

## SUBJECT TEACHING GUIDE

### G747 - Materials Engineering

### Degree in Mechanical Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Mechanical Engineering			Type and Year	Compulsory. Year 3
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Materials Engineering Module: Specific Mechanical Technology				
Course unit title and code	G747 - Materials Engineering				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. CIENCIA E INGENIERIA DEL TERRENO Y DE LOS MATERIALES				
Name of lecturer	JOSE ALBERTO ALVAREZ LASO				
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Other lecturers	LUCIANO SANCHEZ ARAMBURU ISIDRO ALFONSO CARRASCAL VAQUERO SORAYA DIEGO CAVIA				

### 3.1 LEARNING OUTCOMES

- Knowledge of the families of metallic materials commonly used in engineering.
- Basic knowledge of physical metallurgy.
- Knowledge of the production, shaping and transformation techniques of metallic materials.
- Knowledge of the experimental techniques necessary to obtain the mechanical properties of materials.

#### 4. OBJECTIVES

- Relate processing techniques and heat treatments to the internal structure of metallic materials and, in turn, to their mechanical behaviour.
- Knowing the production, shaping and transformation techniques of metallic materials.
- Acquire knowledge of the different families of metallic materials, as well as the procedure to optimise their selection for industrial uses.
- To know the mechanical properties of materials, as well as the experimental methodology to determine them.

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	<p>Block I: Materials characterisation</p> <p>Lesson 1: Introduction to Materials Engineering</p> <p>Lesson 2: Characterisation in traction.</p> <p>Lesson 3: Characterisation in compression, bending, shear and torsion.</p> <p>Lesson 4: Characterisation in hardness.</p> <p>Lesson 5: Characterisation in fracture.</p> <p>Lesson 6: Characterisation in high strain rate stresses (impact).</p> <p>Lesson 7: Characterisation against low strain rate stresses (creep and relaxation).</p> <p>Lesson 8: Characterisation in fatigue</p>
2	<p>Block II: Physical Metallurgy, Production and Forming of Metallic Materials</p> <p>Lesson 9: Crystalline Structure of Metals and Alloys</p> <p>Lesson 10: Solidification and Phase Diagrams</p> <p>Lesson 11: Imperfections and Diffusion</p> <p>Lesson 12: Heat Treatments</p> <p>Lesson 13: Ferrous Alloys: Steels and Castings</p> <p>Lesson 14: Non-Ferrous Alloys</p> <p>Lesson 15: Casting and Casting Processes</p> <p>Lesson 16: Rolling</p> <p>Lesson 17: Forging</p> <p>Lesson 18: Extrusion and Wire Drawing</p> <p>Lesson 19: Sintering</p>

## 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Description Evaluation Block I (40 %)	Written exam	No	Yes	40,00
Description Evaluation Block II (40 %)	Written exam	Yes	Yes	40,00
Description Continuous assessment (20 %)	Others	No	No	20,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>The uncertainty associated with the possible non-compliance with the social distancing decreed by the health authorities may condition the assessment system. If necessary, the assessment may be adapted, on an ad hoc basis, to the use of the most appropriate telematic means available, in order to measure the degree of student achievement of the theoretical and practical concepts taught, whether in the classroom or in the laboratory.</p>				
<b>Observations for part-time students</b>				
<p>In general, the assessment of part-time students will be in accordance with what is established for this purpose in the Assessment Regulations of the University of Cantabria. In any case, the particular circumstances of each student in this situation will be assessed individually and the right of these students to pass the subject in a single assessment process will be guaranteed.</p>				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

PUERTOLAS, RIOS, CASTRO y CASALS: "Tecnología de Materiales". Ed. Síntesis. 2009  
 KALPAKJIAN y SCHMID: " Manufactura, Ingeniería y tecnología". Prentice hall. 2002  
 APPOLD, FEILER, REINHARD y SCHIDT. "Tecnología de los metales". Ed. REverté. 1985  
 ASHBY y JONES: "Materiales para la Ingeniería" (Vol 1 y 2). Ed. Reverté, 2008  
 ASKELAND: "La Ciencia e Ingeniería de los Materiales" Grupo Ed. Iberoamérica.  
 FLINN y TROJAN. " Materiales de Ingeniería y sus aplicaciones". McGraw-Hill  
 SMITH: "Fundamenteos de la ciencia e Ingeniería de los Materiales" McGraw-Hill  
 CALLISTER: "Ciencia e Ingeniería de los Materiales" Ed. Reverté  
 APRAIZ: "Hierros, Aceros y Fundiciones" (tomo 1 y 2) Ed. Urmo. 1985  
 J. M. Montes, F. Gómez y J. Cintas. Ciencia e ingeniería de los materiales. Universidad de Sevilla y Universidad de Huelva.  
 Paraninfo, 2014