Mathematical analysis II - course description

General information

Course name	Mathematical analysis II
Course ID	11.1-WF-FizP-MA-II-S17
Faculty	Faculty of Physics and Astronomy
Field of study	Physics
Education profile	academic
Level of studies	First-cycle studies leading to Bachelor's degree
Beginning semester	winter term 2022/2023

Course information

Semester	2
ECTS credits to win	5
Course type	obligatory
Teaching language	english
Author of syllabus	

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Lecture	30	2	-	-	Exam
Class	45	3	-	-	Credit with grade

Aim of the course

Familiarize students with the advanced methods and potential abilities of classical analysis essential in further education.

Prerequisites

Mathematical analysis I, Algebraic and geometrical methods in physics

Scope

- Partial Derivatives. Differentials in applications. Chain Rules for Functions of Several Variables. Directional Derivatives and Gradients. Tangent Planes and Normal Lines.

- Extreme values of functions of several Variables. Extreme values of functions defined on restricted domains. Implicit functions. Conditional extrema problems and the method of Lagrange multipliers. Applications in geometry and physics.

- Double integrals. Volume and surface area. Double integrals in polar coordinates. Moments and center of mass.

- Triple Integrals and its applications. Triple integrals in cylindrical and spherical coordinates. Change of variables and the Jabionan of a transformation.

- Line integrals and their applications. Conservative fields and independence of path. Geen's theorem.

- Surface integrals and their applications. Gradients, divergence, curl as differential operators. Gauss' divergence theorem and Stokes' theorem.

Teaching methods

The problem-solving lecture, a seminar lecture, the use of multimedia, demonstrating method. The discussion method classes, the problem-classical method, solving exercises illustrating the content of the lecture

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
1. After completing the course a student is able to recognize, select and apply the classical theorems and methods of differential and integral calculus of severable variables - In finding extreme values of a function, in constrained optimization problems, - in geometrical problems such as measure properties of a solid, tangent plane and normal vector to a differentiable manifold, - and physical problems such as vector fields, work, conservative fields, interpretation of main differential operators 2. The student can apply the basics of probability theory in scientific investigation involving randomness 3. The student make use of variety of materials available in Polish as well as English resources 4. The student is able to present and confront his opinion and persuasion during discussion, analyzing and solving scientific problems in the classroom	• K1A_W02 • K1A_W03 • K1A_U01 • K1A_U02 • K1A_U07 • K1A_K01 • K1A_K04	• a discussion • an evaluation test • an observation and evaluation of activities during the classes	• Class

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Assignment conditions

Class:

The grade consists of two criteria: the scores in four tests organized during classes (70%) and degree of active participation in classes and suitable preparation (30%). A student is required to obtain at least 50% of maximal score. The student with the lowest passing grade of 10% of maximal score may write a correction test before the exam class.

Lecture:

The final exam is composed of written part. To be admitted to the exam a student must receive a credit for the class.

The course credit consists of the class grade (50%) and the exam grade (50%). The course credit is attained by positive passing both class and exam.

Recommended reading

[1] G. M. Fichtenholz, *Rachunek różniczkowy i całkowy*, tom I i II, PWN, Warszawa 1995.

[2] M. Gewert, Z. Skoczylas, Analiza matematyczna 2, Definicje, twierdzenia, wzory, Oficyna Wydawnicza GIS, Wrocław 2005.

[3] M. Gewert, Z. Skoczylas, Analiza matematyczna 2, Przykłady i zadania, Oficyna GIS, Wrocław 2005.

[4] M. Gewert, Z. Skoczylas, Elementy analizy wektorowej, Teoria, przykłady i zadania, Oficyna GIS, Wrocław 1998.

[5] W. Kołodziej, *Analiza matematyczna w zadaniach*, PWN, Warszawa 1978.

[6] W. Kołodziej, *Podstawy analizy matematycznej w zadaniach*, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1995.

[7] W. Krysicki, L. Włodarski, A*naliza matematyczna w zadaniach,* cz. 2, Warszawa 1992.

[8] H. i J. Musielakowie, A*naliza matematyczna,* tom I cz. 1 i 2, Wydawnictwo Naukowe UAM, Poznań 1993.

[9] G. I. Zaporożec, *Metody rozwiązywania zadań* z *analizy matematyczne,* WNT, Warszawa 1976.

Further reading

[1] F. Leja: Rachunek różniczkowy i całkowy, PWN, Warszawa 1972.

[2] R. Adams, C. Essex, *Calculus - A Complete Course 7th ed* - (Pearson Canada, 2010)

[3] Earl W. Swokowski, *Calculus with Analytic Geometry Alternate Edition* –PWS Publisher 1983.

Notes

Modified by dr Marcin Kośmider (last modification: 04-04-2022 20:45)