Degree competences to which the subject contributes

Specific:
1. Knowledge of science, technology and materials' chemistry fundamentals. Understanding the relation between microstructure, synthesis or processing and materials' properties.
2. Knowledge and capacities to evaluate security, durability, and structural integrity of materials and components manufactured with these materials.

Transversal:
04 COE N1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.

Teaching methodology

During the course theoretical lectures, problems and laboratory sessions are given. Combined with independent learning practice, it will make possible to relate the knowledge acquired and to achieve the expected objectives. The lectures will be primarily theoretical dissertation while problems and practices will be participatory and cooperative. Two tests will be done, and laboratory practices and sessions of problems will be evaluated.

Learning objectives of the subject

The aim of the subject is that the student acquires basic knowledge about the physical metallurgy involved in solidification and transformation in solid state of materials, and in particular of metals. At the end of the course the student should be capable of:
- Identify and interpret equilibrium and no-equilibrium phase diagrams.
- Identify, calculate and formulate the kinetics of the phase transformations.
- Identify the major phase transformations.
<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Guided activities:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time</strong>: 150h</td>
<td>45h</td>
<td>0h</td>
<td>15h</td>
<td>90h</td>
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<td>10.00%</td>
<td>60.00%</td>
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</tbody>
</table>
# Content

## Chapter I. Equilibrium diagrams

**Description:**
Equilibrium diagrams, Solid Solutions, Intermetallic phases. Binary, multicomponents and polyphasic systems.

**Learning time:** 22h  
Theory classes: 7h  
Practical classes: 4h  
Self study: 11h

## Chapter II: Diffusion

**Description:**

**Learning time:** 26h  
Theory classes: 4h  
Practical classes: 2h  
Laboratory classes: 4h  
Self study: 16h

## Chapter III: Solidification

**Description:**

**Learning time:** 32h  
Theory classes: 6h  
Practical classes: 3h  
Laboratory classes: 4h  
Self study: 19h

## Chapter IV: Phase Transformations in solid state

**Description:**

**Learning time:** 41h  
Theory classes: 8h  
Practical classes: 3h  
Laboratory classes: 4h  
Self study: 26h
Chapter V: Microstructural restoration

Learning time: 29h
- Theory classes: 5h
- Practical classes: 2h
- Laboratory classes: 4h
- Self study: 18h

Description:
Recovery. Recrystallization and Grain Growth (normal and abnormal)

Qualification system

44% Final Exam + 20% Partial Exam + 18% Practices (Activity 1) + 18% Problems (Activity 2)

THIS SUBJECT HAS NO RE-EVALUATION EXAMS.

Bibliography

Basic:

Others resources:
Extra docent material will be available at ATENEA digital campus.