

SUBJECT TEACHING GUIDE

G1778 - Experimental Optics

Double Degree in Physics and Mathematics
Degree in Physics

Academic year 2021-2022

| 1. IDENTIFYING DATA | | | |
|----------------------------------|---|------------------|---|
| Degree | Double Degree in Physics and Mathematics Degree in Physics | | Type and Year Compulsory. Year 3 Compulsory. Year 3 |
| Faculty | Faculty of Sciences | | |
| Discipline | Subject Area: Physics Laboratories Central Module | | |
| Course unit title and code | G1778 - Experimental Optics | | |
| Number of ECTS credits allocated | 6 | Term | Semester based (2) |
| Web | | | |
| Language of instruction | English | Mode of delivery | Face-to-face |

| | | | |
|------------------|--|--|--|
| Department | DPTO. FISICA APLICADA | | |
| Name of lecturer | JOSE MARIA SAIZ VEGA | | |
| E-mail | josemaria.saiz@unican.es | | |
| Office | Facultad de Ciencias. Planta: + 2. INVESTIGADORES DEL PROYECTO EUROPEO X244 (2030) | | |
| Other lecturers | FERNANDO MORENO GRACIA PABLO ALBELLA ECHAVE ANA QUIRCE TEJA | | |

3.1 LEARNING OUTCOMES

- Ability to carry out experiments involving light generation, free and guided propagation, detection and measurement
- Experimental verification of some of the most important phenomena in optics, including the fundamental laws of propagation, dispersion, polarization, interference and diffraction.
- Familiarity with data interpretation according to theory and error handling with scientific criteria
- Development of oral, and written, communication skills for the description of experimental results

4. OBJECTIVES

- Apply the scientific method, critical thinking and experimental rigor.
- Understand a fundamental set of phenomena and experimental displays, as well as their main implications in the field of applied optics.
- Know how to behave safely and easily in an optics lab, either individually or in group.
- Know how to process and analyze the experimental data in a correct way. The student should be able to discuss the results and contrast them with the theoretical models or expected values.
- Know how to prepare reports and oral presentations to present his work and results to others.

6. COURSE ORGANIZATION

CONTENTS

| | |
|---|---|
| 1 | <p>-Basic instrumental optics.</p> <p>Optical experiments related to: Transverse polarization of electromagnetic waves (generation and analysis), Radiometry Laws, Light dispersion, Color filter characterization, and Digital Image Processing.</p> <p>Theory and fundamentals: Classroom sessions for introductory purposes, Experimental displays shown and explained by the teacher, seminars presented by students.</p> |
| 2 | <p>Physical Optics. Optical experiments related to: Time and space coherence, interference with two and multiple beams, diffraction by apertures and gratings, and digital image. Experiments with optical fibers and lasers.</p> <p>Theory and fundamentals: Classroom sessions for introductory purposes, Experimental displays shown and explained by the teacher, seminars presented by students.</p> |

7. ASSESSMENT METHODS AND CRITERIA

| Description | Type | Final Eval. | Reassessn | % |
|---|-----------------------|-------------|-----------|---------------|
| Before leaving the lab, a "results page" with data and conclusions must be handed to the supervisor. The following items are assessed: a) The preparation of the practice. b) The attitude and skills in the lab. c) The results and its analysis. d) The labor | Laboratory evaluation | No | No | 30,00 |
| Two written reports will be done, corresponding to two of the experiments done by the student. The maximum length is 8 pages. If deadlines are not met the mark will suffer a penalty. | Work | No | Yes | 20,00 |
| Each student will present one of the experiments, with an approximate duration of 15 min. | Oral Exam | No | No | 10,00 |
| The format is a True/False test with the main purpose of monitoring the comprehension of the most basic concepts just introduced. | Written exam | No | No | 10,00 |
| Question are mainly about the tasks and concepts developed in the lab. No supplementary support will be allowed (books...) | Written exam | Yes | Yes | 30,00 |
| TOTAL | | | | 100,00 |
| Observations | | | | |
| Realization of the experiments and attendance to demonstrative sessions is mandatory. As a general criterion, all materials presented after the deadline will be assessed with a grade of 0 (zero), unless authorized by the responsible of the course. | | | | |
| Observations for part-time students | | | | |
| Part-time student should inform the person responsible of the course at the beginning of the term | | | | |

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Guides of the experiments as provided to the students.

E. Hecht, OPTICS, Addison-Wesley Ed