COURSE DATA

Data Subject	
Code	34830
Name	Physics
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1407 - Degree in Multimedia Engineering	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
1407 - Degree in Multimedia Engineering	2 - Física	Basic Training

Coordination

Name	Department
MORAIS DE LIMA MARQUES, MAURICIO	175 - Applied Physics and Electromagnetism

SUMMARY

Physics is a fundamental subject that is present in all science and engineering degrees. Specifically Physics 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 Classical mechanics, wave phenomena and electromagnetic phenomena from the phenomenological point of view. It begins with the study of the kinematics and dynamics of the material point, then the oscillations and waves will be studied paying special attention to simple harmonic movement and sound. Next, the basic principles of electromagnetism are presented, studying the electrostatic and static magnetic fields in the vacuum and in the materials, and the course finishes studying the magnetic induction.

The contents of the subject are: Kinematics and dynamics of the point. Oscillations and waves. Electricity and magnetism. Which are structured in the thematic units that appear in section 6.

The fundamental objective of the subject is to provide with student the basic knowledge in relation to mechanics, oscillations, waves and electromagnetism that allow him to understand and explain the phenomena of engineering related to these areas.

On the other hand, the subject aims to provide the support of physical knowledge that can require other subjects 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.

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

1405 - Degree in Multimedia Engineering

- G1 - Be able to relate and structure information from different sources and to integrate ideas and knowledge. (RD1393/2007)
- G2 - Have the learning skills needed to undertake further studies or to gain further training with a certain degree of autonomy. (RD1393/2007)
- G6 - Know the basic subject areas and technologies that serve as a basis to learn and develop new methods and technologies and those that provide versatility to adapt to new situations.
- B2 - Understand and master the basic concepts of fields and waves and electromagnetism, theory of electrical circuits, electronic circuits, physical principles of semiconductors and logic families, electronic and photonic devices and their application to solve engineering problems.
- MM22 - Have knowledge and ability to understand essential facts, concepts, principles and theories related to multimedia and to the spectrum of reference disciplines.

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.
• 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.
• 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.

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 multimedia 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. Kinematics of a material point

Kinematic magnitudes: position, velocity and acceleration vectors of a point particle. Examples and exercises in two dimensions (rectilinear and uniform circular motion).

2. Dynamics of a material point

Forces and Newton laws. Types of Force. Examples and exercises with constant forces (for example, constant gravitational force: inclined plane).

3. Work and kinetic energy

Potential energy (work) and kinetic energy. Conservation of Mechanical Energy.

4. Wave motion. Oscillations and waves

Simple harmonic movement. Wave phenomena. Wave equation. Propagation speed. Harmonic solution. Energy and intensity of a wave. Superposition of waves. Attenuation and absorption. Doppler effect. Examples of waves: electromagnetic waves and pressure waves (sound waves). Perception of sound by the human ear.

5. Electrostatic field in vacuum

Electrical force between punctual charges (Coulomb's Law). Electric field. Potential energy. Work and potential and electrical. Examples and exercises of point-loading systems in two dimensions applying the superposition principle.

6. Static magnetic field in vacuum

Electric current as source of magnetic field. Magnetic field of an undefined rectilinear current (Biot and Savart Law). Magnetic fields of a loop, solenoid and toroid. Force of a magnetic field on a current. Lorentz force on a moving charge. The mass spectrometer.

7. Electric and magnetic fields in materials

Electric field in materials. Dielectric and electrical permeability. Capacitors. Magnetic field in the materials. Magnetic permeability. Magnetic properties of matter: diamagnetic, paramagnetic and ferromagnetic.

8. Magnetic (electromagnetic) induction

Magnetic flow. Faraday-Lenz law of induction. Inductive devices (Generator and Transformer). Examples and exercises.

9. Physics Laboratory

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

• Class work: Theory classes, problem classes and laboratory classes.
• student's class work: preparation of classes, problem solving, job preparation and presentation of results.
• Individual and group tutorials.

EVALUATION

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

A) Evaluation of the theory concepts and problems studied during the course (80 points). This evaluation will be carried out through written exams and continuous evaluation throughout the course. The written exams will consist of a midterm and a final exam. Students who pass the midterm exam may take the final exam only on the subject not included in the midterm exam. The rest of the students will be examined in all the matter 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 carried out 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 for each practice. Attendance at the laboratory will be mandatory and not recoverable. The laboratory qualification is valid for the two calls of the course in which it has been carried out.

To pass the course 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 from sections A and B.

The final grade necessary to pass the course will be 50 points.

In any case, the evaluation system will be governed by what is established in the Evaluation and Qualification Regulation of the University of Valencia for Degrees and Masters. (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. Autores: P.M. Fishbane, S. Gasiorowicz, S. T. Thornton, Vol 1 y 2. Editorial: PrenticeHall, 1993.
- Physics for scientists and engineer. Autores: R.A. Serway. Editorial: Sunders Golden Burst Series.