

Kod. - Cod:F 04.20  
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<b>IKASGAIA/ASIGNATURA/ SUBJECT:</b> Materials for Engineering		
<b>MODULUA/MÓDULO/MODULE:</b> Engineering Science and Techniques		
<b>KODEA/CÓDIGO/CODE:</b> MI 03-2022/23	<b>KURTSOA/CURSO/COURSE:</b> 3	<b>KOKAPENA/UBICACIÓN/PERIOD:</b> 5 <sup>th</sup> semester
<b>IRAUPENA/DURACIÓN/DURATION:</b> 150 h	<b>KREDITUAK/CRÉDITOS/CREDITS:</b> 6 ECTS	<b>MOTA/TIPO/TYPE:</b> Compulsory
<b>IRAKASLEA/PROFESOR/LECTURER:</b> Maitane Gabilondo Nieto		<b>HIZKUNTZA/IDIOMA/LANGUAGE:</b> English

**HELBURUA/OBJETIVO/PURPOSE:** The subject Materials for Engineering studies the microstructure and properties of materials in engineering linked to treatment and testing techniques. This provides future engineering graduates the basic knowledge to understand, classify and select the most suitable materials for each industrial application.

<b>IKAS-PROZESUAREN EMAITZAK/ RESULTADOS DE APRENDIZAJE/ LEARNING OUTCOMES</b>	<b>ASOZIATUTAKO GAITASUNAK / COMPETENCIAS ASOCIADAS/ ASSOCIATED COMPETENCIES</b>	<b>EDUKIAK/ CONTENIDOS/ CONTENTS</b>
<ul style="list-style-type: none"> <li>Characterize the mechanical and thermal behaviour of materials by performing tests.</li> <li>Analyse the structure and properties of the material and predict its behaviour in different environments.</li> <li>Select the most suitable materials for any type of part, based on the requirements of use and design, in order to identify the manufacturing processes and the parameters to be controlled.</li> <li>Relate the characteristics of materials (metal, polymers, ceramics...) with their structure and the variables on which they depend.</li> </ul>	<ul style="list-style-type: none"> <li>CB1</li> <li>CB5</li> <li>CE1</li> <li>CE1.2</li> </ul>	<ul style="list-style-type: none"> <li>CHAPTER 1: Atomic structure</li> <li>CHAPTER 2: Crystalline structure and its imperfections</li> <li>CHAPTER 3: Diffusion</li> <li>CHAPTER 4: Mechanical properties of metals</li> <li>CHAPTER 5: Dislocations and strengthening processes</li> <li>CHAPTER 6: Phase diagrams</li> <li>CHAPTER 7: Heat treatments</li> <li>CHAPTER 8: Classification of materials</li> <li>CHAPTER 9: Degradation mechanisms in service</li> <li>CHAPTER 10: Selection of materials</li> </ul>

**BALIABIDE /METODOLOGI PEDAGOGIKOAK - MEDIOS/MÉTODOS PEDAGÓGICOS – PEDAGOGICAL METHODS:**

- Presentation, explanation and/or demonstration by the teacher.
- Exercises done in the classroom under supervision of the teacher.
- Practical application through exercises, simulations and tests carried out individually or in groups.
- Copy of the transparencies used by the teacher during the classes (available in Moodle).
- List of problems (available in Moodle).
- Laboratory equipment and software for practical exercises.

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## BIBLIOGRAFIA – BIBLIOGRAFÍA - BIBLIOGRAPHY:

- W.D. Callister Jr., "Materials Science and Engineering: An Introduction". 8<sup>o</sup> Edition, John Wiley & Sons, 2010.
- D.R. Askeland, "Ciencia e Ingeniería de los Materiales", 3<sup>a</sup> Edición, International Thomson Editores, Madrid, 1998.
- W.S. Smith, H. Jasemi, "Fundamentos de la Ciencia e Ingeniería de los Materiales", 4<sup>a</sup> Edición, Ed. Mc Graw Hill, 2004.
- J. F. Shackelford, "Introducción a la ciencia de materiales para ingenieros", 6<sup>a</sup> Edición, Ed. Pearson/Prentice Hall, México, 2005.
- M. F. Ashby, "Materials Selection in Mechanical Design", 4<sup>a</sup> Edición, Ed. Butterworth-Heinemann, China, 2011.

