Materials science and engineering

Academic Year: (2020 / 2021) **Review date: 27-07-2020**

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

Coordinating teacher: RABANAL JIMENEZ, MARIA EUGENIA

Type: Compulsory ECTS Credits : 6.0

Year : 2 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Basic Chemistry

OBJECTIVES

By the end of this content subject, students will be able to have:

1. Knowledge and understanding of key aspects of materials science, technology and chemistry.
2. The ability to apply their knowledge and understanding to identify, formulate and solve problems of materials science, technology and chemistry using established methods;
3. The ability to design in Engineering under specific requirements
4. The ability to design and conduct appropriate experiments of materials science, technology and chemistry, interpret the data and draw conclusions;
5. Workshop and laboratory skills in materials science, technology and chemistry.
6. The ability to select and use appropriate equipment, tools and methods to solve problems of materials science, technology and chemistry;
7. The ability to combine theory and practice to solve problems of materials science, technology and chemistry;
8. An understanding of applicable techniques and methods in materials science, technology and chemistry, and of their limitations.

DESCRIPTION OF CONTENTS: PROGRAMME

Introduction to materials science.
Crystalline structure. Defects. Classification.
Diffusion. Laws of diffusion. Industrial processes.
properties of Materials. Mechanical testing of materials. Hardness
Materials Classification: Conductor, semiconductor, isolating and magnetic materials: application in electric technology.
Study of materials, their properties and applications: metallics, ceramics, polymers and composites.

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 the subject program (3 ECTS credits).

The assistance to the laboratory sessions is MANDATORY. The entrance to the laboratory is enabled once the student has watched the general security video and the specific video for chemistry/materials lab and answered both tests correctly. THE STUDENT CAN NOT ENTER THE LABORATORY IF HE/SHE HAS NOT ANSWERED THE TESTS. THE NON-ASSISTANCE TO THE LABORATORY WITHOUT JUSTIFIED CAUSE IMPLIES SUSPENDING THE CONTINUOUS EVALUATION.

ASSESSMENT SYSTEM

Continuous evaluation (40-60% of final weight) will have a minimum of three parts: (i) a minimum of three exercises, during classes, with 10% weight (30-50%% of final mark); (ii) laboratory practices, solving a questionnaire or test at the end, with a 10% weight.

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It is necessary to get at least a 4 on the final exam to pass the course.

% end-of-term-examination:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

BASIC BIBLIOGRAPHY

- ASHBY MF, JONES DRH Materiales para Ingeniería 1. Introducción a las propiedades, las aplicaciones y el diseño¿, Reverté. 2008.
- ASKELAND DR. "Ciencia e Ingeniería de los Materiales",, International Thomson, 4ª Edición, Madrid, 2001.
- CALLISTER WD. "Ciencia e Ingeniería de los Materiales". Vol. I,, Ed Reverté, 3ª Edición, Barcelona, 1995.
- MANGONON PL. ¿Ciencia de Materiales. Selección y Diseño¿., Prentice Hall, 1ª Edición, Méjico, 2001.
- SHACKELFORD JF. "Introducción a la Ciencia de Materiales para ingenieros",, Prentice Hall, 4ª Edición, Madrid, 1998.
- SMITH WF. "Fundamentos de la Ciencia e Ingeniería de Materiales",, McGraw-Hill, 3ª Edición, Madrid, 2003.

ADDITIONAL BIBLIOGRAPHY

- ASHBY MF, JONES DRH Materiales para Ingeniería 1. Introducción a las propiedades, las aplicaciones y el diseño¿, Reverté, 2008
- J.M. Montes, F.G. Cuevas, J. Cintas Ciencia e Ingeniería de los Materiales, Paraninfo, 2014