COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics 1 - Analysis [S1EiT1>MAT1AN]

Course

Field of study
Electronics and Telecommunications

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
60

Laboratory classes
0

Other
0

Tutorials
60

Projects/seminars
0

Number of credit points

8,00

Coordinators

dr Anna Iwaszkiewicz-Rudoszańska
anna.iwaszkiewicz-rudoszanska@put.poznan.pl

Lecturers

Prerequisites

Basic mathematical knowledge from secondary school. Skills to logical thinking. Understanding of limitation of own knowledge and motivation for further education.

Course objective

Knowledge in differential and integral calculus which is necessary to study engineering sciences. Skills for application of acquired knowledge to the analysis of the phenomena and problems in the field of engineering.

Course-related learning outcomes

Knowledge:
1. Has a systematic knowledge of mathematical analysis, knows the basic concepts and theorems, understands the relationships between them.
2. Knows and explains the application of known facts and theorems.

Skills:
1. Can apply differential and integral calculus in practice.

2. Understands the mathematical text read, can obtain information from literature and other sources.

Social competence:
1. Knows the limitations of his own knowledge and skills, understands the need for further training.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: valuation of knowledge and skills during written exam.
Tutotials: three colloquia.
Passing threshold: 50% of total points.

Programme content

Sequences. Functions of real variables. The limit of functions, continous function and their properties. Derivative of real function. Indefinite integral. Methods of integration functions. Define integral and its geometric and mechanical applications. Improper integrals. Series of real numbers. Function sequences and function series (exponental series, Fourier series). Partial derivatives and their application to search of extrema of functions of several variables. Double integral and its applications. Selected ordinary differential equations.

Course topics

Lecture: Elements of logic and the set theory. Sequences (properties, limits of sequences, Euler's number). Functions of real variables (properties, elementary functions). The limit of functions, continous function and their properties. Derivative of real function (properties, mean value theorems, l'Hospital Theorem, Taylor's formula, selected applications). Indefinite integral. Methods of integration functions. Define integral and its geometric and mechanical applications. Improper integrals. Series of real numbers (convergence of a series, convergence tests: integral critesion, comparison test, d'Alembert's criterion, Cauchy's criterion, Leibniz criterion). Function sequences and function series (pointwise convergence and uniform convergence, exponental series, Fourier series). Partial derivatives and their application to search of extrema of functions of several variables. Double integral and its applications. Selected ordinary differential equations.
Tutorials: Limits of sequences. Limits of functions, continous function. Founding of derivatives, tangent lines, L'Hospital Theorem, Taylor's formula, selected application of derivatives. Indefinite integrals, substitution method, integration by parts, integration of rational funtions. Definite integral, geometric applications, improper integrals. Series of real numbers (integral critesion, comparison test, d'Alembert's criterion, Cauchy's criterion, Leibniz criterion). Fourier series. Partial derivatives, extrema of functions of two variables. Double integrals, geometric applications. Ordinary differential equations (equations with separated variables, first order linear differential equations).

Teaching methods

1. Lecture - mulimedia presentation accompanied with examples presented on the blackboard and with questions to the group of students.
2. Classes - solving problems on the board.

Bibliography

Basic
1. M. Gewert, Z. Skoczylas, Analiza matematyczna 1, 2, Definicje, twierdzenia, wzory
2. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, cz. 1 i 2
3. M. Gewert, Z. Skoczylas, Analiza matematyczna 1, 2, Przykłady i zadania
4. J. Mikołajski, Z. Sołtysiak, Zbiór zadań z matematyki dla studentów studiów technicznych
Additional
1 D.A. McQuarrie, Matematyka dla przyrodników i inżynierów cz.1 i 2
2. W.P. Minorski, Zbiór zadań z matematyki wyższej
3. G.M. Fichtenholz, Rachunek różniczkowy i całkowy, t. 1 i 2
4. H. J. Musielakowie, Analiza matematyczna, t. 1 i 2

Breakdown of average student's workload

	Hours	ECTS
Total workload	200	8,00
Classes requiring direct contact with the teacher	135	5,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	65	2,50