

## Materials Science

Academic Year: ( 2024 / 2025 )

Review date: 22-06-2023

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

Coordinating teacher: ALVAREDO OLMOS, PAULA

Type: Electives ECTS Credits : 6.0

Year : 2 Semester : 2

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

General Chemistry  
Organic Chemistry

## SKILLS AND LEARNING OUTCOMES

## LEARNING OUTCOMES:

- Understand the fundamental principles of materials science and engineering.
- Understand the basic relationships between structure, chemical bonding, and properties of the most important materials.
- Become familiar with the most important groups and families of materials.
- Understand the most important processes involved in the industrial processing of materials.
- Know the most important applications of materials science and engineering.
- Be able to estimate the goodness of fit of a model to experimental reality.
- Understand the limitations of the statistical methods used and their validity conditions.
- Evaluate the impact in these areas of the use of Sustainable Chemistry products.
- Correctly apply the chemical and physical protocols according to the application for the evaluation of environmental risks of products derived from nanotechnology.
- Show sensitivity towards environmental issues.
- Demonstrate ethical awareness and empathy with the environment.
- Recognize the ethical dimension of scientific and technical development.

## DESCRIPTION OF CONTENTS: PROGRAMME

Study of different materials: metallic, ceramic, polymers and composites.  
Manufacturing and treating techniques of materials.  
Structure of materials.  
Mechanical testing of materials.  
Conductor, semiconductor, isolating materials: application in electric technology.  
Materials performance.  
Selection criteria.

## LEARNING ACTIVITIES AND METHODOLOGY

Masterly classes, classes to solve doubts in reduced groups, student presentations, individual tutorship and personal work of the student; oriented to acquire theoretical knowledge (3 ECTS credits).  
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 (3 ECTS credits).

## ASSESSMENT SYSTEM

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	40

The laboratory is MANDATORY ATTENDANCE. The entrance to the laboratory is enabled once the student has viewed the videos of general safety and safety in the laboratory of materials available in

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	40

Aula Global and answered the corresponding tests correctly. entry to the laboratory will not be allowed if the tests have not been carried out correctly. NON-ATTENDANCE TO THE LABORATORY WITHOUT JUSTIFIED CAUSE IMPLIES SUSPENDING THE CONTINUOUS ASSESSMENT.

40% of the continuous evaluation mark will be given by:

30%: Three partial exams, each of them with a value of 10%, which will be carried out during class hours.

10%: Laboratory practices carried out outside class hours. The final grade of the laboratory will be given by the behavior in the laboratory, completion of the practice and completion of the questionnaire at the end of each session.

60% of the mark will be given by the mark of the final exam as long as it is higher than 4.

The continuous assessment regulations can be found at:

[https://www.uc3m.es/ss/Satellite/UC3MInstitucional/es/ListadoNormativas/1371206706530/Estudios\\_de\\_Grado](https://www.uc3m.es/ss/Satellite/UC3MInstitucional/es/ListadoNormativas/1371206706530/Estudios_de_Grado)

#### BASIC BIBLIOGRAPHY

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- CALLISTER WD Ciencia e Ingeniería de los Materiales, Reverté, 3ª Edición, Barcelona, 1995
- MANGONON PL Ciencia de Materiales. Selección y Diseño, Prentice Hall, 2001
- SMITH WF. Fundamentos de la Ciencia e Ingeniería de Materiales, McGraw-Hill, 3ª Edición, Madrid, 2003