Universidad Zaragoza

Academic Year/course: 2024/25

26923 - Optics

Syllabus Information

Academic year: 2024/25
Subject: 26923 - Optics
Faculty / School: 100 - Facultad de Ciencias
Degree: 447 - Degree in Physics
ECTS: 8.0
Year: 3
Semester: First semester
Subject type: Compulsory
Module:

1. General information

The aim is the acquisition of theoretical knowledge in the area of Optics by students, so that they are able to understand the different physical phenomena related to light and its interaction with matter, as well as the basic experimental techniques used in their study and applications. On the other hand, the aim is the acquisition of skill in the application of knowledge both in problem solving and in the assembly and handling of experimental devices.

It is recommended to previously take "Electromagnetism" and "Electromagnetic Waves".

2. Learning results

- Know the suitability of laser light sources or other light sources, depending on the type of application.
- Calculate the gain of an active medium as a function of the incident optical intensity.
- Determine the polarization state of a light beam and prepare light in a defined polarization state.
- Define the appropriate characteristics of specific optical assemblies for various applications.
- Calibrate and use radiation detectors and correctly apply the conversion between radiometric and photometric quantities.
- Proper handling of the main colorimetric representations.
- Calculate the resolving power and free spectral range of a single diffractive element. Determine various magnitudes using interferometers.

3. Syllabus

1. Fundamentals of geometrical optics.
2. Image formation.
3. Radiometry, photometry and colorimetry.
4. Optical imaging instruments.
5. Applications of coherence and interference phenomena in optics.
6. Applications of diffraction phenomena in optics.
7. Anisotropic dielectric media. Electro-optical and magneto-optical phenomena.
8. Polarization-based devices.
9. Advanced phenomena of light-matter interaction.
10. Light sources and detectors.

4. Academic activities

- Participative master classes directed to the entire group of students.
- Solving problems related to the contents of the subject.
- Observation, analysis and experimental measurement of optical phenomena in the laboratory.

5. Assessment system

Continuous assessment

- There are 6 laboratory practices in three sessions and a laboratory report of each one. The grade of this activity represents 20% (up to 2 points) of the final grade (it is necessary to obtain a minimum grade of 0.8 points and attendance to the practices is mandatory).
- The rest of the evaluation will be carried out through the completion of parts a and b of the single global test, with a contribution of 80% (up to 8 points) to the final grade.

Passing the subject by means of a single global test

The evaluation will be carried out by means of an examination test consisting of the following parts:

a. Theory of the subject. It contributes 40% (up to 4 points) to the final grade. Minimum grade in this part to pass the subject: 1.6 points.

b. Subject matter problems. It contributes 40% (up to 4 points) to the final grade. Minimum grade in this part for to pass the subject: 1.6 points.

c. Practical laboratory test. It contributes 20% (up to 2 points) to the final grade. Minimum grade in this part to pass the subject: 0.8 points.

The final grade of the subject must be equal or higher than 5 points to pass the subject.

6. Sustainable Development Goals

4 - Quality Education
7 - Affordable and Clean Energy
9 - Industry, Innovation and Infrastructure