Course guides  
295751 - 295EM021 - Modern Manufacture of Metallic Materials

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).  
MASTER'S DEGREE IN MATERIALS SCIENCE AND ADVANCED MATERIALS ENGINEERING (Syllabus 2019). (Compulsory subject).

Academic year: 2021  
ECTS Credits: 6.0  
Languages: Spanish

LECTURER

Coordinating lecturer: JOSE MARIA CABRERA MARRERO  
Others: JOSE MARIA CABRERA MARRERO

PRIOR SKILLS

Mechanical behaviour of materials. Microstructural characterisation microestructural 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 métodes 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 N2. ENTREPRENEURSHIP AND INNOVATION - Level 2. Taking initiatives that give rise to opportunities and to new products and solutions, doing so with a vision of process implementation and market understanding, and involving others in projects that have to be carried out.  
02 SCS N2. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 2. Applying sustainability criteria and professional codes of conduct in the design and assessment of technological solutions.  
06 URI N2. EFFECTIVE USE OF INFORMATION RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.

TEACHING METHODOLOGY

Subject in process of extinction. There is no teaching, the students that enroll it do so only with the right to an exam.
LEARNING OBJECTIVES OF THE SUBJECT

The general objective of the lecture is to provide the necessary bases to understand the traditional manufacturing processes of metallic materials (casting, rolling, forging, extrusion, drawing, powder metallurgical techniques and welding). The student will also understand the interaction of the different processes with the starting microstructures and those obtained, as well as the correlation with the final mechanical properties. At the end of the course some sessions will be devoted to delineate modern metal forming processes.

The generic competences that the student will achieve will be a) ability to understand how to rationalize the manufacturing process of metal parts, b) ability to develop manufacturing techniques and knowledge of characterization techniques, c) ability to work as a team in the pre-project and d) ability to communicate written and oral technique.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>6,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Self study</td>
<td>96,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>42,0</td>
<td>28.00</td>
</tr>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

Solidification and Casting

Description:
content english

Specific objectives:
Molding Feeding and Filling. Molding Rules. Types of Mold

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

Elements of Plasticity Theory

Description:

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

Introduction to Forming Operations

Description:

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

**Description:**

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

### Forging

**Description:**

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

### Extrusion and Drawing

**Description:**

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

### Sheet forming

**Description:**

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

### Welding

**Description:**

**Full-or-part-time:** 2h  
Theory classes: 2h
Powder Metallurgy

Description:

Full-or-part-time: 1h
Theory classes: 1h

New Processes

Description:
Incremental froming: symmetric and asymmetrical. Hydrofroming. Processes of Severe Plastic Deformation

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

GRADING SYSTEM

Subject in process of extinction. There is only one final test that corresponds to 100% of the final grade of the subject.

EXAMINATION RULES.

Students can only take a non-programmable calculator to the test. No notes or books are allowed.

BIBLIOGRAPHY

Basic:

Complementary: