Universidad Zaragoza

Academic Year/course: 2024/25

26915 - Electromagnetism

Syllabus Information

Academic year: 2024/25
Subject: 26915 - Electromagnetism
Faculty / School: 100 - Facultad de Ciencias
Degree: 447 - Degree in Physics
ECTS: 8.0
Year: 2
Semester: First semester
Subject type: Compulsory
Module:

1. General information

The objective of this subject is to provide a broad vision of the physical phenomena associated with Electromagnetism, its applications and its relationship with other related subjects, in order to provide the necessary training to understand these phenomena and applications.

The subject will be similar to the historical development of Electromagnetism: study of the Electrostatic and Magnetostatic Fields , vacuum and material media; time dependence and unification to the Electromagnetic field (equations of Maxwell). It will allow to establish the concept of electromagnetic wave and to fix the basic parameters of radiation and of the propagation of these waves.

2. Learning results

In order to pass this subject, the students shall demonstrate they has acquired the following results:

- Calculate the electric potential created by a system of conductors.
- Evaluate the dielectric capacity and measure the dielectric constant.
- Evaluate induction coefficients and their relation to magnetic susceptibility.
- Select the characteristics of a transformer according to its application.
- Calculate the current induced by a time-varying magnetic field.
- Evaluate the electromagnetic field generated by simple systems.
- Calculate the field of a point charge with constant velocity.
- Measure the electromagnetic field generated by radiating systems.

3. Syllabus

- Electrostatic field and potential in vacuum. Dielectric media and conductor systems. The problem of potential. Energy and electrostatic forces.
- Stationary electric current. Magnetostatic field in vacuum and permeable media. Magnetic potentials.
- Electromagnetic induction. Maxwell's equations. Energy and forces.
- Electromagnetic propagation and radiation. Antennas.
- Introduction to electrodynamics. Relativistic invariance of Maxwell's equations.

4. Academic activities

- **Theoretical and practical classes**: 5.5 theoretical credits and 1.5 credits of problem solving. The days, times and classrooms will be assigned by the Faculty of Sciences
- **Laboratory practices**: 1 credit. Dates will be set at the beginning of the semester according to the availability of laboratories and instrumentation.
- **Voluntary practical work**: Based on specific seminars given, they will have a subsequent estimated workload of 20 hours.
- **Examinations**: The written exam will have a duration of 4 hours. It will be held at the end of the semester, on the date assigned by the Faculty of Sciences. The practical laboratory exam, 1 hour, will be called with due notice.

5. Assessment system

Continuous assessment of learning through the resolution of problems, questions and assignments. (20% grade).

Laboratory practices: The interest and skill in its realization, the precision and accuracy of the results and the brief report presented will be evaluated. The grade must reach 5 (20% grade).

Written examination on fixed dates. It will consist of two exercises: theory and problems. The first will consist of answering reasoned questions about concepts and phenomena, description of examples, small demonstrations or cases of practical application. The problem exam will be based on practical cases of the type solved in class. The grade will be the average of the grades obtained in these two exercises, being necessary that both are higher than 3, and that the average reaches 5. (60 % grade)

-Single global test

Students not subject to progressive evaluation must take an exam with the structure described above, which includes all the topics of the syllabus, and whose result will account for 80% of the grade. The remaining 20% will correspond to an exercise of laboratory practices. In each exam a 5 must be reached in order to pass the subject.

Note:

When the requirements are not met, the grade for the subject may not exceed 4.5 points.

6. Sustainable Development Goals

4 - Quality Education