

## [GBH203] CONTROL TECHNOLOGY AND ROBOTICS

### GENERAL INFORMATION

<b>Studies</b>	DEGREE IN BIOMEDICAL ENGINEERING		<b>Subject</b>	?
<b>Semester</b>	1	<b>Course</b>	3	<b>Mention / Field of specialisation</b>
<b>Character</b>	COMPULSORY		<b>Language</b>	ENGLISH
<b>Plan</b>	2022	<b>Modality</b>	Face-to-face	<b>Total hours</b>
<b>Credits</b>	6	<b>Hours/week</b>	5.54	99.65 class hours + 50.35 non-class hours = <b>150 total hours</b>

### 2030 AGENDA GOALS



### PROFESSORS

AZKARATE FERNANDEZ, IGOR

### REQUIRED PREVIOUS KNOWLEDGE

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

### LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
<b>GBR304</b> - To develop automation systems in the field of medical equipment		x		5,08
<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		0,44
<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		0,48
<b>Total:</b>				<b>6</b>

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

### SECONDARY LEARNING RESULTS

**1RGB394** 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
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	3,75 h.	2,25 h.	6 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%	Observation (technical capacity, attitude and participation)

**CH - Class hours:** 3,75 h.  
**NCH - Non-class hours:** 2,25 h.  
**TH - Total hours:** 6 h.

**RGB312** Comprehend and apply principles of robotics for medical equipments' design

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	3 h.		3 h.
Computer simulation exercises, individually and/or in teams	13 h.	14 h.	27 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and	12 h.		12 h.

procedures associated with the subjects

**EVALUATION SYSTEM**

*W*

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

100%

**Comments:** It is mandatory to have previously submitted the requested exercises to be allowed to take the test.

**MAKE-UP MECHANISMS**

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

**Comments:** It will be mandatory to retake those individual tests that at the first attempt have a grade lower than 5. The final grade will be 25% of the first test and 75% of its retake.

**CH - Class hours:** 28 h.

**NCH - Non-class hours:** 14 h.

**TH - Total hours:** 42 h.

**1RGB392 Identify and accurately discuss the SDGs that the project addresses, suggesting possible actions for improvement. "**

**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

1,9 h.

1,1 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**

Observation (technical capacity, attitude and participation)

**CH - Class hours:** 1,9 h.

**NCH - Non-class hours:** 1,1 h.

**TH - Total hours:** 3 h.

**1RGB393 Prepare the project report, providing detailed arguments and using language that is correct, inclusive, and non-discriminatory.**

**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

3,75 h.

2,25 h.

6 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**

Observation (technical capacity, attitude and participation)

**CH - Class hours:** 3,75 h.

**NCH - Non-class hours:** 2,25 h.

**TH - Total hours:** 6 h.

**RGB311 Design automation processes for medical equipments**

**LEARNING ACTIVITIES**

*CH*

*NCH*

*TH*

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

3 h.

3 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

24 h.

15 h.

39 h.

Computer simulation exercises, individually and/or in teams

13 h.

13 h.

26 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

17 h.

17 h.

<b>EVALUATION SYSTEM</b>	<b>W</b>	<b>MAKE-UP MECHANISMS</b>
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	46%	Individual written and/or oral tests or individual coding/programming tests
Individual written and/or oral tests or individual coding/programming tests	54%	Observation (technical capacity, attitude and participation)
<b>Comments:</b> It is mandatory to have previously submitted the requested exercises to be allowed to take the test. A grade lower than 3.5 in one of the assessment systems will lock the sub-competence to that value, and the average will not be applied.		
<b>CH - Class hours:</b> 57 h. <b>NCH - Non-class hours:</b> 28 h. <b>TH - Total hours:</b> 85 h.		

<b>1RGB390 Define and manage the objectives and planning of a project that allows you to acquire and/or reinforce your knowledge of technologies—sometimes reaching the cutting edge of knowledge—and define an effective self-learning strategy.</b>			
<b>LEARNING ACTIVITIES</b>	<b>CH</b>	<b>NCH</b>	<b>TH</b>
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	2,75 h.	1,25 h.	4 h.
<b>EVALUATION SYSTEM</b>	<b>W</b>	<b>MAKE-UP MECHANISMS</b>	
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	Observation (technical capacity, attitude and participation)	
<b>CH - Class hours:</b> 2,75 h. <b>NCH - Non-class hours:</b> 1,25 h. <b>TH - Total hours:</b> 4 h.			

<b>1RGB391 Coordinate the work team, promoting 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 th</b>			
<b>LEARNING ACTIVITIES</b>	<b>CH</b>	<b>NCH</b>	<b>TH</b>
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	2,5 h.	1,5 h.	4 h.
<b>EVALUATION SYSTEM</b>	<b>W</b>	<b>MAKE-UP MECHANISMS</b>	
Self-assessment	25%	Observation (technical capacity, attitude and participation)	
Co-assessment	25%		
Observation (technical capacity, attitude and participation)	50%		
<b>CH - Class hours:</b> 2,5 h. <b>NCH - Non-class hours:</b> 1,5 h. <b>TH - Total hours:</b> 4 h.			

## CONTENTS

ROBOT PROGRAMMING: Introduction to robotics. Introduction to RobotStudio (ABB). Definition of points and trajectories. Work objects. Complex geometries. Programming in RAPID: procedures, offsets, variables, digital inputs and outputs. Smart tools and components for simulation. AUTOMATION: Introduction to industrial automation. Introduction to PLC. Programming in structured text and contact diagram. Virtual commissioning.

## LEARNING RESOURCES AND BIBLIOGRAPHY

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**Learning resources**

- [!] *Apuntes de la asignatura*
- [!] *Consultas en páginas web relacionadas con el tema*
- [!] *Presentaciones en clase*
- [!] *Proyección de videos*

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**Bibliography**

- Robot Modeling and Control - Mark W. Spong, Seth Hutchinson, M. Vidyasagar - Wiley - 2005
- Autómatas programables SIEMENS Grafset y Guía Gemma con TIA Portal - R. Yuste, V. Guerrero - Marcombo - 2017