GENERAL CHARACTERISTICS*

Type: ☐Basic formation, ☑Compulsory, ☐Optional

☐Master Thesis, ☐External practices

Duration: Semester **Semester / s**: 1
Number of ECTS credits: 4
Languages: Catalan, Spanish, English

DESCRIPTION

BRIEF DESCRIPTION AND JUSTIFICATION

The course presents the different types of metals, ferrous and non-ferrous alloys, their properties and their applications in engineering. One of the objectives is to deepen in the correct terminology of description of aspects related to industrial application materials and their transformation processes. The thermal treatments suitable for each case are treated and the final structure they generate is foreseen, as well as the associated properties.

COMPETENCES

- E3 - To have knowledge of the different types of metallic materials and special alloys, their production, processing, structure, and properties, for their application in Materials Engineering, both at industrial and research level.
- E4 – Ability to explain the effect of the alloying elements and the relationship between microstructure and properties and the techniques to modify them.
- CG2 – The ability to perform a responsible practices of the profession

PREREQUISITES*

The corresponding to access master studies.

CONTENTS

1. Introduction to the metallic materials technology.
2. Heat treatments of ferrous alloys.
3. Aluminum and its alloys.
4. Titanium and its alloys.
5. Other metallic alloys.
6. Superalloys.
7. Fusion and molding.
8. Forming by plastic deformation.
9. Powder metallurgy.
10. Environmental considerations: waste and recycling

METHODOLOGY

LEARNING ACTIVITIES *

Learning Activities	ECTS credits	Competences
Lectures	1,15	E3, E4, CG2, CB6, CB7, CB8, CB9
Seminars	0,07	E3, E4, CG2, CB6, CB7, CB8, CB9
Case and Problem-Solving Sessions	0,15	E3, E4, CG2
Personal study	2,33	E3, E4, CG2
Presentations	0,15	E3, E4, CG2
Assessment Tasks (Exams, Continuous Assessment...)	0,15	E3, E4, CG2
TOTAL	**4**	

TEACHING METHODOLOGY

The didactic methodology used in the subject is based on lectures and problem-solving sessions. Seminars are also scheduled to solve doubts. The student is provided with the complete course documentation with theory and case documents for personal study.

The problem-solving sessions are a complement to the lectures and allow to develop the critical capacity and the practice to solve, independently, other problems. In these sessions, a project of a problem is proposed. This case reflects, as far as possible, the complexity of the subject and its connection with the professional activity. Cooperative resolution is also encouraged.

The students prepare presentations in groups or individually on specific topics, which become part of the study material.

ASSESSMENT

ASSESSMENT METHODS *

Assessment methods	Weight	competences
Final exam	50%	E3, E4, CB6, CB7, CB8
Reports and Presentations	20%	E3, E4, CG2, CB9
Follow-up activities	25%	E3, E4, CG2
Participation	5%	CG2

RESULTADOS DE APRENDIZAJE (Explicación de las realizaciones del alumno que permiten la evaluación de competencias, relacionándolos con las competencias y los métodos de evaluación.)

- The student must demonstrate knowledge of the different types of metallic materials, their procurement, processing, structure and properties. (E3)
- The student must understand the effect of the alloying elements and the relationship between microstructure-properties and the techniques to modify them. (E4)
- The student should know the main applications of metallic materials and special alloys. (E3)
- The student must demonstrate the knowledge of the properties of metallic materials in relation to the consequences derived from their misuse (CG2)

QUALIFICATION

The evaluation of the course will consider all aspects listed in the evaluation table with its corresponding weight. The main weight of the grade lies in the final examination (50%). The reports and Presentations include classroom presentations and specific monographs that students prepare (20%). Follow-up activities include midterm exams or other deliverables (15%). Participation (5%) includes attitude, attendance and initiative shown by the student in the subject.

ASSESSMENT OF THE COMPETENCES (Definir expresiones de cálculo para cada competencia en función de las actividades de evaluación correspondientes.)

For the evaluation of E3 and E4 competences it will be used as an indicator the final exam, and presentations of work and monitoring activities.

For the assessment of competence CG2 it will be used as an indicator the participation, reports and presentations and follow-up activities marks.

For the assessment of CB6, CB7, CB8 competences will be used as an indicator the final exam.

* Estas características no deben ser modificadas sin la aprobación de los órganos responsables de las estructuras académicas de nivel superior (materia, módulo y/o plan de estudios).

For the evaluation of competencies CB9 the mark of the work and presentations will be used

BIBLIOGRAPHY (recomendada y accesible al alumno.)

- Kalpakjian, Schmid, Manufactura, Ingeniería y Tecnología, 5 ed . Prentice Hall. (2008)
- M. P. Groover, Fundamentos de manufactura moderna, Prentice Hall. (1997)
- J. Apraiz Barrero. Tratamientos térmicos de los aceros. Limusa Noriega (2000).
- F.J. Gil y otros. Aleaciones ligeras. Edicions UPC (2001)
- Hertzberg, R. W. Deformation and fracture mechanics of engineering materials. Wiley, (1996)
- G.S. Upadhyaya. Sintered Metals and ceramics. John Wiley & Sons (2000)

DOCUMENT HISTORY

PREVIOUS CHANGES
September 5, 2016, Francesc Montalà i Guitart
October 1, 2015, Francesc Montalà i Guitart

CURRENT REVISION
February 26, 2019, Francesc Montalà i Guitart