

[GFC003] Mechanics

GENERAL INFORMATION

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

PROFESSORS

EGUIA IBARZABAL, JOSU

REQUIRED PREVIOUS KNOWLEDGE

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

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		0,32
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		0,28

Total: 6

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

SECONDARY LEARNING RESULTS

RGF290 [!] *Muestra las habilidades para trabajar en grupo y resuelve los problemas planteados utilizando las herramientas adecuadas en cada caso.*

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 4 h. **NCH** **TH** 4 h.

EVALUATION SYSTEM

Self-assessment 25%
Co-assessment 25%
Observation (technical capacity, attitude and participation) 50%

MAKE-UP MECHANISMS

(No mechanisms)

CH - Class hours: 4 h.
NCH - Non-class hours: 0 h.
TH - Total hours: 4 h.

RGF291 [!] *Utiliza la metodología adecuada para encontrar las soluciones a los problemas y para desarrollar los proyectos: Examina bien los problemas, y busca información significativa para hacerle frente y propone las soluciones.*

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 3 h. **NCH** 1 h. **TH** 4 h.

EVALUATION SYSTEM

Self-assessment 25%
Co-assessment 25%
Observation (technical capacity, attitude and participation) 50%

MAKE-UP MECHANISMS

(No 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

CH - Class hours: 3 h.

NCH - Non-class hours: 1 h.

TH - Total hours: 4 h.

RGF292 [!] *Comunica, busca y estructura correctamente la información de manera escrita: Redacta una memoria de proyecto clara y concisa siguiendo los criterios establecidos en la guía para la redacción de la memoria de proyectos y utilizando herramienta informá*

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)

CH - Class hours: 2 h.

NCH - Non-class hours: 2 h.

TH - Total hours: 4 h.

RGF293 [!] *Comunica, busca y estructura correctamente la información de manera oral: Realiza una presentación oral y defensa del proyecto clara y concisa, utilizando adecuadamente los aspectos recogidos en la guía de comunicación oral y las herramientas informá*

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)

CH - Class hours: 1 h.

NCH - Non-class hours: 2 h.

TH - Total hours: 3 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 coding/programming tests	65%	
CH - Class hours: 20 h. NCH - Non-class hours: 14 h. TH - Total hours: 34 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.

RGF204 [I] *Identifica y analiza las solicitudes 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	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	
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: 13 h.
TH - Total hours: 33 h.

CONTENTS

1) Classical Mechanics:

- Relative motion: particle and rigid solids

Boure's Law

Velocity field - Relative velocity field

Special case studies: Mechanisms and rolling

- Dynamics of rigid solids

Newton's laws

Energy-based methods

Conservation of linear and angular momentums

Conservation of mechanical energy

Impulses and percussions

Special case studies: Mechanisms and rolling

2) Analytic mechanics:

- Lagrange's formulation

Generalized coordinates

D'Alembert's principle

Principle of virtual work

Lagrange's equation

Lagrange's equation with restrictions

- Hamilton's formulation

Hamilton's action principle

Hamilton's equation

Conservation of the Hamiltonian: Cases and meaning

Phase space and observable quantities

3) Elasticity and material resistance

Tension and deformation - Relation

Axial stress

Shear stress

Bending

Torsion

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Subject notes	https://labur.eus/QWoAU
Moodle Platform	
Class presentations	
Slides of the subject	
Student book	