[GJL201] ELECTRICAL MACHINES

GENERAL INFORMATION

Studies	DEGREE IN MECHATRONICS ENGINEERING			**Subject**	?
Semester	1	**Course**	2	**Mention / Field of specialisation**	
Character	OPTIONAL				
Plan	2022	**Modality**	Face-to-face	**Language**	CASTELLANO/EUSKARA
Credits	6	**Hours/week**	5	**Total hours**	90 class hours + 60 non-class hours = **150 total hours**

PROFESSORS

ALMANDOZ LARRALDE, GAIZKA
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REQUIRED PREVIOUS KNOWLEDGE

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

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GJR203 - To know and apply the principles of circuit theory and electrical machines	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

RGJ290 **[!]** ***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 estrategía de aprendiz***

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	2 h.	2 h.	4 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: With the project of the second semester

CH - Class hours: 2 h.
NCH - Non-class hours: 2 h.
TH - Total hours: 4 h.

RGJ291 **[!]** ***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
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	2 h.	2 h.	4 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies,	100%

MAKE-UP MECHANISMS

(No mechanisms)

computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

Comments: With the project of the second semester

CH - Class hours: 2 h.
NCH - Non-class hours: 2 h.
TH - Total hours: 4 h.

RGJ293 **[!]** ***Redacta y estructura correctamente la memoria del proyecto, haciendo un uso correcto 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	2 h.	2 h.	4 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: Revision and correction of the written report of the semester project

CH - Class hours: 2 h.
NCH - Non-class hours: 2 h.
TH - Total hours: 4 h.

RGJ294 **[!]** ***Realiza una presentación oral del proyecto argumentando de forma eficaz, y haciendo un uso correcto 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	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: With the oral presentation of the project of the second semester

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

RGJ209 **[!]** ***Analiza transformadores monofásicos, trifásicos y transformadores de medida.***

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.	7 h.	9 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	8 h.	1 h.	9 h.
Carrying out exercises and solving problems individually and/or in teams	15,75 h.	6,25 h.	22 h.
Practical work in workshops and/or laboratories, individually and/or in teams	3 h.	3 h.	6 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	13%

MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

Individual written and/or oral tests or individual coding/programming tests	87%	Individual written and/or oral tests or individual coding/programming tests

Comments: - Control point: minimum grade 5. - Courseworks: minimum grade 5. - PBL project grade: 30% product, 20% technical content of the report and 50% individual technical defense.

Comments: - Students with less than a 5 at the control point must retake the exam. - Final note of the control point: control point 25% and retake 75%. - For the courseworks, their correction will be asked. The maximum mark for the corrected courseworks will be 5.0. - In the project / PBL there will not be any retake of the individual defense.

CH - Class hours: 28,75 h.
NCH - Non-class hours: 17,25 h.
TH - Total hours: 46 h.

RGJ210 **[!]** ***Analiza máquinas de corriente continua y selecciona la máquina apropiada para una aplicación real.***

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.	2,5 h.	3,5 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	6,25 h.	3,75 h.	10 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	4 h.	1 h.	5 h.
Carrying out exercises and solving problems individually and/or in teams	9 h.	5,5 h.	14,5 h.
Practical work in workshops and/or laboratories, individually and/or in teams	3 h.	2 h.	5 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	18%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems
Individual written and/or oral tests or individual coding/programming tests	74%	Individual written and/or oral tests or individual coding/programming tests
Prototype / Product	8%	Prototype / Product

Comments: - Control point: minimum grade 5. - Courseworks: minimum grade 5. - PBL project grade: 30% product, 20% technical content of the report and 50% individual technical defense.

Comments: - Students with less than a 5 at the control point must retake the exam. - Final note of the control point: control point 25% and retake 75%. - For the courseworks, their correction will be asked. The maximum mark for the corrected courseworks will be 5.0. - In the project / PBL there will not be any retake of the individual defense.

CH - Class hours: 23,25 h.
NCH - Non-class hours: 14,75 h.
TH - Total hours: 38 h.

RGJ211 **[!]** ***Analiza máquinas de corriente alterna. Selecciona el motor y los componentes necesarios para implementar la maniobra eléctrica necesaria para la puesta en marcha de diferentes tipos de máquina.***

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.	6 h.	8 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	12,5 h.	7,5 h.	20 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	2,5 h.	1 h.	3,5 h.
Carrying out exercises and solving problems individually and/or in teams	13 h.	6,5 h.	19,5 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	8%	Individual written and/or oral tests or individual coding/programming tests
		Prototype / Product

Individual written and/or oral tests or individual coding/programming tests	80%	**Comments:** - Students with less than a 5 at the control point must retake the exam. - Final note of the control point: control point 25% and retake 75%. - For the courseworks, their correction will be asked. The maximum mark for the corrected courseworks will be 5.0. - In the project / PBL there will not be any retake of the individual defense.
Prototype / Product	12%	

Comments: - Control point: minimum grade 5. - Courseworks: minimum grade 5. - PBL project grade: 30% product, 20% technical content of the report and 50% individual technical defense.

CH - Class hours: 30 h.
NCH - Non-class hours: 21 h.
TH - Total hours: 51 h.

CONTENTS

1. Magnetism

2. Transformers

2.1. Single-phase transformers

2.2. Three-phase transformers

2.3. Characterisation of the transformer

3. DC current machines

3.1. Working principles

3.2. Machine types

3.3. Characterisation

3.4. Steady-state analysis

4. Synchronous generator

4.1. Working principles

4.2. Characterisation

4.3 Steady-state analysis

4.4. Generators connected to electric grid

4.5. Generators working at island mode

5. Asynchronous machines

5.1. Working principles

5.2. Machine types

5.3. Characterisation

5.4. Steady-state analysis

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Subject notes	Fraile Mora, Jesús; Máquinas Eléctricas; UPM; 1993
Labs	http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_lnk. pl?grupo=MECATRONICA21&ejecuta=30&_ST
Moodle Platform	
Class presentations	