

## [GJJ206] MECHANICAL SYSTEMS DESIGN AND TESTING

### GENERAL INFORMATION

<b>Studies</b>	DEGREE IN MECHATRONICS ENGINEERING	<b>Subject</b>	?
<b>Semester</b>	1	<b>Course</b>	4
<b>Character</b>	COMPULSORY	<b>Mention / Field of specialisation</b>	
<b>Plan</b>	2022	<b>Modality</b>	Face-to-face
<b>Credits</b>	4,5	<b>Hours/week</b>	3.75
		<b>Language</b>	EUSKARA/CASTELLANO/ENGLISH
		<b>Total hours</b>	67.5 class hours + 45 non-class hours = <b>112.5 total hours</b>

### 2030 AGENDA GOALS



### PROFESSORS

ARANA OSTOLAZA, AITOR  
IZQUIERDO ORTIZ DE LANDALUCE, MIKEL

### REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
GRAPHIC EXPRESION PHYSICS ELECTROMECHANICAL SYSTEMS MATERIAL STRENGTH AND ELASTICITY	(No previous knowledge required)

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>GJR402</b> - To know and apply principles for the design and testing of machines and mechanical systems			x	4,02
<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		0,24
<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		0,24
<b>Total:</b>				<b>4,5</b>

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

### SECONDARY LEARNING RESULTS

**RGJ406** [!] *Dimensionar y diseñar conjuntos mecánicos basados en elementos mecánicos partiendo de especificaciones definidas y elaborar documentación técnica correspondiente*

#### 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	8,5 h.	6 h.	14,5 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	12 h.	6 h.	18 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	20 h.	13 h.	33 h.

#### EVALUATION SYSTEM

	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	48%
Individual written and/or oral tests or individual coding/programming tests	31%
Observation (technical capacity, attitude and participation)	21%

#### MAKE-UP MECHANISMS

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

**CH - Class hours:** 40,5 h.  
**NCH - Non-class hours:** 25 h.  
**TH - Total hours:** 65,5 h.

**RGJ491** [!] *Coordinar el equipo de trabajo, estimulando la cohesión y buen clima para lograr la integración de todas las personas y su contribución para alcanzar un rendimiento apropiado, tanto a nivel individual como grupal, para el desarrollo del proyecto en*

#### LEARNING ACTIVITIES

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

CH

2 h.

NCH

1 h.

TH

3 h.

#### EVALUATION SYSTEM

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

W

100%

#### MAKE-UP MECHANISMS

(No mechanisms)

**Comments:** Continuous assessment. Retake is not foreseen.

**CH - Class hours:** 2 h.

**NCH - Non-class hours:** 1 h.

**TH - Total hours:** 3 h.

**RGJ493** [!] *Elabora la memoria del proyecto, aportando argumentos elaborados y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.*

#### LEARNING ACTIVITIES

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

CH

2 h.

NCH

1 h.

TH

3 h.

#### EVALUATION SYSTEM

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

W

100%

#### MAKE-UP MECHANISMS

(No mechanisms)

**Comments:** Continuous assessment. Retake is not foreseen.

**CH - Class hours:** 2 h.

**NCH - Non-class hours:** 1 h.

**TH - Total hours:** 3 h.

**RGJ405** [!] *Conocer y emplear técnicas y herramientas para el ensayo y monitorizado de salud de componentes mecánicos y máquinas*

#### LEARNING ACTIVITIES

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

CH

4 h.

NCH

2 h.

TH

6 h.

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

5 h.

7 h.

12 h.

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

11 h.

6 h.

17 h.

#### EVALUATION SYSTEM

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

W

35%

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

45%

Observation (technical capacity, attitude and participation)

20%

#### MAKE-UP MECHANISMS

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

**CH - Class hours:** 20 h.  
**NCH - Non-class hours:** 15 h.  
**TH - Total hours:** 35 h.

**RGJ490** [!] *Definir y gestionar los objetivos y la planificación de un proyecto que permita adquirir y/o reforzar los conocimientos de tecnologías específicas de su especialidad,- que en ocasiones llegan a la vanguardia del conocimiento- y definir una estrategia*

#### LEARNING ACTIVITIES

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

CH

1 h.

NCH

2 h.

TH

3 h.

#### EVALUATION SYSTEM

W

100%

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

#### MAKE-UP MECHANISMS

(No mechanisms)

**Comments:** Continuous assessment. Retake is not foreseen.

**CH - Class hours:** 1 h.  
**NCH - Non-class hours:** 2 h.  
**TH - Total hours:** 3 h.

**RGJ494** [!] *Realiza una presentación oral del proyecto, justificando las soluciones propuestas con argumentos elaborados y precisos, y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.*

#### LEARNING ACTIVITIES

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

CH

2 h.

NCH

1 h.

TH

3 h.

#### EVALUATION SYSTEM

W

100%

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

#### MAKE-UP MECHANISMS

(No mechanisms)

**Comments:** Continuous assessment. Retake is not foreseen.

**CH - Class hours:** 2 h.  
**NCH - Non-class hours:** 1 h.  
**TH - Total hours:** 3 h.

## CONTENTS

[!]

### 1. ENSAYOS MECÁNICOS

#### 1.1. Instrumentación, sensores y extensometría

#### 1.2. Análisis tiempo vs frecuencia (monitorización máquinas)

### 2. DISEÑO MECÁNICO

#### 2.1. Rodamientos

*Dimensionado de rodamientos*

*Diseño de conjuntos basados en rodamientos*

*2.2. Acoplamientos*

*2.3. Uniones desmontables*

*2.4. Ejes*

*Diseño de ejes*

*Alineación de ejes*

## LEARNING RESOURCES AND BIBLIOGRAPHY

### Learning resources

- [!] *Presentaciones en clase*
- [!] *Programas*
- [!] *Apuntes de la asignatura*
- [!] *Consultas en páginas web relacionadas con el tema*

### Bibliography

- J. Hamrock, O. Jacobson, R. Schmid. Fundamentals of machine elements. Third edition. Editorial Taylor & Francis Group, LLC. 2014
- Peter R.N. Childs. Mechanical Design Engineering Handbook. Elsevier Ltd. 2014
- John Piotrowski. Shaft Alignment Handbook. CRC Press. 2006.
- Hung Nguyen-Schäfer. Computational Design of Rolling Bearings. Springer (2016)
- [http://katalogoa.mondragon.edu/janium-bin/janium\\_login\\_opac\\_re\\_Ink.pl?grupo=MECATRONICA41&ejecuta=15&\\_ST](http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_Ink.pl?grupo=MECATRONICA41&ejecuta=15&_ST)