UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: PROCESS CONTROL AND FACTORY AUTOMATION
Code: 310628
Type: CORE COURSE
ECTS credits: 6
Degree: 2338 - MASTERS DEGREE PROGRAMME IN INDUSTRIAL ENGINEERING (AB)
Academic year: 2023-24
Center: 605 - SCHOOL OF INDUSTRIAL ENGINEERS. AB
Group(s): 10 11
Year: 1
Duration: C2
Main language: Spanish
Second language:
Use of additional languages:
English Friendly: N
Web site:
Bilingual: Y

Lecturer: **LIDIA MARÍA BELMONTE MORENO** - Group(s): **10 11**

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2. Pre-Requisites

Pre-requisites

Before taking this course, it is recommended that the student gets basic knowledge on:

1. *Fundamentals of Computer Science and Programming.*
2. *Fundamentals of System and Control Theory.*
3. *Fundamentals of Industrial Installations.*

3. Justification in the curriculum, relation to other subjects and to the profession

Justification in the study plan, and relation with other courses and the profession

The current study plan aims at providing to the future professional the following results:

1. *Acquisition of basic knowledge to solve tasks in projects related to production automation.*
2. *Development of criteria to select the best solution to a given problem.*
3. *Knowledge of systems used in the field of process control and production automation.*
4. *Acquisition of basic knowledge to understand designs for process control.*

4. Degree competences achieved in this course

Course competences

Code	Description
A01	To have appropriate knowledge of the scientific and technological aspects of mathematical, analytical and numerical methods in engineering, electrical engineering, energy engineering, chemical engineering, mechanical engineering, continuous medium mechanics industrial electronics, automation, manufacturing, materials, quantitative management methods, industrial computing, town planning, infrastructures, etc.
A02	To plan, calculate and design products, processes, facilities and plants.
A04	To conduct research, development and innovation in products, processes and methods.
B08	Ability to design and plan automated production and advanced process control systems.
CB06	Knowledge and skills to organise and manage enterprises.
CB07	Strategy and planning knowledge and skills applied to different organisational structures.
CB09	Knowledge of financial and costs accounting.
CB10	Knowledge of information systems for management, industrial organisation, production, logistics and quality management systems.
D04	Knowledge and abilities to plan and design electrical and fluid installations, lighting, heating and ventilation, energy saving and efficiency, acoustics, communications, domotics, Smart buildings and security installations.
D06	Knowledge and ability to perform verification and supervision of installations, processes and products.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Acquire the knowledge required to understand process control design.
Acquire basic knowledge required for tasks in production automation projects.
Gain knowledge of the systems used in process control and production automation.
Develop criteria to select the best solution for a specific problem.

6. Units / Contents

Unit 1: Industrial Control
Unit 2: Process Automation
Unit 3: Robotics
Unit 4: Computer Vision
Unit 5: Communication Networks in Industrial Environments
Unit 6: Discrete Events Control
Unit 7: Optimisation

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	A01 A02 A04 B08 CB06 CB07 CB09 CB10 D04 D06	0.72	18	Y	N	
Problem solving and/or case studies [ON-SITE]	Lectures	A01 A02 A04 B08 CB10 D04 D06	0.6	15	Y	N	
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	A01 A02 A04 B08 CB10 D04 D06	0.32	8	Y	Y	
Workshops or seminars [ON-SITE]	Workshops and Seminars	A01 A02 A04 B08 D04 D06	0.08	2	Y	N	
Group tutoring sessions [ON-SITE]	Group tutoring sessions	A01 A02 A04 B08 D04 D06	0.52	13	Y	N	
Final test [ON-SITE]	Assessment tests	A01 A02 A04 B08 D04 D06	0.16	4	Y	Y	
Study and Exam Preparation [OFF-SITE]	Self-study	A01 A02 A04 B08 D04 D06	3.6	90	N	-	
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Laboratory sessions	15.00%	0.00%	Laboratory practices
Practicum and practical activities reports assessment	15.00%	0.00%	Practice reports
Projects	10.00%	0.00%	Academically-directed assignments
Final test	60.00%	100.00%	The student who carries out continuous evaluation will obtain 60% of his global grade through the final test of the subject. Students who do not carry out continuous assessment must be examined in this final test, which will have three parts: theoretical-practical aspects seen in the course, a part related to the laboratory practices and, finally, a part related to the resolution of a practical case (see Evaluation Criteria).
Total:	**100.00%**	**100.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

The breakdown of weights for each activity is shown in the "Grading" section of this guide. A minimum grade of 4.0 out of 10 in the final test and a minimum grade of 4.0 out of 10 in the laboratory practices and their reports will be required to pass the course. If these requirements are not met, the final grade of the course will be no greater than 4.5.

