# 295701 - MAME - Metallic Materials

**Coordinating unit:** 295 - EEBE - Barcelona East School of Engineering  
**Teaching unit:** 702 - CMEM - Department of Materials Science and Metallurgy  
**Academic year:** 2019  
**Degree:** BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)  
**ECTS credits:** 6  
**Teaching languages:** Catalan, Spanish, English

## Teaching staff

**Coordinator:** JESSICA CALVO MUÑOZ  
**Others:** Primer quadrimestre:  
JESSICA CALVO MUÑOZ - M11, M12  
CASIMIR CASAS QUESADA - M11, M12

## Prior skills

Knowledge of physical metallurgy

## Requirements

METAL.LÚRGIA FÍSICA - Precorequisit

## Degree competences to which the subject contributes

**Specific:**

1. Knowledge on several types of materials' structure, as well as analysis characterisation and techniques of materials.  
2. Knowledge on mechanical, electronic, chemical and biologic behaviour of materials, and capacity to apply this behaviour into design, calculation and modelling of aspects of elements, components and equipment.  
3. Knowledge and application of materials' technology in the following fields: production, transformation, processing, selection, control, maintenance, recycling, and storage of any type of materials.  
4. Knowledge of science, technology and materials' chemistry fundaments. Understanding the relation between microstructure, synthesis or processing and materials' properties.  

**Transversal:**  
07 AAT N3. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

## Teaching methodology

This course will have a part of theory lectures, problems and lab practices. The theory lectures will mainly be given as exhibitions, whereas the problem lectures and lab practices will be participative and cooperative.

## Learning objectives of the subject

The main objective of the subject is that the student acquires a wide vision of the metallic alloys interesting for industrial use. The most common ferrous and non-ferrous alloys will be described emphasising its mechanical properties, thermal treatments and transformation processes most characteristics for all the family.  
By the end of the course the student will have to be able to:
- Classify the main families of metallic materials and its alloys and compare its mechanical and physical properties.
- Describe the hardening mechanisms for each material and control them to achieve the properties wished.
- Describe and formulate extraction and process means for the manufacturing of metallic components with structural usefulness.

**Study load**

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>45h</th>
<th>30.00%</th>
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<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>15h</td>
<td>10.00%</td>
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<tr>
<td></td>
<td>Guided activities:</td>
<td>90h</td>
<td>60.00%</td>
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</table>
## Content

<table>
<thead>
<tr>
<th>Lesson 1 - Introduction</th>
<th><strong>Learning time:</strong> 3h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
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<tr>
<td></td>
<td>Self study: 1h</td>
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</table>

**Description:**
Classification of metals and its main alloys. Description of the main characteristics of the different metallic families.

<table>
<thead>
<tr>
<th>Lesson 2 - Ferrous alloys</th>
<th><strong>Learning time:</strong> 56h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 12h</td>
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<tr>
<td></td>
<td>Practical classes: 5h</td>
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<td></td>
<td>Laboratory classes: 6h</td>
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<td></td>
<td>Self study: 33h</td>
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**Description:**

<table>
<thead>
<tr>
<th>Lesson 3 - Cooper and its alloys</th>
<th><strong>Learning time:</strong> 29h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 5h</td>
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<tr>
<td></td>
<td>Practical classes: 3h</td>
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<tr>
<td></td>
<td>Laboratory classes: 3h</td>
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<td>Self study: 18h</td>
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**Description:**

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<thead>
<tr>
<th>Lesson 4 - Light alloys</th>
<th><strong>Learning time:</strong> 35h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
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<tr>
<td></td>
<td>Practical classes: 3h</td>
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<tr>
<td></td>
<td>Laboratory classes: 6h</td>
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<tr>
<td></td>
<td>Self study: 20h</td>
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</tbody>
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**Description:**
### Lesson 5 - Superalloys

**Learning time:** 9h  
- Theory classes: 2h  
- Practical classes: 1h  
- Self study: 6h  

**Description:**  

### Lesson 6 - Other families of metallic materials

**Learning time:** 18h  
- Theory classes: 3h  
- Practical classes: 3h  
- Self study: 12h  

**Description:**  

### Qualification system

50% final exam + 20% midterm exam + 15% Laboratory practices + 15% Activities proposed during the lectures

### Regulations for carrying out activities

There will be two exams, partial and final. The practices will also be assessed based on the reports the students will have to make. The activities proposed by the professor will be problems or activities oriented to work a specific subject. These activities will have to be done at home or during the lecturing time in the class. There will be between 3 and 5 activities during the whole semester.
Bibliography

Basic:


Others resources:

Audiovisual material

http://www.steeluniversity.org/content/html/eng/default.asp?catid=1&pageid=1016899460