SUBJECT TEACHING GUIDE

G84 - Further Differential Calculus

Double Degree in Physics and Mathematics
Degree in Mathematics

Academic year 2021-2022

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	G84 - Further Differential Calculus				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web	https://personales.unican.es/stand/				
Language of instruction	Spanish	English Friendly	Yes	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	JESUS ARAUJO GOMEZ

3.1 LEARNING OUTCOMES

- To understand the meaning of the properties of limit and continuity of functions of one and several variables . To know the proofs and apply the theorems to solve problems about continuity and uniform continuity of functions of one and several variables. Build proofs of some simple results on continuity.
- To understand the properties of differentiability of functions using geometric interpretation of the derivative and directional derivatives. Knowing the proofs and apply the theorems to solve problems of differentiability of functions of one and several variables. Build proofs of some simple results on differentiability.
- To know the fundamental theorems of differential calculus and its application to approach and solve basic problems of inverse and implicit functions, and approximation of functions by power series.

4. OBJECTIVES

To understand the mathematical method in the theoretical development: definitions and axioms, propositions and theorems, examples and counter-examples.

To know different mathematical methods to get proofs of results and to be able to apply them for building proofs of simple results. Distinguish between right and wrong reasoning in simple proofs.

To acquire certain ability in handling the mathematical language for the formal statement of properties of sets and functions , as an initiation into the capacity to communicate in the context of this branch of science to an expert audience.

To acquire some skill in handling and interpretation of sets and functions using their properties and graphical interpretation.

To know some fundamental theorems of differential calculus, and their proofs.

The subject therefore complements the course of Differential Calculus , taught in the first year, which gives special attention to the most technical aspect of the issue.

6. COURSE ORGANIZATION

CONTENTS	
1	Fundamental properites of R and Rn
2	Limits and continuity of functions
3	Differentiable functions: derivatives of 1 variable functions, directional derivatives, partial derivatives, differentiable functions and chain rule.
4	Some important theorems
5	Applications: Inverse function and implicit function theorems
6	Applications 2: Taylor theorem, power series and function approximation.
7	Uniform continuity of functions
8	Evaluation

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Partial exam during the course (40%)	Written exam	No	Yes	40,00
Final exam (60%)	Written exam	Yes	Yes	60,00
TOTAL				100,00

Observations

Observations for part-time students

Part-time students may chose between getting their grade as the other students or being evaluated only by the final exam.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

J.E. Marsden y M.J. Hoffman. "Análisis Clásico Elemental". Ed. Addison-Wesley Iberoamericana

T. E. Apostol, "Calculus Volume II - Multivariable Calculus and Linear Algebra, with Applications to Differential Equations and Probability", Wiley, 2nd ed, 1969.