30002 - Physics I

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	436 - Bachelor's Degree in Industrial Engineering Technology
ECTS	6.0
Year	1
Semester	Half-yearly
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

5.2.Learning tasks

5.3.Syllabus

Physics I course focuses on the basics of Mechanics and more applied aspects such as mechanical oscillations, elasticity and fluid mechanics. It also provides the basic concepts and principles of Thermodynamics. Being a basic training course,

the acquired knowledge are intended as a starting point for other courses of the industrial engineering branch specific to the degree.

1. Kinematics: position, velocity and acceleration vectors. Trajectory. Reference frames: Cartesian, polar and intrinsic coordinates. Relative movement.

2. Particle dynamics: Newton's laws. Inertial and non-inertial reference frames. Linear and angular momenta. Work and energy.

3. Dynamics of a system of particles: Introduction: collisions between two particles. Centre of mass. Equation of motion. Linear and angular momenta, conservation laws. Mechanical energy.

4. Rigid Bodies: Moments of inertia. Rotation dynamics about a fixed axis. Work and energy in rotational motion. Equilibrium conditions: Statics.

5. Mechanical vibrations: Simple harmonic motion. Damped oscillations. Forced oscillations: resonance. Anharmonic oscillations analysis.

6. Elasticity: Stress and strain. Hooke's law. Elastic moduli.

7. Fluid Mechanics: Introduction: ideal fluids, basic concepts. Statics: Pascal's and Archimedes' principles. Dynamics: Bernoulli's equation and applications.

8. Temperature and heat: Temperature: thermometers and thermometric scales. Thermal expansion. Heat and heat capacity. Heat transfer.

9. First Law of thermodynamics. Processes: internal energy, equilibrium states. State variables and equations of state. Ideal gases: state variables and internal energy. Thermodynamic processes for an ideal gas.

10. Second Law of thermodynamics. Heat Engines: Introduction: Entropy and second law. Carnot cycle. Thermal machines. Other cycles.

5.4.Course planning and calendar

5.5.Bibliography and recommended resources