COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematics

Course

Field of study

Civil Engineering

Year/Semester

1/1

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

Tutorials

15

Projects/seminars

0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Faculty of Control, Robotics and Electrical

Engineering

Institute of Mathematics

Responsible for the course/lecturer:

Prerequisites

Knowledge of mathematics in the extended high school area. The ability to obtain information from the indicated sources, to think logically, associate facts, analyze problems and apply the right conclusions.

Course objective

To acquaint students with extended mathematical knowledge in the field of differential and integral calculus of one variable functions, to develop the ability to apply it in engineering and to prepare them for effective study of physics, chemistry and specializations.

Course-related learning outcomes

Knowledge

Student

1. Knows the concept of sequence of numbers.

2. Knows the concept of derivative, methods of solving and its applications.

3. Knows the concept of indefinite integral and methods of solving it.

4. Understands the concept of definite integral and its interpretation.

Skills

Student

1. Is able to determine monotonocity and limit of the sequence.

2. Can calculate the derivative and apply it to determine the limit, monotonicity, maxima, minima of functions of single variable.

3. Is able to calculate indefinite and definite integral, measures of areas, the length of curves, volumes and surface areas of solids of revolution.

Social competences

The graduate is ready to critically evaluate his or her knowledge. The graduate understands the need for and knows the possibilities of continuous learning - improving professional, personal and social competences.

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: 2 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:

50% - 3.0

60% - 3,5

70% - 4,0

80% - 4,5

90% - 5,0

Programme content

LECTURE

1. Sequences (monotonocity and limit, Euler's number).

2. Basic functions - graphs and properties (power, exponential, logarithmic, trigonometric, cyclometric, hyperbolic, area).

3. Limit and continuity of a function.

4.The derivative (definition, interpretation and applications - the tangent line, the differential, the L'Hopital's Rule, Mean ValueTheorems with applications - monotonicity, maxima, minima, concavity, convexity and the points of inflection).

5. Indefinite integral (integration by substitution and by parts, integration of rational functions).

6. Definite integral (definition, interpretation and properties, improper integral, applications - calculation of measure of areas, the length of curves, volumes and surface areas of solids of revolution).

7. Matrices and determinants (introduction to the lecture for the second semester).

Tutorials:

1. Sequences (monotonocity and limits with particular emphasis on the number e).

2. Basic functions (determining formulas and drawing graphs of inverse functions).

3 The derivative (evaluation and applications - l'Hopital's Rule, extrema and monotonocity).

4. Indefinite integral (integration by substitution and by parts, integrals of rational functions).

5. Definite integral (calculation of measure of areas, the length of curves, volumes and surface areas of solids of revolution).

Teaching methods

1. Interactive lecture with questions to the group of students which is supported by solving examples on board.

2. Classes during which students solve tasks on board.Teacher's detailed assessment of students' solutions followed by discussion and comments.

Bibliography

Basic

1. G. Decewicz, W. Żakowski, Matematyka t. I. WNT, Warszawa 2003.

2. F. Leja, Rachunek różniczkowy i całkowy. PWN, Warszawa 2008.

3. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka cz. I i II, Wydawnictwo Politechniki Poznańskiej, Poznań 2001.

Additional

1. M. Gewert, Z. Skoczylas, Analiza matematyczna 1, Oficyna Wydawnicza GiS, Wrocław 2012.

3. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, t. I, PWN, Warszawa 2006.

4. W. Stankiewicz, Zadania z matematyki dla wyższych uczelni technicznych, PWN, Warszawa 2003.

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	3,0
Classes requiring direct contact with the teacher	45	1,5
Student's own work (literature studies, preparation for tutorials, preparation for tests and exam) [1]	45	1,5

[1] delete or add other activities as appropriate