

## [GJC201] PHYSICS

### GENERAL INFORMATION

<b>Studies</b>	DEGREE IN MECHATRONICS ENGINEERING		<b>Subject</b>	?
<b>Semester</b>	1	<b>Course</b>	1	
<b>Character</b>	BASIC TRAINING		<b>Mention / Field of specialisation</b>	
<b>Plan</b>	2022	<b>Modality</b>	Face-to-face	
<b>Credits</b>	6	<b>Hours/week</b>	5	
		<b>Language</b>	EUSKARA/CASTELLANO	
		<b>Total hours</b>	90 class hours + 60 non-class hours = <b>150 total hours</b>	

### PROFESSORS

GANDARIAS INCHAUSTI, KEPA
EGUIA IBARZABAL, JOSU

### REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
(No specific previous subjects required)	(No previous knowledge required)

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>G-RA03</b> - To understand and master the basic concepts of the general laws of mechanics, and their application to solve engineering problems		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		0,28
<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		0,32
<b>Total:</b>				<b>6</b>

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

### SECONDARY LEARNING RESULTS

**RGJ131** [!] *Modeliza, calcula y examina el equilibrio estático de los sólidos.*

#### 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	4,5 h.	2,5 h.	7 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	12 h.		12 h.
Carrying out exercises and solving problems individually and/or in teams	4 h.	10 h.	14 h.
Self-assessment tests in a context of autonomous and continuous learning		3 h.	3 h.
Carrying out work experience in real environments and writing the corresponding report	4,5 h.	2,5 h.	7 h.

#### EVALUATION SYSTEM

	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	10%
Individual written and/or oral tests or individual coding/programming tests	80%
Prototype / Product	10%
<b>Comments:</b> - Control point: minimum grade 5. - PBL project grade: 30% product, 20% technical content of the report and 50% individual technical defense.	

#### MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests  
 Prototype / Product  
**Comments:** - Students with less than a 5 at the control point must retake the exam. - Final note of the control point: control point 25% and retake 75%. - In the project / PBL there will not be any retake of the individual defense.

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

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

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

**RGJ132** [!] *Identifica, calcula y analiza el movimiento de partículas y sólidos, así como los sistemas de fuerza necesarios para producirlos*

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	9 h.	5,5 h.	14,5 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	4 h.		4 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	27 h.		27 h.
Carrying out exercises and solving problems individually and/or in teams	9 h.	20 h.	29 h.
Self-assessment tests in a context of autonomous and continuous learning		7,5 h.	7,5 h.
Carrying out work experience in real environments and writing the corresponding report	5 h.	3 h.	8 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	10%	Individual written and/or oral tests or individual coding/programming tests
Individual written and/or oral tests or individual coding/programming tests	80%	Prototype / Product
Prototype / Product	10%	
<b>Comments:</b> - Control point: minimum grade 5. - PBL project grade: 30% product, 20% technical content of the report and 50% individual technical defense.		
<b>Comments:</b> - Students with less than a 5 at the control point must retake the exam. - Final note of the control point: control point 25% and retake 75%. - In the project / PBL there will not be any retake of the individual defense.		

**CH - Class hours:** 54 h.

**NCH - Non-class hours:** 36 h.

**TH - Total hours:** 90 h.

**RGJ190** [!] *Conocer y aplicar las fases para desarrollar de forma guiada, con los objetivos y la planificación previamente definidos, un proyecto de complejidad técnica acorde con los conocimientos de formación básica de la ingeniería. Reflexiona sobre los cono*

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	3 h.	1 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> With the project of the second semester		

**CH - Class hours:** 3 h.

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

**TH - Total hours:** 4 h.

**RGJ191** [!] *Contribuir en la estrategia de funcionamiento del equipo priorizando los objetivos comunes, fomentando y valorando la participación de todas las personas y responsabilizándose de las tareas individuales, así como del cumplimiento de plazos.*

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.	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%

Observation (technical capacity, attitude and participation)  
**Comments:** With the project of the second semester

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

**RGJ193** [!] *Redacta una memoria de proyecto clara y concisa utilizando las fuentes de información y estructura de memoria facilitadas, y haciendo un uso correcto, inclusivo y no discriminatorio 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.

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)*

**Comments:** Revision and correction of the written report of the semester project

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

**RGJ194** [!] *Realiza una presentación oral y defensa del proyecto clara y concisa, 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.

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)*

**Comments:** With the oral presentation of the project of the second semester

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

**CONTENTS**

**1. STATICS**

1.1. Forces and moments

Forces and components

Moments. Moment of a couple

1.2 Newton's laws

Equilibrium of a particle

Equilibrium of a rigid body

1.3. Free body diagrams in 2D and 3D

Isolating a mechanical system

Constraints

Contact forces: normal and friction

1.4. Centroid. Center of mass. Center of gravity. Distributed forces

## 2. KINEMATICS

2.1. Motion in one dimension of a particle

Position, speed and acceleration

2.2. Motion in two dimensions of a particle

Tangential and normal components

2.3. Case studies: parabolic motion and circular motion

2.4. Motion of connected particles

## 3. KINETICS

3.1. Kinetics of particles. Newton's 2nd law

3.2. Kinetics of rigid solids. Newton's 2nd law

3.3. Kinetics of particles. Energy methods

3.4. Kinetics of rigid solids. Energy methods

## LEARNING RESOURCES AND BIBLIOGRAPHY

### Learning resources

Subject notes  
Moodle Platform  
Class presentations  
Slides of the subject

### Bibliography

<https://katalogoa.mondragon.edu/janium-bin/sumario.pl?id=20230918125413>  
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P.A. Tipler, G. Mosca. Física para la ciencia y la tecnología (2º vol.). Barcelona: Reverté. 2010. ISBN: 978-84-291-4433-8  
P. M. Fishbane, S. Gasiorowicz, S. T. Thornton. Fisika zientzialari eta ingeniari entzat. EHU-ko argitalpen zerbitzua. 2008  
J. L. Meriam, L. G. Kraige. Estática / Dinámica. Editorial Reverté, 1999  
W. F. Riley. L. D. Sturges. Estática / Dinámica. Editorial Reverté. 2005  
F. Beer, E. Johnston, P. Cornwell. Mecánica Vectorial para ingenieros Estática + Dinámica. 10 Ed. Mc Graw Hill. 2013