

## SUBJECT TEACHING GUIDE

### G63 - Physics Laboratory II

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

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Physics			Type and Year	Compulsory. Year 2 Compulsory. Year 2
Faculty	Faculty of Sciences				
Discipline	Subject Area: Physics Laboratories Central Module				
Course unit title and code	G63 - Physics Laboratory II				
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. FISICA APLICADA				
Name of lecturer	JOSE ANGEL MIER MAZA				
E-mail	joseangel.mier@unican.es				
Office	Facultad de Ciencias. Planta: + 2. DESPACHO PROFESORES (2033)				
Other lecturers	DAVID GONZALEZ ALONSO				

### 3.1 LEARNING OUTCOMES

- Know the operation and use of basic equipment in electricity and magnetism laboratory (galvanometer, ammeter, voltmeter, ohmmeter, oscilloscope, electrometer, current and voltage sources, power meter, function generator, digital and analog multimeters, teslameter)
- Know the meaning and experimental testing of fundamental laws such as: Coulomb's law, Faraday's law, Ampere's law and law Biot-Savart
- Understand the phenomenon of electrostatic induction
- Know the radiation phenomena, diffraction and interference of electromagnetic waves
- Solve potential problems in two dimensions.
- Solve simple AC circuits both transient and steady
- Design properly tables and graphs
- Make correctly errors analysis
- To consolidate the ability to elaborate scientific reports .

### 4. OBJECTIVES

- Being able to analyze the relevant physical parameters to study an electromagnetic phenomenon.
- Analyze and discuss the experimental results comparing them with the assumed model
- Knowing how to prepare a report describing an experiment and properly presenting the results including error analysis
- Knowing how to behave in the laboratory both individually and in group.
- Handle tools and mathematics necessary for conducting experiments
- To be able to develop further actions or complementary experiments analyzing their viability

### 6. COURSE ORGANIZATION

#### CONTENTS

1	<p>Theoretical introduction</p> <ul style="list-style-type: none"> <li>- Electrostatic field and electrostatic potential.</li> <li>- Conductors in electrostatic equilibrium. Capacity.</li> <li>- Methods of solving electrostatic problems.</li> <li>- Magnetostatic field. Ampere's and Biot-Savart's laws</li> <li>- Behavior of a dipole in a uniform magnetic field</li> <li>- Faraday's law.</li> <li>- Hysteresis loop in ferromagnetic materials</li> <li>- Resolution of linear circuits.</li> <li>- Stationary and transient response in AC circuits .</li> <li>- Power in AC circuits</li> <li>- Propagation of electromagnetic waves</li> <li>- Reflection, interference and diffraction phenomena</li> <li>- Antenna radiation pattern</li> </ul> <p>Practical Introduction</p> <ul style="list-style-type: none"> <li>- Error analysis</li> <li>- Preparation of reports</li> </ul>
2	<ul style="list-style-type: none"> <li>- Instrumentation and circuits experiments</li> <li>- Electrostatic experiments</li> <li>- Magnetostatic experiments</li> <li>- Electromagnetic induction experiments</li> <li>- Electromagnetic waves experiments</li> </ul>

## 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
The duration of the exam will be about 3 hours. It will not be possible to use books or notes and it will consist of about 8 questions related to both the theory studied and the experimental procedures seen in laboratory.	Written exam	Yes	Yes	30,00
The teacher will globally assess the student's attitude and ability in the laboratory, as well as the laboratory notebook. This notebook is mandatory and everything necessary to be able to prepare the results or the practice reports will be recorded in i	Laboratory evaluation	No	No	20,00
Students must write the practice reports indicated by the teacher, up to a maximum of 3. The remainder of the practices that do not include the preparation of a report, students must present only the results (not a full report). The evaluation will be pra	Work	No	Yes	50,00
		No	No	0,00
		No	No	0,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
In the event of a complete suspension of classes, the practices will be carried out remotely, from a series of experimental data that will be facilitated by the teaching staff. The results will be elaborated by the student and presented by videoconference. The preparation and presentation of results will account for 70% of the mark, provided that the final exam can be made face-to-face format. Otherwise, the mark in practices would be 100%. The final exam will only take place in face-to-face format.				
<b>Observations for part-time students</b>				
As far as possible, and in accordance with the teacher, it will try to facilitate monitoring of the subject.				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

<b>BASIC</b>
El documento básico de trabajo es el guion de la misma, elaborado por los profesores de la asignatura. Estos guiones están disponibles en el Moodle de la asignatura.
R. K. Wangsness, "Campos Electromagnéticos".
J. R. Reitz, F. J. Mildford, R. W. Christy, "Fundamentos de la Teoría Electromagnética".