

## [GMI303] ELECTRONIC SYSTEMS

### GENERAL INFORMATION

<b>Studies</b>	DEGREE IN MECHANICAL ENGINEERING	<b>Subject</b>	?
<b>Semester</b>	2	<b>Course</b>	3
<b>Character</b>	COMPULSORY	<b>Mention / Field of specialisation</b>	
<b>Plan</b>	2022	<b>Modality</b>	Face-to-face
<b>Credits</b>	4,5	<b>Language</b>	EUSKARA/CASTELLANO
		<b>Hours/week</b>	2.89
		<b>Total hours</b>	52 class hours + 60.5 non-class hours = <b>112.5 total hours</b>

### 2030 AGENDA GOALS



### PROFESSORS

MILIKUA URZELAI, ARITZ
AZPI-ZABALO, IÑAKI (GOIERRI)
FERNANDEZ DE GOBEO DIAZ DE DURANA, ANDER

### REQUIRED PREVIOUS KNOWLEDGE

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

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>GMR302</b> - To know the fundamentals of electronics	x			3,78
<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		0,4
<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		0,32
<b>Total:</b>				4,5

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

### ENAAE LEARNING RESULTS

(No learning results)

### SECONDARY LEARNING RESULTS

#### 2RGM392 (2 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.	2 h.	3 h.

#### EVALUATION SYSTEM

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

**Comments:** Students have the responsibility of meeting the tutor to do the tracking of the project and to ensure the achievement of the goals.

#### MAKE-UP MECHANISMS

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

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

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

#### RGM305 [I] Conocer los métodos de control de sistemas y elegir el más adecuado para cada caso

LEARNING ACTIVITIES		CH	NCH	TH
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		10 h.	10 h.	20 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.	8,5 h.	18,5 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	20%	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	30%			
Individual written and/or oral tests or individual coding/programming tests	50%			
<b>Comments:</b> The make-up exams of the two Check Points will take place on the same day. If a mark of 4 is not achieved in a Check Point, to take the make-up exam will be compulsory. Criteria for calculating the grade after taking the make-up exams: 25 % Check Point + 75 % make-up exam. In order to pass simulations 1 and 2 it will be necessary, on the one hand, to hand in all the simulation exercises carried out and, on the other hand, to pass the defence, if any. The conditions for taking each Check Point will be determined in class as the course progresses.				
<b>CH - Class hours:</b> 20 h. <b>NCH - Non-class hours:</b> 18,5 h. <b>TH - Total hours:</b> 38,5 h.				

2RGM391 (2 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.	2 h.	3 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANISMS		
Self-assessment	50%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems <b>Comments:</b> Continuous evaluation. FEEDBACK received from the tutor in the semester project follow-up meetings.		
Observation (technical capacity, attitude and participation)	50%			
<b>Comments:</b> The average of the marks of the tutor's assessment and the self-assessment carried out by the work team is calculated, using the defined rubrics. Afterwards, the final mark is calculated taking into account the co-evaluation among the members of the team.				
<b>CH - Class hours:</b> 1 h. <b>NCH - Non-class hours:</b> 2 h. <b>TH - Total hours:</b> 3 h.				

<b>RGM306 [I] Capacidad de comprender y diseñar el acondicionamiento de señal de los sensores</b>				
<b>LEARNING ACTIVITIES</b>		<b>CH</b>	<b>NCH</b>	<b>TH</b>
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning		1 h.		1 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		9 h.	18 h.	27 h.
<b>Comments:</b> Exercises are carried out with the updated version of Simulink.				
<b>EVALUATION SYSTEM</b>	<b>W</b>	<b>MAKE-UP MECHANISMS</b>		
Presentation and defence of exercises, case studies,	30%	Individual written and/or oral tests or individual		

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 70%

coding/programming tests

**Comments:** The make-up exams of the two Check Points will take place on the same day. If a mark of 4 is not achieved in a Check Point, to take the make-up exam will be compulsory. Criteria for calculating the grade after taking the make-up exams: 25 % Check Point + 75 % make-up exam. In order to pass simulations 1 and 2 it will be necessary, on the one hand, to hand in all the simulation exercises carried out and, on the other hand, to pass the defence, if any. The conditions for taking each Check Point will be determined in class as the course progresses.

