

60037 - Interaction of radiation and matter

Syllabus Information

Academic year: 2024/25

Subject: 60037 - Interaction of radiation and matter

Faculty / School: 100 - Facultad de Ciencias

Degree: 538 - Master's in Physics and Physical Technologies
589 - Master's in Physics and Physical Technologies

ECTS: 5.0

Year: 1

Semester: First semester

Subject type: Optional

Module:

1. General information

Interaction of Radiation and Matter is an elective subject that provides the basis for the understanding of numerous phenomena of advanced radiation physics, matter physics and astrophysics.

The main focus is on understanding the classical and quantum nature of electromagnetic interactions at both macroscopic and microscopic scales. It is primarily aimed at students who are interested in learning about the quantum properties of the electromagnetic field and their role in the microscopic world. The objective is to help the student to become familiar with theoretical concepts that are used in research areas at the frontier of physics, where electromagnetic interactions play a key role. At the end of the term the student should be able to use and apply their knowledge to solve current problems in radiation generation and detection, particle physics, astrophysics and cosmology.

2. Learning results

- To know the fundamentals and practical consequences of the relativistic aspects of radiation, as well as the quantum effects associated with the phenomena of such radiation.
- To be able to analyse the different physical phenomena involving emission or absorption of electromagnetic radiation.
- To master radiation detection techniques.
- To master the basic rules of the interaction of light and particles with matter

3. Syllabus

- Relativistic electrodynamics.
- Lorentz and spin symmetries.
- Classical radiation theory.
- Synchrotron radiation.
- Cerenkov effect.
- Applications in astrophysics.
- Relativistic charged fluids.
- Interaction of photons with matter.
- Interaction of charged particles with matter
- Photons in astrophysics

4. Academic activities

The program offers the students help to achieve the expected results and comprises the following activities:

- Participation and attendance to lectures
- Problem solving related to the contents of the subject.
- Written work and its presentation
- Production and oral presentation of works.
- On-site or telematic tutorials
- Individual study
- Assessment tests.

5. Assessment system

The student must demonstrate achievement of the intended learning results through the following assessment activities:

Assessment of reports and written work (20%-40%) 20%

Assessment of case analysis, problem solving, questions and other activities (10%-40%)

Assessment of oral presentations of work (10%-20%) 20%.

Assessment of the evaluation tests (20%-40%) 30%.

Passing the subject by means of a single global test.

The subject has been designed for students who attend the classroom and lab classes and perform the assessment activities described above. However, there will also be an assessment test for those students who have not taken the assessment activities or have not passed them.

6. Sustainable Development Goals

4 - Quality Education

5 - Gender Equality

9 - Industry, Innovation and Infrastructure