



MATHEMATICAL ANALYSIS 1 (SURNAMES A-K)

Enrollment year	2015/2016
Academic year	2015/2016
Regulations	DM270
Academic discipline	MAT/05 (MATHEMATICAL ANALYSIS)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	BIOENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	(28/09/2015 - 15/01/2016)
ECTS	9
Lesson hours	92 lesson hours
Language	ITALIAN
Activity type	WRITTEN AND ORAL TEST
Teacher	MORA MARIA GIOVANNA - 6 ECTS VENERONI MARCO - 3 ECTS
Prerequisites	Mathematics: the required prerequisites for enrollment into the Engineering Faculty
Learning outcomes	The course is aimed at providing the basic knowledge of calculus (differential, integral) for real functions of one real variable, together with an introduction to ordinary differential equations. Lectures will be mainly focused on the comprehension of notions (definitions, results), although some proofs will still be detailed. Examples and exercises will be presented. By the end of the course the Students are expected to be able to handle correctly and without hesitation limits, derivatives, function graphs, integrals, differential equations, and the corresponding theoretical facts.
Course contents	Preliminaries.

Recalls and complements on: set theory, mathematical logic, real numbers. Complex numbers: algebraic, trigonometric, and exponential form. Operations on complex numbers; algebraic equations on the complex field.

Functions, Limits, Continuity. Sequences and Series.

Functions: definitions, graphs; invertible functions; odd and even functions; monotone functions; periodic functions; operations on functions; nested functions. Elementary functions and corresponding graphs. Limits of functions: definitions, operations on limits. Continuous functions. Discontinuity points and their classification. Global properties of continuous functions. Limits of real sequences. Real series: definitions and basic examples; series with positive terms (and convergence tests); absolute and simple convergence.

Differential Calculus in one real variable and Applications.

Derivative of a function: definition and properties, applications in Geometry and Physics. Derivation rules and calculus. Fundamental theorems of differential calculus. Primitives and indefinite integrals. Successive derivatives. Function study: extrema, monotonicity, convexity. De l'Hopital rules.

Integral Calculus.

Definite integrals: definitions and basic properties, applications in Geometry and Physics. Fundamental theorems of integral calculus. Integration techniques. Improper integrals.

Ordinary Differential Equations.

Introduction to ordinary differential equations. The Cauchy problem. Separation of variables. Linear ordinary differential equations of the first order. Linear ordinary differential equations of the second order with constant coefficients. Linear systems of ordinary differential equations.

Teaching methods

Lectures (hours/year in lecture theatre): 90
Practical class (hours/year in lecture theatre): 0
Practicals / Workshops (hours/year in lecture theatre): 0

Reccomended or required readings

M. Bramanti, C.D. Pagani e S. Salsa. C.E. Zanichelli, Bologna, 2008-2009. Analisi Matematica I . C.E. Zanichelli, Bologna, 2008-2009.

Assessment methods

Finals consist in a written consistinmg into two parts: the first made by exercises and the second requiring theoretical notions. Both have to be passed within the same finals session. In order to be admitted to the second test on theory, a specific minimum of points has to be obtained in the first part of the written test.

Further information

Finals consist in a written consistinmg into two parts: the first made by exercises and the second requiring theoretical notions. Both have to be passed within the same finals session. In order to be admitted to the second test on theory, a specific minimum of points has to be obtained in the first part of the written test.

Sustainable development

