[GFC003] Mechanics

GENERAL INFORMATION

Studies	DEGREE IN ENGINEERING PHYSICS APPLIED TO INDUSTRY			**Subject**	Physics
Semester	1	**Course**	2	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	CASTELLANO
Credits	6	**Hours/week**	0	**Total hours**	90 class hours + 60 non-class hours = **150 total hours**

2030 AGENDA GOALS

PROFESSORS

EGUIA IBARZABAL, JOSU

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
CALCULUS I	*(No previous knowledge required)*
LINEAR ALGEBRA	
GENERAL PHYSICS I	

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GFR101 - Displaying knowledge of the general laws of mechanics and their application to solve problems in the engineering field.	x	x		5,4
G-RTR1 - 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
G-RTR2 - 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		0,36
			Total:	6

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

SECONDARY LEARNING RESULTS

1RGF292 **(1 sem)**

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

1RGF294 **[!]** ***(1 sem)Realiza una presentación oral del proyecto con argumentos elaborados por sí mismos y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.***

LEARNING ACTIVITIES	CH	NCH	TH

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	1 h.	2 h.	3 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	100%	*(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.

1RGF291 **(1 sem)**

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.		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%	Individual written and/or oral tests or individual coding/programming tests **Comments:** Continuous assessment. Retake is not foreseen.

CH - Class hours: 3 h.
NCH - Non-class hours: 0 h.
TH - Total hours: 3 h.

1RGF293 **(1 sem)**

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	1 h.	2 h.	3 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	100%	*(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.

RGF202 **[!]** ***Analiza el comportamiento dinámico de sólidos rígidos, aislando diferentes sólidos y utilizando el principio más adecuado.***

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 h.	4 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	15 h.	5 h.	20 h.

Carrying out exercises and solving problems individually and/or in teams	5 h.	5 h.	10 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%	*(No 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	15%	
Individual written and/or oral tests or individual coding/programming tests	65%	

CH - Class hours: 20 h.
NCH - Non-class hours: 14 h.
TH - Total hours: 34 h.

RGF203 **[!]** ***Utiliza las formulaciones Lagrangiana y Hamiltoniana para resolver problemas mecánicos.***

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 h.	4 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	15 h.	5 h.	20 h.
Carrying out exercises and solving problems individually and/or in teams	5 h.	5 h.	10 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
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	20%	

CH - Class hours: 20 h.
NCH - Non-class hours: 14 h.
TH - Total hours: 34 h.

RGF201 **[!]** ***Analiza y calcula el movimiento relativo, el movimiento de la partícula y del sólido rígido, eligiendo el sistema de coordenadas apropiado***

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 h.	4 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	15 h.	5 h.	20 h.
Carrying out exercises and solving problems individually and/or in teams	5 h.	5 h.	10 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%	*(No 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	15%	
Individual written and/or oral tests or individual	65%	

coding/programming tests

CH - Class hours: 20 h.
NCH - Non-class hours: 14 h.
TH - Total hours: 34 h.

1RGF290 **(1 sem)**

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.		3 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	85%
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	15%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

CH - Class hours: 3 h.
NCH - Non-class hours: 0 h.
TH - Total hours: 3 h.

RGF204 **[!]** ***Identifica y analiza las solicitaciones que soportan los elementos estructurales, y asegura el comportamiento mecánico adecuado de estos***

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 h.	4 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	15 h.	4 h.	19 h.
Carrying out exercises and solving problems individually and/or in teams	5 h.	5 h.	10 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	20%
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	15%
Individual written and/or oral tests or individual coding/programming tests	65%

MAKE-UP MECHANISMS

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

CH - Class hours: 20 h.
NCH - Non-class hours: 13 h.
TH - Total hours: 33 h.

CONTENTS

1) Newtonian Mechanics:

- Analysis of relative motion, particle motion, and rigid body motion:

Boure's Rule

Velocity Fields - Relative Velocity Fields

Special Application: Mechanisms and Rolling Motion

- Dynamic behavior analysis of rigid bodies:

Newton's Laws

Energy Methods

Conservation of Linear and Angular Momentum

Conservation of Mechanical Energy

Collisions and Impulses

Special Application: Mechanisms and Rolling Motion

2) Analytical Mechanics:

- Lagrangian Formulation

Generalized Coordinates

D'Alembert's Principle

Principle of Virtual Works

Lagrange Equations

Lagrange Equations with Constraints

- Hamiltonian Formulation

Hamilton's Principle of Least Action

Hamilton's Equations

Conservation of the Hamiltonian: Cases and Implications

Phase Space and Observables

3) Elasticity and Strength of Materials

Stress and Strain - Relations

Axial Stress

Shear Stress

Bending

Torsion

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
[!] *Apuntes de la asignatura*	https://labur.eus/QWoAU
[!] *Plataforma Moodle*	
[!] *Presentaciones en clase*	
[!] *Transparencias de la asignatura*	
[!] *Unidad didáctica*	