Course guide
295584 - 295PB013 - Nanotechnology

Last modified: 09/08/2024

Unit in charge: Barcelona East School of Engineering
Teaching unit: 713 - EQ - Department of Chemical Engineering.

Degree: MASTER'S DEGREE IN POLYMERS AND BIOPLASTICS (Syllabus 2024). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 3.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: CARLOS ENRIQUE ALEMAN LLANSO

Others: Primer quadrimestre:
CARLOS ENRIQUE ALEMAN LLANSO - Grup: T1
VICTOR CASTREJON COMAS - Grup: T1
JORDI SANS MILA - Grup: T1

PRIOR SKILLS

Nanotechnology

TEACHING METHODOLOGY

Classes and presentation of works.

LEARNING OBJECTIVES OF THE SUBJECT

Learn basic knowledge related to the use of polymers and biopolymers in nanotechnology. Learn the concepts that relate the structure and properties of polymeric nanostructured materials.

STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	36.00
Self study	48,0	64.00

Total learning time: 75 h

CONTENTS

Introduction

Description:
Nanometric couplings. Specific interactions of coupling. Simple nanometric structures of molecules: geometric relations. Hierarchical structure. Methods of characterization of the nanostructure.

Specific objectives:
Acquire basic knowledge and theoretical foundations about nanotechnology.

Full-or-part-time: 3h
Theory classes: 3h

Polymeric nanoparticles

Description:
Types of nanoparticles, synthesis of nanoparticles, characterization of nanoparticles, applications of nanoparticles.

Full-or-part-time: 11h
Theory classes: 11h

Polymeric nanomembranes

Description:
The materials for the manufacture of ultra-fine membranes. Preparation of ultra-fine membranes. Giant nanomembranes The functionalization of ultra-fine membranes. Applications of ultra-fine membranes in Electronics and Biomedicine.

Specific objectives:

Full-or-part-time: 11h
Theory classes: 11h

Polymeric nanofibers

Description:
Polymeric materials for the manufacture of nanofibres. Preparation of nanofibres. The functionalization of nanofibres. Applications of nanofibres.

Full-or-part-time: 11h
Theory classes: 11h

Polymeric nanogels

Description:
Hydrogels and nanogels. Properties and types. Applications of nanogels.

Full-or-part-time: 11h
Theory classes: 11h

Nanocomposites based on nanotubes, nanofibres, nanoparticles and nanosheets

Description:
Nanocomposites NTC-polymer. Manufacture, structure and properties of NTC. Optimization of dispersions. Natural and synthetic nanofibres. Dispersion strategies: superficial modifications and grafts. Silica and gold nanoparticles. Magnetic nanoparticles. Silicate-polymer nanocomposites. Laminated silicates. Interface effects: nanostructuring. Organic silicate modification. Methods for preparing nanocomposites. Modification of properties. Nanocomposite double hydroxides laminars-polymer. Graphene Nanocomposites.

Full-or-part-time: 11h
Theory classes: 11h

GRADING SYSTEM

NC= (NP1+NP2+2·E)/6
where NC is the course mark, NP1-NP2 are the notes of the for parts in which the subject is divided and E is the mark of the exam.

EXAMINATION RULES.

Works and presentations drawn up by teams of two-three students depending on the number of students enrolled.
The written exam will be held individually at the end of the semester. It has a minimum of 70% attendance at the classes, in order to be able to reflect the preparation of the different Works assigned to teams.

RESOURCES

Other resources:
Supplied by the teaching staff.