SUBJECT TEACHING GUIDE

G416 - PYSICS 1

Degree in Industrial Technologies Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Industrial Technologies Engineering			Type and Year	Core. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Physics Basic Training Module				
Course unit title and code	G416 - PYSICS 1				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web	http://personales.unican.es/rodrigufj/				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. CIENCIAS DE LA TIERRA Y FISICA DE LA MATERIA CONDENSADA
Name of lecturer	JESUS MARIA RODRIGUEZ FERNANDEZ
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Other lecturers	VIRGINIA MONTESEGURO PADRON

3.1 LEARNING OUTCOMES
- To know precisely fundamental concepts and models associated to the different parts of the subject.
- To write properly the concepts and to know how to establish comparisons about of the relative importance and the role of the models in addressing a physical problem. To write correctly a judgment on the obtained results.
- To write properly the concepts and to know how to establish comparisons about of the relative importance and the role of the models in addressing a physical problem. To write correctly a judgment on the obtained results.
- To solve numerical problems associated to the contents of subject using different units and basic mathematical tools.
- To be able to verbally make judgments about practical situations related to the contents of the subject.

4. OBJECTIVES
To know the basic concepts and variables associated with mechanics. To be able to solve analytically and / or numerically practical cases associated with these concepts.
To appreciate the physics as a way to understand the Nature. To be able to verbally make judgments about practical situations related to the contents of the subject.
To identify the key points of a physical phenomenon. To know how to analyse the physical phenomenon experimentally considering the proposed model and the mathematical methods needed and provide a quantitative result testable with experience.
Analyse and present the results taking into account the accuracy of the instruments used.

6. COURSE ORGANIZATION

	CONTENTS
1	1.-VECTORS: Vectors and scalars. Laws of vectors algebra. Coordinate systems and components of vectors. Scalar and vector products. Derivatives and integrals of a vector. Nabla operator, gradient, divergence and rotational. Systems with many vectors. 2. PARTICLE KINEMATIC. Motion in one dimension: speed and acceleration. Movement in two and three dimensions: speed and acceleration, motion with constant acceleration, intrinsic components of acceleration, projectile motion, motion in a circle. 3. RELATIVE MOVEMENT: Speed and acceleration relative. Relative motion of uniform translation, Galileo transformations. Relative motion of uniform rotation. Relative motion in the Earth. Basic concepts of the relativity theory: Lorentz transformations.
2	4. PARTICLE DYNAMICS: Newton's laws, force concept and linear momentum conservation principle. Fundamental forces. Types of forces: restraining forces, elastic and frictional. Dependent speed friction forces. Fictitious forces. Angular momentum. Central forces and Kepler's laws. 5. WORK AND ENERGY: Work made by a force. Power. Kinetic energy. Conservative forces and potential energy. Strength and potential gradient. Conservation of mechanical energy and non-conservative forces. Potential energy curves. Time dependent forces and impulse. Collisions 6. Simple Harmonic Motion: kinetic and potential energies. Examples: simple pendulum and vertical spring. Damped and forced oscillations, resonance.
3	7. DYNAMICS OF PARTICLE SYSTEMS: Properties of internal forces. Application of Newton's laws to a particle system, linear and angular momentum. Center of mass of a particle system: definition and movement. Kinetic energy of a particle system. Energy conservation. Variable mass systems. Centers of gravity: definition and determination. Theorems of Pappus Guldin. 8. DYNAMICS OF RIGID SOLID: translational and rotational movement. Angular momentum and moment of inertia. Calculating moments of inertia. Steiner theorem. Equation of motion for rotation of a solid. Rotational kinetic energy. Physical pendulum. Gyroscopes and precession. 9. EQUILIBRIUM: Equilibrium of a particle and of a rigid solid. Equilibrium of a rigid body submitted to two or three forces. Conditions for equilibrium. Solving rigid-body equilibrium problems.
4	10. STATIC OF FLUIDS: Fluid Definition. Concept of pressure. Fundamental equation of hydrostatic. Pascal principle, applications. Pressure gauges and barometers. Archimedes' principle. Forces on a dam.
5	11 EXPERIMENTATION IN PHYSICS 1) Introduction to the theory of errors. Calculating the density of a solid (using rule, calibre and scale). 2) Kinematics of uniformly accelerated motion by using inclined planes. 3) Collisions and coefficient of restitution. 4) Concept of angular momentum and inertia moment measurements of a human body. 5) Measurements of specific heat. Use of a calorimeter.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Laboratory work 15%	Laboratory evaluation	No	No	15,00
Partial written exams (theory and problems) 25%	Written exam	No	Yes	25,00
Final written exam (theory and problems) 60%	Written exam	Yes	Yes	60,00
TOTAL				100,00

Observations

Note: Due to the uncertain current health situation, in case that the competent health and educational authorities so indicate, not allowing any evaluation activity to be carried out in person in the classroom, a distance evaluation modality will be adopted using telematic tools.

Observations for part-time students

Part-time students may be exempt from doing the laboratory practices, in that case the percentage of the mark assigned to practices will go to the final exam.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

-M. Alonso, E.J. Finn. "Física" Addison-Wesley Iberoamericana, 1995
-F.W. Sears, M.W. Zemansky, H.D. Young. R.A. Freedman "Física". Ed. Addison Wesley Longman, 1998
-R.A. Serway, J.W. Jewett. "Física", Thomsom, 2005
-P.A. Tipler. "Fisica". Ed. Reverte, 1999
- José María de Juana. “Física General” Vol 1. Prentice Hall, 2003