The grades obtained in any of the parts will not be kept for subsequent courses.

Non-continuous evaluation:

Those students who have not participated in the continuous evaluation during the semester will have to take a final test. This test will consist of three parts that will include the assessable activities of the continuous evaluation modality of the course:

1) Part related to theoretical-practical aspects (Weight 60%; Minimum Required Grade 4.0 out of 10 (*)): Written test related to theoretical and practical issues seen in the course.
2) Part related to laboratory practices (Weight 30%; Minimum Required Grade 4.0 out of 10 (*)): The student must obtain the practical results requested by means of simulation.
3) Part related to the resolution of a practical case (Weight 10%).

(*) If the minimum grade of 4.0 out of 10 is not achieved in the assessable activities or parts indicated, the course will not be passed and the final grade will be no greater than 4.5.

The grades obtained in any of the parts will not be kept for subsequent courses.

Specifications for the resit/retake exam:

There will be a final test with three parts. These parts include the assessable activities of the continuous evaluation modality of the course, and it is equivalent to the final exam of the non-continuous modality:

1) Part related to theoretical-practical aspects (Weight 60%; Minimum Required Grade 4.0 out of 10 (*)): Written test related to theoretical and practical issues seen in the course.
2) Part related to laboratory practices (Weight 30%; Minimum Required Grade 4.0 out of 10 (*)): The student must obtain the practical results requested by means of simulation.
3) Part related to the resolution of a practical case (Weight 10%).

(*) If the minimum grade of 4.0 out of 10 is not achieved in the assessable activities or parts indicated, the course will not be passed and the final grade will be no greater than 4.5.

The grades equal to or greater than 5.0 obtained in the ordinary call for the assessable activities of the continuous evaluation (final exam, laboratory practices and reports, and assignments), or for the equivalent parts in the non-continuous evaluation modality (theoretical/practical aspects, laboratory practices, and resolution of a practical case), may be kept for the corresponding part of the extraordinary call.

The grades obtained in any of the parts will not be kept for subsequent courses.

Specifications for the second resit / retake exam:

Identical to those indicated in the non-continuous evaluation modality of the ordinary call.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	**hours**
Final test [PRESENCIAL][Assessment tests]	4
Unit 1 (de 7): Industrial Control	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Lectures]	3
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	2
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	12
Unit 2 (de 7): Process Automation	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Lectures]	2
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	12
Unit 3 (de 7): Robotics	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Lectures]	2
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	12
Unit 4 (de 7): Computer Vision	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	6
Problem solving and/or case studies [PRESENCIAL][Lectures]	2
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	4
Workshops or seminars [PRESENCIAL][Workshops and Seminars]	2
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	18
Unit 5 (de 7): Communication Networks in Industrial Environments	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Lectures]	2
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	12
Unit 6 (de 7): Discrete Events Control	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Lectures]	2
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	12
Unit 7 (de 7): Optimisation	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Lectures]	2
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	2

Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	12

Global activity	
Activities	**hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	18
Problem solving and/or case studies [PRESENCIAL][Lectures]	15
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	8
Workshops or seminars [PRESENCIAL][Workshops and Seminars]	2
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	13
Final test [PRESENCIAL][Assessment tests]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Boyer A.	SCADA: Supervisory Control and Data Acquisition	ISA			1999	
Acedo Sánchez J.	Instrumentacion y control avanzado de procesos	Diaz de Santos			2006	
Bradsky G., Kaehler A. O'Reilly	Learning OpenCV - Computer Vision with OpenCV Library				2008	
González R.C., Woods R.E.	Digital Image Processing (3ª Ed.)	Pearson Prentice-Hall			2008	
Ogata K.	Ingeniería de Control Moderna (5ª Ed.)	Prentice Hall			2010	
Pajares G., De la Cruz J.	Visión por Computador. Imágenes Digitales y Aplicaciones (2ª Ed.)	Ra-Ma			2007	
Rodriguez Penin A.	Sistemas SCADA (3ª Ed.)	Marcombo			2012	
Somolinos J.A., Morales R., Tremps E.	Fundamentos de la Ingeniería de Control	Editorial Universitaria Ramón Aceres			2013	
Vélez Serrano J.F., et al.	Visión por Computador (2ª Ed.)				2003	Libro electrónico descargable en la Web de los autores