

## SUBJECT TEACHING GUIDE

### G113 - Further Algebra

Double Degree in Physics and Mathematics

Degree in Mathematics

Degree in Mathematics

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in 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	G113 - Further Algebra				
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	LUIS FELIPE TABERA ALONSO				
E-mail	luisfelipe.tabera@unican.es				
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Other lecturers	LUIS MIGUEL PARDO VASALLO				

3.1 LEARNING OUTCOMES
- Recognize the primary decomposition of an ideal as a generalization of the factorization of a number.
- Understand geometric properties of an algebraic set from algebraic properties of its local ring
- Compute in a local ring, interpret geometrically the method of localization.
- Solve problems in a local ring.

#### 4. OBJECTIVES

This is a course in commutative algebra centered in the study of local rings and integral extensions.

#### 6. SUBJECT PROGRAM

##### CONTENTS

1	Reinterpretation of known results
2	Primary decomposition. Hilbert basis, Lasker Noether and Nullstellensatz theorems.
3	Local rings, local ring of a closed point: Jacobian and cotangent space. Valuations: Hensel lemma.

#### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
written test	Written exam	No	Yes	100,00
final test	Written exam	Yes	No	0,00
TOTAL				100,00
Observations				
Observations for part-time students				
Part time students will follow the same tests as regular students.				

#### 8. BIBLIOGRAPHY AND TEACHING MATERIALS

##### BASIC

M.F. Atiyah, I.G. Macdonald "introducción al álgebra conmutativa", reverte, 1978

L.F. Tabera, "Apuntes de ampliación de álgebra"