30006 - Physics II

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	436 - Bachelor's Degree in Industrial Engineering Technology
ECTS	6.0
Course	1
Period	Half-yearly
Subject Type	Basic Education
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

5.2.Learning activities

5.3.Program

Physics II course provides in a first part the basic concepts and laws related to electromagnetic fields and ends with Maxwell's equations in integral form. The wave concepts are also shown from a general point of view, while it is performed a more detailed analysis of the peculiarities of wave phenomena of interest in engineering: waves in solids and fluids (acoustics), electromagnetic waves and optics.

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1. Wave motion: Mathematical description. Transverse waves in a stretched string. Mechanical energy of a harmonic wave. Waves in two and three dimensions.

2. Acoustics: Longitudinal waves in a solid. Longitudinal waves in a gas. Doppler effect.

3. Superposition of waves: Standing waves. Interference and diffraction

4. Electrostatic field and potential: Coulomb's Law: field and potential. Charge distributions. Energy stored in a charge distribution.

5. Gauss' law: Flux of the electrostatic field: Gauss' law. Applications: planar, cylindrical and spherical symmetries.

6. Electrostatic fields in the presence of conductors: electrostatic equilibrium conditions. Potential and capacity coefficients. Capacitor.

7. Electrostatic field in the presence of dielectrics: Electric dipole. Polarization vector. Gauss' law. Displacement vector. Dielectric properties of matter.

8. Electric current: Current density. Continuity equation. Microscopic Ohm's law. Resistance.

9. Magnetic induction field, B: Lorentz force. Hall effect. Biot-Savart's law. Current distributions.

10. Ampère's law in vacuum: Circulation of the magnetic field, B. Ampère's law. Applications: calculation of B in highly symmetric situations.

11. Magnetostatic field in the presence of matter: Magnetic dipole. Magnetization. Ampère's law. H field. Magnetic properties of matter.

12. Electromagnetic induction: Faraday's law. Self-inductance and mutual inductance coefficients.

13. Maxwell's equations: Ampère-Maxwell's law. Displacement current. Maxwell's equations in integral form. Electromagnetic waves.

5.4.Planning and scheduling

5.5.Bibliography and recomended resources