30301 - Basic principles of physics

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	438 - Bachelor's Degree in Telecomunications Technology and Services Engineering
ECTS	6.0
Year	1
Semester	First semester
Subject Type	Basic Education
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The learning process that has been designed for this course is based on the following:

1. Plenary lectures , given to the entire group, in which the teacher will explain the basics of the subject and will solve some selected problems. The participation of the students in this activity will be boosted through previous planning of selected problems. I.e., that will be introduced beforehand in the classroom so that the student can reflect on them and

participate to their resolution.

2. Laboratory sessions distributed throughout the semester and the evaluation of which will be part of the final exam score. Groups of two or three students are formed to work on each experiment set-up, with the help of a guide previously provided to the students together with a questionnaire which collects the experimental data and their analysis.

3. Activities in small groups which can be: seminars on topics of interest for the degree, experimental practical work, supervised resolution of problems, etc.

4. Personal work , home study of the theory and its application to problems solution. This activity is fundamental in the learning process of the student and to overcome the evaluation process.

5. Tutorials , which can be related to any part of the course program. The teacher will give a personal appointment to the student who will make specific questions previously pondered.

5.2.Learning tasks

The program offered to the student to help him in achieving the expected results includes the following activities

Plenary lectures. They will take place during the semester by giving 3 hours per week as scheduled by the School. The attendance is non-mandatory but highly recommended for good learning process.

Problem discussion lectures. They will take place during the semester by giving one hour in weeks of type A or B according to School scheduling and will be devoted to the overall resolution of medium-high level exercises.

Laboratory sessions . 5 laboratory sessions of two hours will be scheduled. The students will join in subgroups of two or three people. Attending the lab sessions is mandatory. The evaluation consists of a final practical exam. A guide will be previously provided to the students together with a questionnaire which collects the experimental data and their analysis The School will schedule and communicate the laboratory sessions calendar at the beginning of the course.

Small group activities . Meetings of small student groups will be encouraged to solve problems, review laboratory works and supervised projects.

Study and personal work. This is the individual personal work part of the course, 100 hours are estimated as necessary for the study of theory, problem solving and laboratory reviewing redactions.

Tutorials. Teachers will publish a timetable for students reception to attend to questions and doubts in a regular way during the whole semester

5.3.Syllabus

Fundamentals of Physics

Degree of Engineering Technologies and Telecommunication Services Course program 2016-2017

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Part I. MECHANICS and THERMODYNAMICS

1. **Kinematics and dynamics of one particle**

- Position, velocity, and acceleration vectors.
- Cartesian, polar and intrinsic coordinates.
- Laws of Newton.
- Linear and angular Momentum.
- Work, kinetic energy and potential energy.
- Momentum and energy conservation laws.
- Periodic movements: Simple harmonic motion.
- Anharmonic Oscillations: small oscillations.
- Dumped and forced oscillations: resonance.

2. Dynamics of many particle system.

- Center of mass. Equation of motion.
- Momentum. Conservation.
- Angular Momentum. Conservation.
- Mechanical energy.

3. Thermodynamics

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- Many particle systems: heat, work and temperature.
- Heat conduction.

PART II. ELECTRICITY and MAGNETISM

4. Electrostatic field.

- Coulomb's law.
- Electrostatic field. Force field lines.
- Continuous charge distributions.
- Gauss law.

5. Electrostatic Potential

- Conservative character of the electrostatic field: electrical potential.
- Equipotential surfaces. The electric field gradient.
- Electrostatic energy of a charge distribution.

6 Electrical conductors

- Conductor in electrostatic equilibrium
- Charge distribution: shielding and grounding.

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- Capacity: capacitors.
- Electrostatic energy density.

7. Electric current

- Ohm's law: resistance.
- Electric current density: microscopic Ohm's law.

8. Magnetic induction

- Lorentz force on moving charges.
- Forces on wires
- Magnetic moment of a coil
- Biot and Savart's law
- Ampere's law

9 Electromagnetic induction

- Lenz law
- Faraday law
- Self and mutual induction

LABORATORY SESSIONS

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* Session 1: Introduction to experimental work.

* Session 2: Oscillatory motion of simple and physical pendulum

* Session 3: Determination of equipotential lines of an electric field

* Session 4: I/v curves in DC circuits.

* Session 5: Measures of magnetic field using a Hall detector.

5.4.Course planning and calendar

Scheduling sessions and presentation of works

Lectures, problem discussion classes and laboratory sessions will be held according to the scheduling established by the School and published prior to the beginning of the course.
Each teacher will provide his own tutorials timetable and deadlines for works presentation.

5.5.Bibliography and recommended resources

- 1. Alonso, Marcelo. Física / Marcelo Alonso, Edward J. Finn ; versión en español de Homero Flores Samaniego . México : Addison-Wesley Iberoamericana, cop. 2000
- 2.1 Tipler, Paul A.. Física para la ciencia y la tecnología. Vol. 1, Mecánica , oscilaciones y ondas, termodinámica / Paul A. Tipler, Gene Mosca ; [coordinador y traductor José Casas-Vázquez ; traductores Albert Bramon Planas ... et al.]. 6ª ed. Barcelona : Reverté, D.L. 2010
- 2.2 Tipler, Paul A.. Física para la ciencia y la tecnología. Vol. 2, Electricidad y magnetismo, luz / Paul A. Tipler, Gene Mosca; [coordinador y traductor, José Casas-Vázquez; traductores, Albert Bramon Planas...[et al.]]. 6ª ed. Barcelona : Reverté, D.L. 2010
- 3. Serway, Raymond A. Física / Raymond A. Serway, John W. Jewett, Jr. ; revisión técnica, José García Solé, Francisco Jaque Rechea. 3ª ed. Madrid [etc.] : Thomson : Paraninfo, D.L. 2003
- 4. Young, Hugh D.. Física universitaria / Hugh D. Young, Roger A. Freedman ; con la colaboración de A. Lewis Ford ; traducción Antonio Enríquez Brito. - 13ª ed. Naucalpan de Juárez (Estado de México) : Pearson Educación, 2013