SUBJECT TEACHING GUIDE

G112 - Projective and Algebraic Geometry

Double Degree in Physics and Mathematics
Degree in Mathematics

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Mathematics			Type and Year	Optional. Year 5 Optional. Year 4
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)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION
Name of lecturer	NURIA CORRAL PEREZ
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Other lecturers	MONICA BLANCO GOMEZ

3.1 LEARNING OUTCOMES
- Students will calculate subspaces of projective spaces over the real and complex numbers as well as over some finite fields.
- Students will calculate equations of projective subspaces and matrices of projective maps, as well as their basis, center and fixed points.
- Students will know the relationships among vector, affine and projective spaces.
- Students will be able to classify conics and to calculate equations of conics.
- Students will calculate singular points of a plane curve and classify the singularity type in some cases.
- Students will calculate the genus of a curve with ordinary singularities
- Students will calculate interesection of curves and intersection multiplicity by using elimination techniques.
- Students will know the basic concepts of projective curves and their algebraic description.

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. COURSE ORGANIZATION	
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 and projective algebraic sets. Bezout Theorem.
5	Plane curves: local and global properties
6	Study of curve singularities
7	Midterm exams
8	Final exam

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
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

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

Curvas algebraicas, Introducción a la geometría algebraica, William Fulton, editorial Reverté, 1971