

## [GJG203] MANUFACTURING TECHNOLOGY LABORATORY

### GENERAL INFORMATION

<b>Studies</b>	DEGREE IN MECHATRONICS ENGINEERING		<b>Subject</b>	?
<b>Semester</b>	2	<b>Course</b>	2	<b>Mention / Field of specialisation</b>
<b>Character</b>	OPTIONAL		<b>Language</b>	CASTELLANO/EUSKARA
<b>Plan</b>	2022	<b>Modality</b>	Face-to-face	<b>Total hours</b>
<b>Credits</b>	6	<b>Hours/week</b>	5	90 class hours + 60 non-class hours = <b>150 total hours</b>

### PROFESSORS

ORTUBAY IBABE, RAFAEL
VILLAR ANCHIA, JOSEBA ANDONI
MENDIGUREN OLAETA, JOSEBA
AZPI-LOPEZ, ANGEL (SOMORROSTRO)

### REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
MANUFACTURING TECHNOLOGY	(No previous knowledge required)

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>GJR106</b> - Knowing and applying production and manufacturing techniques, tools and systems	x			5,4
<b>G-RTR1</b> - To develop interdisciplinary projects specific to their specialty and of gradual complexity, - becoming aware of respect for human rights and fundamental rights, and analyzing and assessing the impact of the proposed solutions on the SDGs - to acquire and/or apply basic, advanced and /or avant-garde, demonstrating the ability to work in multidisciplinary teams and/or undertake further studies with a high degree of autonomy		x		0,32
<b>G-RTR2</b> - To express information, ideas and the arguments that support them in an orderly, clear and coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language		x		0,28
<b>Total:</b>				<b>6</b>

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

### SECONDARY LEARNING RESULTS

**RGJ290** [!] *Proponer los objetivos y la planificación de un proyecto que le permita adquirir y/o reforzar los conocimientos de tecnologías propias de su especialidad,- que en ocasiones llegan a la vanguardia del conocimiento- y definir una estrategia de aprendizaje*

#### LEARNING ACTIVITIES

	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	2 h.	2 h.	4 h.

#### EVALUATION SYSTEM

	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%

#### MAKE-UP MECHANISMS

(No mechanisms)  
**Comments:** Continuous assessment. Retake is not foreseen.

**CH - Class hours:** 2 h.  
**NCH - Non-class hours:** 2 h.  
**TH - Total hours:** 4 h.

**RGJ291** [!] *Establecer las responsabilidades de los miembros del equipo utilizando técnicas adecuadas para fomentar la eficiencia del equipo para el desarrollo del proyecto en los plazos establecidos (compartir recursos, aportar ideas, habilidades comunicativas)*

#### LEARNING ACTIVITIES

	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	2 h.	2 h.	4 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	(No mechanisms) <b>Comments:</b> Continuous assessment. Retake is not foreseen.
<b>CH - Class hours:</b> 2 h. <b>NCH - Non-class hours:</b> 2 h. <b>TH - Total hours:</b> 4 h.		

**RGJ293** [!] *Redacta y estructura correctamente la memoria del proyecto, haciendo un uso correcto del lenguaje. Para ello, busca y hace uso de las fuentes de información adecuadas*

LEARNING ACTIVITIES	CH	NCH	TH
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	2 h.	2 h.	4 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANISMS	
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	(No mechanisms) <b>Comments:</b> Revision and correction of the written report of the semester project	
<b>CH - Class hours:</b> 2 h. <b>NCH - Non-class hours:</b> 2 h. <b>TH - Total hours:</b> 4 h.			

**RGJ294** [!] *Realiza una presentación oral del proyecto argumentando de forma eficaz, y haciendo un uso correcto del lenguaje*

LEARNING ACTIVITIES	CH	NCH	TH
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	2 h.	1 h.	3 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANISMS	
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	(No mechanisms) <b>Comments:</b> Continuous assessment. Retake is not foreseen.	
<b>CH - Class hours:</b> 2 h. <b>NCH - Non-class hours:</b> 1 h. <b>TH - Total hours:</b> 3 h.			

