Bachelor in Electrical Engineering

Course information

Year 2018-19

GENERAL SPECIFICATIONS				
English name				
PHYSICS I				
Spanish name				
FÍSICA I				
Code		**Type**		
606310102		Basic		
Time distribution				
	Total	**In class**	**Out class**	
Working hours	100	30	70	
ECTS: 6				
Standard group	**Small groups**			
	Classroom	**Lab**	**Practices**	**Computer classroom**
4.14	0.36	1.5		0
Departments		**Knowledge areas**		
Ciencias Integradas		Física Aplicada		
Year		**Semester**		
1º		1º		

TEACHING STAFF			
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SPECIFIC INFORMATION OF THE COURSE
1. Contents description
1.1. In English:
Scalar and vector quantities Particle Kinematics Particle Dynamics Dynamics of particle systems Kinematics of rigid bodies Dynamics of rigid bodies Vibration
1.2. In Spanish
Mecánica del punto material Trabajo y energía Sistemas de partículas Mecánica del sólido rígido Oscilaciones y ondas
2. Background
2.1.Situation within the Degree:

Physics I is a first-year, first-semester course that provides basic and applied knowledge on the fundamental principles in Physics, including basic concepts of Classical Mechanics and Waves. This course is specially intended for students in the first year of an Electrical Engineering degree.

2.2. Recommendations:

It is recommended that students have studied Physics and Mathematics at high school, as well as the introductory subjects on Physics and Mathematics at the Escuela Técnica Superior de Ingeniería (School of Engineering).

3. Objectives (as result of teaching):

On completion of this course, students should be able to:

- demonstrate understanding of the scientific method and basic experimental techniques in Physics
- apply basic principles of Physics
- solve problems involving classical mechanics, including motion in one and two dimensions
- solve problems involving dynamics, oscillations and wave motion

4. Skills to be acquired

4.1. Specific Skills:

B02: Understanding and mastery of basic concepts about the general laws of mechanics, fields and waves and its application for the resolution of engineering problems

4.2. General Skills:

CB1: That the students have demonstrated to possess and understand knowledge in an area of study that starts from the basis of general secondary education, and is usually found at a level that, while supported by textbooks advanced, also includes some aspects that imply knowledge coming from the vanguard of its field study

CB2: That students know how to apply their knowledge to their work or vocation in a professional manner and possess the competencies that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within, their area of study

CB3: That students have the ability to gather and interpret relevant data (usually within their area of study) to issue judgments that include a reflection on relevant social, scientific or ethical issues

G01: Ability to solve problems

G04: Ability to apply knowledge in practice

G07: Capacity for analysis and synthesis

5. Training Activities and Teaching Methods

5.1. Training Activities:

- Theory sessions on the contents of the Program.
- Problem Solving sessions.
- Practical sessions in specialized laboratories.
- Activities Academically Directed by the Faculty: seminars, conferences, development of works, debates, collective tutorials, evaluation activities and self-evaluation.

5.2. Teaching Methods:

- Theory classes
- Laboratory Sessions
- Supervised resolution of exercises

- Individual and group tutorials
- Exams

5.3. Development and Justification:

Academic sessions of theory: they will be taught in large groups and consist of face-to-face classes in which they will develop the theoretical contents of the subject.
Academic sessions of problems: they are face-to-face classes in which type problems and practical cases will be solved related to the subject. These sessions can be developed in both large and small groups.
Practical laboratory sessions: will consist in the development of different experiments in the laboratory related to the thematic blocks of the subject.
Work in small groups and resolution and delivery of problems/practices: this teaching technique would consist in forming small groups of students who would be responsible for solving problems and jobs, which would be carried out in a not face-to-face and that later would be exposed in face-to-face sessions. Depending on the progress of the course, it will be possible to carry out evaluable partial examinations whose frequency will be agreed with the students.

