

## [GJH201] INTRODUCTION TO AUTOMATION

### GENERAL INFORMATION

<b>Studies</b>	DEGREE IN MECHATRONICS ENGINEERING		<b>Subject</b>	?	
<b>Semester</b>	2	<b>Course</b>	2	<b>Mention / Field of specialisation</b>	
<b>Character</b>	OPTIONAL	<b>Modality</b>	Face-to-face	<b>Language</b>	CASTELLANO/EUSKARA
<b>Plan</b>	2022	<b>Hours/week</b>	2.5	<b>Total hours</b>	45 class hours + 30 non-class hours = <b>75 total hours</b>
<b>Credits</b>	3				

### PROFESSORS

SUEIRO ANDINO, URKO
   
 AZPI-VIGURI, MIGUEL ANGEL (SOMORROSTRO)

### REQUIRED PREVIOUS KNOWLEDGE

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

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>GJR208</b> - To know and apply the basic fundamentals of automation and programming	x			2,6
<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		0,16
<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		0,24
<b>Total:</b>				<b>3</b>

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

### SECONDARY LEARNING RESULTS

**RGJ290** [!] *Proponer los objetivos y la planificación de un proyecto que le permita adquirir y/o reforzar los conocimientos de tecnologías propias de su especialidad,- que en ocasiones llegan a la vanguardia del conocimiento- y definir una estrategia de aprendiz*

#### 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.	1 h.	2 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:** 1 h.  
**NCH - Non-class hours:** 1 h.  
**TH - Total hours:** 2 h.

**RGJ291** [!] *Establecer las responsabilidades de los miembros del equipo utilizando técnicas adecuadas para fomentar la eficiencia del equipo para el desarrollo del proyecto en los plazos establecidos (compartir recursos, aportar ideas, habilidades comunicativas*

#### 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.	1 h.	2 h.

#### EVALUATION SYSTEM

	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory	100%

#### MAKE-UP MECHANISMS

(No mechanisms)  
**Comments:** Continuous assessment. Retake is not foreseen.

exercises, term projects, challenges and problems

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

**RGJ293** [!] *Redacta y estructura correctamente la memoria del proyecto, haciendo un uso correcto del lenguaje. Para ello, busca y hace uso de las fuentes de información adecuadas*

**LEARNING ACTIVITIES**

	<i>CH</i>	<i>NCH</i>	<i>TH</i>
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**

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

*W*

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.

**RGJ294** [!] *Realiza una presentación oral del proyecto argumentando de forma eficaz, y haciendo un uso correcto del lenguaje*

**LEARNING ACTIVITIES**

	<i>CH</i>	<i>NCH</i>	<i>TH</i>
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**

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

*W*

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.

**RGJ224** [!] *Diseña y desarrolla el programa de un dispositivo de control programable (relé o autómatas), según la normativa sobre lenguajes de programación IEC-61131-3, para implementar y poner en marcha un sistema automático secuencial según las especificaciones*

**LEARNING ACTIVITIES**

	<i>CH</i>	<i>NCH</i>	<i>TH</i>
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.	2 h.	5 h.
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning	3 h.	2 h.	5 h.
Practical work in workshops and/or laboratories, individually and/or in teams	22 h.	13 h.	35 h.

**EVALUATION SYSTEM**

Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree

*W*

50%

**MAKE-UP MECHANISMS**

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

**Comments:** If you take the make-up test, the mark obtained in the

project, master's thesis, challenges and problems  
 Individual written and/or oral tests or individual coding/programming tests 50%  
 initial test will have a weight of 25% and the make-up test 75%.

**CH - Class hours:** 28 h.  
**NCH - Non-class hours:** 17 h.  
**TH - Total hours:** 45 h.

**RGJ225** [!] *Configura y simula sistemas secuenciales automatimaticos mediante gemelos digitales*

**LEARNING ACTIVITIES**

	CH	NCH	TH
Personal study and flexible development of concepts and subjects using active dynamics, to foster more meaningful learning	2 h.	2 h.	4 h.
Practical work in workshops and/or laboratories, individually and/or in teams	9 h.	7 h.	16 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	50%
Individual written and/or oral tests or individual coding/programming tests	50%

**MAKE-UP MECHANISMS**

Individual written and/or oral tests or individual coding/programming tests  
**Comments:** If you take the make-up test, the mark obtained in the initial test will have a weight of 25% and the make-up test 75%.

**CH - Class hours:** 11 h.  
**NCH - Non-class hours:** 9 h.  
**TH - Total hours:** 20 h.

**CONTENTS**

1. Design of electrical diagrams  
 2. Design of electro-pneumatic diagrams  
 3. Assembly of electropneumatic diagrams  
 4. Introduction to programmable controllers  
 5. PLC programming  
 5.1. Introduction to Tia Portal software  
 5.2. Basic programming with logic equations  
 5.3. Timers  
 5.4. Counters  
 5.5. Assembly of electronic pneumatic systems with PLC programming  
 5.6.5.6. Programming with Grafset language

6. Digital Twin

6.1. Simulation

6.2. Changes in the models

**LEARNING RESOURCES AND BIBLIOGRAPHY**

**Learning resources**

Moodle Platform  
 Slides of the subject  
 Video projections  
 Labs

**Bibliography**

MANDADO, E. MARCOS, J. FERNÁNDEZ, C. ARMESTO, J. 2009. *Autómatas programables y sistemas de automatización*. Barcelona. Marcombo.  
 PECIÑA, L. 2018. *Programación de controladores avanzados SIMATIC S7 1500 con TIA Portal AWL y SCL*. Marcombo Formación  
 MENGUAL, P. 2009. *Step 7: una manera fácil de programar PLC de Siemens*. Barcelona. Marcombo  
 YUSTE, R. L. 2017. *Autómatas programables SIEMENS Grafset y Guía Gemma con TIA Portal*. Barcelona. Marcombo  
[http://katalogoa.mondragon.edu/janium-bin/janium\\_login\\_opac\\_re\\_Ink.pl?grupo=MECATRONICA22&ejecuta=20&\\_ST](http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_Ink.pl?grupo=MECATRONICA22&ejecuta=20&_ST)