**RGJ220** [!] *Determina procesos de fabricación, analizando y justificando la secuencia y variables del proceso*

LEARNING ACTIVITIES	CH	NCH	TH
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning	2 h.		2 h.
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	3 h.	3 h.	6 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	5 h.	3 h.	8 h.
Practical work in workshops and/or laboratories, individually and/or in teams	8 h.	6 h.	14 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANISMS	

Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems

40%

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

**Comments:** If a retake exam is needed, the final mark will be obtained 25% first mark 75% second one

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

60%

**CH - Class hours:** 18 h.

**NCH - Non-class hours:** 12 h.

**TH - Total hours:** 30 h.

**RGJ221** [!] *Opera las herramientas, máquinas y equipos que intervienen en el proceso de fabricación, relacionando su funcionamiento con las condiciones del proceso y las características del producto final*

**LEARNING ACTIVITIES**

**CH**

**NCH**

**TH**

Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning

2 h.

3 h.

5 h.

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams

5 h.

4 h.

9 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

8 h.

4 h.

12 h.

Practical work in workshops and/or laboratories, individually and/or in teams

12 h.

7 h.

19 h.

**EVALUATION SYSTEM**

**W**

**MAKE-UP MECHANISMS**

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

20%

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

**Comments:** If a retake exam is needed, the final mark will be obtained 25% first mark 75% second one

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

80%

**CH - Class hours:** 27 h.

**NCH - Non-class hours:** 18 h.

**TH - Total hours:** 45 h.

**RGJ222** [!] *Prepara máquinas de control numérico (CNC), seleccionando los útiles y aplicando las técnicas o procedimientos requeridos.*

**LEARNING ACTIVITIES**

**CH**

**NCH**

**TH**

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints

2 h.

3 h.

5 h.

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams

6 h.

3 h.

9 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

8 h.

4 h.

12 h.

Practical work in workshops and/or laboratories, individually and/or in teams

12 h.

7 h.

19 h.

**EVALUATION SYSTEM**

**W**

**MAKE-UP MECHANISMS**

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

80%

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

**Comments:** If a retake exam is needed, the final mark will be obtained 25% first mark 75% second one

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

20%

**CH - Class hours:** 28 h.

**NCH - Non-class hours:** 17 h.

**TH - Total hours:** 45 h.

**RGJ223** [!] *Controla dimensiones, geometrías y superficies de productos, comparando las medidas con las especificaciones del producto.*

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.	1 h.	2 h.
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	2 h.	1 h.	3 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	2 h.	1 h.	3 h.
Practical work in workshops and/or laboratories, individually and/or in teams	4 h.	3 h.	7 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANISMS	
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	60%	Individual written and/or oral tests or individual coding/programming tests	
Individual written and/or oral tests or individual coding/programming tests	40%	<b>Comments:</b> If a retake exam is needed, the final mark will be obtained 25% first mark 75% second one	

**CH - Class hours:** 9 h.  
**NCH - Non-class hours:** 6 h.  
**TH - Total hours:** 15 h.

## CONTENTS

### SELECTION OF MACHINING MATERIALS

- Commercial forms of the materials.
- Materials and their machining conditions.

### MACHINING WITH MANUAL TOOLS

- Filing, drilling, sawing, reaming, threading, riveting, punching...

### PREPARATION OF MACHINES, EQUIPMENT, FIXTURES AND TOOLS

- Forming machines and equipment
- Machines and equipment for chip removal manufacturing
- Elements and controls of the machines.
- Regulation of process parameters.

### OPERATIONS WITH MACHINE-TOOLS FOR THE REMOVAL OF CHIPS.

- Operation of machine tools.
- Cutting tools.
- Operating techniques for removing chips.

### NUMERICAL CONTROL PROGRAMMING

- Part clamping tools.
- Machining strategies.
- CNC-ISO programming.

### FORMING OPERATIONS

- Operation of the machines - Tools and utensils - Operational forming techniques

### WELDING IN NATURAL ATMOSPHERE AND PROJECTION

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- Operation of welding and projection machines.
  - Welding and projection techniques.

CONTROL OF DIMENSIONS, GEOMETRIES AND SURFACES OF PRODUCTS.

- Measurement, comparison and verification processes
- Geometric and surface measurement and verification techniques in the manufacturing process

### LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Moodle Platform	CRUZ, T. 2010. Control Numérico y Programación II. Marcombo Formación
Class presentations	KALPAKJIAN, S. SCHMID, S.R. 2009. Manufactura, ingeniería y tecnología. Prentice Hall
Labs	GROOVER, M. 1997. Fundamentos de manufactura moderna: Materiales, procesos y sistemas. Prentice Hall
Lab practical training	HERNÁNDEZ, G. 2016. Manual del soldador. Cesol
Topic related web quires	<a href="http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_in k.pl?grupo=MECATRONICA22&amp;ejecuta=15&amp;_ST">http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_in k.pl?grupo=MECATRONICA22&amp;ejecuta=15&amp;_ST</a>