6. Detailed Contents:

Chapter 1. Physical magnitudes, units and vectorial analysis
1.1 Standards and Units
1.2 Unit Consistency and Conversions
1.3 Uncertainty and Significant Figures
1.4 Estimates and Orders of Magnitude
1.5 Vectors and Vector Addition
1.6 Components of Vectors
1.7 Unit Vectors
1.8 Products of Vectors

Chapter 2. Kinematics and dynamics of a particle
2.1 Motion along a straight line
2.2 Motion in two or three dimensions
2.3 Force and Interactions
2.4 Newton's laws of motion
2.5 Mass and Weight
2.6 Free-Body Diagrams
2.7 Frictional Forces
2.8 Dynamics of Circular Motion
2.9 The Fundamental Forces of Nature

Chapter 3. Work and Energy
6.1 Work
6.2 Kinetic Energy and the Work–Energy Theorem
6.3 Work and Energy with Varying Forces
6.4 Power
6.5 Gravitational Potential Energy
6.6 Elastic Potential Energy
6.7 Conservative and Nonconservative Forces
6.8 Force and Potential Energy
6.9 Energy Diagrams

Chapter 4. Momentum, impulse, and collisions
4.1 Momentum and Impulse
4.2 Conservation of Momentum
4.3 Momentum Conservation and Collisions
4.4 Elastic Collisions
4.5 Center of Mass
4.6 Rocket Propulsion

Chapter 5. Rotation of rigid bodies
5.1 Angular Velocity and Acceleration
5.2 Energy in Rotational Motion
5.3 Torque and Angular Acceleration for a Rigid Body
5.4 Rigid-Body Rotation About a Moving Axis
5.5 Work and Power in Rotational Motion
5.6 Angular Momentum
5.7 Conservation of Angular Momentum
5.8 Gyroscopes and Precession

Chapter 6. Static Equilibrium and Elasticity
6.1 Conditions for Equilibrium
6.2 Center of Gravity
6.3 Solving Rigid-Body Equilibrium Problems
6.4 Stress, Strain, and Elastic Moduli
6.5 Elasticity and Plasticity

Chapter 7. Oscillations and Mechanical Waves
7.1 Simple Harmonic Motion
7.2 Energy in Simple Harmonic Motion
7.3 The Simple Pendulum
7.4 The Physical Pendulum
7.5 Damped, Forced Oscillations and Resonance
7.6 Types of Mechanical Waves
7.7 Periodic Waves
7.8 Energy in Wave Motion
7.9 Wave Interference, and Superposition
7.10 Standing Waves on a String
7.11 Normal Modes of a String

7. Bibliography

7.1. Basic Bibliography

Sears, Zemansky, Young, Freedman. University Physics with Modern Physics. 13th Ed. Pearson 2012.
R. Serway, J.W Jewett. Physics for Scientists and Engineers. Brooks Cole Pub Co. 2013

7.2. Additional Bibliography:

Any book on General Physics

8. Systems and Assessment Criteria

8.1. System for Assessment:

- Written exam (theory and problems)… 80%. The skills evaluated are B02, CB1, CB2, G01, G04 and G07.

- Reports of laboratory practices and/or practice exam (10% of the total subject). The skills that are evaluated are: CB3, G01, G04 and G07. In the case that there is an examination of practices, the note of the reports would suppose between 50-70% of the practical note and the of the exam between 50-30% of the practical note.
- Solving exercises…10%

8.2. Assessment Criteria and Marks:

Final results will be given in terms of a numerical scale between 0 and 10 (including tenths), with the corresponding qualitative ratings below:

- ≤4.9: Fail (D)
- 5.0 - 6.9: Pass (C)
- 7.0 - 8.9: Pass with Merit (B)
- 9.0 - 10: Distinction (A)

The total number of distinctions cannot exceed 5% of the students enrolled in the subject in the academic year (unless the number of students enrolled is lower to 20, in which case one distinction can be awarded)

The grading system is subject to the Bachelor's Degree Exam Regulations of the University of Huelva (Normativa de Evaluación para las Titulaciones de Grado de la Universidad de Huelva). Please refer to:

<http://www.uhu.es/sec.general/Normativa/Texto_Normativa/Normativa_de_Evaluacion_grados.pdf>.

In particular, please note that make-up exams and other special circumstances will be subject to article 19 of these regulations