Course guide
240EM141 - 240EM141 - Selection of Materials in Mechanical Design

Last modified: 26/06/2025

Unit in charge: Barcelona East School of Engineering
Teaching unit: 702 - CEM - Department of Materials Science and Engineering.

Degree: ERASMUS MUNDUS MASTER'S DEGREE IN ADVANCED MATERIALS SCIENCE AND ENGINEERING (Syllabus 2014). (Optional subject).

Academic year: 2025 **ECTS Credits:** 4.5 **Languages:** Spanish

LECTURER

Coordinating lecturer: JOSE MARIA CABRERA MARRERO

Others:

PRIOR SKILLS

Microstructure and mechanical properties of materials

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEMCEM-02. (ENG) Dissenyar i desenvolupar productes, processos, sistemes i serveis, així com l'optimització d'altres ja desenvolupats, atenent a la selecció de materials per a aplicacions específiques
CEMCEM-03. (ENG) Aplicar mètodes innovadors en la resolució de problemes i aplicacions informàtiques adequades, pel disseny, simulació, optimització i control de processos de producció i transformació de materials
CEMCEM-07. (ENG) Dissenyar, calcular i modelar aspectes relacionats amb els materials per a components mecànics, estructures i equips

Transversal:
01 EIN N3. ENTREPRENEURSHIP AND INNOVATION - Level 3. Using knowledge and strategic skills to set up and manage projects. Applying systemic solutions to complex problems. Devising and managing innovation in organizations.

TEACHING METHODOLOGY

The structure of the subject is of 3 theoretical ECTS and 2 ECTS of work in groups of students. Classes of the discipline occur during two hours a week. Along the semester students must prepare a pre-project which subject will be decided together with the professor and groups of three-four students. Weekly meetings will be schelduled to follow the pre-project. This must be presented in written report and defended orally. The generic competences that the student will reach will be a) capacity to understand and to rationalize the process of selection of materials, b) capacity to develop manufacturing techniques and knowledge of characterization techniques, c) capacity to work in equipment and e) capacity of communication written and oral technique

LEARNING OBJECTIVES OF THE SUBJECT

objectives

STUDY LOAD

Type	Hours	Percentage
Hours large group	40,5	36.00
Self study	72,0	64.00

Total learning time: 112.5 h

CONTENTS

Process of Design

Description:
Steps and examples

Full-or-part-time: 3h
Theory classes: 3h

Materials Selection

Description:
Behaviour and characteristics of materials. The process of materials selection. Evaluation methods. Ratio cost ? properties. Shape effect. Examples

Full-or-part-time: 6h
Theory classes: 6h

Manufacturing methods

Description:
Types and classification of manufacturing processes. Economical aspects

Full-or-part-time: 7h
Theory classes: 7h

Software EDUPACK

Description:
introduction to EDUPACK software

Full-or-part-time: 2h
Theory classes: 2h

Oral presentation

Description:
Oral presentation pre-project

Full-or-part-time: 4h
Theory classes: 4h

Interaction between materials, processing technology and design

Description:
Design of cast, forged, sheet metal formed, machined, sintered and soldered pieces. Desing after the beahvioir. Selection maps. Examples.

Full-or-part-time: 8h
Theory classes: 8h

GRADING SYSTEM

The final mark, Nfinal, will be calculated according to the following equation:
Nfinal= 0.60Nef + 0.40Nproject
where Nef is the mark obtained in the final exam and Nproyecto is the mark of a pre-project carried out along the course
In case of re-evaluation Nef will be substituted by the reevaluation exam mark

BIBLIOGRAPHY

Basic:
- Ashby, M. F. Materials selection in mechanical design [on line]. 4th ed. Burlington: Butterworth-Heinemann, 2011 [Consultation: 06/03/2015]. Available on: http://www.sciencedirect.com/science/book/9781856176637. ISBN 9781856176637.
- Charles, James Anthony. Selection and use of engineering materials. 3rd ed. Oxford: Butterworth-Heinemann, 1997. ISBN 0750632771.
- Dieter, G. E.; Schmidt, L. C. Engineering design. 6th ed. New York: McGraw-Hill, 2021. ISBN 9781260575279.