UNIVERSITÀ DI PAVIA

Anno Accademico 2017/2018

GEOMETRY AND ALGEBRA

Enrollment year	2017/2018
Academic year	2017/2018
Regulations	DM270
Academic discipline	MAT/03 (GEOMETRY)
Department	DEPARTMENT OF CIVIL ENGINEERING AND ARCHITECTURE
Course	CIVIL AND ENVIRONMENTAL ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	1st semester (02/10/2017 - 19/01/2018)
ECTS	6
Lesson hours	60 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	BONSANTE FRANCESCO (titolare) - 6 ECTS
Prerequisites	The same mathematics prerequisites for enrollment into the Engineering Faculty. In particular, the following issues are required elementary set theory; basic algebra: monomials/polynomials, polynomial division, equations and inequations (inequalities) of degree 1 or 2, also for fractions of polynomials; functions; basic trigonometry: goniometric functions, trigonometric equations and inequations, double- and half-angle formulae etc., laws for right and oblique triangles; Euclidean basic 2D 3D geometries, including area and volume formulas for mosto common figures, parallelism and orthogonality between straight lines and/or planes, parallelograms.
Learning outcomes	This is a basic course on Linear Algebra and Analytic Geometry. Particular emphasis will be given to topics useful in other disciplines,

	with a great deal of motivation and many computational examples. A tutoring staff, composed by experienced graduate or undergraduate students, provides an expert help and support for students attending the course.
Course contents	Preliminaries Polynomials and algebraic equations. Complex numbers and the Fundamental Theorem of Algebra. Linear Algebra Vector spaces, vectors of R^n, linear subspaces; linear span of a set of vectors; spanning sets and linear independence, basis, coordinates, and dimension. Operations with matrices, determinant and rank of a matrix, inverse of a matrix. Linear systems, Rouche?-Capelli and Cramer theorems, Gauss elimination method, representation of the set of the solutions of a linear system. Linear mappings between vector spaces, kernel and image, matrix associated with a linear mapping. Eigenvalues and eigenvectors of a linear operator, diagonalisation of a linear operator. Inner product in R^n, orthonormal basis, Gram-Schmidt process. Orthogonal matrices. Real quadratic forms. Spectral theorem: real symmetric matrices and orthogonal diagonalisation. Coordinate systems in 2- and 3-dimensional spaces; straight lines and planes. Canonical forms of plane conics. Quadric surfaces.
Teaching methods	Lectures (hours/year in lecture theatre): 23 Practical class (hours/year in lecture theatre): 37 Practicals / Workshops (hours/year in lecture theatre): 0
Reccomended or required readings	F.Bisi, F.Bonsante, S. Brivio. Lezioni di Algebra Lineare con Aplicazioni alla Geometria Analitica. Edizioni La Dotta.
Assessment methods	The final exam consists of a written and an oral test. Both have to be passed within the same session. A minimum grade in the written test will be required to be admitted to the oral test. Under certain specific conditions, the student can be exonerated from oral test.
Further information	
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile