

## SUBJECT TEACHING GUIDE

G37 - Mathematics III: Integra Calculus

Degree in Physics

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Degree in Physics			Type and Year	Core. Year 1
Faculty	Faculty of Sciences				
Discipline	Subject Area: Basic Mathematics for Science Basic Module				
Course unit title and code	G37 - Mathematics III: Integra Calculus				
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	BEATRIZ PORRAS POMARES				
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Other lecturers					

### 3.1 LEARNING OUTCOMES

- Understanding the concept of integral and being able to work with it, geometrically, intuitively and formally.
- Using the elementary techniques of integration for one variable functions in a fluent way, as well as being able to compute areas, volumes and lengths.
- Being able to compute tangents, normals, areas, volumes, etc., for surfaces and for planar or three dimensional curves.
- Computing iterated integrals in several variables over elementary regions, determining the limits of the integrals involved and applying the change of variables formula whenever appropriate.
- Computing line and surface integrals, both for scalar and for vector fields. Applying the classical theorems of Stokes, Green and divergence on specific settings.

#### 4. OBJECTIVES

Within the context of the programs for bachelor degrees in Physics and in Mathematics, the subject Integral Calculus is an introduction to the main types of integrals used in classic applications of Infinitesimal Calculus. Its aims are: understanding the different types of situations where these integrals are used for modelling; getting a working knowledge of how integrals can be evaluated, as well as their main properties and their relationships among them; getting started in mathematical language and mathematical reasoning; and getting used to intellectual work.

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	1. Riemann integral for one real variable functions. Fundamental Theorem of Calculus. Computation of primitives. Improper integrals.
2	2. Integrals of functions of several real variables: Concept and fundamental properties. Riemann criteria. Iterated integrals. Fubini theorem. Integrals of functions defined over other bounded sets. Change of variables in double integrals. Change of variables in triple integrals. Some applications: mean value, center of gravity, ...
3	3.-Line Integrals: Smooth simple curves in the plane and space. Smooth piecewise simple curves. Closed curves. Curve length. Integral of a scalar field on a path. Integral of a vector field along a path. Green Theorem. Conservative fields.
4	4.- Surface Integrals. Smooth simple surfaces. Smooth piecewise simple surfaces. Surface area. Integral of a scalar field over a surface. Integral of a vector field over a surface. Stokes Theorem. Gauss Theorem.

### 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
First partial exam about content of chapters 1 and 2	Written exam	No	Yes	40,00
Second partial exam about content of chapter 3.	Written exam	No	Yes	25,00
Third partial exam about content of chapter 4	Written exam	No	Yes	25,00
The day of the partial exam, students must present some exercises proposed in class about the subject. Teacher will say which exercise should be presented in that moment.	Work	No	No	10,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>Along with the third partial exam, students will be able to improve the qualification obtained in the first two exams by performing new exercises of the corresponding contents.</p> <p>The final mark will be the weighted mean of the three partial exams. The subject is passed when the final mark is equal or greater than 5; otherwise, the student can be evaluated in the extraordinary call.</p> <p>None of the marks (partial) can be kept for the extraordinary exam; this exam therefore would represent 90% of the mark.</p>				
<b>Observations for part-time students</b>				
The same evaluation type applies to part time students				

### 8. BIBLIOGRAPHY AND TEACHING MATERIALS

#### BASIC

M. Spivak, Calculus, Reverté

J.E. Marsden y A.J. Tromba, Cálculo vectorial (edición 3ª o posterior). Addison-Wesley.

Materiales docentes en el Aula Virtual