Course guide
295756 - 295EM111 - Structure and Properties of Metal Alloys

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). (Optional subject).

Academic year: 2023  ECTS Credits: 6.0  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: JAIRO ALBERTO MUÑOZ BOLAÑOS

Others: Primer quadrimestre:
PERE BARROJO VILA - Grup: T10
JAIRO ALBERTO MUÑOZ BOLAÑOS - Grup: T10

PRIOR SKILLS

The student must be familiar with the concepts and terminology of physical metallurgy explained in subjects of fundamentals of materials science and engineering.

REQUIREMENTS

The student must have previously taken basic materials science or engineering courses.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific: CEMCEAM-01. (ENG) Dissenyar i desenvolupar productes, processos i sistemes, això com l'optimització d'altres ja desenvolupats, atenent a la selecció de materials per aplicacions específiques.

TEACHING METHODOLOGY

The subject will be taught based on lectures, case studies and laboratory practices

LEARNING OBJECTIVES OF THE SUBJECT

The objective of the course is for the student to acquire a broad vision of metal alloys of industrial interest. Common ferrous and non-ferrous alloys will be described, establishing relationships between processing, microstructure, properties and applications. Also, thermodynamic models will be provided for the prediction of phase transformations in metals.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Self study</td>
<td>102,0</td>
<td>68.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>14,0</td>
<td>9.33</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>28,0</td>
<td>18.67</td>
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</tbody>
</table>

Total learning time: 150 h

CONTENTS

Introduction

Description:
Clasificación de los metales y sus principales aleaciones. Descripción de las principales características de las diferentes familias de metales

Specific objectives:
Classification of metals and their alloys. Description of the main characteristics of each family of metals

Full-or-part-time: 2h
Theory classes: 1h
Self study : 1h

Ferrous alloys

Description:

Full-or-part-time: 42h
Theory classes: 10h
Laboratory classes: 5h
Guided activities: 2h
Self study : 25h

Copper and its alloys

Description:
Pure copper. Brasses, alloys and applications. Bronces, alloys and applications. Other copper alloys.

Full-or-part-time: 19h
Theory classes: 2h
Practical classes: 3h
Guided activities: 2h
Self study : 12h
### Light alloys

**Description:**

**Full-or-part-time:** 25h  
Practical classes: 3h  
Laboratory classes: 2h  
Guided activities: 2h  
Self study: 18h

### Phase transformations in metals

**Description:**
- Phase diagrams thermodynamics  
- Interphases, nucleation and growth  
- Martensitic transformation and microstructural characterization of low carbon steels  
- Interfaces and grain growth

**Full-or-part-time:** 62h  
Theory classes: 46h  
Practical classes: 10h  
Laboratory classes: 6h

### GRADING SYSTEM

- NF = Final Grade  
- EX = Final exam or 50% P1 + 50% P2 (If P1 and P2 > 5)  
P1 and P2 are partial exams 1 and 2  
- NEC = Continuous Evaluation Note (activities, practices, presentations,...)

### EXAMINATION RULES.

The partial exams will be in the classroom, during the course schedule, one in the middle of the semester and another at the end.

If the student does not pass the partial exams, he/she must take the final exam at the time established for the final exam in January.

### BIBLIOGRAPHY

**Basic:**  