

[GJL302] OP S1. ELECTRICAL MACHINERY

GENERAL INFORMATION

Studies	DEGREE IN MECHATRONICS ENGINEERING	Subject	?
Semester	1	Course	2
Character	OPTIONAL	Mention / Field of specialisation	???
Plan	2025	Modality	Face-to-face
Credits	6	Language	EUSKARA/CASTELLANO
		Hours/week	5
		Total hours	90 class hours + 60 non-class hours = 150 total hours

2030 AGENDA GOALS



PROFESSORS

ALMANDOZ LARRALDE, GAIZKA
ZARATE BARRIGA, SERGIO

REQUIRED PREVIOUS KNOWLEDGE

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

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GJR223 - To know and apply the principles of circuit theory and electrical machines	x			5,4
G-TR1 - 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-TR2 - 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

SECONDARY LEARNING RESULTS

RGJ210 They analyze DC machines and select the right machine for a real application.

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 h.	4 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
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	20%
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	26%
Individual written and/or oral tests or individual coding/programming tests	54%
Comments: - Control point: minimum grade 5. - Courseworks: minimum grade 5.	

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
Prototype / Product
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.

CH - Class hours: 23 h.
NCH - Non-class hours: 15 h.

TH - Total hours: 38 h.

RGJ211 They analyze alternating current machines: they select the required motor and the components to set the electrical manoeuvre necessary to start different types of machine.

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	10%	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	34%	Prototype / Product	
Individual written and/or oral tests or individual coding/programming tests	56%	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%.	
Comments: Control Point: Minimum mark 5			

CH - Class hours: 30 h.

NCH - Non-class hours: 21 h.

TH - Total hours: 51 h.

RGJ209 They analyze single-phase transformers, three-phase transformers and instrument transformers.

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	14 h.	8 h.	22 h.
Practical work in workshops and/or laboratories, individually and/or in teams	3 h.	3 h.	6 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	25%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	
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		Individual written and/or oral tests or individual coding/programming tests	
Individual written and/or oral tests or individual coding/programming tests	75%	Comments: - Students with less than a 5 at the control point must retake the exam. - Final mark 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.	
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: 27 h.

NCH - Non-class hours: 19 h.

TH - Total hours: 46 h.

1RGJ291 (1 sem) Establish the responsibilities of team members using appropriate techniques to promote their efficiency in project development (sharing resources, contributing ideas, seeking consensus, evaluating results, the process, etc.).

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.	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 project of the second semester

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

1RGJ292 (1 sem) Identify and accurately explain the SDGs addressed by the project carried out.

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.	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)

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

1RGJ293 (1 sem) Correctly draft and structure the project report, using appropriate language. To do so, search for and use the appropriate sources of information.

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: Revision and correction of the written report of the semester project

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

1RGJ290 (1 sem) Propose the objectives and planning of a project that will enable you to acquire and/or reinforce your knowledge of technologies—which are sometimes at the cutting edge of knowledge—and define an effective learning strategy.

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.	1 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)		
Comments: With the project of the second semester				
CH - Class hours: 2 h. NCH - Non-class hours: 1 h. TH - Total hours: 3 h.				

1RGJ294

(1 sem) Give an oral presentation of the project, arguing effectively and using language correctly.

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	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)
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.

CONTENTS

- Direct current machines
 - 1.1 Principle of operation
 - 1.2 Types of machines
 - 1.3 Characterization
 - 1.4 Analysis in steady state
- Transformers
 - 2.1 Single-phase transformer
 - 2.2 Three-phase transformer
 - 2.3 Transformer characterization
- Synchronous alternator
 - 3.1 Principle of operation
 - 3.2 Characterization
 - 3.3 Analysis in steady state
 - 3.4 Alternators connected to the grid
 - 3.5 Alternators operating in island mode
- Asynchronous machines
 - 4.1 Principle of operation
 - 4.2 Types of machines
 - 4.3 Characterization
 - 4.4 Analysis in steady state

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_Ink.pl?grupo=MECATRONICA21&ejecuta=30&_ST
Moodle Platform	
Class presentations	