

**COURSE DATA****Data Subject**

Code	34790
Name	Physics II
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1402 - Degree in Telecommunications Electronic Engineering	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
1402 - Degree in Telecommunications Electronic Engineering	2 - Physics	Basic Training

Coordination

Name	Department
CANTARERO SAEZ, ANDRES	175 - Applied Physics and Electromagnetism

SUMMARY

The course provides the basis of wave mechanics and electromagnetic phenomena from a phenomenological point of view. It starts with wave mechanics, paying special attention to sound. Next, the basic principles of electromagnetism are developed, first the electro- and magnetostatic fields in vacuum and material media, continuing with the study of the time-dependent fields. The course finishes with the description of the basic characteristics of electromagnetic plane waves.

PREVIOUS KNOWLEDGE



Relationship to other subjects of the same degree

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

Other requirements

It is recommended to have acquired the knowledge given in Physics I (in particular, harmonic oscillator motion, work and energy, vector forces, linear momentum, torque, concept of pressure) and Mathematics I (basic geometry, vectors, dot and vector product, determinant of a matrix, angle between vector, projection of a vector on a plane, complex numbers, derivatives, chains rule, integrals, Taylor formula, graphical study of a one-dimensional function). Students who have completed High School, but have little foundations in Physics and Mathematics or those who comes from Professional Training, are recommended to take the reinforcement course provided by the School.

OUTCOMES

1402 - Degree in Telecommunications Electronic Engineering

- G3 - Acquisition of the knowledge of the basic and technological subjects that allows students to learn new methods and theories and endows them with the versatility to adapt to new situations.
- G4 - Ability to solve problems with initiative, decision-making and creativity, and to communicate and transmit knowledge, abilities and skills, understanding the ethical and professional responsibility of the activity of a telecommunications technical engineer.
- B3 - Understand and master the basic concepts of the general laws of mechanics, thermodynamics, fields and waves and electromagnetism their application to solve engineering problems.

LEARNING OUTCOMES

Understanding and mastery of concepts and basic electromagnetic wave and its application to solving problems of engineering.

Knowledge of the principles and technologies that enable them to learning new methods and to adapt to new situations.

Ability to solve problems, apply knowledge creatively and communicate knowledge in the field of engineering.

DESCRIPTION OF CONTENTS

1. Waves.

Basic parameters of a wave. Transversal and longitudinal waves. Waves propagating in one dimension. Stationary waves. Superposition and interference of waves. Speed of a wave in a rope. Reflection and transmission. Harmonic waves. Energy and intensity The wave equation.



2. Acoustic.

Speed of sound waves. Periodic waves. Intensity of a sound wave. The human ear. Spherical and plane wave. The Doppler effect.

3. The electric field in vacuum

The electric charge. Conductors and insulators. Coulomb law. The electric field. The electric field of a charge distribution. The electric dipole. Electrostatic potential. Capacitance. Energy stored in a capacitor. Electric flux. Gauss law.

4. Magnetic field in vacuum

The electric current. The magnetic field. Biot and Savart law. Magnetic force between conductor wires. Ampères law. Magnetic field of a solenoid. The Gauss law in magnetism. Displacement current. The magnetic dipole.

5. Electric field in matter

Polarization of dielectric media. The vector P . Dielectric permittivity. Electrical resistance. Properties of dielectrics.

6. Magnetic field in matter

Magnetization of matter. The vector M . Magnetic permeability. Magnetic properties of matter.

7. Time dependent fields

Faraday law. Electromotive force. Lenz law. Induced currents. Inductance. Energy in a magnetic field. RL circuits. LC circuits.

8. Electromagnetic waves.

Maxwell equations. Plane waves. Energy carried by the fields. The electromagnetic spectrum

9. Laboratory

Velocity and attenuation of electromagnetic waves. Interferences 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
Study and independent work	11,00	0
Preparation of evaluation activities	12,00	0
Preparing lectures	16,00	0
Preparation of practical classes and problem	17,00	0
Resolution of case studies	34,00	0
TOTAL	150,00	

TEACHING METHODOLOGY

Class work: theory classes, practical classes and laboratory classes.

Student class work: Preparation of classes, problem solving, job preparation and presentation of results.

Individual or group tutoring.

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 unrecoverable. 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:

<https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?idEdictoSeleccionado=5639>



REFERENCES

Basic

- Referencia b1: Física, P.A. Tipler, Edt.Reverte.
- Referencia b2: Physics for scientists and engineers, R.A. Serway, Edt Sunders Golden Burst Series.