[GFE002] Electronics and Automation

GENERAL INFORMATION

Studies	ENGINEERING PHYSICS APPLIED TO INDUSTRY			**Subject**	Industrial Electronics
Semester	2	**Course**	2	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	ENGLISH
Credits	4,5	**Hours/week**	0	**Total hours**	67.5 class hours + 45 non-class hours = **112.5 total hours**

PROFESSORS

ALACANO LOITI, ARGIÑE

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
Foundations of Electronic Engineering	*(No previous knowledge required)*

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GFR118 - Modelling and analysing linear systems and designing control systems in the frequency domain	x	x		4,06
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		0,24
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		0,2
			Total:	4,5

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

SECONDARY LEARNING RESULTS

RGF290 **[!]** ***Muestra las habilidades para trabajar en grupo y resuelve los problemas planteados utilizando las herramientas adecuadas en cada caso.***

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	3 h.		3 h.

EVALUATION SYSTEM	W
Self-assessment	25%
Co-assessment	25%
Observation (technical capacity, attitude and participation)	50%

MAKE-UP MECHANISMS

(No mechanisms)

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

RGF291 **[!]** ***Utiliza la metodología adecuada para encontrar las soluciones a los problemas y para desarrollar los proyectos: Examina bien los problemas, y busca información significativa para hacerle frente y propone las soluciones.***

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

RGF292 **[!]** ***Comunica, busca y estructura correctamente la información de manera escrita: Redacta una memoria de proyecto clara y concisa siguiendo los criterios establecidos en la quía para la redacción de la memoria de proyectos y utilizando herramienta informá***

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

RGF293 **[!]** ***Comunica, busca y estructura correctamente la información de manera oral: Realiza una presentación oral y defensa del proyecto clara y concisa, utilizando adecuadamente los aspectos recogidos en la guía de comunicación oral y las herramientas informá***

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.

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: 2 h.
NCH - Non-class hours: 0 h.
TH - Total hours: 2 h.

RGF230 **[!]** ***Identifica y modela sistemas lineales y realiza su análisis temporal, de estabilidad y precisión.***

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.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 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	1 h.	10 h.	11 h.
Computer simulation exercises, individually and/or in teams	1 h.	2 h.	3 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	20 h.		20 h.

Carrying out exercises and solving problems individually and/or in teams	5,5 h.	7 h.	12,5 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	30%	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	70%	Individual written and/or oral tests or individual coding/programming tests

Comments: In "SE00000009", both the Coursework (10 %) and the POPBL (20 %) are taken into account.

Comments: The Coursework must be retaken if mark <5 and with a maximum (retake) mark of 5. In case of failing the exam, the final mark will be: 25 % exam + 75 % retake exam.

CH - Class hours: 29,5 h.
NCH - Non-class hours: 21 h.
TH - Total hours: 50,5 h.

RGF231 **[!]** ***Diseña y analiza sistemas de control en el dominio frecuencial aplicando diferentes métodos: FT en lazo cerrado, métodos frecuenciales y lugar de las raíces.***

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.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 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.
Computer simulation exercises, individually and/or in teams	1 h.	4 h.	5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	20 h.		20 h.
Carrying out exercises and solving problems individually and/or in teams	4 h.	8 h.	12 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	50%	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	50%	Individual written and/or oral tests or individual coding/programming tests

Comments: In "SE00000009", both the Coursework (30 %) and the POPBL (20 %) are taken into account.

Comments: The Coursework must be retaken if mark <5 and with a maximum (retake) mark of 5. In case of failing the exam, the final mark will be: 25 % exam + 75 % retake exam.

CH - Class hours: 27 h.
NCH - Non-class hours: 24 h.
TH - Total hours: 51 h.

CONTENTS

1. Introduction to control systems
Introduction
Definition of the system concept
Definition of the control concept
Basic control actions
Closed-loop configuration using sensors

2. Electronic sensors for industrial applications
Main characteristics of sensors
Temperature measurement
Measurement of electrical variables: voltage & current
Measurement of mechanical variables: position & velocity
Conditioners and measurement systems

3. Modelling of linear dynamic systems

Mathematical modelling of multi-physics systems
Transfer function

4. Analysis of linear systems
Time domain responses. Types of responses
Frequency analysis of systems
Controllers
Stability analysis. Routh-Hurwith method
Root locus analysis
Accuracy of systems

5. Controller design
Types of controllers
Tuning techniques

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Moodle Platform	https://labur.eus/gHReJ
Slides of the subject	