

SUBJECT TEACHING GUIDE

G45 - Geometry, Art And Nature

Degree in Mathematics

Degree in Mathematics

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Mathematics Degree in Mathematics			Type and Year	Core. Year 1 Core. Year 1
Faculty	Faculty of Sciences				
Discipline	Subject Area: Basic Mathematics Basic Module				
Course unit title and code	G45 - Geometry, Art And Nature				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Knowledge Field					
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION
Name of lecturer	FRANCISCO SANTOS LEAL
E-mail	francisco.santos@unican.es
Office	Facultad de Ciencias. Planta: + 3. DESPACHO PROFESORES (3013)
Other lecturers	

4. OBJECTIVES

To realize a general view of geometrical concepts and structures, and to spot them in diverse contexts. To experience geometry through exploration and discovery.

To learn the main geometric structures in the plane and 3D space and their relevant properties.

To use software for exploration and conjecture in Geometry.

To learn the main geometric structures in the plane and 3D space and their relevant properties.

To be able to identify geometric forms in Art and Nature.

6. SUBJECT PROGRAM

CONTENTS

1	Plane Euclidean Geometry: Properties of triangles. Pythagoras theorem. Area and volume of some notable bodies
2	Symmetries and transformation groups: Polyhedra. Classification and symmetries of regular polyhedra. Motions, translations, rotations, reflections, glide reflections. Symmetry groups of plane figures. Frieze and crystallographic groups.
3	Curves and surfaces: Conics. Definition by excentricity, foci and directrix. Polar and cartesian equations. Sum/ difference of distances to foci. Reflection properties. Parametric curves. Cycloid, spirals, tractrix. Catenary, brachistochrone, parabola, ellipse.
4	Lab exam Final exam

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Students will hand in some written problems or GeoGebra exercises.	Others	No	Yes	20,00
Exam covering the first half of the course	Written exam	No	Yes	35,00
Dynamic geometry practice (GeoGebra) on the computer lab	Laboratory evaluation	No	Yes	10,00
Final exam. It covers the second half of the course. Students willing to increase their grade for the first half can do so in a second exam after the final.	Written exam	Yes	Yes	35,00
Participation in class. Students can get up to 0.5 additional points (added to the average from the rest of the evaluation) by participating in class, most notably solving exercises in the blackboard.	Others	No	No	0,00
TOTAL				100,00
Observations				
<p>To pass the course students need to:</p> <ul style="list-style-type: none"> - have an average score of at least 5 in the whole of evaluation. - have an average score of at least 3 in each of the two exams. <p>Students that have a better average with exams alone than including the rest will have as final grade the average of the two exams. In particular, students can obtain 100% of their grade from exams, if they wish.</p>				
Observations for part-time students				
<p>Partial dedication students have the same evaluation system, which includes the possibility of obtaining their final grade with the final exam alone.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Introduction to geometry, Coxeter, H.S.M. 2nd ed. Editorial New York [etc.] : Wiley, cop. 1969. CIE B A51 5
Transformation Geometry, An Introduction to Symmetry, G. E. Martin, Springer, 1982. CIE A51 18
Geometría Elemental, A.V. Pogorelov, Mir, 1974. CIE MA 51 20, CIE B A51 18