SUBJECT TEACHING GUIDE

G86 - Further Integral Calculus

Double Degree in Physics and Mathematics
Degree in Mathematics

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Mathematics			Type and Year	Compulsory. Year 2 Compulsory. Year 2
Faculty	Faculty of Sciences				
Discipline	Subject Area: Mathematical Analysis and Differential Equations Module: Compulsory Subjects				
Course unit title and code	G86 - Further Integral Calculus				
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	MANUEL GONZALEZ ORTIZ
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Office	Facultad de Ciencias. Planta: + 0. DESPACHO PROFESORES (0053)
Other lecturers	RAFAEL GRANERO BELINCHON

3.1 LEARNING OUTCOMES
- Properties of the family of Lebesgue measurable sets.
- Understand and apply the properties of the Lebesgue integral and the main results of Lebesgue theory.
- Apply the main results of Lebesgue theory to solve integrals in a rigorous and efficient way . Understand the proofs of the main theorems of integration in several variables: Fubini, change of variables, Green, Stokes y Gauss.

4. OBJECTIVES

Advanced integral calculus is a key part for the understanding of the integration of functions, which is one of the most important concepts of Mathematics. The course aims to understand the concept of integral and assimilate the two main properties of modern integration theory: theoretical rigor and practicality, as an indivisible unit. Appreciate the need for both properties, and be familiar with both so that: 1) the student understands the need for rigour, and acquires the ability to prove theorems and use them correctly, and 2) he reaches the necessary ability to solve integration problems in a rigorous way.

6. COURSE ORGANIZATION

	CONTENTS
1	Lebesgue measure. Measurable functions. Properties and examples.
2	Lebesgue integral. Theorems of monotone convergence and dominated convergence; applications.
3	Relation between the Riemann integral and the Lebesgue integral. Integration using parametric derivatives.
4	Integration of several variables functions. Fubini's theorem. Change of variables.
5	Line integrals. Green's theorem. Surface integrals. Integration of scalar fields and vector fields. Stokes' theorem and Gauss' theorem.
6	Final exam

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Final exam	Written exam	Yes	Yes	30,00
Partial exams	Written exam	No	Yes	70,00
TOTAL				100,00

Observations

To pass this subject, the student should pass two partial exams. Otherwise he should pass a final global exam.

Observations for part-time students

Partial time students should choose between the evaluation method for full time students and being evaluated by their marks in the final exam.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Facenda, J.A. y Freniche, F.J. Integración de funciones de varias variables. Ed. Pirámide (2002)