Università degli Studi di L'Aquila - Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica

Course catalogue

Page compiled on 07/12/2019

Programme of Course "Istituzioni Di Geometria Superiore I"

- Code: F1195
- Type of course unit: Compulsory (Bachelor Degree in Mathematics curriculum Generale)
- Level of course unit: Undergraduate Degrees
- Semester: 2

Number of ects credits: (Bachelor Degree in Mathematics) 9 (workload 225 hours)

Teachers: Margherita Lelli Chiesa (margherita.lellichiesa@univaq.it)

1	**Course objectives**	The goal is to introduce the basic concepts of projective geometry, algebraic geometry and algebraic topology
2	**Course content and learning outcomes (dublin descriptors)**	Topics of the module include: • Projective geometry: affine spaces and subspaces, affinities, projective spaces and subspaces, Grassmann formula, homogeneous coordinates, projective duality, projectivities, projective line and cross-ratio, projective classification of real and complex quadrics. • Algebraic geometry: Zariski topology on the affine space and on the projective space, affine varieties and projective varieties, Hilbert Nullstellensatz, regular functions, dimension of an affine variety, morphisms and rational maps, smooth and singular points. • Algebraic topology: path connected components of a topological space, homotopies, retractions and deformation retractions, homotopy of paths and fundamental group, local homeomorphisms and covering maps, lifitings, homotopy lifting property, the Borsuk Theorem and the Brouwer fixed point theorem, Van Kampen Theorem, fundamental groups of real and complex spheres and projective spheres, the universal covering space. On successful completion of this module, the student should : • have knowledge and understanding of basic projective geometry and basic algebraic geometry; • understand the fundamental concepts of algebraic topology; • demonstrate skill in mathematical reasoning and ability to conceive a proof; • understand and explain the meaning of complex statements using mathematical notation and language.
3	**Course prerequisites**	The student must master the linear algebra, the general topology and the differential geometry taught in the courses Geometria A and Geometria B. He should also know the basic concepts of algebra.
4	**Teaching methodsand language**	Lectures and exercises **Language**: Italian **Reference textbooks** • R. Hartshorne, ***Algebriac Geometry***. Springer. • M. Manetti, ***Geometria Algebrica***. • E. Sernesi, ***Geometria 1***. Bollati Boringhieri. • F. Bottacin, ***Introduzione alla geometria algebrica***. • M. C. Beltrametti, E. Carletti, D. Gllarati, G. M. Bragadin, ***Lezioni di geometria analitica e geometria proiettiva***. Bollati Boringhieri.
5	**Assessment methods**	Written and oral exam