UNIVERSITÀ DI PAVIA

Anno Accademico 2018/2019

GEOMETRY 1

Enrollment year	2018/2019
Academic year	2018/2019
Regulations	DM270
Academic discipline	MAT/03 (GEOMETRY)
Department	DEPARTMENT OF MATHEMATICS "FELICE CASORATI"
Course	MATHEMATICS
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	2nd semester (04/03/2019 - 14/06/2019)
ECTS	9
Lesson hours	72 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	STOPPINO LIDIA (titolare) - 9 ECTS
Prerequisites	A course in Calculus and a course in Linear Algebra
Learning outcomes	The main part of the course is an introduction to general topology. The second part is an introduction to projective geometry.
Course contents	Topological spaces and continuous functions. Compactness, connectedness, separation and numerability properties. Subspaces, products, quotients of topological spaces. Metric spaces: completeness, compactness, Baire's theorem, Ascoli's theorem. Homotopy. Introduction to projective geometry. Projective space associated to a vector space; subspaces;homogeneous coordinates. Embedding of the euclidean plane in the real projective plane. Projectivities. Conics: projective and affine classification; polarity. Quadrics (outline). The Erlangen programme (outline). Extended summary

	Topological spaces; open sets, closed sets, neighborhoods and related notions Continuous functions. Connected spaces; connectivity and continuous functions. Compact spaces; compactness and continuous functions. Hausdorff spaces; T3 and T4 spaces. Continuous maps between Hausdorff and/or compact spaces. Construction of topological spaces: subspaces, quotient of a topological space modulo an equivalence relation, products of topological spaces. Metric spaces; continuous functions between metric spaces. Completeness; completion of a metric space. Characterization of compactness for metric spaces. Uniformly continuous functions between metric spaces. Baire's theorem. Ascoli's theorem. Homotopy of continuous functions. Simply connected spaces. Coverings; lifting of homotopies. The fundamental group of a topological space. The fundamental group of the circle and of the spheres. Van Kampen's theorem (outline). Review of isometries of the euclidean plane. Introduction to projective geometry. Historical motivations. Projective space associated to a vector space (over any field, but particularly over the real field); projective subspaces; homogeneous coordinates. Immersion of the Euclidean plane in the real projective plane. Projectivities; projective properties. Conics; affine and projective classifications; polarity. Outline of quadrics. Outline of the "Erlangen program".
Teaching methods	Lectures and problem sessions
Reccomended or required readings	For the topology: E. Sernesi, Geometria 2, seconda edizione, Bollati Boringhieri, 2000 - M. Manetti, Topologia, seconda edizione, Springer, Milano 2014. - C. Kosniowski, Introduzione alla topologia algebrica, Zanichelli, Bologna 1988 For projective geometry: - E. Sernesi, Geometria 1, seconda edizione, Bollati Boringhieri, Torino 2000, E. Fortuna, R. Frigerio, R. Pardini, Geometria Proiettiva, Esercizi e richiami di teoria, Springer Milano, 2011
Assessment methods	Written and oral exam
Further information	Written and oral exam
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile