

230081 - FDF - Fundamentals of Physics

Coordinating unit: 230 - ETSETB - Barcelona School of Telecommunications Engineering
 Teaching unit: 748 - FIS - Department of Physics
 Academic year: 2019
 Degree: BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Teaching unit Compulsory)
 ECTS credits: 5 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Benadero Garcia-Morato, Luis
 Others: Benadero Garcia-Morato, Luis
 Gomis Arbones, Vicente
 Juan Zornoza, Jose Miguel
 Garcia Garcia, Jose Eduardo

Degree competences to which the subject contributes

Generical:

12 CPE N1. They will be able to identify, formulate and solve engineering problems in the ICC field and will know how to develop a method for analysing and solving problems that is systematic, critical and creative.

Learning objectives of the subject

The course aims primarily to prepare students for the understanding of force fields, oscillations and waves. It also aims to harmonize the level of knowledge of students and simultaneously introduce a more mathematical language to describe the physical phenomena.

Learning outcomes:

Understand and master the basics of the general laws of mechanics, thermodynamics and waves.
 Apply basic physical principles to solve problems in engineering

Study load

Total learning time: 125h	Hours large group:	52h	41.60%
	Self study:	73h	58.40%

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Content

Unit 1. Introduction to Mechanics	Learning time: 10h Theory classes: 10h
<p>Description:</p> <p>Kinematics and dynamics is revisited, incorporating new mathematical elements: assume that we have any movement, we need a reference that can move from one reference to another, we introduce the analysis of movement in three dimensions, the analysis regarding inertial reference systems, and how to confront a mechanical problem. To strengthen the basic concepts of function, derivative and integral, as well as the manipulation of vectors. Prior to the study of the oscillator and waves.</p>	
Unit 3. Work and Energy	Learning time: 10h Theory classes: 10h
<p>Description:</p> <p>Concepts of energy and other conservative figures are introduced. Work is defined as the line integral in a force field and the potential energy is defined in a conservative field. Basic to understanding the behavior of electrostatic fields and electric potential</p>	
Unit 3. Heat and Temperature	Learning time: 8h Theory classes: 8h
<p>Description:</p> <p>The study of gases, necessary to understand acoustic waves, serves as an example to understand the concept of temperature and how it affects the behavior of real physical systems. The study of systems formed by many particles moving randomly will help to understand the conduction processes in conductive or semiconducting materials.</p>	
Unit 4. Mechanical Oscillations	Learning time: 10h Theory classes: 10h
<p>Description:</p> <p>Physical systems in which a force depends on the position and speed are introduced, thus allowing, by analogy, introduce to the study of linear electrical circuits. The need for linear differential equations of first and second order is introduced. Relaxation and oscillations, both transient and steady state are studied. The tools for the treatment of harmonic signals are introduced.</p>	

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Unit 5. Waves	Learning time: 10h Theory classes: 10h
Description: We study the basic behavior of the waves, thanks to the introduction of the concept of partial derivative. This study focuses on the transverse waves on a string and the longitudinal waves in a gas. Behavioral studies include interferences, standing waves and reflected waves. This study is the basis for understanding the electromagnetic waves.	

Qualification system

- 1) Assessment procedure: The top note of the following two options:
 - a.- 40% course mark + 60% final exam
 - b.- 100% final exam
- 2) Re-evaluation procedure: If the subject was failed and the qualification was not Absent, there is a chance of a second test during the first two weeks of July. Qualification higher than 3 is required and for a not more than two subjects in the case of students enrolled in September.

Bibliography

Basic:

- Tipler, Paul Allen; Mosca, Gene. Física para la ciencia y la tecnología. 6a ed. Barcelona [etc.]: Reverté, 2010. ISBN 9788429144291.
- Tipler, Paul Allen. Física. 3a. ed., [traduida al català]. Barcelona [etc.]: Reverté, DL 1994. ISBN 842914370X.
- Roller, Duane Emerson; Blum, Ronald. Física. Barcelona [etc.]: Reverté, 1983-1986. ISBN 8429143378.
- Serway, Raymond A; Jewett, John W; Campos Olguín, Víctor; Flores Rosas, Misael. Física : para ciencias e ingeniería. 7a ed. México: Cengage Learning, cop. 2008. ISBN 9789706868220.

Complementary:

- Alonso, Marcelo; Finn, Edward J. Física. México [etc.]: Addison Wesley Longman, 2000. ISBN 9684444265.
- Gorri Ochoa, José Antonio; Toribio Millán, Eliezer; Albareda Tiana, Alfons. Oscilaciones y ondas [on line]. 2a ed. Barcelona: Edicions UPC, 1995 [Consultation: 23/10/2015]. Available on: <<http://hdl.handle.net/2099.3/36729>>. ISBN 8476535333.