

## SUBJECT TEACHING GUIDE

### G32 - Basic Experimental Physics II: Waves: Light and Sound

#### Double Degree in Physics and Mathematics

#### Degree in Physics

#### Degree in Physics

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Physics			Type and Year	Core. Year 1 Core. Year 1
Faculty	Faculty of Sciences				
Discipline	Subject Area: Basic Experimental Physics Basic Module				
Course unit title and code	G32 - Basic Experimental Physics II: Waves: Light and Sound				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web	<a href="https://aulavirtual.unican.es/">https://aulavirtual.unican.es/</a>				
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. FISICA APLICADA				
Name of lecturer	JOSE MARIA SAIZ VEGA				
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Other lecturers	PEDRO JOSE VALLE HERRERO FRANCISCO MATORRAS WEINIG				

### 3.1 LEARNING OUTCOMES

- To use Physics as a tool to understand Nature.
- Discuss, understand and interpret the basic magnitudes and phenomena associated to a wave. Describe geometrically light propagation. Understand the physical models used in the basic description of either mechanic waves or electromagnetic waves.
- Identify the key points in both geometrical and physical optics. Connect the theoretical descriptions, mathematical models and laboratory experiments in a logical way.
- Understand experimental demonstrations and get familiar with their corresponding instrumentation.
- Carry out simple experiments in optics, in particular geometrical (optics laws and use of mirrors and prisms). Attend the lab to witness a wider variety of experiments in optics.
- To be able to analyze results, according to the instruments and procedure used in their development.

### 4. OBJECTIVES

In summary: to reach the above described results.

General objectives:

[Part 1] Know the fundamentals of mechanical waves, their properties, and effects such as interference or the Doppler effect.

Study sound as a wave, and understand a series of devices for its analysis.

[Part 2] Know the principles of optics and know how to apply them to a set of systems and instruments, whether related to vision or image formation.

[Part 3] Understand the phenomenon of light propagation as a transverse wave, its polarization, the most basic interferential and diffraction phenomena and its application to a couple of devices.

### 6. COURSE ORGANIZATION

#### CONTENTS

1	1.- Waves. General concepts. 2.- Wave superposition. 3.- Standing waves. [Laboratory session. Lessons 1-3] 4.- Wave propagation 5.- Sound [Laboratory session. Lessons 4-5]
2	6.- Fundamentals of geometrical optics. 7.- Optical systems. [Experiment: Focal length of a lens] 8.- Light limitation and image quality. [Laboratory session. Lessons 6-8] 9.- The eye and other imaging systems. 10.- Microscopes and telescopes. [Laboratory session. Lessons 9-10]
3	11.- Wave nature of light. Propagation and polarization. 12.- Light interferometry. 13.- Diffraction: Basic phenomena and gratings. [Laboratory session. Lessons 11-13]

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
After a demo session in the lab, carried out by the teacher, students are asked to fill in a short true/false test.	Laboratory evaluation	No	No	20,00
After finishing a lesson, or every two if they are short, students are asked to fill in a short true/false test on questions related to matters discussed in the class.	Written exam	No	Yes	15,00
Students are given exercises to do on their own and give back to the teacher.	Others	No	Yes	15,00
During a lab experiment student's work is assessed in several ways: By questions at the beginning of the session, by observing how the experiment is performed and by revising the results they present immediately after the session.	Laboratory evaluation	No	No	15,00
The final exam is divided in two parts: First (about 1h) is composed of questions and second (about 2h) is composed of exercises.	Written exam	Yes	Yes	35,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
The part of the assessment that is based on the laboratory work is over 1/3 of the total. This evaluation cannot be recovered later. The rest of the evaluation inputs admit re-evaluation, that is done together with the final exam.				
<b>Observations for part-time students</b>				
For part-time students some lab sessions could be adapted to his/her working schedule.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
<b>BASIC</b>
Material didáctico disponible en el Aula Virtual UC.
"FISICA para la ciencia y la tecnologia"; Paul A. Tipler; Ed. Reverte; 4ª Edicion, 2001