SUBJECT TEACHING GUIDE

G284 - Physics

Degree in Telecommunication Technologies Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Telecommunication 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	G284 - Physics				
Number of ECTS credits allocated	6	Term		Semester based (2)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. CIENCIAS DE LA TIERRA Y FISICA DE LA MATERIA CONDENSADA
Name of lecturer	PABLO GARCIA FERNANDEZ
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Office	Facultad de Ciencias. Planta: + 2. DESPACHO PROFESORES (2007)
Other lecturers	JAVIER RUIZ FUERTES TORAYA FERNÁNDEZ RUIZ NAYARA CARRAL SAINZ

3.1 LEARNING OUTCOMES
- Students will be able to present, analyze and interpret experimental results in brief memoirs of scientific and technological nature.
- Properly write the concepts and know how to establish and submit comparisons of the relative importance of models addressing a physical problem. Properly write a judgment on the outcome.
- Know the fundamental concepts and models associated to each of the blocks mentioned in the content .
- Solve numerical problems associated with the contents of the subject, using different units and basic mathematical tools to provide a concrete result .
- Verbally make judgments about practical situations associated with the contents of the subject.

4. OBJECTIVES
Know the basic concepts and variables associated with the Mechanics, Waves and Electromagnetism. Being able to solve analytically and / or numerically practical situations associated with these concepts.
Appreciate physics as a way to understand nature. Being able to verbally make judgments about practical situations related to the contents of the subject.
Identify the key points of a physical phenomenon, how to analyze them experimentally considering the proposed model and mathematical methods needed and provide a quantitative result testable with experience.
Analyze and present the results taking into account the accuracy of the instruments used.

6. COURSE ORGANIZATION

	CONTENTS
1	ITEM 1. VECTORS. Magnitudes. Coordinate systems and components of a vector. Vector operations: addition, subtraction, scalar product, vector product, mixed product. Derivatives and integrals. Introduction to scalar and vector fields. A moment vector about a point. Vector system: resultant and resultant moment about a point. Varignon theorem. Systems of null resultant. ITEM 2. KINEMATICS OF THE PARTICLE. Path, vectors position, velocity and mean and instantaneous acceleration. Rectilinear motion, uniform and accelerated. Parabolic motion. Intrinsic components of acceleration. Circular motion. ITEM 3. PARTICLE DYNAMICS. Newton's laws, force concept. Linear momentum and conservation principle. Examples. Frictional forces, static and dynamic coefficient. Frictional forces dependent on the speed. Forces in accelerated reference systems. Equilibrium conditions. Angular momentum. Central forces and Kepler's laws. ITEM 4. WORK, POWER AND ENERGY. Work done by a force. Power. Kinetic energy. Conservative forces and potential energy. Force as gradient of potential energy. Conservation of mechanical energy. Potential energy curves. Nonconservative forces. Time dependent forces and impulse. Direct and oblique central impact.
2	ITEM 5. HARMONIC MOTION AND THEIR COMPOSITION. Harmonic motion. Composition of harmonic motions. Damped oscillations and forced oscillations. Resonances : examples of resonances . ITEM 6. INTRODUCTION TO THE WAVES IN PHYSICS. Wavefunction, wave propagation in space and time. Wave equation. Wave speed. Longitudinal and transversal waves. Energy and transport of energy by a wave. Pressure waves. Intensity and intensity levels. Superposition of waves. Standing waves. Doppler effect. Nature of light , wave-particle duality. Energy and momentum of a photon. Speed of light. Huygens' principle. Interference conditions, Young's experiment. Diffraction.
3	ITEM 7 . ELECTRIC INTERACTION. Electric charge. Coulomb's law. Quantization of electric charge. Principle of conservation of electric charge. Electric field. Lines of electric fields. Electric flux and Gauss's theorem. Electric potential. Relationship between the electric potential and the electric field. Potential of a point charge. Electric dipole: electric dipole moment, and torque on an electric dipole placed in a uniform electric field. Energy of a dipole in a uniform electric field.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Memory laboratory practices	Laboratory evaluation	No	No	15,00
Final exam	Written exam	Yes	Yes	0,00
Test (part 1)	Written exam	No	Yes	40,00
Test (part 2)	Written exam	No	Yes	40,00
Participation in the classroom	Others	No	No	5,00
TOTAL				100,00

Observations

Two partial exams will be made. The first one at the end of item 4 (Mechanics) and the second at the end of item 7 (Waves , Electromagnetism and Oscillating Movement). To pass the subject a minimum grade of 4 will be required in partial exams and an overall average over 5. Up to 0.5 points in each partial could be evaluated through work in the classroom.
If plagiarism (copying Internet or reports of previous courses) are detected in practice reports will be scored with zero (fail).

Observations for part-time students

For part-time students to attend practical classes (Lab work) is mandatory, as well as to write the reports.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

R. A. Serway. "Física". Ed. Interamericana. 1985.

P. A. Tipler and G. Mosca. "Física". 6a Edición. Ed Reverté . 2010.

F. W. Sears, M. V. Zemansky, H. D. Young y R. A. Freedman. "Física Universitaria". Ed. Addison Wesley Longman 1998