

SUBJECT TEACHING GUIDE

351 - Discrete Geometry and Computation

Master's Degree in Mathematics and Computing

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Master's Degree in Mathematics and Computing			Type and Year	Optional. Year 1
Faculty	Faculty of Sciences				
Discipline					
Course unit title and code	351 - Discrete Geometry and Computation				
Number of ECTS credits allocated	3	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	FRANCISCO SANTOS LEAL				
E-mail	francisco.santos@unican.es				
Office	Facultad de Ciencias. Planta: + 3. DESPACHO PROFESORES (3013)				
Other lecturers	MONICA BLANCO GOMEZ				

3.1 LEARNING OUTCOMES

- To know, understand and be able to apply discrete geometry techniques, and be aware of their role in mathematics and computer science

4. OBJECTIVES

Geometric structures and algorithms will be studied. The goals are:

- that students understand the mathematical (geometric, algebraic and combinatorial) foundations that lie behind the problems under study.
- that students understand the structures and algorithms that are appropriate to optimally solve these problems, as well as (a first approximation to) their complexity.

6. COURSE ORGANIZATION

CONTENTS

1	Polytope combinatorics. Face lattice. Shelling. f-vector and h-vector
2	Triangulations and subdivisions of polytopes and point configurations
3	Delaunay triangulation and Voronoi diagram. Algorithm(s) and optimality properties. Delaunay triangulations in the plane.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Problem solving 60%	Work	No	Yes	60,00
Final exam 40%	Written exam	No	Yes	40,00
TOTAL				100,00
Observations				
Observations for part-time students				
The evaluation of these students will be essentially the same as regular students, but the deadlines for the different tasks will be adapted to their needs.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

R. Thomas, Lectures in Geometric Combinatorics, Student Mathematical Library, 33. IAS/Park City Mathematical Subseries. AMS, Providence, RI, 2006.

M. Joswig y T. Theobald, Polyhedral and Algebraic Methods in Computational Geometry, Springer, Universitext, 2013.