[GFE003] INSTRUMENTATION AND SIGNAL PROCESSING

GENERAL INFORMATION

Studies	DEGREE IN ENGINEERING PHYSICS APPLIED TO INDUSTRY	**Subject**	Industrial Electronics
Semester	2	**Course**	3	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	CASTELLANO
Credits	4,5	**Hours/week**	0	**Total hours**	64.6 class hours + 47.9 non-class hours = **112.5 total hours**

2030 AGENDA GOALS

PROFESSORS

SAGREDO BLANCO, ENRIQUE

REQUIRED PREVIOUS KNOWLEDGE

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

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GFR211 - To analyze and specify the requirements and design of circuits for instrumentation sensor conditioning and develop the mathematical fundamentals of signal processing in a practical context, both individually and in teams		x		3,78
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		0,4
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		0,32
			Total:	4,5

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

SECONDARY LEARNING RESULTS

2RGF392 **[!]** ***(2 sem)Identificar y argumentar de forma precisa los ODS en los que incide el proyecto realizado, aportando posibles acciones para la mejora.***

LEARNING ACTIVITIES	CH	NCH	TH
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning	1,5 h.	1,5 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: 1,5 h.
NCH - Non-class hours: 1,5 h.
TH - Total hours: 3 h.

RGF324 **Identifies the need, specifies the requirements and designs analogue electronic circuits for the conditioning of sensor signals for measurement by instrumentation equipment**

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	9,5 h.	6,3 h.	15,8 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning	10,2 h.	5,5 h.	15,7 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	60%
Individual written and/or oral tests or individual coding/programming tests	40%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Final grade= Initial grade*0,25+Make Up grade*0,75

CH - Class hours: 19,7 h.
NCH - Non-class hours: 11,8 h.
TH - Total hours: 31,5 h.

2RGF391 **[!]** ***(2 sem)Coordinar el equipo de trabajo, estimulando la cohesión y clima para lograr la integración de todas las personas y su contribución para alcanzar un rendimiento apropiado, a nivel individual como grupal, para el desarrollo del proyecto en clase***

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	1,5 h.	1,5 h.	3 h.

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

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

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

RGF326 **Identifies the mathematical foundations of signal processing and develops them in a practical context both individually and in teams**

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	4,3 h.	3,7 h.	8 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning	12,5 h.	11 h.	23,5 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	70%
Individual written and/or oral tests or individual coding/programming tests	30%

MAKE-UP MECHANISMS

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

Comments: Final grade= Initial grade*0,25+Make Up grade*0,75.

CH - Class hours: 16,8 h.
NCH - Non-class hours: 14,7 h.
TH - Total hours: 31,5 h.

2RGF394 **[!]** ***(2 sem)Realiza una presentación oral del proyecto, justificando las soluciones propuestas con argumentos elaborados y precisos, y haciendo un uso correcto, inclusivo y no discriminatorio 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.	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: Continuous assessment. Retake is not foreseen.

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

2RGF390 **[!]** ***(2 sem)Definir y gestionar los objetivos y planificación de un proyecto que le permita adquirir y/o reforzar los conocimientos de tecnologías - llegando en ocasiones a la vanguardia del conocimiento- y definir una estrategia de autoaprendizaje eficaz***

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	85%
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	15%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

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

2RGF393 **[!]** ***(2 sem)Elabora la memoria del proyecto, aportando argumentos elaborados y haciendo un uso correcto, inclusivo y no discriminatorio 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.	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%

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

MAKE-UP MECHANISMS

(No mechanisms)

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

RGF325 **Analyses and specifies the hardware requirements of a data acquisition system**

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	12 h.	7,7 h.	19,7 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	7,1 h.	4,7 h.	11,8 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	65%
Individual written and/or oral tests or individual coding/programming tests	35%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Final grade= Initial grade*0,25+Make Up grade*0,75

CH - Class hours: 19,1 h.
NCH - Non-class hours: 12,4 h.
TH - Total hours: 31,5 h.

CONTENTS

1. Measurement Equipment1.1. Fundamentals of Measurement Equipment1.2. Types of Measurement Equipment1.3. Key Characteristics of Measurement Equipment2. Analog Signal Conditioning2.1. Introduction2.2. Conditioning Circuits for Passive Sensors2.3. Differential Amplifiers2.4. Isolation Amplifiers3. Data Acquisition Systems (DAQ)3.1. Hardware Architectures3.2. Main Characteristics3.3. Analog-to-Digital (ADC) and Digital-to-Analog (DAC) Converters4. Mathematical Foundations of Signal Processing4.1. Discrete-Time Systems4.2. Basic Operations4.3. Spectral Analysis4.4. Z-Transform4.5. Signal Processing Systems: Digital Filters

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

[!] *Apuntes de la asignatura*
[!] *Plataforma Moodle*
[!] *Presentaciones en clase*
[!] *Realización de prácticas en ordenador*

Bibliography

https://labur.eus/h09nf