COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics 1 - Analysis [S1EiT1E>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
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other
60	0	0

Tutorials	Projects/seminars	
60	0	

Number of credit points

8,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of mathematics (high school level).

Course objective

The aim is: 1. To recognize methods and applications of differential and integral calculus of single and double variable functions; 2. To introduce the concepts of infinite series, power series and some differential equations; 3. To teach how to use those concepts, to make proper transformations and to use appropriate mathematical methods and tools to solve typical engineering tasks.

Course-related learning outcomes

Knowledge:
Student
1. Understands the concept of limit of the sequence, convergence of the series.
2. Knows the concept of derivative, methods of solving and its applications.
3. Knows the idea of partial derivatives and knows how to calculate extrema for functions of two variables.
4. Comprehends the concept of double integral and knows methods of calculation and its applications.

5. Recognizes some types of differential equations and knows methods of solving them.

Skills:
Student
1. Can calculate the derivative, determine monotonicity and find limit, maxima, minima of functions of one variable.
2. Is able to calculate indefinite and definite integrals, measures of areas, the length of curves, volumes and surface areas of solids of revolution.
3. Can calculate partial derivatives, extrema for functions of two variables, total differential.
4. Can calculate double integral .
5. Is able to expand function into power series and Fourier series.
6. Can solve some first order differential equations and second order differential equations with constant coeeficients.

Social competences:
Student is aware of the need to continue increasing their knowledge.

Methods for verifying learning outcomes and assessment criteria
Learning outcomes presented above are verified as follows:

Lecture: written exam to check theoretical knowledge and the abillity of its practical use. Exam is passed if student gains 50% of all points.
Tutorials: 3 written tests during the semester and activity during tutorials. Students have an opportunity to gain additional points (10% from the total) for their activity (e.g. giving correct answers to teacher's or colleagues' questions).
Range of grades:
60% - 3.0
68% - 3,5
76% - 4,0
84% - 4,5
92% - 5,0

Programme content
Lecture and tutorials
The program includes differential and integral calculus for one and two variable functions, infinite series, power series and differential equations

Course topics
Lecture and tutorials:
1. Sequences – monotonocity and limits
2. Limits and continuity of functions
3. Derivative - definition, interpretation and differentiation
4. Finding maxima, minima and points of inflection of functions. Determining monotonicity and concavity
5. Indefinite integral – methods of evaluation (integration by parts and by substitution, integration of rational functions)
6. Definite integral - definition, interpretation, improper integral
7. Applications of the definite integral - calculation of measure of areas, the length of curves, volumes and surface areas of solids of revolution
8. Infinite series and power series - tests for convergence. Fourier series
9. Differential calculus for functions of several variables
10. Double integral and its applications
11. First order differential equations – with separable variables, linear, exact 12. Second order linear differential equations with constant coefficients

Teaching methods
1. Interactive lecture with questions to the group of students which is supported by solving examples on board.
2. Tutorials during which students solve tasks on board. Teacher"s detailed assessment of students"

solutions followed by discussion and comments.

Bibliography

Basic
1. B. Sikora, E. Łobos, A first course in calculus, Wydawnictwo Politechniki Śląskiej, Gliwice 2007.
2. B. Sikora, E. Łobos, Advanced calculus : selected topics, Wydawnictwo Politechniki Śląskiej, Gliwice 2009.
3. E. W. Swokowski, Calculus, Brooks/Cole, Boston 1983.
4.D. G. Zill, Calculus with analytic geometry, PWS Publishers, Boston 1985.
Additional
1. E. Łobos, B. Sikora, Calculus and differential equations in exercises, Wydawnictwo Politechniki Śląskiej, Gliwice 2004.
2. W. Trench, "Introduction to Real Analysis" (digitalcommons.trinity.edu/mono/7/)
3.M. Gewert, Z. Skoczylas, Analiza matematyczna 1 i 2, Oficyna Wyd. GiS, Wrocław 2012.

Breakdown of average student's workload

	Hours	ECTS
Total workload	200	8,00
Classes requiring direct contact with the teacher	135	5,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	65	3,00