SUBJECT TEACHING GUIDE

M1303 - Nanomaterials and Nanotechnology

Master's Degree in New Materials

Academic year 2019-2020

1. IDENTIFYING DATA					
Degree	Master's Degree in New Materials			Type and Year	Optional. Year 1
Faculty	Faculty of Sciences				
Discipline	Optional Module: Materials Subjects				
Course unit title and code	M1303 - Nanomaterials and Nanotechnology				
Number of ECTS credits allocated	5	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	RAFAEL VALIENTE BARROSO MAITE INSAUSTI PEÑA JOSE MARIA PITARKE DE LA TORRE ANA GARCIA PRIETO

3.1 LEARNING OUTCOMES
- Aiming to obtain a general view of the state-of-the-art of nanomaterials, providing enough resources to succeed.
- To be able to distinguish the characteristics of nanomaterials respect those in bulk state.
- To select a preparation method, using the most convenient synthesis route for nanomaterials towards different applications.
- To be able to put forward the most adequate nanomaterials depending on the electronic, magnetic or biomedical applications
- To expose and communicate relevant results, not only related to own work but also by other researchers in the ample area of Nanotechnology. Moreover, to disseminate those results for specialized, multidisciplinary and general audiences.

4. OBJECTIVES
- To know and understand the social implications of Nanoscience and Nanotechnology.
- To know most common production routes for nanostructured materials and in particular those related to chemistry.
- To know the most common characterisation techniques from the structural, electronic and magnetic standpoints. To be able to provide quantitative parameters through simple calculations from experimental results.
- To understand the size-modification of properties, especially those concerning the magnetic and electronic behaviours.
- To know the use of nanostructured materials in some medical applications.

6. COURSE ORGANIZATION	
CONTENTS	
1	T1. Introduction to Nanoscience and Nanotechnology.
2	T2. Production of bulk and fllm nanostructures by physical methods (top down).
3	T3. Chemical synthesis of nanostructures depending on dimensionality.
4	T4. Moldecular Materials: Self-organisation and assembly. Biomedical materials.
5	T5. Structural characterisation of nanomaterials.
6	T6. Electronic and magnetic behaviour of nanomaterials.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Final exam. Test.	Written exam	Yes	Yes	50,00
Oral talk based on recent publications.	Oral Exam	No	Yes	20,00
Experimental Work L1.	Laboratory evaluation	No	No	10,00
Experimental Work L2.	Laboratory evaluation	No	No	10,00
Experimental Work L3.	Laboratory evaluation	No	No	10,00
TOTAL				100,00
Observations				
Experimental works are carried out in a single session due to sophisticated techniques used.				
Observations for part-time students				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
- Nanomaterials : an introduction to synthesis, characterization and processing, Dieter Vollath, Wiley-VCH, Weinheim, Germany, 2008
- Nanomaterials : synthesis, properties and applications / edited by A. S. Edelstein and R. C. Cammarata. New York ; London : Taylor & Francis, 1996.
- Wolf, Edward L. Nanophysics and nanotechnology : an introduction to modern concepts in nanoscience / Edward L. Wolf.Weinheim : Wiley-VCH, cop. 2004.
- Introduction to nanoscience / Gabor L. Hornyak ... [et al.]. Boca Raton : CRC Press, cop. 2008.
- Magnetic nanostructures / edited by Hari Singh Nalwa.Stevenson Ranch, California : American Scientific Publishers,cop. 2002.
- T. Pradeep ; with A. Ashokreddy, ... [et al.].-- 2nd repr. -- New Delhi : McGraw-Hill Education (India), 2016. A textbook of nanoscience and nanotechnology