## IRAKASKUNTZA MOTA - TIPO DE DOCENCIA – TYPE OF TEACHING

*Irakaskuntza mota/Tipos de docencia/Teaching types:*

**M**=Magistrala/Magistral/Master; **S**=Mintegia/Seminario/Seminar; **GA**=Gelako praktikak/Prácticas de Aula/Practical testing in classroom; **GL**=Laborategiko praktikak/Prácticas de Laboratorio/Laboratory Tests; **GO**=Ordenagailuko praktikak/Prácticas de ordenador/Computer Tests; **TA**=Tailerra/Taller/Workshop; **TI**=Tailer industriaial/Taller Industriail/Industrial workshop;

Irakaskuntza mota / Tipo de docencia / Type of teaching	M	S	GA	GL	GO	TA	TI
<b>Ikasgelako eskola-orduak / Horas de docencia presencial / Face-to-face class hours</b>	41	8	18	8			
<b>Ikasgelaz kanpoko ikaslearen orduak / Horas de actividad no presencial del alumno/ Student hours outside the classroom</b>	41	6	20	8			

## EBALUAZIO METODO ETA IRIZPIDEAK – MÉTODOS Y CRITERIOS DE EVALUACIÓN – EVALUATION METHODS AND CRITERIA

**ETENGABEKO EBALUAZIOA - EVALUACIÓN CONTINUA – CONTINUOUS EVALUATION**

**AZKEN EBALUAZIOA - EVALUACIÓN FINAL – FINAL EVALUATION**

**Ebaluazio probetan erabili ahal izango diren baliabide eta bitartekoak / Medios y recursos que se podrán utilizar en las pruebas de evaluación / Resources that can be used in the evaluation tests**

Summary sheet with formulas  
Calculator

## OHIKO DEIALDIA - CONVOCATORIA ORDINARIA – REGULAR CALL

**Evaluation method 1 – Etengabeko ebaluazioa - Evaluación continua – Continuous evaluation**

- Group work (20 %)
- Group or individual exercises (20 %)

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- Laboratory tests (10 %)
- Conceptual questionnaires (15%)
- Exam (35%)

### **Argibideak/Aclaraciones/Explanations:**

- Group work (20 %)
  - All members of the group will be given the same grade for the written work (10%), but will be assessed individually for the presentation (10%).
  - Students that do not participate in the preparation of the assignment will be graded 0/10. There will be no options to repeat or improve the grade obtained. No assignments will be accepted after the deadline.
- Group or individual exercises (20 %)
  - For group exercises, all members of the group will be given the same grade.
  - The final grade for this section will be the average grade of all exercises/work to be handed in.
  - Failure to hand in a particular group/individual exercise within the stipulated period will be graded 0/10.
- Laboratory tests (10 %)
  - Compulsory attendance (if a practical session is not attended, that person will be graded 0/10 for that particular practical session).
  - Written report on the laboratory practical sessions (a report for each group; all members of the group who have participated in the practical session will be given the same grade).
  - The grade of the laboratory tests is calculated by taking the average of the grade obtained in the practical sessions.
- Conceptual questionnaires (15 %)
  - There will be several questionnaires. A minimum score of 8/10 will be required to move on to the next questionnaire (there will be as many opportunities as needed).
  - The final grade is 0 for any questionnaires that are not done or with a grade lower than 8/10.
  - The qualification of this section is obtained by taking the average (taking into account the previous conditions) of all the questionnaires.
- Exam (35 %)
  - Written/oral exam (minimum 4/10 to be able to pass the course and calculate the average grade).

### **Evaluation method 2 – Azken ebaluazioa - Evaluación final – Final evaluation**

- Exam (100 %)

### **Argibideak/Aclaraciones/Explanations:**

- Written/oral exam (minimum 5/10 to pass the course).

### **EZOHIKO DEIALDIA - CONVOCATORIA EXTRAORDINARIA – EXTRAORDINARY CALL**

- Exam (100 %)

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**Argibideak/Aclaraciones/Explanations:**

- The student will have to take the exam for the whole course. The result of the exam of the extraordinary exam is the final grade of the whole course.
- Written/oral exam (minimum 5/10 to pass the course).