<table>
<tr><td colspan="6">Academic subject: ALGEBRIC GEOMETRY</td></tr>
<tr><td colspan="2">Degree Class:
L-35-Scienze Matematiche</td><td colspan="2">Degree Course:
Mathematics</td><td colspan="2">Academic Year:
2017/2018</td></tr>
<tr><td colspan="2"></td><td colspan="2">Kind of class:
Optional</td><td>Year:
3</td><td>Period:
2</td></tr>
<tr><td></td><td></td><td colspan="2"></td><td colspan="2">ECTS: 7
divided into
ECTS lessons: 6,5
ECTS exe/lab/tutor: 0,5</td></tr>
<tr><td colspan="6">Time management, hours, in–class study hours, out–of–class study hours
lesson: 52 exe/lab/tutor: 8 in–class study: 60 out–of–class study: 115</td></tr>
<tr><td>Language:
Italian</td><td>Compulsory Attendance:
no</td><td colspan="4"></td></tr>
<tr><td>Subject Teacher:
Amici Oriella Maria</td><td>Tel: 085442691
e-mail:
oriellamaria.amici@uniba.it</td><td>Office:
Department of Mathematics
Room 14 , Floor III</td><td colspan="3">Office days and hours:
Thursday 11-13, other days by appointment.</td></tr>
<tr><td colspan="6">Prerequisites: The notions given in the courses: Geomerty 1, Geomerty 2, Geomerty 3 and Algebra</td></tr>
<tr><td colspan="6">Educational objectives: Knowledge of basic notions of Algebric Geometry through the study of curves and algebric varieties</td></tr>
<tr><td>Expected learning outcomes (according to Dublin Descriptors)</td><td colspan="5">Knowledge and understanding:
Acquiring basic concepts of affine and projective Algebric Geometry, dimension and birational equivalence of Algebric varieties

Applying knowledge and understanding:
The acquired theoretical knowledge is useful in Commutative Algebra and Complex Geometry

Making judgements:
Ability to state and prove basic results on Algebric varieties

Communication:
Acquiring of a rigorous mathematical language

Lifelong learning skills:
The students will able to relate notions of Algebric Geometry, Topological Geometry, Differential Geometry</td></tr>
<tr><td colspan="6">Course program
<u>Projective spaces</u>

<u>Algebraic curves</u>
Plane curves. Rational curves. Relation with field theory .Rational maps. Weierstrass normal form of a cubic. Singular and nonsingilar points. Local parameter on the curve at point.Tangent line. Fix point. Projective curves. Birational maps between non singular projective plane curves. Hessian curve . Pascal’s line. Linear system of curves.

<u>Algebraic preliminaries</u>
Polynomials. Notherian rings. Homogeneous forms. Homogeneous ideals.

<u>Algebraic varieties</u>
Affine algebraic varieties. Hypersurfaces. Ideal-variety correspondence. Zariski topology. Ideal of variety. Homogeneization and dehomogeneization of a polynomial. Projective algebraic varieties. Zariski topology</td></tr>
</table>

on the projective space. Ideal radical of ideal. Radical ideal.

<u>Groebner bases and Nullstellensatz</u>.
Monomial ordering. Monomial ideal. The Hilbert basis Theorem. Groebner bases and properties. Nullstellensatz and Projective Nullstellensatz. Irreducible varieties and ideal primes. Minimal decomposition of a variety.

<u>The Elimination and Extension Theorems</u>.
Elimination ideal. Elimination Theorem. Resultants. The Extension Theorems.

<u>Rational functions on a variety</u>
Regular mappings. Coordinate ring. Rational functions on a variety. Function field.. Rational mappings. Varieties birationally equivalent. Rational variety.

<u>Dimension of a variety</u>.

Teaching methods:
Lectures and exercise sections

Auxiliary teaching:

Assessment methods:
Oral exam

Bibliography:

W. FULTON, Algebraic Curves, The Benjamin-Cummings, Publ. Comp., Menlo Park, 1969.D. COX Ideals, varieties and algorithms. Springer 1990
D. MUMFORD, Algebraic Geometry I, Complex Projective Varieties, Springer Verlag, Berlin 1976
M. NAMBA, Geometry of Projective Algebraic Curves, Marcel Dekker, Inc., New York, 1984.
I.R. SHAFAREVICH, Basic Algebraic Geometry 1: Varieties in Projective Space, Springer-Verlag 1994.
O. ZARISKI-P. SAMUEL, Commutative Algebra I e II, Springer Verlag, Berlin, 1958.