[GMA303] STATISTICS

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
Language	EUSKARA/CASTELLANO		
Credits	6	**Hours/week**	4
Total hours	72 class hours + 78 non-class hours = **150 total hours**		

2030 AGENDA GOALS

PROFESSORS

FRAILE SANTAMARIA, ITZIAR
ELGUEZABAL LAZCANO, BORJA
ZUBIRIA ULACIA, MARIA

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
MATHEMATICS I	*(No previous knowledge required)*

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GMR202 - To solve mathematical problems that may arise in engineering. Ability to apply knowledge about: statistics and optimization			*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*		0,36
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*		0,24
			Total:	**6**

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

ENAEE 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.

ENA103 - Knowledge and comprehension: Awareness of the multidisciplinary context of engineering.

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 fr analysis, design and research and their limitations in the field of 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

1RGM290 **(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	,75 h.	,75 h.	1,5 h.

Tutoring sessions and monitoring of training activities	,75 h.	,75 h.	1,5 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%

Comments: Continuous evaluation. FEEDBACK received from the tutor and the experts in the project follow-up meetings

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous evaluation. FEEDBACK received from the tutor and the experts in the project follow-up meetings

CH - Class hours: 1,5 h.
NCH - Non-class hours: 1,5 h.
TH - Total hours: 3 h.

1RGM293 (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	,75 h.	,75 h.	1,5 h.
Tutoring sessions and monitoring of training activities	,75 h.	,75 h.	1,5 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%

Comments: Continuous evaluation. FEEDBACK received from the tutor and the experts in the project follow-up meetings

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous evaluation. FEEDBACK received from the tutor and the experts in the project follow-up meetings

CH - Class hours: 1,5 h.
NCH - Non-class hours: 1,5 h.
TH - Total hours: 3 h.

1RGM294 (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	1 h.	1 h.	2 h.
Tutoring sessions and monitoring of training activities	1 h.		1 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	50%
Observation (technical capacity, attitude and participation)	50%

Comments: Continuous evaluation. FEEDBACK received from the tutor and the experts in the project follow-up meetings

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous evaluation. FEEDBACK received from the tutor and the experts in the project follow-up meetings

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

1RGM292 (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	,75 h.	,75 h.	1,5 h.
Tutoring sessions and monitoring of training activities	,75 h.	,75 h.	1,5 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	20%
Self-assessment	50%
Observation (technical capacity, attitude and participation)	30%

Comments: Continuous evaluation. FEEDBACK received from the tutor and the experts in the project follow-up meetings

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous evaluation. FEEDBACK received from the tutor and the experts in the project follow-up meetings

CH - Class hours: 1,5 h.
NCH - Non-class hours: 1,5 h.
TH - Total hours: 3 h.

RGM205 **[!]** ***Utiliza métodos de estadística descriptiva para describir grupos de datos gráficamente y numéricamente***

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.	4 h.	6 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		20 h.	20 h.
Computer simulation exercises, individually and/or in teams	2 h.		2 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	2 h.		2 h.

Comments: The simulation exercises are carried out using the latest version of MATLAB software.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	67%
Individual written and/or oral tests or individual coding/programming tests	33%

Comments: The 33 % of the grade will be evaluated with an individual practice. The rest with the technical grade of the project.

MAKE-UP MECHANISMS

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

Comments: The evaluation of the semester project will be continuous and is based on the meetings that the teams will have with the tutors and experts. One week before the final delivery of the report, the work will be analyzed together to identify the aspects to be improved and communicated to the team. The final version of the report with the corrected aspects to be improved will be the retake.

CH - Class hours: 6 h.
NCH - Non-class hours: 24 h.
TH - Total hours: 30 h.

