COURSE DATA

Data Subject	
Code	34652
Name	Physics
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1400 - Degree in Computer Engineering	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
1400 - Degree in Computer Engineering	4 - Physics	Basic Training

Coordination

Name	Department
ANDRES BOU, MIGUEL VICENTE	175 - Applied Physics and Electromagnetism

SUMMARY

Physics is a fundamental subject that is present in all degrees of Science and Engineering. Specifically Physics is coursed in the second semester of the first academic year. It consists of a part of theory and exercises and another of practical work in laboratory. The course establishes the basis of wave phenomena and Electromagnetism. It begins with the study of mechanical waves, with special attention to sound, and electromagnetic waves. Next the basic principles of electromagnetism are presented, studying the electrostatic and magnetostatic fields in vacuum and in material media, and the phenomenon of magnetic induction.
The contents of the course are: mechanical, acoustic waves and electromagnetic waves. Electricity, Magnetism and magnetic induction, which are divided into thematic units listed in Section 6.
The main objective of the course is to provide students with basic knowledge regarding with mechanical and electromagnetic waves, in addition to Electromagnetism, that will allow the student to understand and explain themselves the phenomena involved in Engineering based in those areas of knowledge. Moreover, the course intends to provide physical knowledge that can be required for other course of the Degree.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Knowledge of physics, chemistry and mathematics at high school or similar.

OUTCOMES

1400 - Degree in Computer Engineering

- G8 - Knowledge of basic subject areas and technologies that serve as a basis for learning and developing new methods and technologies, and of those which provide versatility to adapt to new situations.
- G9 - Ability to solve problems with initiative, decision making, autonomy and creativity. Ability to communicate and transmit the knowledge, skills and abilities of a computer engineer.
- B2 - Understanding and mastery of basic concepts of fields and waves and electromagnetism, electrical circuit theory, electronic circuits, physical principles of semiconductors and logic families, electronic and photonic devices and their application for solving problems in engineering.

LEARNING OUTCOMES

Learning outcomes:
• Be able to evaluate clearly the orders of magnitude and relative importance of different causes involved in a physical phenomenon.
• Know and understand the fundamentals of physics and mathematical background for the formulation, and most important applications in industry or daily life.
• Solve problems, being able to identify the essential elements and perform the required approximations.
• Be able to delve into the different branches of physics from the basic concepts acquired in this area, integrating mathematical formalisms and more complex concepts.
• Be able to communicate information, ideas, problems and solutions through argumentation and reasoning.

Additional skills to be acquired:
The student should be able to:

• Understanding and mastery of basic concepts and electromagnetic wave and its application to solving problems of engineering.
• Knowledge of principles and technologies that enable them to learn new methods, and to adapt to new situations. Acquire the necessary training in electromagnetism and waves to support other areas of engineering.
• Ability to solve problems, apply knowledge creatively and communicate knowledge in the field of engineering. • Identify and electromagnetic wave phenomena.

• Know the principles of operation of devices and systems based on electromagnetic or wave phenomena.
• Know how to evaluate the order of magnitude of the phenomena studied devices.
• Be able to apply their knowledge to different technological branches, specifically in the field of computer engineering.
• Know how to organize and communicate knowledge and information.

In addition to the specific objectives mentioned above, the course will encourage the development of several generic skills, among which include:
• Develop the ability to identify problems and devise strategies for their resolution.
• Develop the ability to plan and organize their own learning based on individual work, from the literature and other sources.
• Develop the ability to work in groups.
• Develop the ability to argue from rational and scientific criteria.
• Develop the ability to track their learning from the issues and problems done in class.
• Develop the capacity to develop a text based on suggested reading and written in an understandable and organized.
• Assess the relative importance of different causes involved in a phenomenon.
• Identify the essential elements of a complex situation, make the necessary approaches to construct simplified models that describe and to understand their behavior and in other situations.

DESCRIPTION OF CONTENTS

1. Wave motion.

Wave phenomena. Wave equation. Periodic harmonic waves. Wavelength, frequency and speed. Superposition of waves: standing waves. Energy and intensity of a wave. Absorption and attenuation.

2. Sound and Light

Acoustics. Intensity level and loudness. Electromagnetic waves: speed of light. Plane waves. Electromagnetic spectrum. Poynting vector. Intensity and radiation pressure. Doppler effect.

3. Electrostatic field in vacuum

Coulomb's law. Electric field. Gauss theorem. Potential. Work.

4. Electrostatic field in matter

Loaded conductors in electrostatic equilibrium balance. Capacitors with different geometry and capacity. Charging and energy storage. Polarization and dielectric permittivity materials.

5. Static magnetic field in vacuum

Magnetic field and Lorentz Force. Electric current. Action of a magnetic field on a current. Biot-Savart Law. Ampère's theorem.

6. Magnetostatic fiels in matter

Media magnetic materials. Relative magnetic permeability. Magnetic properties of matter.

7. Electromagnetic induction

Faraday's law of induction. Inductive devices. Displacement current.

8. Laboratory sessions

Speed and attenuation of electromagnetic waves. Electromagnetic wave interference. Measurement of magnetic fields. Electromagnetic induction and transformers.

WORKLOAD

ACTIVITY	Hours	% To be attended
Classroom practices	25,00	100
Theory classes	25,00	100
Laboratory practices	10,00	100
Development of individual work	4,00	0
Study and independent work	15,00	0
Readings supplementary material	2,00	0
Preparation of evaluation activities	8,00	0
Preparing lectures	9,00	0
Preparation of practical classes and problem	17,00	0
Resolution of case studies	33,00	0
Resolution of online questionnaires	2,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

- **Class work**: Theory classes, problem classes and laboratory classes.
- **Home work**: preparation of classes, problem solving, job preparation and presentation of results.
- Individual and group **tutorials**.

EVALUATION

The theoretical and practical concepts studied during the course will be evaluated by a written exam. The exam will represent the 80% of the total mark. The teacher can define, based on the characteristics of the group, complementary ways of evaluating the work done by the students throughout the course by means of partial exams.

The attendance to the laboratory classes and the realization of the experiments is obligatory and non recoverable. The evaluation will be carried by means of the presentation in writing of the results obtained in the laboratory throughout the different sessions and will represent the 20% of the total mark, being compulsory to obtain at least 8 points out of 20.

In any case, the evaluation system will be governed by the provisions of the Evaluation and Qualification Regulations of the Universitat de València for Degrees and Masters: (http://links.uv.es/7S40pjF).

REFERENCES

Basic

- Referencia b1: Física, P.A. Tipler, G. Mosca, Edt. Reverte.

Additional

- Referencia c1: Física para ciencias e ingeniería, P.M. Fishbane, S. Gasiorowicz, S. T. Thornton, Vol 1 y 2, Prentice Hall, 1993.
- Referencia c2: Physics for scientists and engineers, R.A. Serway, Edt Sunders Golden Burst Series.