivative, investigation of a function
- indefinite integrals: indefinite integral and its properties, chosen methods of integreation
- definite integrals: definite integral and its properties, chemical and physical interpretation of an definite integral

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