[GJH303] ADVANCED INDUSTRIAL AUTOMATION

GENERAL INFORMATION

Studies	DEGREE IN MECHATRONICS ENGINEERING			**Subject**	?
Semester	1	**Course**	4	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2025	**Modality**	Face-to-face	**Language**	EUSKARA/CASTELLANO/ENGLISH
Credits	4,5	**Hours/week**	3.75	**Total hours**	67.5 class hours + 45 non-class hours = **112.5 total hours**

2030 AGENDA GOALS

PROFESSORS

AZURMENDI URTEAGA, ASIER
POGGI, TOMASO
SESAR GIL, IÑIGO
ARRATIBEL GARCIA, ANDONI

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
INDUSTRIAL AUTOMATION	*(No previous knowledge required)*

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GJR413 - To know and apply principles for the design and testing of machines and systems Design industrial-mechanical control and automation systems		x		4,02
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		0,24
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:	4,5

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

SECONDARY LEARNING RESULTS

RGJ491 Coordinate the work team, fostering cohesion and a positive atmosphere to achieve the integration of all individuals and their contribution to achieving appropriate performance, both individually and as a group, for the development of the project.

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: Continuous assessment. Retake is not foreseen.

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

RGJ493 Prepare the project report, providing detailed arguments and using language that is correct, inclusive, and non-discriminatory.

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	1 h.	2 h.	3 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)* **Comments:** Continuous assessment. Retake is not foreseen.

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

RGJ407 Design, develop, and validate the position control program for an axis using predefined standard functions.

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	2 h.	1 h.	3 h.
Practical work in workshops and/or laboratories, individually and/or in teams	6 h.	6 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	60%	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	40%	**Comments:** Final mark = % 25 ordinary mark + % 75 retake mark. Only the individual test has a retake option.

CH - Class hours: 10 h.
NCH - Non-class hours: 7 h.
TH - Total hours: 17 h.

RGJ490 Define and manage the objectives and planning of a project that allows you to acquire and/or reinforce knowledge of specific technologies in your field of expertise—which are sometimes at the cutting edge of knowledge—and define a 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:** Continuous assessment. Retake is not foreseen.

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

RGJ494 Give an oral presentation of the project, justifying the proposed solutions with detailed and precise arguments, and using language that is correct, inclusive, and non-discriminatory.

LEARNING ACTIVITIES	CH	NCH	TH

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:** Continuous assessment. Retake is not foreseen.

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

RGJ408 They design, develop and validate HMI interfaces with specified requirements

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	7 h.	4,5 h.	11,5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	2 h.	2 h.	4 h.
Practical work in workshops and/or laboratories, individually and/or in teams	4,5 h.	2,5 h.	7 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	80%	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	20%	**Comments:** Final mark = % 25 ordinary mark + % 75 retake mark.

CH - Class hours: 13,5 h.
NCH - Non-class hours: 9 h.
TH - Total hours: 22,5 h.

RGJ409 They design the automation and supervision system of a real application, assessing the risk, defining and implementing the technical solution required according EN ISO 13.849-1 relative to machine safety.

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	6 h.	4 h.	10 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	23 h.	15 h.	38 h.
Practical work in workshops and/or laboratories, individually and/or in teams	6 h.	4 h.	10 h.
Seminars, debates and/or workshops to deepen and/or share experiences.	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	20%	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	30%	Individual written and/or oral tests or individual coding/programming tests **Comments:** Final mark = % 25 ordinary mark + % 75 retake mark. Only the individual test has a retake option.
Individual written and/or oral tests or individual coding/programming tests	50%	

CH - Class hours: 37 h.
NCH - Non-class hours: 24 h.
TH - Total hours: 61 h.

CONTENTS

1. - Advanced programming of automatons1.1 - PLC programming environment1.2 - Basic PLC concepts1.3 - Advanced programming (numerical processing, analogue processing, FC, FB and variables)1.4 - Industrial communications (industrial Ethernet, industrial fieldbuses, OPC UA)2. - HMI, monitoring and control.3. - Machine safety3.1 - Directives and regulations (2006/42/EC, CE marking, UNE-EN ISO12.100, UNE-EN ISO 13849-1: 2008)4. - Introduction to Motion Control

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Moodle Platform	https://www.br-automation.com/en/academy/classroom-learning/training-modules/
Lab practical training	https://www.br-automation.com/en/academy/virtual-classroom/br-tutorial-portal/
Programmes	PLCs OMRON: https://sites.google.com/view/omron-spain-education/p%C3%A1gina-principal/cursos/sysmac-automat-avanzada
Slides of the subject	Web Omron: https://automation.omron.com/es/us/support/resources/downloads.html?filters=type==document&filters=type.document==type.document&page=1&pageSize=10
	http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_lnk.pl?grupo=MECATRONICA41&ejecuta=5&_ST