SUBJECT TEACHING GUIDE

G112 - Projective and Algebraic Geometry

Double Degree in Physics and Mathematics
Degree in Mathematics

Academic year 2026 - 2027

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Mathematics			Type and Year	Optional. Year 4 Optional. Year 3
Faculty	Faculty of Sciences				
Discipline	Subject Area: Further Algebra and Geometry Mention in Pure and Applied Mathematics				
Course unit title and code	G112 - Projective and Algebraic Geometry				
Number of ECTS credits allocated	6	Term		Semester based (2)	
Knowledge Field	Mathematics and statistics				
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION
Name of lecturer	IRMA PALLARES TORRES
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Office	
Other lecturers	LUIS CRESPO RUIZ

4. OBJECTIVES
Projective and Algebraic Geometries are two classical branches of Maths. Nowadays they are used in Vision and Computer Aided Geometric Design. Students will be able to study this kind of applications, because their theoretic statements will be described in the present subject.

6. SUBJECT PROGRAM	
CONTENTS	
1	Projective spaces and subspaces. Projective maps. Projective references. Homogenous coordinates. Equations and matrices.

2	The relationships among vector, affine and projective spaces. Classical theorems.
3	Conics and quadrics. Classification. Polairity of conics. Tangent lines.
4	Introduction to Algebraic Geometry. Affine algebraic sets. Hilbert Nullstellensatz. Zariski topology. Coordinate ring. Irreducible components.
5	Morphisms between affine algebraic sets. Rational functions. Projective algebraic sets. Affine cover and projective clausure. Affine cone of an affine algebraic set.
6	Morphism between algebraic projective sets. Plane curves. Singular and regular points. Intersection multiplicity. Bezout Theorem.
7	Midterm exams
8	Final exam

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessment	%
Midterm exam (EP1)	Written exam	No	Yes	50,00
Midterm exam (EP2)	Written exam	No	Yes	50,00
Final exam	Written exam	Yes	Yes	0,00
TOTAL				100,00

Observations

Students with a grade greater or equal to 4 in the midterms exams and with (EP1+EP2)/2 greater or equal to 5 do not need to do the final exam.
Students not doing midterm exams will have as final mark that of the final exam.

Observations for part-time students

If you are a part-time student, you can replace the above evaluation system by the final exam.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

E. Outerelo Domínguez; J. M. Sánchez Abril: Nociones de Geometría Proyectiva. Ed. Sanz y Torres, 2009

W. Fulton: Curvas algebraicas. Introducción a la geometría algebraica. Editorial Reverté, 1971