Physics II

Academic Year: (2019 / 2020) **Review date: 15-05-2020**

Department assigned to the subject: Department of Physics

Coordinating teacher: SANCHEZ FERNANDEZ, LUIS RAUL

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 2

Branch of knowledge: Engineering and Architecture

STUDENTS ARE EXPECTED TO HAVE COMPLETED

Physics I

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

Competences and skills that will be acquired (PO: a,b d)

The goal of this course is the student can understand the physical phenomena involved in electromagnetism as well as in oscillations and waves, both mechanical and electromagnetic.

In order to achieve this goal, the following competences and skills have to be acquired

- Ability to understand and know basic concepts of electromagnetism and thermodynamics.
- Ability to understand and use the mathematics involved in the physical models
- Ability to understand and use the scientific method
- Ability to understand and use the scientific language
- Ability to develop skills to solve problems
- Ability to use scientific instruments and analyze experimental data.
- Ability to retrieve and analyze information from different sources
- Ability to work in a team.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Basic concepts of Thermodynamics
Temperature. Thermodynamical variables. Work.
2. First Law of Thermodynamics. Heat Transfer.
3. Second Law of Thermodynamics. Entropy.
4. Electrostatics in vacuum.
Coulomb's law. Superposition principle. Electric field created by a point change and a continuous distribution of charge. Gauss' law. Sources of the electric field. Electric potential. Electrostatic energy.
5. Conductors y Capacitors.
Conductors. Conductors in equilibrium. Cavities. Electrostatic shielding. Capacitors. Capacitance. Association of capacitors. Capacitors and dielectrics.
6. Electric current. Electric circuits.
Current density and current intensity. Ohm's law. Resistance and conductivity. Joule's law. Association of resistances. Electromotive force.
7. Magnetostatics in vacuum.
Force between currents. Magnetic field. Lorentz force. Motion of a charge in a magnetic field. Magnetic flux. Sources of the magnetic field. Ampere's law. Magnetic energy.
8. Magnetic induction.
Faraday's law. Lenz's law.
9. Introduction to magnetic materials.
Diamagnetism. Paramagnetism. Ferromagnetism.

LEARNING ACTIVITIES AND METHODOLOGY

Lectures where the theoretical concepts are explained (PO: a)

The lecturer will provide the following information (1 week in advance)
- Notes describing the main topics to be discussed during the theoretical session
- Chapters/sections in each of the text books provided in the bibliography were the studend can read about these topics

Activities in groups (~ 40 students dividen in 2-3 people groups) to solve problems (PO: a, d).

The main skills to be developed in these activities are:
- To understand the statement of the problem (for instance drawing an scheme that summarizes the statement)
- To identify the physical phenomenon involved in the statement and the physical laws related to it.
- To develop a strategy to reach the objective (for instance breaking the problem in small subproblems).
- To be careful in the use of mathematics
- To analyze the reasonability of the result (is the final number reasonable?, are the dimensions consistent?)

Small works focused to the search of scientific information in different sources (mainly internet). (PO: a, d)

Laboratoy sessions (~ 24 students dividen in 2 people groups). (PO:b, d)

The main skills to be developed in this activity are:
- To understand that physics is an experimental science and they can reproduce the laws that have been theoretically explained in the lectures.
- To use scientific instruments and to be careful in its operation
- To be careful in the acquisiton of the experimental data.
- To learn the basis of the management of a scientific data set
- To write a report with the main results of the experiment
- To reason in a critical way these results: have we achieve the goals of the experiment?

ASSESSMENT SYSTEM

1) Laboratory sessions (15% of final grade). Evaluation based on:

- Attendance is mandatory to the laboratory sessions as is the realization of the report requested for each session. Activities are carried out in groups of two students.
- Laboratory reports will be graded. Grade is shared by the members of the group.

2) Assessment during the course (25% of final grade). Evaluation based on:

- Midterm exams.
- Delivery and evaluation of any assigned homework.

3) Final exam (60% of final grade) (PO: a).

The exam is made at the end of the semester and it is the same for all the students.
Contents of the exam:
- Problems to be solved related to the topics covered of the program
- Short theoretical questions (sometimes).

Minimal grade in written exam to pass the course: 3.0. This requirement is independent of what the final grade might be once the different aggregate contributions are added.

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

- DW Cheng Fundamentals of electromagnetism for engineers, Addison-Wesley.

- JR Reitz, FJ Milford and RW Christie Fundamentals of electromagnetic theory, Addison-Wesley.

ADDITIONAL BIBLIOGRAPHY

- Sears, Zemansky, Young and Friedman College Physics. Vols I and II, Addison-Wesley.