30705 - Physics 2

Información del Plan Docente

Academic Year	2018/19
Subject	30705 - Physics 2
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	470 - Bachelor's Degree in Architecture Studies
ECTS	6.0
Year	1
Semester	Second semester
Subject Type	Basic Education
Module	

1.General information

1.1.Aims of the course

Physics 2 is part of the basic training block of the degree program in Architecture Studies. It is a subject of 6 ECTS, compulsory and taught in the second semester of the first year of the Degree. Together with Physics 1 in the first semester, Physics 2 gives an introduction to physics that, in addition to providing basic scientific knowledge of the fundamental laws of Nature, should serve as a basis for technical subjects of higher courses of the degree in Architecture.

It begins with the study of the topics of electric field, and current.

Then it treats the basic mechanisms of heat transmission and an introduction to the thermal machines.

The next block is dedicated to the propagation of waves, where the nature and the features of the sound are emphasized.

Finally, in the last part of the semester, some basic concepts of geometrical and wave optics are studied.

1.2.Context and importance of this course in the degree

On the one hand, being a subject of basic training, the knowledge and the abilities acquired should serve as a basis for subjects of later courses of the degree (such as Conditioning, services and facilities) related to the evaluation of the energy cost of buildings, safety problems or comfort features.

On the other hand, and more generally, the activities carried out imply the development of reasoning, analysis and synthesis, and problem solving capacities.

1.3.Recommendations to take this course

Class attendance is a FUNDAMENTAL factor in the follow-up of this subject.
The experience acquired in the past courses shows a strong correlation between the ACTIVE student attendance with the

final results achieved. Before the beginning of the classes, it is strongly recommended to read and complete the questionnaires of the ZERO COURSE of PHYSICS (accessible via Moodle), complemented by the study of any gaps that may be present and evidenced in the process. The study and continuous work are essential to achieve an adequate mastery of the contents and their application in problems and lab sessions. When studying physics usually many doubts arise, that it is important to resolve as soon as possible to guarantee any correct progress. To solve them, the student can profit of the advice of the teacher, both during the classes, and in the office hours specially designed for it either individually or in small groups.

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

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

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The learning process that is designed for this subject is based on the following:

. Theory sessions will focus on the explanation of the physical principles as well as on the resolution of selected problems.

Throughout the semester assessment tests will be conducted in order to check the understanding of the topics under study.

-Scheduled problem classes. In general, each problem class will cover topics belonging to one module. (See the program)

-Laboratory sessions, in which the students must carry out simple physics experiments, under the teacher supervision, and the support of a manual. Students must prepare a lab report for each experiment including their experimental results as well as data analysis and a brief discussion

- Throughout the semester students may be asked to prepare some academic works to be submitted in writing and presented in an interview with the teacher.

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4.2.Learning tasks

The scheduled activities to achieve the expected learning results are:

Theory and problem classes

At the beginning of the lecture the teacher will make a brief presentation of the subject, referring it to a more general context and highlighting the relationships with other items. Applications of the studied concepts will be emphasizes throughout each session giving general guidelines for problem solving. During problem classes the increase of the participation of students is pursued. The students are encouraged to solve some selected problems and explain them to the class group. Besides, dialogue will be promoted so that the questions/answers of the students should allow the teacher to perceive the learning progress of the group.

Laboratory sessions

The group is divided in several laboratory subgroups -of about 14-16- students that are organized in pairs to carry out the lab work.

The laboratory program is designed according to the scheduled classes of theory. The student will have a detailed script of the practical works to perform as well as guidance on the proper presentation of the results.

Academic work and oral presentations

Students can autonomously perform an academic work (of appropriate level for 1st year students) previously authorized by the teacher and under his supervision. The work must be submitted in writing, in advance of the compulsory oral presentation.

Tutorial support

Tutorial support is offered to the students, who can book an appointment with the teacher to solve any question concerning the program items.

4.3.Syllabus

I. Electric Fields and Currents

A. Electric Field and Electric Potential

1.

Coulomb's Law.

2. Electric Flux and Gauss's Theorem.
3. Electric Potential.
4. Conductors and Dielectric Materials. Capacitors.

B. Direct Currents.

1. Ohm's Laws.
2. Joule Effect and Energy Dissipation.

II. Thermodynamics and Calorimetry

A. Heat and Temperature

1. Temperature. Thermal Expansion. Thermal Stress.
2. Specific Heat and Thermal Capacity.
3. Mechanisms of Heat Transmission. Fourier's Equation.

B. Thermodynamics and Thermal Machines.

1. Work and Heat in Thermodynamics.
2. The First Law of Thermodynamics: Thermodynamic Processes.
3. The Second Law of Thermodynamics: Thermodynamic Cycles. Thermal Engines.

III. Oscillatory Motion and Waves.

1. Nature of the Waves.
2. Waves Superposition Principle

3. Sound Waves. Intensity of Sound. Tone and Timbre.
4. Reverberation. Sound Absorption. Sound Insulation.

IV. Light and Colour

1. The Nature of Light. Electromagnetic Waves.
2. Reflection and Refraction.
3. Geometric Optics.
4. Light Polarization. Interference
5. Fotometry and Colourimetry.

4.4.Course planning and calendar

Lectures (3 or 4 hours a week, on alternate weeks) and laboratory sessions (2 hours a week on alternate weeks for each subgroup) are taught according to the schedule established, published well in advance at the beginning of the term.

The laboratory reports have to be delivered at the end of the corresponding experimental class.

Appointments for oral presentation of academic works will be set up with the students

4.5.Bibliography and recommended resources

Bibliography

Main Reference Text

- Sears - Zemansky -Young - Freedman, *University Physics*, Vol.2, Ed. Pearson Addison Wesley, 13th Ed.

Alternative Choices

- P. Tipler, G. Mosca, *Physics for Scientists and Engineers*, Vol. 2 (Mechanics, Oscillations and Waves, Thermodynamics) 6th Ed.
- R. A. Serway, J. W. Jewett, *Physics*, Vol. 2, (Mechanics, Oscillations and Waves, Thermodynamics), Ed. Thomson,

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7th Ed.

Complementary Bibliography for Specific Aspects of the Course:

- A.P. French, *Oscillations and Waves,*