

Academic Year: ( 2022 / 2023 )

Review date: 30-06-2021

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

Coordinating teacher: ALVAREDO OLMOS, PAULA

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 2

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

It is recommended, but not mandatory, to have passed the subjects Advanced metallic materials, advanced polymeric materials, advanced ceramic materials and advanced composite materials.

**OBJECTIVES****COMPETENCES**

CB6- Acquire and understand concepts that provide the foundation or opportunity to be original on the development and/or application of ideas, often in a research context.

CB7, Students will be able to apply the acquired knowledge and skills on problem resolution in new or hardly known environments in wide (or multidisciplinary) contexts related to the area under study.

CB8, Students will be able to integrate knowledge to face the complexity of making assessments based on limited or incomplete information, but considering the ethical and social responsibilities associated to the application of their knowledge and assessments.

CB9, Students will be able to communicate their conclusions and the knowledge and reasons that support them to specialized and the wide public in a clear and unambiguous manner

CB10, Students will acquire learning skills that allow them to continue studying in an autonomous and self-paced way.

CG1, Understand the challenges associated to Materials Science and Engineering in an industrial and research environment.

CG2 ¿ Know the appropriated disciplines for working in a materials laboratory and for optimizing the obtaining of results.

CG3, Develop team working skills in a research environment.

CG4, Develop skills to apply the acquired knowledge to the research and development of new materials or in technologies for their processing in strategic sectors.

CG5, Combine the interest on innovation and process optimization, with the need of doing so in an environmentally friendly manner.

CG6, Acquire the required skills to defend a research project and its results.

CG7, Develop creative strategies for decision making to solve problems associated with materials, their design, processing and behaviour.

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 allows obtaining 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.

CE9, Consolidate specific research skills in Materials Science and Engineering

CE10 Acquire knowledge and useful scientific and technical skills to solve specific problems associated with the work in a research laboratory in the field of material development and characterization

**LEARNING outcomes**

The overcoming of this matter successfully ensures that students have reached the following learning outcomes:

- Requirements that have to fulfill the materials for specific applications of great relevance today.

- Within certain applications, know how to identify materials that are the most used currently and know the current alternatives to achieve improved properties.

## DESCRIPTION OF CONTENTS: PROGRAMME

Specific topics for - materials for transportation:

- Classification of means of transport. Selection criteria for each sector. Distinction between structures and propulsion systems.
- Materials for automotive: steels, light alloys, polymeric and composite materials.
- Materials for the naval sector.
- Materials for the rail sector.
- Materials for the aeronautics sector.
- Materials for Aerospace.

## LEARNING ACTIVITIES AND METHODOLOGY

### TRAINING ACTIVITIES

AF1, classroom. Attendance to lectures

AF3, tutorials

AF4, teamwork

AF5, individual work of the student

### EDUCATIONAL METHODOLOGIES

MD1, explanations in class where the Professor, with audiovisual and computer support, develops the main matter concepts and resolution of exercises or practical cases are given

MD2, critical reading by the student of texts and scientific publications recommended by Professor

MD4 Explanation and discussion in class, under professor supervision, of issues related to the subject

MD6, Elaborating Works and reports, alone or in groups

## ASSESSMENT SYSTEM

Participation in lectures and laboratories and capacity for critical analysis shown on the issues raised (SE1) 10

Carry out and exhibition of works, exercises or reports made individually or collectively during the course (SE2) 40

Final evaluation of the subject to be done individually, in writing or orally. (SE4) 50

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