

Course guide

230081 - FDF - Fundamentals of Physics

Last modified: 25/05/2023

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 748 - FIS - Department of Physics.

Degree: BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 5.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Consultar aquí / See here:
<https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura>

Others: Consultar aquí / See here:
<https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma>

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.

TEACHING METHODOLOGY

The classes combine theoretical exposition of the contents with problem-type exercises. No difference between theoretical and practical classes is done. Demonstrations of specific topics are carried out in class, using online or experimental resources when possible.

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

Type	Hours	Percentage
Self study	73,0	58.40
Hours large group	52,0	41.60

Total learning time: 125 h

CONTENTS

Unit 1. Introduction to Mechanics

Description:

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.

Full-or-part-time: 10h

Theory classes: 10h

Unit 2. Work and Energy

Description:

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

Full-or-part-time: 10h

Theory classes: 10h

Unit 3. Mechanical Oscillations

Description:

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.

Full-or-part-time: 10h

Theory classes: 10h

Unit 4. Heat and Temperature

Description:

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.

Full-or-part-time: 8h

Theory classes: 8h

Unit 5. Waves

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.

Full-or-part-time: 10h

Theory classes: 10h

GRADING SYSTEM

1) Assessment procedure: The highest mark from the following two options:

a.- 40% course mark + 60% final exam mark

b.- 100% final exam mark

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:

- Roller, D.E.; Blum, R. Física. Barcelona: Reverté, 1986-1990. ISBN 8429143378.

- Tipler, P.A.; Mosca, G. Física para la ciencia y la tecnología [on line]. 6a ed. Barcelona: Reverté, 2010 [Consultation: 27/04/2022].

Available on : https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=10372. ISBN

9788429144284.

Complementary:

- Gorri Ochoa, José Antonio; Toribio Millán, Eliezer; Albareda Tiana, Alfons. Oscilaciones y ondas [on line]. 2a ed. Barcelona: Edicions UPC, 1995 [Consultation: 22/09/2020]. Available on: <http://hdl.handle.net/2099.3/36729>. ISBN 8476535333.

- Alonso, M.; Finn, E.J. Física. México: Addison Wesley Longman, 2000. ISBN 9684444265.