SUBJECT TEACHING GUIDE

G426 - Physics II

Degree in Mechanical Engineering

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Degree in Mechanical 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	G426 - Physics II				
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	JOSE JAVIER SANDONIS RUIZ
E-mail	javier.sandonis@unican.es
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 5. DESPACHO (S5028)
Other lecturers	MARTA NORAH SANZ ORTIZ

3.1 LEARNING OUTCOMES

- - Students will be able to meet and properly apply the concepts and basic models associated to each of the blocks mentioned in the content.
- Develop new models suited to addressing a particular physical problem.
- To know and properly apply the mathematical tools used by physics to solve numerical problems associated with the contents.
- Verbally make judgments about practical situations associated with the contents of the subject .
- To present, analyze and interpret experimental results in brief memoirs of scientific and technological character.

4. OBJECTIVES

Appreciate physics as a science that studies and tries to explain natural phenomena.
Know and apply the concepts and basic laws of electromagnetism.
Develop reasoning ability for the development of physical models and the application of physics to particular physical problems.
To know and apply the mathematical tools used by physics.
Familiarize students with the experimental physics, so that you know handled with different instruments and be able to analyze and present the results obtained .

6. COURSE ORGANIZATION

CONTENTS	
1	ELECTRIC FIELD : Properties of electric charges . Conductors and insulators , charging objects by induction. Coulomb's law. Electric field: calculation for discrete and continuous charge distributions. Electric field lines . Motion of a charged particle in an electric field . Electric flux. Gauss's law. Mathematical proof of Gauss's law . Applications of Gauss's law. Conductors in electrostatic equilibrium.
2	ELECTRIC POTENTIAL : Line integral of electric field : electric potential and potential difference. Potential differences in a uniform electric field . Obtaining electric fields from the electric potential. Electric potential due to point charges. Electric potential due to continuous charge distributions. Electric potential due to a charged conductor. Sharing charge between conductors. Millikan experiment .
3	CAPACITANCE AND DIELECTRICS : Capacitors and definition of capacitance. Calculating capacitance, examples of parallel plates capacitors, cylindrical and spherical. Combinations of capacitors. Energy stored in a charged capacitor. Electric Dipole. Dielectrics and its effects on a capacitor.
4	DIRECT CURRENT: Definition of electrical current (intensity and current density). Ohm's Law and resistance. Microscopic model of electrical conduction. Behavior of the resistance with temperature: conductors, semiconductors and superconductors. Generators and batteries. Electrical power. Association of resistances. Kirchoff laws. RC circuit. Electrical meters.
5	MAGNETIC FIELD, ACTION : Introduction. Definition of magnetic field. Magnetic force on current carrying conductors. Moment of force on a current loop. Motion of a charged particle in a uniform magnetic field, applications. Hall effect.
6	SOURCES OF MAGNETIC FIELD : Magnetic field created by a moving point charge. Magnetic field created by an electric current: The Biot-Savart law. Magnetic field created by rectilinear and circular conductors. Magnetic force between parallel conductors: Ampere and Coulomb units . Ampere's law, applications. Magnetic flux.
7	MAGNETIC INDUCTION: Faraday's Law. Motional emf. Lenz's law. Induced emf and electric fields. Generators and motors. Self-inductance. R-L circuit. Energy in a magnetic field. Mutual inductance. Oscillations in an L-C circuit. R-L-C circuit.
8	MAGNETISM IN MATTER: Magnetic dipole moments of the atoms. Magnetization vector. Magnetic susceptibility. Classification of magnetic materials: diamagnetism, paramagnetism and Curie law, ferromagnetism, magnetic domains and hysteresis. Earth's magnetic field .

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Description: Memory laboratory practices. Type: Laboratory evaluation. Final Eval.: No Reassessment: Yes %: 20%	Laboratory evaluation	No	Yes	20,00
Description: First partial exam. Type: Written exam. Final Eval.: No Reassessment: Yes %: 20%	Written exam	No	Yes	20,00
Description: Second partial exam. Type: Written exam. Final Eval.: No Reassessment: Yes %: 20%	Written exam	No	Yes	20,00
Description: Third partial exam. Type: Written exam. Final Eval.: No Reassessment: Yes %: 20%	Written exam	No	Yes	20,00
Description: Fourth, and final, exam. Type: Written exam. Final Eval.: Yes Reassessment: No %: 20%	Written exam	Yes	No	20,00
TOTAL				100,00

Observations

Observations for part-time students

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Serway-Jewet, “Física para Ciencias e Ingeniería”, vol. 2, 6a edición. Thomson 2005
P. A. Tipler, “Física” vol. 2, 4a edición. Ed. Reverté 2001