



MATHEMATICAL ANALYSIS (COMPLEMENTS) AND STATISTICS

Enrollment year	2015/2016
Academic year	2015/2016
Regulations	DM270
Academic discipline	
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	INDUSTRIAL ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	2nd semester (29/02/2016 - 10/06/2016)
ECTS	9
Lesson hours	82 lesson hours
Language	ITALIAN
Activity type	WRITTEN AND ORAL TEST
Teacher	SEGATTI ANTONIO GIOVANNI (titolare) - 6 ECTS RIGO PIETRO - 3 ECTS
Prerequisites	Analisi Matematica I, Geometria e Algebra.
Learning outcomes	This is a second course in calculus and a first course in mathematical probability with an introduction to statistical inference. It includes series, vector analysis, multiple integrals, line and surface integrals, the integral theorems of vector calculus; moreover, the calculus of probability, combinatorial analysis, independence, conditional probability, Bayes' theorem, random variables, expectation, variance, distribution functions, law of large numbers and central limit theorem; interval estimation.
Course contents	Mathematical Analysis Series; absolute and simple convergence; series with positive terms; special series. Convergence results. Power series; derivation and

integration. Taylor expansion.

Calculus for functions of several variables. Limits, continuity, partial derivatives, gradient, differentiability, Hessian; stationary points and their classification. Taylor's formula. Calculus for vector functions; Jacobian.

Multiple integrals. Two dimensional integrals; change of coordinates, polar coordinates, techniques of integration. Three dimensional integrals: spherical or cylindrical coordinates; evaluating the integral by the slice method or the line method.

Line and surface integrals. Parametric equations of a line; tangent line; arc length. Parametric equations of a surface; tangent plane; surface area; surface of revolution. Line integrals of scalar fields and of vector fields. Conservative vector fields. The differential operators curl and div. Surface integrals. Green's theorem; Stokes' theorem; divergence theorem.

Statistics

Definition of probability. Conditional probability; Bayes' theorem.

Independence. Mathematical expectation, variance. Random variables; discrete and continuous. Chebyshev inequality. Law of large numbers. Central limit theorem. Student's t-distribution and chi-square distribution. Inferential statistics; confidence intervals for the mean value and the variance. Linear regression.

Teaching methods

Lectures (hours/year in lecture theatre): 35

Practical class (hours/year in lecture theatre): 65

Practicals / Workshops (hours/year in lecture theatre): 0

Reccomended or required readings

M. Bramanti, C. D. Pagani, S. Salsa. *Analisi Matematica 2*. Zanichelli, 2009.

P. Baldi. *Introduzione alla probabilità con elementi di statistica*. McGraw-Hill.

Assessment methods

The exam consists of two parts: written and oral. Admission to the oral exam only if the result of written exam is not less than 16/30. Both exams must be completed in the same session. The written test takes place on the day of the beginning of the exam session; the oral exam will start few days later.

Further information

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Sustainable development goals - Agenda 2030

[Sibi legenda sviluppo sostenibile](#)