Goi Eskola Politeknikoa | Mondragon Unibertsitatea
Course: 2024 / 2025 - Course planning

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Superior

[GEJ305] ADVANCED INDUSTRIAL AUTOMATION

GENERAL INFORMATION

Studies	DEGREE IN INDUSTRIAL ELECTRONICS ENGINEERING	**Subject**	?
Semester 2	**Course** 3	**Mention / Field of specialisation**	
Character COMPULSORY			
Plan 2022	**Modality** Face-to-face	**Language**	EUSKARA/CASTELLANO
Credits 4,5	**Hours/week** 3.78	**Total hours**	68 class hours + 44.5 non-class hours = **112.5 total hours**

2030 AGENDA GOALS

8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

PROFESSORS

ZALDIBIA GARATE, JOSEBA EDORTA

REQUIRED PREVIOUS KNOWLEDGE

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

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GER311 - To design industrial control and automation systems		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

ENAEE LEARNING RESULTS

ENA102 - Knowledge and comprehension: Knowledge and comprehension of the engineering disciplines of their speciality, at the level necessary to acquire the rest of the competencies of the degree, including notions of the latest advances.

ENA104 - Analysis in engineering: The ability to analyse complex products, processes and systems in their field of study; choose and apply relevant analytical, calculation and experimental methods in a suitable way; and correctly interpret the results of such analyses.

ENA105 - Analysis in engineering: The ability to identify, formulate and solve engineering problems in their speciality; choose and apply adequately established analytical, calculation and experimental methods; and acknowledge the importance of social, health and safety, environmental, economic, and industrial restrictions.

ENA106 - Engineering projects: Ability to project, design and develop complex products (parts, components, finished products, etc.), processes and systems of their speciality, which meet the established requirements, including awareness of the social, health and safety, environmental, economic and industrial aspects, as well as selecting and applying appropriate project methods.

ENA107 - Engineering projects: Project capacity some state-of-the-art knowledge of their engineering speciality.

ENA108 - Research and innovation: Ability to carry out bibliographic searches and consult and use databases and other information sources with discretion, in order to carry out simulation and analysis with the aim of conducting research on technical topics of their speciality.

ENA109 - Research and innovation: Ability to consult and apply codes of good practice and security in their speciality.

ENA110 - Research and innovation: Capacity and ability to project and carry out experimental investigations, interpret results, and reach conclusions in their field of study.

ENA111 - Practical application of engineering: Understanding of the applicable techniques and methods fr analysis, design and research and their limitations in the field of their speciality.

ENA112 - Practical application of engineering: Practical competency to solve complex problems, carry out complex engineering projects, and conduct investigations specific to their speciality.

ENA113 - Practical application of engineering: Knowledge of application of materials, equipment and tools, engineering technology and processes, and their limitations in the field of their speciality.

ENA114 - Practical application of engineering: Ability to apply standards of engineering practice in their speciality.

ENA118 - Preparation of judgements: Ability to manage complex technical or professional activities or projects of their speciality, taking responsibility for decision making.

ENA119 - Communication and Teamwork: Ability to effectively communicate information, ideas, problems and solutions in the field of engineering and with society in general.

ENA120 - Communication and Teamwork: Ability to operate effectively in domestic and international contexts, individually and as a team, and to cooperate with both engineers and people from other disciplines.

ENA121 - Continued training: Ability to acknowledge the need for their own continued training and to undertake this activity throughout their professional life independently.

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ENA122 - Continued training: Ability to stay up to date on science and technology innovations.

SECONDARY LEARNING RESULTS

2RGE392 (2 sem)

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%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems **Comments:** - Continuous assessment. - It may be asked to redo the document.

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

RGE329 [!] *Valida el sistema automatizado en un entorno práctico evaluando el riesgo, defininiendo e implementando la solución técnica requerida según la norma EN ISO 13.849-1 relativa a la seguridad de máquinas.*

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out work experience in real environments and writing the corresponding report	17 h.	10 h.	27 h.

Comments: *The latest generation technologies are used, Scada Intouch HMI Application (System Platform IDE) for the graphical visualization of processes and Servodriver from the Siemens Sinamics family for the control of a servo drive.

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%	Prototype / Product **Comments:** - There will not be any retake of the individual defense.
Individual written and/or oral tests or individual coding/programming tests	50%	
Prototype / Product	30%	

Comments: - PBL project grade: 30% product, 20% technical content of the report and 50% individual technical defense.

CH - Class hours: 17 h.
NCH - Non-class hours: 10 h.
TH - Total hours: 27 h.

2RGE393 (2 sem)

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	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems **Comments:** - Continuous assessment. - It may be asked to redo the document.

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

2RGE390 (2 sem)

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.	1 h.	4 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Observation (technical capacity, attitude and participation)	100%	Observation (technical capacity, attitude and participation) **Comments:** Continuous assessment.

CH - Class hours: 3 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 4 h.

2RGE394 (2 sem)

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	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%	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 **Comments:** - Continuous assessment.

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

RGE327 [!] *Diseña el algoritmo, desarrolla el programa de PLC que cumpla el estándar IEC-61131-3; valida y realiza la puesta en marcha.*

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	3 h.	3 h.	6 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	18 h.	10 h.	28 h.
Practical work in workshops and/or laboratories, individually and/or in teams	6 h.	5 h.	11 h.

Comments: *The latest generation technologies are used, Scada Intouch HMI Application (System Platform IDE) for the graphical visualization of processes and Servodriver from the Siemens Sinamics family for the control of a servo drive.

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
Individual written and/or oral tests or individual coding/programming tests	80%	Individual written and/or oral tests or individual coding/programming tests

Comments: - Control point: minimum grade 5. - Courseworks: minimum grade 5.

Comments: - Students with less than a 5 at the control point must retake the exam. - Final note of the control point: control point 25%

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and retake 75%. - For the courseworks, their correction will be asked. The maximum mark for the corrected courseworks will be 5.0.

CH - Class hours: 27 h.
NCH - Non-class hours: 18 h.
TH - Total hours: 45 h.

2RGE391 (2 sem)

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
Observation (technical capacity, attitude and participation)	100%	Observation (technical capacity, attitude and participation) **Comments:** Continuous assessment.

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

RGE328 [!] *Diseña, desarrolla y valida los interfaces hombre-máquina (SCADA) y HMI que cumplan con los requsitos especificados.*

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	3 h.	1,5 h.	4,5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	6 h.	5 h.	11 h.
Practical work in workshops and/or laboratories, individually and/or in teams	4 h.	3 h.	7 h.

Comments: *The latest generation technologies are used, Scada Intouch HMI Application (System Platform IDE) for the graphical visualization of processes and Servodriver from the Siemens Sinamics family for the control of a servo drive.

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: - Control point: minimum grade 5. - Courseworks: minimum grade 5.		**Comments:** - Students with less than a 5 at the control point must retake the exam. - Final note of the control point: control point 25% and retake 75%. - For the courseworks, their correction will be asked. The maximum mark for the corrected courseworks will be 5.0.

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

CONTENTS

1.-Study of the Runs/Stops of an automated system-GEMMA methodology.
2.-Advanced Programming of Programmable Logic Controllers
- Analogue and numerical processing- Parameterisable functions FC's- Data modules DB's- Parameterisable functions FB's - Organisation modules OB's**3.-Supervision Systems: Scada**
- HMI interfaces- Monitoring- Alarm management- Trend graphs (trend)- Script- Historicals

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Moodle Platform Class presentations Lab practical training Programmes Computer practical training	https://katalogoa.mondragon.edu/janium-bin/sumario.pl?Id=20231204100100