1RGM291 **(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	,75 h.	,75 h.	1,5 h.
Tutoring sessions and monitoring of training activities	,75 h.	,75 h.	1,5 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	20%
Self-assessment	50%
Observation (technical capacity, attitude and participation)	30%

Comments: Continuous evaluation. FEEDBACK received from the tutor and the experts in the project follow-up meetings

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous evaluation. FEEDBACK received from the tutor and the experts in the project follow-up meetings

CH - Class hours: 1,5 h.
NCH - Non-class hours: 1,5 h.
TH - Total hours: 3 h.

RGM208 **[!]** ***Estima parametros poblacionales y realiza contraste de hipótesis usando las principales distribuciones muestrales***

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.	3 h.	5 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		10 h.	10 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	6 h.		6 h.
Carrying out exercises and solving problems individually and/or in teams	9 h.	8 h.	17 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	26%
Individual written and/or oral tests or individual coding/programming tests	74%

Comments: 74 % of the grade will be evaluated with an individual test. The rest with the technical grade of the project.

MAKE-UP MECHANISMS

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

Comments: The evaluation of the semester project will be continuous and is based on the meetings that the teams will have with the tutors and experts, and one week before the final delivery of the report, the work will be analyzed together to identify the aspects to improve and communicate to the team. The final version of the report with the corrected aspects to be improved will be the recovery.

CH - Class hours: 17 h.
NCH - Non-class hours: 21 h.
TH - Total hours: 38 h.

RGM206 **[!]** ***Comprende y utiliza el concepto de probabilidad. Conoce los teoremas de los espacios probabilísticos y los utiliza para analizar y predecir resultados de un experimento aleatorio***

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.	4 h.	6 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	6 h.	2 h.	8 h.
Carrying out exercises and solving problems individually and/or in teams	9 h.	5 h.	14 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	25%
Individual written and/or oral tests or individual coding/programming tests	75%

MAKE-UP MECHANISMS

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

Comments: First test 25%, second if necessary 75%.

CH - Class hours: 17 h.
NCH - Non-class hours: 11 h.
TH - Total hours: 28 h.

RGM207 **[!]** ***Comprende y utiliza las principales distribuciones de variables aleatorias, discretas y continuas***

LEARNING ACTIVITIES	CH	NCH	TH

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.	6 h.	8 h.
Computer simulation exercises, individually and/or in teams	2 h.	2 h.	4 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	10 h.		10 h.
Carrying out exercises and solving problems individually and/or in teams	10 h.	7 h.	17 h.

Comments: The simulation exercises are carried out using the latest version of MATLAB software.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	25%
Individual written and/or oral tests or individual coding/programming tests	75%

MAKE-UP MECHANISMS

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

Comments: First test 25%, second if necessary 75%.

CH - Class hours: 24 h.
NCH - Non-class hours: 15 h.
TH - Total hours: 39 h.

CONTENTS

1. Descriptive statistics

Frequency tables
Centralisation and dispersion parameters
Statistical graphs with computer support

2. Probability

Counting theory
Basic concepts. Definition of Probability
Total Probability Theorem and Bayes Theorem.

3. Random variable

Probability distribution and density function
Mathematical expectation, mean standard deviation
Discrete random variables. Bernoulli, Binomial, Poisson, discrete uniform
Continuous random variables. Normal, Central Limit Theorem, Exponential, Uniform Continuous.

4. Statistical inference

Point estimators, confidence interval estimation.
Statistical theory of decision making

5. Linear regression

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Moodle Platform
Technical articles
Class presentations
Slides of the subject
Video projections
Computer practical training
Subject notes
Lab practical training

Bibliography

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Walpole, R. E., Myers, R. H. & Myers, S. L. Probabilidad y estadística para ingenieros, 6a. ed. (Prentice Hall:)
MONTGOMERY, D. C. & RUNGER, G. C. Probabilidad y estadística aplicadas a la inegeniería. (McGraw-Hill:)
CAO, R. et al. Introducción a la estadística y sus aplicaciones. (Ediciones Piramide: 2001)
Cuadras, C. M. Problemas de probabilidades y estadística VOL. 1. (PPU:)
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