SUBJECT TEACHING GUIDE

G45 - Geometry, Art And Nature

Degree in Mathematics
Degree in Mathematics

Academic year 2023-2024

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.
3	Curves and surfaces: Conics. Definition by excentricity, foci and directrix. Polar and cartesian equations. Sum/ difference of distances to foci. Reflection properties. Prametric 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 0.5 additional points (added to the average form 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

To pass the course students need to:
- have an average score of 5 in the whole of evaluation.
- have an average score of 3 in the two exams, and at least 2.5 in each.

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.

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