COURSE DESCRIPTION CARD- SYLLABUS

Course name
Mathematical Analysis II

Course

Field of study
Mathematics in Technology
Area of study (specialization)
—
Level of study
first-cycle studies
Form of study
full-time

Year/Semester
1/2
Profile of study
general academic
Course offered in
Polish
Requirements
compulsory

Number of hours

Lectures
60
Tutorials
60

Laboratory classes
—
Projects/seminars
—

Other (e.g. online)
—

Number of credit points

8

Lecturers

Responsible for the course/lecturer::

dr Karol Leśnik

Responsible for the course/lecturer::

—

Prerequisites

Student is familiar with the knowledge of calculus from the first semester. In particular, student has kills of efficient evaluating limits of sequences, derivatives of functions. Using method of calculus in concrete practical situations.

Course objective

Student get a deep knowledge in advanced differential and integral calculus to a degree which is necessary to study mathematics. Skills for application of acquired knowledge to theoretical as well as practical problems in other subjects as chemistry, physics, engineering, economy.

Course-related learning outcomes

Knowledge

- the student is able to use the advanced differential and integral calculus, among others theory of functions of several variables ant theory of ordinary differential equations;
- the student is able to prove an important theorems of mathematical analysis and to support it by examples.

Skills

- the student is able to prove an important theorems of mathematical analysis and to support it by examples;
- the student can interpret and explain functional relationships given in the form of formulas, tables, graphs, schemes and use them in practical problems;
- the student can apply theorems and methods of the single and multivariable calculus in optimization problems. He is able to find the global and local extrema and analyse of functions in order to construct the graph of them. He can explain the correctness of his reasoning.

Social competences

- the student can formulate questions precisely in order to deepen his own understanding of a given subject or to find the missing elements of reasoning;
- the student is able to find information in literature on one's own including literature written in foreign languages.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: valuation of knowledge and skills during oral and written exam.

Tutorials: two large tests concerning an application of knowledge from the lectures in exercises. Systematic control of theoretical knowledge in form of short quizes. Valuation of student answers during lessons. Valuation of activity during lessons.

Programme content

Update: 31.01.2020r.

Define integral and its geometric and mechanical applications. Improper integrals. Criteria of convergence of improper integrals. Application of improper integrals. Partial derivatives and their application to search of extrema of functions of several variables. Theorem on inverse function and on involved functions. Integrals depended on parameters. Beta and Gamma functions and their application in others branches of mathematics. Multiply integral, line integral and surface integral and their applications. Fundamental formulas for integration. Fourier series. Minimum property of the partial sums of Fourier series. Bessel's and Parseval's inequality. Criteria for uniform convergence of Fourier series. An application of Fourier series to describing of oscillatory phenomenon.

Teaching methods

Lectures:

- presenting theory and relating it with a students knowledge;
- presenting new material in connection with refeering to pevious lectures and subjects.

Tutorials:

- solving exercises strictly connected with the theory presented on lectures;
- solving exercises on the blackboard;
- detailed discussion of solutions.

Bibliography

Basic

- G. M. Fichtenholz, Rachunek różniczkowy i całkowy, PWN, Warszawa 2007.
- F. Leja, Rachunek różniczkowy i całkowy, PWN, Warszawa 1971.
- H. J. Musielakowie, Analiza matematyczna, Wydawnictwo Naukowe UAM 2000.

Additional

- W. Rudin, Analiza rzeczywista i zespolona, PWN, Warszawa 1998.
- A. Sołtysiak, Analiza matematyczna„ cz. i , cz. II. WN UAM, Poznań 2004.
- W. Swokowski, Calculus with analytic geometry, Prindle, Weber & Schmidt Publishers 1998.

Breakdown of average student's workload

	Hours	ECTS
Total workload	200	8,0
Classes requiring direct contact with the teacher	122	5,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)	78	3,0