

[GMA304] MATHEMATICS III

GENERAL INFORMATION

Studies	DEGREE IN MECHANICAL ENGINEERING	Subject	MATHEMATICS
Semester	1	Course	2
Character	BASIC TRAINING	Mention / Field of specialisation	
Plan	2022	Modality	Face-to-face
Credits	6	Language	CASTELLANO/EUSKARA
		Total hours	78 class hours + 72 non-class hours = 150 total hours

PROFESSORS

LIZARRIBAR MORAIZ, JATSU
LASA ALONSO, JON

REQUIRED PREVIOUS KNOWLEDGE

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

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GMR201 - To solve mathematical problems that may arise in engineering. Ability to apply knowledge about: differential and integral calculus of several variables; vector calculus			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

ENAEF LEARNING RESULTS

- ENA101** - Knowledge and comprehension: Knowledge and understanding of mathematics and other basic sciences inherent in them engineering speciality, at a level that allows them to acquire the other competencies of the degree.
- ENA104** - Analysis in engineering: The ability to analyse complex products, processes and systems in their field of study; choose and apply relevant analytical, calculation and experimental methods in a suitable way; and correctly interpret the results of such analyses.
- ENA106** - Engineering projects: Ability to project, design and develop complex products (parts, components, finished products, etc.), processes and systems of their speciality, which meet the established requirements, including awareness of the social, health and safety, environmental, economic and industrial aspects, as well as selecting and applying appropriate project methods.
- ENA111** - Practical application of engineering: Understanding of the applicable techniques and methods for analysis, design and research and their limitations in the field of their speciality.
- ENA112** - Practical application of engineering: Practical competency to solve complex problems, carry out complex engineering projects, and conduct investigations specific to their speciality.
- ENA113** - Practical application of engineering: Knowledge of application of materials, equipment and tools, engineering technology and processes, and their limitations in the field of their speciality.
- ENA118** - Preparation of judgements: Ability to manage complex technical or professional activities or projects of their speciality, taking responsibility for decision making.
- ENA119** - Communication and Teamwork: Ability to effectively communicate information, ideas, problems and solutions in the field of engineering and with society in general.
- ENA120** - Communication and Teamwork: Ability to operate effectively in domestic and international contexts, individually and as a team, and to cooperate with both engineers and people from other disciplines.

SECONDARY LEARNING RESULTS

RGM290 [I] *Proponer los objetivos y la planificación de un proyecto que le permita adquirir y/o reforzar los conocimientos de tecnologías propias de su especialidad,- que en ocasiones llegan a la vanguardia del conocimiento- y definir una estrategia de aprendizaje*

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

Self-assessment

W

50%

MAKE-UP MECHANISMS

(No mechanisms)

Co-assessment

50%

CH - Class hours: 0 h.

NCH - Non-class hours: 4 h.

TH - Total hours: 4 h.

RGM291 [!] *Establecer las responsabilidades de los miembros del equipo utilizando técnicas adecuadas para fomentar la eficiencia del equipo para el desarrollo del proyecto en los plazos establecidos (compartir recursos, aportar ideas, habilidades comunicativas)*

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.

RGM293 [!] *Redacta y estructura correctamente la memoria del proyecto, haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje. Para ello, busca y hace uso de las fuentes de información adecuadas.*

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.

RGM294 [!] *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

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

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

RGM201 [I] Utiliza el cálculo diferencial multivariable para optimización de funciones, estimación de errores y otras aplicaciones

LEARNING ACTIVITIES

	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	4 h.		4 h.
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	5 h.	3 h.	8 h.
Computer simulation exercises, individually and/or in teams	4 h.	4 h.	8 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	9 h.		9 h.
Carrying out exercises and solving problems individually and/or in teams	8 h.	13 h.	21 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)	
Individual written and/or oral tests or individual coding/programming tests	80%		

CH - Class hours: 30 h.
NCH - Non-class hours: 20 h.
TH - Total hours: 50 h.

RGM202 [I] Utiliza el cálculo integral para funciones multivariables en la resolución de problemas geométricos y físicos

LEARNING ACTIVITIES

	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	4 h.		4 h.
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	5 h.	3 h.	8 h.
Computer simulation exercises, individually and/or in teams	4 h.	4 h.	8 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	9 h.		9 h.
Carrying out exercises and solving problems individually and/or in teams	8 h.	13 h.	21 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)	
Individual written and/or oral tests or individual coding/programming tests	80%		

CH - Class hours: 30 h.
NCH - Non-class hours: 20 h.
TH - Total hours: 50 h.

RGM203 [I] Desarrolla e interpreta series de Fourier de funciones periódicas y no periódicas

LEARNING ACTIVITIES

CH NCH TH

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.	2 h.	4 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	3 h.		3 h.
Carrying out exercises and solving problems individually and/or in teams	3 h.	5 h.	8 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

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

100%

(No mechanisms)

CH - Class hours: 8 h.

NCH - Non-class hours: 7 h.

TH - Total hours: 15 h.

RGM204 [!] *Utiliza el cálculo vectorial en la resolución de problemas geométricos y físicos*

LEARNING ACTIVITIES

CH

NCH

TH

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

10 h.

10 h.

20 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

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

100%

(No mechanisms)

CH - Class hours: 10 h.

NCH - Non-class hours: 10 h.

TH - Total hours: 20 h.

CONTENTS

1) Multivariable functions

- Domain of multivariable functions
- Limits of multivariable functions
- Partial derivatives
- Local maxima and minima
- Absolute maxima and minima in closed domains
- Differential approximation
- Optimization problems
- Gradient. Directional derivatives
- Tangent planes

2) Multivariable integrals

- Doble integrals. Computation of volumes and areas
- Integrales triples. Computation of volumes and center of mass

3) Fourier series

- Gibbs phenomenon

4) Multivariable vector functions

- Conservative fields
- Green's theorem

LEARNING RESOURCES AND BIBLIOGRAPHY**Learning resources**

Subject notes
Moodle Platform
Class presentations
Specific Master Software

Bibliography

Calculus (Volumen II) Salas/Hille/Etgen Ed.Reverté
Cálculo de varias variables (volumen 2) Gerald Bradley Karl J.
Smith Ed Prentice Hall