



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

0

Tutorials

30

Projects/seminars

0

Number of credit points

6,00

Coordinators

dr Wiesława Nowakowska

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Lecturers

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 . 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 techniques 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 conscious of self-learning need for whole life - k_k01
2. being conscious 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 - two tests during the semester

Lecture: 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 exponential form of complex 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 exponential functions, trigonometric functions, cyclometric 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

Teaching methods

Lecture: traditional form given on the blackboard with discussion

Lab classes: solving problems and exercises

Bibliography

Basic

1. G. Decewicz, W. Żakowski, *Matematyka t. I*. Wydawnictwo Naukowo-Techniczne, Warszawa 2003.
2. I. Foltynańska, Z. Ratajczak, Z. Szafranski, *Matematyka, cz. I, II i III*, Wydawnictwo Politechniki Poznańskiej, Poznań 2001.
3. F. Leja, *Rachunek różniczkowy i całkowy*. Państwowe Wydawnictwo Naukowe, Warszawa 1978.

Additional

1. W. Krywicki, L. Włodarski, *Analiza matematyczna w zadaniach cz. 1*, PWN, Warszawa 2006.
2. W. Stankiewicz, *Zadania z matematyki dla wyższych uczelni technicznych, t. I*, Państwowe Wydawnictwo Naukowe, Warszawa 2006.
3. M. Gewert, Z. Skoczylas, *Analiza matematyczna 1*, GiS, Wrocław 2020.
4. H. Jurlewicz, Z. Skoczylas, *Algebra liniowa 1*. Oficyna Wydawnicza GiS, Wrocław 2006.

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 |