

Academic Year: (2022 / 2023)

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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 : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Materials Science and Engineering

OBJECTIVES

- Ability to solve problems with initiative, decision making, creativity, critical reasoning and to communicate and transmit knowledge, abilities and skills in the field of the selection of materials in Industrial Engineering.
- Ability to design a system, component or process from the point of view of the selection of materials in the field of Industrial Technologies, to meet the required specifications.
- Knowledge and ability to apply current legislation as well as the specifications, regulations and mandatory standards for materials selection processes in the field of Industrial Engineering.
- Knowledge and ability to apply the principles and methods of quality required in the material selection processes.
- Knowledge and ability to apply computational and experimental tools for the analysis and quantification of Industrial Engineering problems in the field of material selection.
- 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 industry
 - 2.4. Aerospace industry
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

% end-of-term-examination/test:	0
% of continuous assessment (assignments, laboratory, practicals...):	100
<ul style="list-style-type: none">- Lab practices: 15%- Class exercises: 50%- Public exhibition: 15%- Assessment tests: 20%	

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