

**1. General information****Course:** DIGITAL CONTROL**Type:** CORE COURSE**Degree:** 412 - UNDERGRADUATE DEGREE PROGRAMME IN ELECTRICAL ENGINEERING**Center:** 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING**Year:** 3**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 56381**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 55**Duration:** C2**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** JAVIER DE LAS MORENAS DE LA FLOR - Group(s): 55

Building/Office	Department	Phone number	Email	Office hours
Edificio Störr, 3ª planta, Dpto. IEEAC	INGENIERÍA ELÉCTRICA, ELECTRÓNICA, AUTOMÁTICA Y COMUNICACIONES	+34 926 05 22 69	javier.delasmorenas@uclm.es	To be indicated at the beginning of the semester

**2. Pre-Requisites**

In order to take this subject to the best advantage, the student must have acquired the knowledge derived from obtaining the competences related to the basic subjects and common to the industrial branch of mathematics, physics, computer science, electrical and electronic technology and feedback control.

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

The subject of digital control allows students to acquire knowledge of automatic regulation and control techniques and their application to industrial automation which, complemented by those acquired in other specific subjects, will facilitate the application of their skills in the world of work and, in the end, will help the engineer to face the problems that will arise throughout the exercise of the profession.

**4. Degree competences achieved in this course****Course competences**

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CEE08	Knowledge of the principles of automatic regulation and their application to industrial automation.
CG03	Knowledge of basic and technological subjects to facilitate learning of new methods and theories, and provide versatility to adapt to new situations.
CG04	Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of industrial engineering.
CG06	Ability to handle specifications, regulations and mandatory standards.
CT01	Knowledge of a second language.
CT02	Knowledge and application of information and communication technology.
CT03	Ability to communicate correctly in both spoken and written form.

**5. Objectives or Learning Outcomes****Course learning outcomes****Description**

Ability to reconstruct continuous signals from the sampled signal.

Conocer e interpretar correctamente los criterios de estabilidad de sistemas discretos.

Ability to use the main computer support tools.

Analysis of the dynamic and static response of a discrete system

Command of the techniques for the design of discrete control systems using discretisation of continuous controllers and by means of z-transfer functions.

Ability to obtain and simplify z-variable block diagrams

**6. Units / Contents****Unit 1: Introduction****Unit 2: Discrete systems and signals**

Unit 3: Analysis of discrete systems

Unit 4: Analysis of close-loop discrete systems

Unit 5: Design of digital controllers

## 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	CB01 CB02 CB03 CB04 CB05 CEE08 CG03 CG04 CG06 CT01 CT02 CT03	1.2	30	N	-	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CB01 CB02 CB03 CB04 CB05 CEE08 CG03 CG04 CG06 CT01 CT02 CT03	0.4	10	N	-	
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB01 CB02 CB03 CB04 CB05 CEE08 CG03 CG04 CG06 CT01 CT02 CT03	0.6	15	Y	Y	
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CEE08 CG03 CG04 CG06 CT01 CT02 CT03	3.6	90	N	-	
Formative Assessment [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CB05 CEE08 CG03 CG04 CG06 CT01 CT02 CT03	0.2	5	Y	Y	
<b>Total:</b>			<b>6</b>	<b>150</b>			
<b>Total credits of in-class work: 2.4</b>			<b>Total class time hours: 60</b>				
<b>Total credits of out of class work: 3.6</b>			<b>Total hours of out of class work: 90</b>				

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	30.00%	30.00%	
Mid-term tests	70.00%	0.00%	
Final test	0.00%	70.00%	
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

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).

## 9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
<b>Hours</b>	<b>hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	10
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Formative Assessment [PRESENCIAL][Assessment tests]	5
<b>Global activity</b>	
<b>Activities</b>	<b>hours</b>
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Formative Assessment [PRESENCIAL][Assessment tests]	5
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	10
<b>Total horas: 150</b>	

## 10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
4 Fadali, M.	Digital Control Engineering	Academic Press			2009	Bibliografía complementaria
3 Ogata, K.	Sistemas de Control en Tiempo Discreto	Prentice Hall			1996	Bibliografía básica
5.	Control Tutorials for Matlab & Simulink <a href="http://ctms.engin.umich.edu/CTMS">http://ctms.engin.umich.edu/CTMS</a>				2012	Bibliografía complementaria
6. Pinto Bermúdez, E.	Fundamentos de Control con Matlab	Prentice Hall			2010	Bibliografía complementaria

7. The Math Works, Inc.	La Edición de Estudiante de Simulink	Prentice Hall		1998	Bibliografía complementaria
8 Reinoso, O., Sebastián, J.M, Aracil, R., Torres, F.	Control de sistemas discretos	Mc Graw Hill		2004	Bibliografía complementaria
1 Valdivia Miranda, C.	Sistemas de control continuos y discretos	Paraninfo	978-84-283-0744-4 (R	2012	Bibliografía básica
2 Aracil Santonja, R.	Sistemas discretos de control : (representacion externa)	Universidad Politecnica, Escuela Tecnica Superi	84-7484-014-7	1993	Bibliografía básica