

# SUBJECT TEACHING GUIDE

## G1901 - Materials

### Degree in Mechanical Engineering

Academic year 2023-2024

1. IDENTIFYING DATA			
Degree	Degree in Mechanical Engineering	Type and Year	Compulsory. Year 2
Faculty	School of Industrial Engineering and Telecommunications		
Discipline	Subject Area: Materials Module in Common with the Industrial Branch		
Course unit title and code	G1901 - Materials		
Number of ECTS credits allocated	6	Term	Semester based (1)
Web			
Language of instruction	English	Mode of delivery	Face-to-face

Department	DPTO. CIENCIA E INGENIERIA DEL TERRENO Y DE LOS MATERIALES
Name of lecturer	JOSE ANTONIO CASADO DEL PRADO
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Other lecturers	BORJA ARROYO MARTINEZ ISRAEL ENRIQUE SOSA YEPEZ

### 3.1 LEARNING OUTCOMES

- Correlate the processing techniques, the structure, and the properties with the behavior of the materials.
- Acquire basic knowledge of the different families of materials commonly used in industrial applications
- Define, analyze, evaluate and compare the physical-mechanical properties of industrial and construction materials.
- Know the basic techniques of production, conformation and transformation of industrial materials.

#### 4. OBJECTIVES

- Correlate the processing techniques, the structure, and the properties with the behavior of the materials.
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#### 6. COURSE ORGANIZATION

CONTENTS	
1	<p>Block I.- FUNDAMENTALS OF MATERIALS SCIENCE</p> <p>Lesson 1.- Introduction to Materials. Description, composition, properties and applications</p> <p>Lesson 2.- Hooke's Law. Analysis of physical properties</p> <p>Lesson 3.- Crystalline and Amorphous Structure. Structure and behavior</p> <p>Lesson 4.- Tensile Strength and Hardness</p> <p>Lesson 5.- Fast Fracture and Toughness</p> <p>Lesson 6.- Fatigue Failure</p> <p>Lesson 7.- Creep</p> <p>Lesson 8.- Oxidation and Corrosion</p>
2	<p>Block II.- FUNDAMENTALS OF MATERIALS TECHNOLOGY</p> <p>Lesson 9.- Phase diagrams</p> <p>Lesson 10.- Iron Alloys</p> <p>Lesson 11.- Other Metal Alloys</p> <p>Lesson 12.- Treatments</p> <p>Lesson 13.- Production and Conformation of metals. Processes for the production of pieces.</p> <p>Lesson 14.- Ceramics and Glasses</p> <p>Lesson 15.- Polymers</p> <p>Lesson 16.- Composite Materials</p> <p>Lesson 17.- Mortars and Concrete</p> <p>Lesson 18.- Materials Selection</p>

## 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
<p>Minimum grade: 5,00 Length of the exam: 3 hours Date: During the last two weeks of November Reassessment: September Exam</p> <p>Evaluation of theoretical contents and Exercises. The minimum grade to compensate theory or exercises will be 2,50 in either of the tw</p>	Written exam	No	Yes	40,00
<p>Minimum grade: 5,00 Length of the exam: 3 hours Date: The one that indicates the exam calendar Reassessment: September Exam</p> <p>Evaluation of theoretical contents and Exercises. The minimum grade to compensate theory or exercises will be 2,50 in either of the</p>	Written exam	No	Yes	40,00
<p>Length of the exam: For the first quarter</p> <p>Laboratory practices, periodic tests, delivery of solved problems, delivery and oral presentation of works and complementary activities.</p>	Others	No	No	20,00
<b>TOTAL</b>				<b>100,00</b>
<b>Observations</b>				
<p>The final grade of the subject will be obtained by means of the following formula:  <math>0,4 \cdot (\text{grade Block I}) + 0,4 \cdot (\text{grade Block II}) + \text{Continuous Evaluation grade (maximum 2 points)}</math>  The grade of the Continuous Evaluation will be saved for the September Call for all those students who do not pass the Subject in the February Call. Neither of the two blocks will be saved for later courses</p>				
<b>Observations for part-time students</b>				
<p>In general, the evaluation of part-time students will be based on what is established for this purpose in the Evaluation Regulations of the University of Cantabria. In any case, the unique circumstances of each student who is in this situation will be assessed individually and the right of these students to overcome the subject in an unique evaluation process will be guaranteed.</p>				

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

ASHBY and JONES. Engineering Materials 1 (Fourth Edition). An Introduction to Properties, Applications and Design. Elsevier, 2012.

ASHBY and JONES. Engineering Materials 2 (Third Edition). An Introduction to Microstructures, Processing and Design. Elsevier, 2006.

ASKELAND: "The science and engineering of materials". Sixth Edition. Cengage Learning, 2010.

FLINN and TROJAN: "Engineering Materials and Their Applications". John Wiley and Sons (WIE). Fourth Edition, 1995.

CALLISTER: "Materials Science and Engineering. An Introduction". John Wiley & Sons, 2007.

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