SUBJECT TEACHING GUIDE

G33 - Basic Experimental Physics III: Matter and its Properties

Double Degree in Physics and Mathematics
Degree in Physics

Academic year 2020-2021

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Physics			Type and Year	Core. Year 1 Core. Year 1
Faculty	Faculty of Sciences				
Discipline	Subject Area: Basic Experimental Physics Basic Module				
Course unit title and code	G33 - Basic Experimental Physics III: Matter and its Properties				
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	LUIS FERNANDEZ BARQUIN
E-mail	luis.fernandez@unican.es
Office	Facultad de Ciencias. Planta: + 2. DESPACHO PROFESORES (2016)
Other lecturers	JONATAN PIEDRA GOMEZ IGNACIO HERNANDEZ CAMPO JESUS MANUEL VIZAN GARCIA

3.1 LEARNING OUTCOMES
- - The undergraduate will be able to present, analyse and interpret key experimental results in short reports. These reports will display a very clear structure following present recommendations: Abstract, Introduction, Experimental, Results, Discussion and Conclusion. Acknowledgements and References.
- - The undergraduate will solve problems and calculate magnitudes in relation to the basic concepts of the mentioned subjects. Regarding Fluids and Thermodynamics they will establish the main equations and the value of some magnitudes . For the rest, simple problems will be engaged due to the relatively low mathematics level. Simple crystallographic structures will be reviewed.
- - Relevant phenomena and properties will be known and described of Fluid & Thermodynamics, Atoms & Molecules, Solids and Nuclei & Particles. Precise knowledge of Bernouilli equation, 1st principle and Kinetic Energy.They will describe Bohr´s atom, quantum numbers and electronic configurations. Moreover, they will get input of bonding types, crystalline structures and some macroscopic properties. Finally they will study Nuclear and Particle Physics.

4. OBJECTIVES
- To understand the interpretation of relevant physical phenomena. To obtain experimental result and calculate magnitudes related to the following Sections: Fluids & Thermodynamics, Atoms & Molecules, Solids & Crystalline Structure, Nuclei and Particles.
- To appraisal Physics as a form to understand nature.
- To identify key points of a physical phenomenon, and to analyse them following an experimental procedure taking into account the supporting model and the mathematical methods. This will provide a result to be checked with experience.
- To understand the experimental data of physical phenomena and the utility of instruments.
- To analyse and present the obtained results taking into account the precision of instruments.

6. COURSE ORGANIZATION	
CONTENTS	
1	Fluids & Thermodynamics. Boyle-Mariotte and Descartes diver experiences. Lab: Determination of the density of a liquid by the Archimedes and Oscillation methods. Lab: Latent heat of vaporisation of liquid nitrogen.
2	Quantum Physics and Atomic and Molecular Physics. Demonstrations of LED and Planck constant and X-ray spectroscopy.
3	Structure and bonding of Solids. Electronic structure and properties of solids. Lab: X- ray diffraction. Lab: Photoelectric effect.
4	Nuclear Physics and Radioactivity. Fundamental interactions and particles. Lab: Gamma rays decay. Lab: Simulations of CERN experiments.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Description Lab (experimental) work	Laboratory evaluation	No	No	30,00
Short evaluations of Subject blocks	Written exam	No	Yes	20,00
Final examination.	Written exam	Yes	Yes	40,00
Experimental demonstrations evaluation (short).	Written exam	No	Yes	10,00
Extra-ordinary evaluation.	Written exam	No	No	0,00
		No	No	0,00
		No	No	0,00
		No	No	0,00
TOTAL				100,00

Observations

Experimental lab work: Delay penalty (2 points: 7 days. 4 points > 7 days. 3 weeks the mark will be 0. Controls, experiences and final exam can be re-evaluated in extraordinary exam. Undergraduates without Lab logbook will not be evaluated (Experimental reports).

Observations for part-time students

Part-time undergraduate will attend the Experimental Labs and present the Experimental Reports.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

R. A. Serway. "Física". Ed. Interamericana, 1985 (Múltiples ediciones).
9ª Edición Serway, Jewett. "Física para ciencias e ingeniería". Ed. Mexico (2015). Todos los bloques.

P. A. Tipler. "Física". Ed Reverté, 1992. Todos los bloques.

D. C. Giancoli. "Física para Universitarios". Ed. Pearson, 2002. Todos los bloques.

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

W. Bauer, G. D. Westfall, "Física para ingeniería y ciencias". Ed. McGraw Hill, 2013. Todos los bloques.

William D. Callister, "Introducción a la Ciencia e Ingeniería de los Materiales". Ed. Limusa-Wiley, 2009. Bloque 3.

R. Chang, “Química”. Ed. Mc Graw Hill. 2010 (10ª Ed.). Bloque 2.

Th. L. Brown, H. E. LeMay (Jr), B. E. Bursten, J. R. Burdge (2004). Química. La ciencia central. Ed. Pearson-Prentice Hall, 9ª ed. Bloque 2.

R. H. Petrucci; W. S. Harwood; F. G. Herring. "Química General: Principios y aplicaciones modernas Reactividad". Pearson Educación, D.L. 2011. (10ª Ed.).Bloque 2.