COURSE DATA

Data Subject	
Code	34916
Name	Physics II
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1404 - Degree in Industrial Electronic Engineering	School of Engineering	2	First term

Subject-matter

Degree	Subject-matter	Character
1404 - Degree in Industrial Electronic Engineering	2 - Physics	Basic Training

Coordination

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

SUMMARY

Physics is a fundamental subject that is present in all science and engineering degrees. Specifically Physics II is taught in the second semester of the first course. It consists of a part of theory and problems and a laboratory practice.

The course provides the basis of wave mechanics and electromagnetic phenomena from the phenomenological point of view. It begins with the study of mechanical waves with special attention to sound. Here are the basic principles of electromagnetism, studying electrostatic and magnetostatic fields in vacuum and matter, then studies the behavior of time-varying fields, and the course finishes studying the basic characteristics of electromagnetic waves .

The course contents are: mechanical and acoustic waves. Electricity and magnetism. Electromagnetic fields and electromagnetic waves, which are divided into thematic units listed in paragraph 6.

The main objective of this course is to provide students with basic knowledge regarding the mechanical waves and electromagnetism (including specifically the study of electromagnetic waves) that help you understand and explain the phenomena of engineering related to these areas. Moreover, the course aims to provide support for physical knowledge in other subjects that may require 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.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1404 - Degree in Industrial Electronic Engineering

- CG3 - Knowledge of basic and technological subjects that allows students to learn new methods and theories and provides them with versatility to adapt to new situations.
- CG4 - Ability to solve problems with initiative, decision-making skills, creativity and critical reasoning and to communicate and transmit knowledge, abilities and skills in the field of industrial engineering (with specific industrial electronics technology).
- CG13 - Understanding and mastery of the basic concepts of the general laws of mechanics, thermodynamics, electromagnetics fields and waves, and of their application to solve engineering problems.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

Learning outcomes:

• Be able to evaluate clearly the orders of magnitude and relative importance of different causes involved in a physical phenomenon (G4, B2).
• Know and understand the fundamentals of physics and mathematical background for the formulation, and most important applications in industry or daily life (G3, B2).
• Solve problems, being able to identify the essential elements and perform the required approximations (G3, G4).
• 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 (B2).
• Be able to communicate information, ideas, problems and solutions through argumentation and reasoning (G4).
• Understanding and mastery of basic concepts and electromagnetic wave and its application to solving

problems of engineering (G4, B2).
• 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 (G3, G4, B2).
• Ability to solve problems, apply knowledge creatively and communicate knowledge in the field of engineering (G4).

Skills to be acquired:

The student should be able to:
• 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 telecommunications 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. Propagation speed. Harmonic solution. Energy and intensity of a wave.

2. Acoustics

Pressure waves. The human ear. Attenuation and absorption.

3. Electrostatic field in vacuum

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

4. Electrostatic field in matter

Electric dipoles. Polarization of the materials. Permittivity. Driver charged in equilibrium. Electricity, resistivity.

5. Static magnetic field in vacuum

Ampère's law. Magnetic Field. Biot-Savart Law. Ampère's theorem.

6. Magnetostatic fiels in matter

Magnetic dipoles. Magnetization of materials. Relative magnetic permeability. Magnetic properties of matter.

7. Fields that depend on time

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

8. Electromagnetic waves

Wave equation. Harmonious solution. Electromagnetic spectrum. Boundary conditions of the electromagnetic field.

9. Laboratory experiments, Physics II

Speed and attenuation of electromagnetic waves. Interference of electromagnetic waves. Magnetic fields. Electromagnetic induction.

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

- **Classroom work:** classes of theory, problems and laboratory (G3, G4, B2).
- **Home work**: preparation of theory classes, problem solving, job preparation and presentation of results. (G3, G4, B2).
- **Individual or group tutorial classes**. (G3, G4, B2)

EVALUATION

To assess student learning, the following procedure will be applied:

A) Evaluation of the concepts of theory and problems studied during the course (80 points). This evaluation will be carried out through written exams and continuous evaluation during the course. The written exams will consist of partial and final exams. Students who pass any partial exam may be examined in the final exam only of the subject not included in that partial exam. The rest of the students will be examined on all the contents of the subject. The continuous evaluation will consist of the presentation of activities, problems or questionnaires proposed to the student, and their qualification will represent at least 15 of the 80 points of this block.

B) Work done in the laboratory (20 points). The laboratory work will be evaluated based on the reports made by the students for each of the practices planned during the course. These reports must contain the data measured in the laboratory and the resolution of the questions indicated in the script of each practice. Attendance at the laboratory will be compulsory and non-recoverable.

To pass the subject it is necessary that the qualification of the written exam and that of the laboratory have both been higher than 40%. In that case, the final grade will be obtained as the sum of the grades of sections A and B.

The final grade required to pass the subject will be 50 points. In any case, the evaluation procedure will be governed by the Evaluation and Qualification Regulations of the University of Valencia for Bachelor's and Master's degrees. (http://links.uv.es/7S40pjF).

REFERENCES

Basic

- Física para la Ciencia y la Tecnología (Vol. 1 y 2). Autores: Gene Mosca y Paul A. Tipler. Editorial: Reverté.
- Física para ingeniería y ciències. Autores: Wolfgang Bauer, Michigan State University, Gary D. Westfall. Editorial: McGraw-Hill, 2014.

Additional

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