Testi del Syllabus

Resp. Did.	**PERRONI FABIO**	**Matricola: 019262**

Docente	**PERRONI FABIO, 9 CFU**

Anno offerta:	**2025/2026**
Insegnamento:	**534SM - ADVANCED GEOMETRY 3**
Corso di studio:	**SM28A - MATHEMATICS**
Anno regolamento:	**2025**
CFU:	**9**
Settore:	**MAT/03**
Tipo Attività:	**C - Affine/Integrativa**
Anno corso:	**1**
Periodo:	**Secondo Semestre**
Sede:	**TRIESTE**

Testi in italiano

Lingua insegnamento	English
Contenuti (Dipl.Sup.)	Affine and algebraic varieties. Dimension theory. Local properties. Projective varieties. Examples. Elimination theory. Morphisms.
Testi di riferimento	G. R. Kempf, "Algebraic Varieties", London Mathematical Society, Lecture Notes Series 172 D. Mumford, "Algebraic Geometry I, Complex Projective Varieties", Springer Berlin, Heidelberg, 1995.
Obiettivi formativi	Knowledge and understanding: at the end of the course the student is required to prove that he/she knows the basic tools and results of complex algebraic geometry. Applying knowledge and understanding: at the end of the course the student must know how to apply the material of the course to study the geometric properties of the set of solutions of a system of polynomial equations. Making judgments: at the end of the course the student will know how to recognize and how to apply the acquired techniques of algebraic geometry, and will also recognize the situations and problems in which these techniques can be advantageously used. Communication skills: at the end of the course the student will be able to express himself/herself appropriately on the above topics. Learning skills: at the end of the course the student will be able to consult standard manuals of basic algebraic geometry.

Prerequisiti	Basic familiarity with linear algebra, affine and projective geometry, topology, real and complex analysis, differential geometry, at the level of a Laurea in Matematica program. Linear algebra, affine and projective spaces and their subspaces; basic notions of general topology; a basic knowledge of plane algebraic curves is useful but not essential.
Metodi didattici	Lessons and exercises sessions. During the course some exercises will be assigned as homework, their solutions will be discussed in class.
Altre informazioni	There will be a moodle page of the course in which it will be reported: the diary of the lessons; the dates of the exams; and additional material.
Modalità di verifica dell'apprendimento	The final exam is aimed at ascertaining the knowledge of the topics of the entire program of the course, expression skills and language skills of the students. It consists of an oral exam.
Programma esteso	DEFINITION OF ALGEBRAIC VARIETIES. GENERAL CONSTRUCTION OF AFFINE VARIETIES. HILBERT'S NULLSTELLENSATZ. SUBVARIETIES. NOETHERIANITY. IRREDUCIBILITY. DIMENSION THEORY. HYPERSURFACES AND THE PRINCIPAL IDEAL THEOREM. PRODUCTS. SEGRE EMBEDDING. SEPARATEDNESS. PROJECTIVE NULLSTELLENSATZ. ELIMINATION THEORY. PROJECTIONS AND THE NOETHER NORMALIZATION LEMMA. SMOOTHNESS.

Obiettivi per lo sviluppo sostenibile

Codice	Descrizione

Testi in inglese

Language	English
	Affine and algebraic varieties. Dimension theory. Local properties. Projective varieties. Examples. Elimination theory. Morphisms.
	G. R. Kempf, "Algebraic Varieties", London Mathematical Society, Lecture Notes Series 172 D. Mumford, "Algebraic Geometry I, Complex Projective Varieties", Springer Berlin, Heidelberg, 1995.
	Knowledge and understanding: at the end of the course the student is required to prove that he/she knows the basic tools and results of complex algebraic geometry. Applying knowledge and understanding: at the end of the course the student must know how to apply the material of the course to study the geometric properties of the set of solutions of a system of polynomial equations. Making judgments: at the end of the course the student will know how to recognize and how to apply the acquired techniques of algebraic geometry, and will also recognize the situations and problems in which these techniques can be advantageously used. Communication skills: at the end of the course the student will be able to express himself/herself appropriately on the above topics. Learning skills: at the end of the course the student will be able to

	consult standard manuals of basic algebraic geometry.
	Basic familiarity with linear algebra, affine and projective geometry, topology, real and complex analysis, differential geometry, at the level of a Laurea in Matematica program. Linear algebra, affine and projective spaces and their subspaces; basic notions of general topology; a basic knowledge of plane algebraic curves is useful but not essential.
	Lessons and exercises sessions. During the course some exercises will be assigned as homework, their solutions will be discussed in class.
	There will be a moodle page of the course in which it will be reported: the diary of the lessons; the dates of the exams; and additional material.
	The final exam is aimed at ascertaining the knowledge of the topics of the entire program of the course, expression skills and language skills of the students. It consists of an oral exam.
	DEFINITION OF ALGEBRAIC VARIETIES. GENERAL CONSTRUCTION OF AFFINE VARIETIES. HILBERT'S NULLSTELLENSATZ. SUBVARIETIES. NOETHERIANITY. IRREDUCIBILITY. DIMENSION THEORY. HYPERSURFACES AND THE PRINCIPAL IDEAL THEOREM. PRODUCTS. SEGRE EMBEDDING. SEPARATEDNESS. PROJECTIVE NULLSTELLENSATZ. ELIMINATION THEORY. PROJECTIONS AND THE NOETHER NORMALIZATION LEMMA. SMOOTHNESS.

Obiettivi per lo sviluppo sostenibile

Codice	Descrizione