

Electromagnetism Laboratory

Code: 100151
ECTS Credits: 5

Degree	Type	Year	Semester
2500097 Physics	OB	2	2

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Prerequisites

There are no prerequisites.

Objectives and Contextualisation

The objectives of this course are:

- The experimental study of the main laws of electromagnetism.
- To acquire experience in the experimental work of the laboratory.
- To acquire experience in the writing of lab reports (concise and precise scientific language).
- To acquire experience in teamwork as well as the development of skills in collective work.

Competences

- Act, and issue reports and judgments, with ethical and social responsibility, according to legal, prevention-based and environmental conditions.
- Develop critical thinking and reasoning and know how to communicate effectively both in the first language(s) and others
- Develop independent learning strategies
- Develop strategies for analysis, synthesis and communication that allow the concepts of physics to be transmitted in educational and dissemination-based contexts
- Formulate and address physical problems identifying the most relevant principles and using approximations, if necessary, to reach a solution that must be presented, specifying assumptions and approximations
- Plan and perform, using appropriate methods, study, research or experimental measure and interpret and present the results.
- Respect the diversity and plurality of ideas, people and situations
- Use computer tools (programming languages and software) suitable for the study of physical problems
- Work independently, have personal initiative and self-organisational skills in achieving results, in planning and in executing a project

- Working in groups, assume shared responsibilities and interact professionally and constructively with others, showing absolute respect for their rights.

Learning Outcomes

1. Act, and issue reports and judgments, with ethical and social responsibility, according to legal, prevention-based and environmental conditions.
2. Analyse and assess the adequacy of the assemblies prepared and carried out, in order to obtain measurements and the desired results.
3. Analyse the influence of various parameters on the simulation of an experiment.
4. Correctly assess the uncertainty associated with a measure or set of measures.
5. Describe physical phenomena, identify variables, analyse the influence, presenting the results and conclusions of the work developed in a clear and precise manner.
6. Describe the function and manner of operation of the measuring instruments used.
7. Determine and measure the variables that describe a physical system.
8. Develop critical thinking and reasoning and communicate ideas effectively, both in the mother tongue and in other languages.
9. Develop independent learning strategies.
10. Discriminate to the most important dependencies and draw the most conclusions from a set of experimental measurements.
11. Foster discussion and critical thinking, evaluating the precision and characteristics of the results obtained.
12. Respect diversity in ideas, people and situations.
13. Suitably present the results of a series of measures through graphs and perform linear regressions.
14. Use basic programmes to write reports and carry out basic data processing.
15. Use digital sensors for measuring magnitudes.
16. Work independently, take initiative itself, be able to organize to achieve results and to plan and execute a project.
17. Working in groups, assume shared responsibilities and interact professionally and constructively with others, showing absolute respect for their rights.
18. Write and present the results and conclusions of experimental work with rigor and conciseness.

Content

The course consists of the following lab experiments:

- 1) Representation of electrostatic fields and potentials.
- 2) Force between electric currents.
- 3) RLC circuit in the transitory and permanent regimes.
- 4) Transformers and mutual inductances.
- 5) Measurement of the metal resistor as a function of the temperature.
- 6) Cathode ray beams.
- 7) Magnetic field measurements in circular wires and coils.

Methodology

Theoretical lectures. Directed lessons in which the teacher will give the key points of the different parts of the content as well as the guidelines to follow to deepen it through the bibliography. This type of lesson is intended to give a complete and orderly description of the topic of the subject.

Personal work. Before arriving at the laboratory, the student must have previously prepared the notes. Once these have been carried out, the student must work individually as well as in teams to understand the concepts learned and prepare the reports with which the student will be evaluated.

Lab sessions. Supervised activity aimed at the students to carry out different practices based on guide notes previously distributed and worked on. Supervision by the teaching staff will help to resolve any doubts that may arise in the laboratory.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab sessions	30	1.2	1, 2, 3, 4, 6, 5, 9, 8, 7, 10, 11, 13, 18, 12, 16, 17, 14, 15
Theoretical lectures	10	0.4	1, 2, 9, 8, 11, 12, 16, 17
Type: Autonomous			
Personal work	83	3.32	1, 2, 3, 4, 6, 5, 9, 8, 7, 10, 11, 13, 18, 12, 16, 17, 14

Assessment

The subject will be evaluated as follows:

*Score of the laboratory sessions (5%): attendance, prior preparation and active participation in laboratory sessions.

*Lab reports (45%): reports (by group) of the practices carried out in the laboratory sessions. The requirements that must be met from the reports are written in a document that will be provided to the students.

*Written examination (50%): individual written examination to be carried out at the end of the course consisting of various questions aimed to assess the student's understanding of the basis and functioning of the practices.

In order to pass the course, a minimum score of 3 in the written examination and 3.5 in the practice reports will be required. It must be taken into account that reports are not recoverable, therefore, failing them with a grade lower than that indicated above implies not being able to pass the subject. The written examination is retake. To be eligible for recovery one must have been previously evaluated both the written examination and the reports of practices.

Attendance at laboratory sessions is mandatory. Failure to attend such sessions implies a final grade of "Not Evaluable". Similarly, a student who does not take the written exam will also be considered "Not Evaluable".

Granting with an honourable distinction (HD) is a decision of the responsible teacher for the subject. The HDs can only be granted to students who have obtained a grade equal to or greater than 9.0. The number of HDs will not exceed 5% of the total number of students enrolled.

Without prejudice to other disciplinary measures deemed appropriate, the irregularities committed by the student that may lead to a variation in the grade of an evaluation act will be scored with a zero. Therefore, copying, plagiarism, cheating, letting copy, etc. in any of the evaluation activities will involve suspending such activity with a zero without the opportunity to recover it. If it is necessary to pass any of these evaluation activities in order to pass the course, the course will be suspended directly without the opportunity to recover it in the same course.

After the second enrolment, the evaluation of the subject will consist of a written examination (50%), which will be carried out at the end of the course, plus the grade corresponding to the practice reports (45%) and the

grade of the laboratory sessions (5%) obtained the first time the student was registered and which was equal to or greater than 5. In this case, attendance at the laboratory sessions will not be necessary. To select this differentiated assessment, the repeating student must notify it the teacher by email (nuria.delvalle@uab.cat) no later than 15 days after the start of classes.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Reports (in group)	45%	0	0	1, 2, 3, 4, 6, 5, 9, 8, 7, 10, 11, 13, 18, 12, 16, 17, 14, 15
Score of laboratory sessions	5%	0	0	2, 3, 4, 9, 7, 10, 16, 15
Written examination	50%	2	0.08	1, 2, 3, 4, 6, 5, 9, 8, 7, 10, 11, 18, 12, 16, 17

Bibliography

The students will receive a copy of the guide notes of the lab experiments to carry them out.