66223 - Nanostructured Materials

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	531 - Master's in Chemical Engineering
ECTS	3.0
Year	1
Semester	Half-yearly
Subject Type	Optional
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as

- Lectures, where the teacher explains the theoretical principles of the course and solves some "model" problems.
- Practice sessions, where students work on problems solving and case studies.
- Laboratory practice sessions are a useful support to lectures because these enable the learning of the contents and

also help to develop a more applied knowledge in the student.
- Special sessions.
- Assignments complement all these activities and will be key to succeed in this course.

Students are expected to participate actively in the class throughout the semester.

5.2.Learning tasks

The course includes the following learning tasks:

- Lectures (15 hours). These lectures cover the basics of nanotechnology and provide a solid understanding of the course contents.
- Practice sessions (10 hours). A variety of problems and case studies will be solved in base of the previous knowledge acquired in the lectures.
- Laboratory session (3 hours). The student will produce a nanomaterial in the laboratory. A variety of characterization techniques will help to study the unique properties of the nanomaterial. A practical summary will be required.
- Special session (2 hours). Visit to a nanomaterial production laboratory and electron microscopy facilities.
- Assignment (7 hours). The student will give a talk summarizing the main aspects of his/her work in a public defense.
- Autonomous work and study (24 hours).
- Assessment (3 hours).

5.3.Syllabus

The course will address the following topics:

Section 1. Introduction to Nanomaterials

- Topic 1. Nanomaterials

Section 2. Porous nanomaterials

- Topic 2. Amorphous nanomaterials: Silica based
- Topic 3. Crytalline nanomaterials: Zeolites, ALPOs, MOFs

Section 3. Carbon based nanomaterials

- Topic 4. Active carbon and graphite based nanomaterials
- Topic 5. Carbon nanotubes, graphene and fullerenes

Section 4. Nanoparticles and composites

- Topic 6. Nanoparticles: Production techniques
- Topic 7. Nanocomposites
- Topic 8. Toxicity

5.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website, the Master's website (http://titulaciones.unizar.es/mas_inge_quim/) and the course website (https://moodle.unizar.es/).

5.5.Bibliography and recommended resources

BB	Handbook of zeolite science and technology / Edited by Scott M. Auerbach,

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BB	Smart, Lesley. Química del estado sólido : una introducción / Lesley Smart y Elaine Moore ; versión en español de Patricia Quintana Owen y María A. Castellanos Román ; con la colaboración técnica de Raúl Valenzuela Monjarás y María Vallet Regí . - [1a ed.] Wilmington, Delaware [etc] : Addison-Wesley Iberoamericana, cop. 1995
BC	Chemistry of zeolites and related porous materials : synthesis and structure / Ruren Xu ... [et al.] Singapore : John Wiley & Sons (Asia), cop. 2007
BC	Cragg, Peter J.. A practical guide to supramolecular chemistry / Peter J. Cragg Chichester (England) : John Wiley & Sons, cop. 2005
BC	Cussler, E. L.. Chemical product design / E. L. Cussler, G. D. Moggridge . - 2nd ed. Cambridge, United Kingdom : Cambridge University Press, 2011
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