Course guide
240EM134 - 240EM134 - Nanotechnology

Last modified: 27/05/2024

Unit in charge: Barcelona East School of Engineering
Teaching unit: 702 - CEM - Department of Materials Science and Engineering.

Degree: ERASMUS MUNDUS MASTER'S DEGREE IN ADVANCED MATERIALS SCIENCE AND ENGINEERING (Syllabus 2014). (Optional subject).

Academic year: 2024 **ECTS Credits:** 4.5 **Languages:** English

LECTURER

Coordinating lecturer: CRISANTO JOSE VILLALOBOS

Others:

REQUIREMENTS

Mechanical behaviour of materials. Microstructural behavior of materials

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEMCEM-07. (ENG) Dissenyar, calcular i modelar aspectes relacionats amb els materials per a components mecànics, estructures i equips

Transversal:
03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

TEACHING METHODOLOGY

The structure of the subject is of 4.5 credits. Classes of the discipline occur during three hours a week. One of these hours will be dedicated to the accomplishment of practices and the reading, explanation and putting in common of articles and published scientific works in the area, which will complement with work of library and scientific research. All these activities will be presented in class the last days of the course. The generic competitions that the student will reach will be a) capacity to understand and to rationalize the process of selection of materials, b) capacity to develop manufacturing techniques and knowledge of characterization techniques, c) capacity to work in equipment and e) capacity of communication written and oral technique

LEARNING OBJECTIVES OF THE SUBJECT

The general aim of the lectures is to provide the necessary bases to understand nanomaterials from the point of view of their synthesis, their properties and their applications. Since materials on this scale display new and mproved characteristics in relation to traditional materials, the lecture will be focused in the description of these new properties and how obtaining nanoestructured materials. The generic competences that the student will reach will be a) capacity to understand and rationalize the process of selection of materials, b) capacity to develop manufacturing techniques and knowledge of characterization techniques, c) capacity to work in equipment and e) capacity of written and oral technique communication

STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	24.00
Self study	72,0	64.00
Hours small group	13,5	12.00

Total learning time: 112.5 h

CONTENTS

Introduction

Description:
Definitions. First approach to nanostructured materials

Full-or-part-time: 2h
Practical classes: 2h

Mechanical properties

Description:
Mechanical properties: strength and ductility. Deformation mechanism

Full-or-part-time: 5h
Practical classes: 5h

Microstructural characterization: EBSD

Description:
Microstructural characterization applied to nanomaterials: EBSD

Full-or-part-time: 3h 30m
Practical classes: 3h 30m

Metallic glasses

Description:
Introduction, types, properties and synthesis

Full-or-part-time: 2h
Practical classes: 2h

Processing routes: Bottom-up

Description:
Formation of clusters and nanoparticles from supersaturated vapour. Synthesis by chemical routes. Nanoestructured materials sol-gel

Full-or-part-time: 3h 30m
Practical classes: 3h 30m

Processing routes: Top-Down

Description:
Severe plastic deformation and mechanical milling

Full-or-part-time: 5h
Practical classes: 5h

Oral defense and guidance on the monographic work

Description:
Oral defense and guidance of the monographic work

Full-or-part-time: 6h
Practical classes: 6h

GRADING SYSTEM

The final mark, Nfinal, will be calculated according to the following equation:
Nfinal= 0.65Nef + 0.20Npract + 0.15Ndefensa
where Nef is the mark obtained in the final exam, Npract is the laboratory mark and Ndefensa is the mark of the oral defense of a scientifical work
In case of reevaluation, Nef will be substitued by the reevaluation exam mark