

## SUBJECT TEACHING GUIDE

### G87 - COMPLEX VARIABLES

#### Double Degree in Physics and Mathematics Degree in Mathematics

Academic year 2020-2021

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Mathematics			Type and Year	Compulsory. Year 3 Compulsory. Year 3
Faculty	Faculty of Sciences				
Discipline	Subject Area: Mathematical Analysis and Differential Equations Module: Compulsory Subjects				
Course unit title and code	G87 - COMPLEX VARIABLES				
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	CARLOS BELTRAN ALVAREZ				
E-mail	carlos.beltran@unican.es				
Office	Facultad de Ciencias. Planta: + 1. DESPACHO CARLOS BELTRAN ALVAREZ (1040)				
Other lecturers	FATIMA LIZARTE LOPEZ				

### 3.1 LEARNING OUTCOMES

- Relate the concepts of differentiable function and complex function derivable. Techniques of the integral along paths. Knowledge of the main theorems of analytic functions, with special treatment for the entire functions. Geometric interpretation of the results. Management of the point of infinity, singularities, meromorphic functions, residues etc. Geometric interpretation of the results. Use of the residue, argument, Rouché, Hurwitz theorems, for calculations and problems of the calculus, Algebra and other branches of mathematics. Knowledge of special functions and its close relationship with the analytic theory of numbers

### 4. OBJECTIVES

Establish the great virtues of analytical functions. Provide tools for the resolution of problems of Real analysis.

## 6. COURSE ORGANIZATION

CONTENTS	
1	Differentiable functions of complex variable. Power series. The Cauchy-Riemann conditions. Integration along roads. Cauchy's integral formula.
2	Representation of analytic functions by power series. Principle of the maximum module. The complex logarithm. Entire functions. Applications of the disk on itself. Schwarz reflection principle
3	Isolated singularities. Laurent series. Meromorphic functions. The residue theorem and its applications to calculate integrals and numerical series. Argument principle. Rouché theorem. Hurwitz theorem
4	Final Exam

## 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Partial Exams	Written exam	No	Yes	50,00
Around end of october and at the end of the classes, two 1.5 hours tests.	Written exam	No	Yes	50,00
This can be used to pass and/or to improve the qualifications obtained in the partial examinations.	Written exam	Yes	Yes	0,00
<b>TOTAL</b>				<b>100,00</b>
Observations				
Observations for part-time students				
Part-time students may choose to follow the same assessment as full-time students or only to attend the final exam that will count for 100% of the note				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC
Apuntes de la asignatura, tanto en versión documento como en versión Aula Virtual (Moodle)