SUBJECT TEACHING GUIDE

G45 - Geometry, Art And Nature

Degree in Mathematics
Degree in Mathematics

Academic year 2022-2023

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)	
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
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Office	Facultad de Ciencias. Planta: + 3. DESPACHO PROFESORES (3013)
Other lecturers	

3.1 LEARNING OUTCOMES
- Ability to see and find symmetries of figures, friezes, mosaics and other shapes.
- To know the main properties of geometirc figures and be able to use them to describe buildings, art work and nature beings.
- To recognize different kinds of curves or surfaces in architecture, bridges, plants, shells, etc.
- To know how to use Dynamic Geometry software.
- To know different families of polyhedra and their main properites.
- Be able to determine symmetries in figures, frieze patterns and other figures, or in pictures or photographs.
- To recognise some curves and surfaces. To understand why some of them appear in art, engineering, or nature.

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. COURSE ORGANIZATION	
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. Homothecies and similarities
3	Curves and surfaces: Implicit curves. Conics, algebraic curves. Prametric curves. Cycloid, spirals, tractrix. Catenary, brachistochrone, parabola, ellipse. Ruled and revolution surfaces
4	Lab exam Final exam

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Problem solving.	Written exam	No	No	30,00
Short essay on a particular topic.	Work	No	Yes	10,00
Dynamic geometry practice on the computer lab	Laboratory evaluation	No	Yes	10,00
Final exam.	Written exam	Yes	Yes	50,00
TOTAL				100,00
Observations				
Dates for second evaluations for activities not fixed by the school will be arranged with the instructors.				
Observations for part-time students				
Partial dedication students are allowed to have a single exam evaluation.				

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 M A 51 20, CIE B A51 18