

SUBJECT TEACHING GUIDE

G36 - Mathematics II: Differential Calculus

Degree in Physics

Degree in Physics

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Physics Degree in Physics			Type and Year	Core. Year 1 Core. Year 1
Faculty	Faculty of Sciences				
Discipline	Subject Area: Basic Mathematics for Science Basic Module				
Course unit title and code	G36 - Mathematics II: Differential Calculus				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION				
Name of lecturer	BEATRIZ PORRAS POMARES				
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Other lecturers					

3.1 LEARNING OUTCOMES
- The knowledge about concepts and methods of mathematical language as a tool for modelitation.
- Use of matrix, points, vectors, functions, polynomials, sequences, series, diferencial equations and integrals.
- Knowing a relevant set of samples and situations that serve to improve intuition about concepts such as plane, movement, limit, derivative or integral, both in one and several variables.
- Improve the skills for mathematical modelitation and computation of simple phisical problems

4. OBJECTIVES

To know, understand and handle a number of basic concepts and results concerning functions of one real variable:

- Equations and inequations with absolute values.
- Sequences and series in \mathbb{R} ; study of their convergence.
- Taylor series

To know, understand and apply basic results about functions of several real variables: limits, continuity, partial derivatives and differentials..., and apply them in problems of implicit functions, maxima and minima.

6. COURSE ORGANIZATION

CONTENTS

1	<p>REAL NUMBERS: SEQUENCES AND SERIES OF REAL NUMBERS</p> <ol style="list-style-type: none"> 1. Real numbers, absolute values and inequalities. 2. Sequences in \mathbb{R} and limits (finite and infinite) of such sequences. 3. Common criteria to study the convergence of a sequence in \mathbb{R} and to calculate its limit if it exists: Sandwich rule, monotonous sequences (the number e), Stolz criterion, equivalences (Stirling formula). 4. Series of real numbers. Geometric and harmonic series. 5. Convergence criteria: Gauss, quotient and Leibnitz. 6. Power series. Convergence radius. 7. Taylor Series. Bounding of the rest.
2	<p>LIMITS AND CONTINUITY OF FUNCTIONS OF SEVERAL REAL VARIABLES.</p> <ol style="list-style-type: none"> 1. Introduction to functions of several real variables with values in \mathbb{R}^n. 2. Limit and continuity of functions of several real variables. 3. Directional and iterated limits. Limits in polar coordinates.
3	<p>DERIVATION OF FUNCTIONS OF SEVERAL REAL VARIABLES.</p> <ol style="list-style-type: none"> 1. Directional derivatives. Partial derivative. Gradient. Jacobian matrix. 2. Differentiable functions of several variables. 3. Properties of differentiable functions. Chain rule. Change of variables 4. Partial derivatives of higher order. Hessian matrix. 5. Extremes of real functions of several real variables. Conditioned extremes. Lagrange multipliers. 6. Derivation of implicit functions.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Quiz on the content of chapter 1	Written exam	No	Yes	30,00
Quiz on the content of chapter 2	Written exam	No	Yes	30,00
Quiz on the content of chapter 3	Written exam	No	Yes	30,00
Context problem.	Written exam	No	No	10,00
TOTAL				100,00
Observations				
Continuous evaluation (ordinary call): 1st partial exam 2nd partial exam and recovery of first partial 3rd partial exam and recovery of second partial Global problem.(Unrecoverable) Extraordinary call: recovery of each of the partials.				
Observations for part-time students				
The same evaluation type applies to part time students				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Material didáctico disponible en el Aula Virtual UC.

J.E. Marsden, A.J. Tromba. Cálculo Vectorial. Quinta edición. Pearson, Addison-Wesley, 2004.