

Academic Year: ( 2019 / 2020 )

Review date: 06-04-2018

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

Coordinating teacher: VELASCO LOPEZ, FRANCISCO JAVIER

Type: Electives ECTS Credits : 6.0

Year : Semester :

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

Materials Science and Engineering

## OBJECTIVES

- To solve complex problems related to selection of materials for a particular application.
- To acquire the ability to look for, to understand and to differentiate the relevant information to be able to take a decision, in the field of Materials Science and Engineering.
- To relate multi-disciplinary knowledge to solve a problem.
- To understand the reasons beneath selection of materials.
- To develop abilities to work in groups and distribute work to face up to complex problems.
- To extrapolate materials selection procedures to other engineering problems.
- To communicate (oral and written) concepts, developments and results related to materials selection.

Overcoming this subject guarantees the student has learn to:

- Be able to establish procedures of materials selection.
- Be able to evaluate reasons to select and use materials in individual applications.
- Understand how selection procedure affects selection of materials.

## DESCRIPTION OF CONTENTS: PROGRAMME

1. Materials selection
  - 1.1. Introduction
  - 1.2. Process of design and materials selection
  - 1.3. Methods of materials selection.
  - 1.4. Design and selection for mechanical properties
  - 1.5. Design and selection for functional properties
  - 1.6. Environmental aspects of materials selection
  - 1.7. Methods of manufacturing process selection
  - 1.8. Rapid prototyping and additive manufacturing
2. Materials for different industries
  - 2.1. Automotive industry
  - 2.2. High-technology processes for automotive industry
  - 2.3. Aeronautics and aerospace industries
  - 2.4. Chemical industry
  - 2.5. Nuclear industry
  - 2.6. Windturbines
3. Materials with technological interest and their applications.
  - 3.1. Metallic foams
  - 3.2. Intermetallics
  - 3.3. Carbon-based materials
  - 3.4. Nanomaterials
  - 3.5. Phase change materials

## LEARNING ACTIVITIES AND METHODOLOGY

- Teaching classes.
- Class exercises. Individual exercises.
- Lab practices to use materials selection software programmes.
- Work in groups.

## ASSESSMENT SYSTEM

- Lab practices: 15%
- Class exercises: 50%
- Public exhibition: 15%
- Assessment tests: 20%

<b>% end-of-term-examination:</b>	0
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	100

## BASIC BIBLIOGRAPHY

- ASHBY, M.F. Materials selection in mechanical design, Butterworth-Heinemann, 1999
- BUDINSKI, K.G. Engineering materials: Properties and selection, Prentice-Hall International, 1996
- CHARLES, J.A.; CRANE, F.A.A.; FURNESS, J.A.G. Selection and use of engineering materials, Butterworth Heinemann, 1997
- SWIFT, K.G.; BOOKER, J.D. Process selection: from design to manufacture, Butterworth-Heinemann, 2003

## ADDITIONAL BIBLIOGRAPHY

- AGUEDA, E. y otros Fundamentos tecnológicos del automóvil, Paraninfo.
- ASHBY, M.F.; JONES, D.R.H. Engineering Materials I: An introduction to their properties and applications, Pergamon Press, 1980
- HAPPIAN-SMITH, J. An introduction to modern vehicle desing, Butterworth Heinemann, 2002
- NOORANI, R. Rapid prototyping: principles and applications, John Wiley & Sons, 2006