Advanced Physics

Academic Year: (2024 / 2025) **Review date: 17-01-2025**

Department assigned to the subject: Physics Department

Coordinating teacher: SANTALLA ARRIBAS, SILVIA NOEMI

Type: Electives ECTS Credits : 3.0

Year : Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

PHYSICS

LEARNING OUTCOMES

CB1: Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study
CB2: Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CG3: Knowledge of basic and technological subject areas which enable acquisition of new methods and technologies, as well as endowing the technical engineer with the versatility necessary to adapt to any new situation.
CG12: Understanding and command of the basic concepts of the general laws of mechanics, thermodynamics, electromagnetic fields and waves, and their application to resolve problems characteristic of engineering.
RA1: Knowledge and understanding of the general fundamentals of engineering, scientific and mathematical principles, as well as those of their branch or specialty, including some knowledge at the forefront of their field.
RA5: Applications. Graduates will have the ability to apply their knowledge and understanding to solve problems, conduct research, and design engineering devices or processes. These skills include knowledge, use and limitations of materials, computer models, process engineering, equipment, practical work, technical literature and information sources. They must be aware of all the implications of engineering practice: ethical, environmental, commercial and industrial.

OBJECTIVES

Students should acquire the fundamentals of Optics. Understanding these basics will allow them in turn to acquire the skills necessary to apply the optical models to simple problems resolution. In particular, those corresponding to wave optics, geometrical optics and quantum optics (light as photons accumulation).
Understand the basics of applications based on optics.
Understand the basic phenomena involved in the interaction of light and matter.

DESCRIPTION OF CONTENTS: PROGRAMME

0. A brief history
1. Wave motion
2. Electromagnetic waves
3. The propagation of light
4. Geometrical optics
5. Interference and diffraction
6. Polarization
7. Quantum optics

LEARNING ACTIVITIES AND METHODOLOGY

-In the lectures the theoretical concepts previously described, will be discussed.
- Given the advanced nature of the subject, when methodologically appropriate, problems solving and questions, similar to those of the exams, in order to: Identify the more important Optics and the light-matter interaction laws involved. Analyze the logic of the result obtained: orders of magnitude, relate the most important conclusions to other scientific and technological subjects involved in advanced optics
- Tutorial sessions will be schedule throughout the course, available to students at will. These sessions must be requested in advance

ASSESSMENT SYSTEM

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

The continuous evaluation consists of two tests, the first for the first four topics and the second for the rest. Each test will be 25% of the final grade.

The final exam will correspond to 50% of the final evaluation.

BASIC BIBLIOGRAPHY

- E. HECHT, A. ZAJAC OPTICS, Addison Wesley, ultima disponible

ADDITIONAL BIBLIOGRAPHY

- GUENTHER, R. Modern Optics, J. Wiley & Sons, N.Y., Más reciente disponible

- R. P. Feynman. The Feynman Lectures on Physics, Millenium Edition. Basic Books, 2010