

Academic Year: ( 2023 / 2024 )

Review date: 19-05-2023

Department assigned to the subject: Materials Science and Engineering and Chemical Engineering Department

Coordinating teacher: RUIZ NAVAS, ELISA MARIA

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

None

**OBJECTIVES**

In a generic manner, the student must develop the following skills:

- CG1, Understand the challenges associated to Materials Science and Engineering in an industrial and research environment
- CG2, Know the disciplines appropriated for working in a laboratory of materials and for optimizing the obtaining of results
- CG3, Develop team working skills in a research environment
- CE1, Discover the latest tendencies in development of new materials and be aware of their potential advantages with respect to more traditional materials
- CE2, Be able to design new ways of optimizing the properties of different materials for specific applications, through the modification of their structure and composition.
- CE3, Know processing systems and advanced synthesis that allow to obtain materials with improved properties.
- CE4 Acquire the ability of contributing to the optimization of processing technology for applications and specific problems.
- CE5 Be able to develop creative strategies and decision-making facing problems related to materials, manufacturing and behavior.

Learning results:

Overcoming this matter ensures that students have achieved the following learning outcomes:

- To identify the requirements for the selection of materials for biomedical applications.
- To be able to identify which materials are most commonly used today and to understand the alternatives that are contemplated at this time to achieve improved properties.
- To be familiar with the concepts of biological response and biocompatibility, as well as biocompatibility assays, cytotoxicity and cytocompatibility necessary to assess behavior of biomaterials and biological response.
- Know new diagnostic techniques and the importance of the materials in them.

**DESCRIPTION OF CONTENTS: PROGRAMME**

- Introduction to Biomaterials and Biological Materials.
- Biological Response and biocompatibility.
- Testing of biocompatibility, cytotoxicity and cytocompatibility. Laboratory
- Hard and soft Biomaterials (Tissue Engineering).
- Metallic Biomaterials. Properties and main applications
- Polymeric Biomaterials. Properties and main applications
- Ceramic Biomaterials. Properties and main applications
- Biomaterials and Health Sciences: Biomaterials for bone regeneration
- Biomaterials and Health Sciences: Materials for gene transfer
- Biomaterials and health sciences: Biomaterials for diagnosis
- Biomaterials and health sciences: Composite Materials with antibacterial properties
- Biomaterials and Health Sciences: Applications / Case Studies

## LEARNING ACTIVITIES AND METHODOLOGY

Masterly classes, classes to solve doubts in reduced groups, individual tutorship and personal work of the student; oriented to acquire theoretical knowledge.

Laboratory classes, classes for solving problems in reduced groups; individual tutorship and personal work of the student; oriented to acquire practical knowledge related to subject program.

Conferences taught by professionals

## ASSESSMENT SYSTEM

The assessment consists of a final test (50% of the final mark) and the continuous evaluation (50%).

The continuous assessment consists of:

(I) Conducting laboratory is mandatory to be evaluated in the subject. The rating is 10% continuous assessment.

(II) Realization and/or exhibition of works. They will carry out works individually as well as in groups, mainly in the classroom. They will make at least one oral presentation of one of the works. The rating is 40%.

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| <b>% end-of-term-examination:</b> | 50 |
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| <b>% of continuous assessment (assignments, laboratory, practicals...):</b> | 50 |
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## BASIC BIBLIOGRAPHY

- J.B.Park Biomaterials. An introduction. 2nd ed., Plenum Press, 1992

- M. Elices Structural Biological Materials. , Pergamon, , 2000