MATHEMATICAL ANALYSIS (Ist Year of study, Ist Semester)

Credit value (ECTS) 5

Course category
Domain (Compulsory courses)

Discipline Code: A.PCM.F.101

Course holder:
Lect. PhD. Emilian BULGARIU

Discipline objectives (course and practical works)

Applying the given theoretical concepts in order to solve specific problems and modeling processes.

Understand the limits, continuity, differentiability, integrability of real functions of a real variable using appropriate practical examples;

Application of theoretical notions being exposed to solve specific problems.

Knowledge of analytical research methods in the field and their application in the profile disciplines. Learning models to calculate the derivative, primitives and the integral of a function of several variables.

Contents (syllabus)

Course (chapters/subchapters)
Functions of a real variable
Limit and continuity of real functions of a real variable. Continuous functions, limits and continuity, properties of continuous functions on an interval. Points of discontinuity and their classification. Monotone functions.
Differential calculus
Derivatives and differentials of real functions of a real variable. Operations of differentiable functions. Differentiable function composed and inverse functions. Fundamental theorems of differential calculus (Fermat's theorem, Rolle's theorem, theorems average) and their consequences
Characterization using derivative monotony. L'Hospital's rule. Higher order derivability. Convexity characterization using second order derivative sign.
Taylor's formula. Rating points optimally using derivatives. Applications of differential and integral calculus in biology.
Functions of several variables
Function of several variables. Limit and continuity for functions of several variables. Derivatives and differentials of functions of several variables. Extremes of functions of several variables
Number series. Series of functions
Number series. Series with positive terms. Criteria for convergence of series with positive terms. Sequences and series of functions. Power series. Development of functions in power series.
Integral calculus

Primitive and integral undefined. Methods of integration: integration by parts formula and formula variable change. Riemann integrability of a function and Riemann integral
Riemann integrals functions. Properties of integrals functions. Leibniz Newton's formula. The formula of integration by parts and change of variable formula. Improper integrals
Differential equations
First order differential equations. Differential equations with variables separable. First order differential equations homogeneous. First order linear differential equations.

Practicum
The derivative of a function of a real variable (review), applications of derivatives.
The derivative of order n, the string of Rolle, the evolution of a function, differentiability and extreme points for functions of a real variable
Derivative-order, second order, mixed derivative of a function of two real variables.
Order differential I and II order for functions of two real variables.
Local extreme points for functions of two real variables, gradient, rotor.
Series of numbers, criteria of convergence of series with positive terms.
Series of numbers, convergence criteria series with some terms.
Series of functions. Decomposition Taylor series, Maclaurin's formula.
Interpolation methods. Lagrange polynomial interpolation, Newton. The method of least squares
Integrale. Calculation methods.
Definite integrals, Applications of integrals, length, area, volume.
Differential equations with variables separable
Homogeneous first order differential equations

References

1. **Aldea Florica,** *Matematici aplicate în ştiinţele agricole şi silvice*, Editura Risoprint, Cluj Napoca, 2006.
2. **Bunu I. coord. colectiv de autori,** *Matematici economice*, Departamentul Editorial Poligrafic al Academiei de Studii Economice a Moldovei, Chișinău, 2012.
3. **Burdujan I**.-*Elemente de matematici cu aplicaţii în Biologie*, Ed.Vasiliana'98, Iaşi 2001.
4. **Chiruță C.,** *Elemente de matematică - Programare liniară și statistică matematică*, Ed. Ion Ionescu de la Brad, iași, 2019
5. **BULGARIU E.,** *Indrumar pentru seminariile de Analiza Matematica***,** Ed. Ion Ionescu de la Brad, Iași, 2018

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Course	Exam	70%
	presence	10%
Practical works	Tests + course and practical	20%

Contact
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