**CH - Class hours:** 10 h.

**NCH - Non-class hours:** 18 h.

**TH - Total hours:** 28 h.

### **2RGM393 (2 sem)**

#### **LEARNING ACTIVITIES**

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

**CH**

1 h.

**NCH**

3 h.

**TH**

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%

**Comments:** Students have the responsibility of meeting the tutor to do the tracking of the project and to ensure the achievement of the goals.

#### **MAKE-UP MECHANISMS**

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

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

**CH - Class hours:** 1 h.

**NCH - Non-class hours:** 3 h.

**TH - Total hours:** 4 h.

### **RGM335 [!] Conoce los fundamentos de la electrónica de potencia y las arquitecturas de los convertidores/Para entender las arquitecturas de los convertidores utiliza los fundamentos de la electrónica de potenci**

#### **LEARNING ACTIVITIES**

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints

**CH**

2 h.

**NCH**

11 h.

**TH**

26 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

15 h.

11 h.

26 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%

**Comments:** The make-up exams of the two Check Points will take place on the same day. If a mark of 4 is not achieved in a Check Point, to take the make-up exam will be compulsory. Criteria for calculating the grade after taking the make-up exams: 25 % Check Point + 75 % make-up exam. In order to pass simulations 1 and 2 it will be necessary, on the one hand, to hand in all the simulation exercises carried out and, on the other hand, to pass the defence, if

#### **MAKE-UP MECHANISMS**

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

any. The conditions for taking each Check Point will be determined in class as the course progresses.

**CH - Class hours:** 17 h.

**NCH - Non-class hours:** 11 h.

**TH - Total hours:** 28 h.

### 2RGM394 (2 sem)

#### LEARNING ACTIVITIES

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

**CH**

1 h.

**NCH**

3 h.

**TH**

4 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

100%

**Comments:** Students have the responsibility of meeting the tutor to do the tracking of the project and to ensure the achievement of the goals.

#### 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

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

**CH - Class hours:** 1 h.

**NCH - Non-class hours:** 3 h.

**TH - Total hours:** 4 h.

### 2RGM390 (2 sem)

#### 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**

1 h.

**NCH**

3 h.

**TH**

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%

**Comments:** Students have the responsibility of meeting the tutor to do the tracking of the project and to ensure the achievement of the goals.

#### MAKE-UP MECHANISMS

(No mechanisms)

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

**CH - Class hours:** 1 h.

**NCH - Non-class hours:** 3 h.

**TH - Total hours:** 4 h.

## CONTENTS

1.General Concepts	-Ohm's Law	-Physical quantities	-Basic electronic elements	2.Power electron
ics	-Rectifiers	-Transformers	-DC/DC converters	-Buck converter
s of control	-Proportional (P)	-Integral (IP)	-Derivative (PD)	3.Type
	-Fourier transform	-Filters	-Theorems for capturing signals	4.Signal theory
				-Anplifiers

## LEARNING RESOURCES AND BIBLIOGRAPHY

### Learning resources

Subject notes  
Moodle Platform

### Bibliography

Mohan, Undeland, Robins (2002). Power Electronics: Converters, Applications, and Design. John Wiley & Sons Inc. ISBN: 978-0471226932

Jain Shailendra (2013). Modeling And Simulation Using Matlab - Simulink, 2Nd Ed. ISBN: 978-8126551972

Kluever, Craig. (2015). Dynamic Systems: Modeling, Simulation, and Control. John Wiley & Sons Inc. ISBN: 978-1118289457