

## [GFA002] LINEAR ALGEBRA

### GENERAL INFORMATION

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

### PROFESSORS

ITURRASPE LARREATEGUI, MARIA AINHOA
URIEN CRESPO, MIREN JOSUNE

### REQUIRED PREVIOUS KNOWLEDGE

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

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>GFR010</b> - Solving any mathematical problems that might arise in engineering, showing an aptitude for applying knowledge of: linear algebra; geometry; differential geometry and differential equations	x	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

Total: 6

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

### SECONDARY LEARNING RESULTS

**RGF190** [!] *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 con*

#### 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

2 h.

TH

4 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)

CH - Class hours: 2 h.

NCH - Non-class hours: 2 h.

TH - Total hours: 4 h.

**RGF191** [!] *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

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

2 h.

TH

4 h.

#### EVALUATION SYSTEM

W

#### MAKE-UP MECHANISMS

Self-assessment	25%	(No mechanisms)
Co-assessment	25%	
Observation (technical capacity, attitude and participation)	50%	

CH - Class hours: 2 h.

NCH - Non-class hours: 2 h.

TH - Total hours: 4 h.

**RGF193** [!] *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	1 h.	2 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)	

CH - Class hours: 1 h.

NCH - Non-class hours: 2 h.

TH - Total hours: 3 h.

**RGF194** [!] *Realiza una presentación oral y defensa del proyecto clara y concisa, haciendo 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		4 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: 0 h.

NCH - Non-class hours: 4 h.

TH - Total hours: 4 h.

**RGF121** [!] *Conoce el cuerpo de los números complejos y modeliza y resuelve problemas geométricos, físicos y de ingeniería mediante ecuaciones diferenciales*

LEARNING ACTIVITIES	CH	NCH	TH
Computer simulation exercises, individually and/or in teams	12 h.	7 h.	19 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	16 h.	10 h.	26 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	30%	Individual written and/or oral tests or individual coding/programming tests	

Individual written and/or oral tests or individual coding/programming tests 70%

**CH - Class hours:** 28 h.  
**NCH - Non-class hours:** 17 h.  
**TH - Total hours:** 45 h.

**RGF122** [!] *Utiliza el álgebra lineal para modelizar y resolver problemas de ingeniería, utilizando software matemático*

#### LEARNING ACTIVITIES

	CH	NCH	TH
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	35 h.	24 h.	59 h.
Carrying out exercises and solving problems individually and/or in teams	22 h.	9 h.	31 h.

#### EVALUATION SYSTEM

	W
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	30%
Individual written and/or oral tests or individual coding/programming tests	70%

#### MAKE-UP MECHANISMS

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

**CH - Class hours:** 57 h.  
**NCH - Non-class hours:** 33 h.  
**TH - Total hours:** 90 h.

## CONTENTS

Linear algebra:

- Matrices, determinants.- Systems of linear equations.- Vector spaces.- Linear applications.- Euclidean spaces.- Diagonalization.- Conics and quadrics.

Complex numbers.

Differential equations.

## LEARNING RESOURCES AND BIBLIOGRAPHY

### Learning resources

Subject notes  
 Topic related web quires  
 Class presentations  
 Specific Master Software  
 Moodle Platform

### Bibliography

<https://labur.eus/3peXM>