

## [MHL202] LABORATORY OF MATERIALS AND PROCESSES I

### GENERAL INFORMATION

<b>Studies</b>	UNIVERSITY MASTER IN INDUSTRIAL ENGINEERING	<b>Subject</b>	?
<b>Semester</b>	1	<b>Course</b>	1
<b>Character</b>	OPTIONAL	<b>Mention / Field of specialisation</b>	???
<b>Plan</b>	2022	<b>Modality</b>	Face-to-face
<b>Credits</b>	3	<b>Hours/week</b>	1.67
		<b>Language</b>	CASTELLANO/ENGLISH
		<b>Total hours</b>	30 class hours + 45 non-class hours = <b>75 total hours</b>

### PROFESSORS

SAENZ DE ARGANDOÑA FERNANDEZ DE GOROSTIZA, ENEKO
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AGINAGALDE LOPEZ, ANDREA
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MENDIGUREN OLAETA, JOSEBA

### REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
MATERIAL FORMING	(No previous knowledge required)
METAL SOLIDIFICATION PROCESSES	
PROCESS AND MATERIALS ENGINEERING	

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>MHMP01</b> - To project, calculate and design integrated manufacturing systems, optimizing the most suitable manufacturing processes for different industrial sectors, based on their material and design, identifying the machinery to be used, the parameters to control and establishing the designs of the tools to be used.		x		0,88
<b>MHMP02</b> - To project, calculate and design integrated manufacturing systems taking into account the performance of polymeric, metallic, composite and biomaterial materials and be able to establish the relationship between properties-microstructure-processing		x		0,88
<b>MHMP03</b> - To design and carry out machine tests, determining the test plan for the chemical, physical, mechanical and microstructural characterization of materials and carrying them out in accordance with standard norms		x		0,24
<b>MHMP04</b> - To design and carry out machine tests predicting the chemical, physical and mechanical behavior of a material in service		x		0,24
<b>MHRA22</b> - To demonstrate knowledge and capabilities to carry out verification and control of facilities, processes and products		x		0,2
<b>MHRA23</b> - To demonstrate knowledge and capabilities to carry out certifications, audits, verifications, tests and reports		x		0,2
<b>MHRA27</b> - To demonstrate the ability to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on the social, health and safety, environmental, economic and industrial implications and responsibilities		x		0,04
<b>MHRA28</b> - To communicate your conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous way		x		0,08
<b>MHRA30</b> - To work with people, involving and directing them in a dynamic aimed at a common objective that includes reflection on their ethical and social responsibility, with a global vision of the work to be carried out and the characteristics that it requires (quality, deadlines,...), assuming responsibility for the decisions made		x		0,08
<b>MHR125</b> - To possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context		x		0,04
<b>MHR126</b> - To apply the knowledge acquired and your problem-solving skills in new, little-known or changing environments within broader (or multidisciplinary) contexts related to your area of study		x		0,08
<b>MHR129</b> - To possess the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous		x		0,04
<b>Total:</b>				<b>3</b>

KC: Knowledge or Content / SK: Skills / AB: Abilities

### ENAAE LEARNING RESULTS

ENAAE LEARNING RESULTS	ECTS
<b>ENA124</b> - Knowledge and comprehension: Deep knowledge and comprehension of the engineering disciplines of their speciality, at the level necessary to acquire the rest of the competencies of the degree.	0,37
<b>ENA126</b> - Knowledge and comprehension: Critical knowledge of the broad multidisciplinary context of engineering and the interrelations existing between the knowledge of the different fields.	0,37
<b>ENA127</b> - Analysis in engineering: Ability to analyse new and complex engineering products, processes and systems within a broader multidisciplinary context; select and apply the most appropriate analysis, calculation and experimental methods already established, as well as innovative methods; and critically interpret the results of such analyses.	0,23
<b>ENA130</b> - Analysis in engineering: Ability to identify, formulate and solve engineering problems in emerging areas of their	0,52

speciality.

<b>ENA134</b> - Research and innovation: Ability to carry out bibliographic searches and consult and use databases and other information sources with discretion, in order to carry out simulations with the aim of conducting research on complex topics of their speciality.	0,37
<b>ENA137</b> - Research and innovation: Ability to investigate the application of the most advanced technologies in their speciality.	0,37
<b>ENA139</b> - Practical application of engineering: Practical skills, such as the use of computer tools to solve complex problems, carry out complex engineering projects, and design and guide complex investigations.	0,37
<b>ENA140</b> - Practical application of engineering: Complete knowledge of application of materials, equipment and tools, engineering technology and processes, and their limitations.	0,37

**Total:** 3

## SECONDARY LEARNING RESULTS

**RMH120** [!] *Analiza materiales y procesos de fabricación en casos prácticos y reales tras su desarrollo, así como su comportamiento durante su vida en servicio*

### LEARNING ACTIVITIES

	<i>CH</i>	<i>NCH</i>	<i>TH</i>
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams		7 h.	7 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		19 h.	19 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.	2 h.	3 h.
Computer simulation exercises, individually and/or in teams	5 h.		5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	2 h.	5 h.	7 h.
Practical work in workshops and/or laboratories, individually and/or in teams	12 h.	2 h.	14 h.
Carrying out visits and/or learning trips to other university centres, laboratories, companies and/or thermal power plants	10 h.		10 h.
Reading and personal and/or shared analysis of relevant and current publications (books, articles, catalogues, etc.) related to the speciality		5 h.	5 h.
Conducting experimental research in their field of study.		5 h.	5 h.

### EVALUATION SYSTEM

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	<i>W</i> 40%
Individual written and/or oral tests or individual coding/programming tests	60%

### MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests

**CH - Class hours:** 30 h.  
**NCH - Non-class hours:** 45 h.  
**TH - Total hours:** 75 h.

## CONTENTS

## LEARNING RESOURCES AND BIBLIOGRAPHY

### Learning resources

Moodle Platform  
Technical articles  
Class presentations  
Lab practical training

### Bibliography

William D. Callister, Jr. Introducción a la ciencia e ingeniería de los materiales;. Tomo II. Ed. Reverté S.A.; Barcelona; 1996.  
James F. Shackelford. Introducción a la ciencia de materiales para ingenieros. 4ª edición. Prentice Hall Iberia. Madrid. 1998.  
William F. Smith. Fundamentos de la ciencia e ingeniería de materiales. 3ª edición. McGraw Hill-Interramericana de España S.A.U. Madrid. 1998.  
Banabic, D. Sheet Metal Forming Processes. Constitutive Modelling and Numerical Simulation, Elsevier, 2010. ISBN 978-3-540-88112-4  
Lange, K. Handbook of metal forming. McGraw-Hill Book Company,

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1985. ISBN-10: 0872634574

Schuler GmbH., & Schuler GmbH. Metal forming handbook. Springer Science & Business Media, 1998. ISBN 9783642637636

Serope Kalpakjian, Steven R. Schmid. Manufactura Ingeniería y tecnología, Pearson Educación, México, 2002

John Campbell. Introduction to Casting Practice: The 10 Rules of Castings, Complete Casting Handbook, Elsevier, 2004