



Teaching Guide

Identifying Data					2018/19
Subject (*)	Electronics and Instrumentation		Code	730497207	
Study programme	Mestrado Universitario en Enxeñaría Industrial (plan 2018)				
Descriptors					
Cycle	Period	Year	Type	Credits	
Official Master's Degree	1st four-month period	First	Optional	4.5	
Language	Spanish				
Teaching method	Face-to-face				
Prerequisites					
Department	Enxeñaría Industrial				
Coordinador	Quintían Pardo, Héctor		E-mail	hector.quintian@udc.es	
Lecturers	Jove Pérez, Esteban Quintían Pardo, Héctor		E-mail	esteban.jove@udc.es hector.quintian@udc.es	
Web	http://https://moodle.udc.es/				
General description	<p>Esta materia proporciona ao alumno a capacidade para deseñar sistemas electrónicos e de instrumentación industrial, mediante a consecución dos seguintes resultados da aprendizaxe:</p> <ul style="list-style-type: none"> - Coñecer os elementos e os principios de funcionamento dun sistema de adquisición de datos. - Coñecer os fundamentos do procesamento de sinais analóxicos e dixitais. - Coñecer os principios de funcionamento e a aplicación dos sistemas de instrumentación. - Capacidade de deseñar sistemas electrónicos e de instrumentación industrial. 				

Study programme competences

Code	Study programme competences
A7	ETI7 - Ability to design electronic systems and industrial instrumentation.
B1	CB6 - Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
B2	CB7 - That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study.
B3	CB8 - That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments.
B4	CB9 - That the students know how to communicate their conclusions -and the knowledge and ultimate reasons that sustain them- to specialized and non-specialized audiences in a clear and unambiguous way.
B5	CB10 - That students have the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous.
B6	G1 - Have adequate knowledge of the scientific and technological aspects in Industrial Engineering.
B7	G2 - Project, calculate and design products, processes, facilities and plants.
B13	G8 - Apply the knowledge acquired and solve problems in new or unfamiliar environments within broader and multidisciplinary contexts.
B14	G9 - Be able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
B15	G10 - Knowing how to communicate the conclusions -and the knowledge and ultimate reasons that sustain them- to specialized and non-specialized publics in a clear and unambiguous way.
B16	G11 - Possess the learning skills that allow to continue studying in a self-directed or autonomous way.
C1	ABET (a) - An ability to apply knowledge of mathematics, science, and engineering.
C2	ABET (b) - An ability to design and conduct experiments, as well as to analyze and interpret data.
C3	ABET (c) - An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
C5	ABET (e) - An ability to identify, formulate, and solve engineering problems.
C6	ABET (f) - An understanding of professional and ethical responsibility.
C7	ABET (g) - An ability to communicate effectively.



C8	ABET (h) - The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
C9	ABET (i) - A recognition of the need for, and an ability to engage in life-long learning.
C11	ABET (k) - An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Learning outcomes		
Learning outcomes	Study programme competences	
Coñecer os elementos e os principios de funcionamento dun sistema de adquisición de datos.	BJ1 BJ6 BJ7 BJ15	CJ1 CJ6 CJ7 CJ9 CJ11
Coñecer os fundamentos do procesamento de sinais analóxicos e dixitais.	BJ1 BJ5 BJ6 BJ7 BJ13 BJ15	CJ1 CJ6 CJ7 CJ8 CJ9
Coñecer os principios de funcionamento e a aplicación dos sistemas de instrumentación.	BJ1 BJ2 BJ4 BJ5 BJ6 BJ13 BJ14 BJ15 BJ16	CJ1 CJ2 CJ6 CJ7 CJ8 CJ9
Capacidade para deseñar sistemas electrónicos e de instrumentación industrial.	AJ7 BJ3	CJ3 CJ5

Contents	
Topic	Sub-topic
1. Arquitectura e elementos dos sistemas de instrumentación industrial	1.1. Introducción. 1.2. Acondicionadores de sinal. 1.2.1. Amplificadores. 1.2.2. Filtros. 1.2.3. Moduladores e demoduladores. 1.2.4. Outros Acondicionadores. 1.3. Sensores
2. Sistemas de adquisición de datos.	2.1. Introducción. 2.2. Convertedores A/D e D/A. 2.3. Sistemas electrónicos dixitais programables.
3. Dispositivos de medida para contornas industriais	3.1. Sensores Intelixentes. 3.2. Buses de Campo.
Contenidos da memoria da titulación asignados por temas:	- Arquitectura e elementos dos sistemas de instrumentación industrial: Tema 1 - Arquitectura e elementos dos sistemas de adquisición de datos: Tema 2 - Dispositivos de medida para entornos industriais: Tema 3 - Deseño de sistemas electrónicos, de instrumentación industrial e de adquisición de datos: Tems 1, 2 e 3



Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Problem solving	B2 B3 B13 B16 B7 B6 C11	9	19	28
Guest lecture / keynote speech	A7 B1 B14 C1 C2 C5 C6 C8 C9	13	0	13
Laboratory practice	B1 B2 B13 B14 C3 C2	21	5.5	26.5
Objective test	A7 B1 B2 B13 B14 B7 B6	1.5	0	1.5
Multiple-choice questions	B2 B5 B13 B15 B16 C1 C2	1.5	0	1.5
Supervised projects	B4 B5 B15 C7	2	40	42
Personalized attention		0		0

(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
Methodologies	Description
Problem solving	Técnica mediante a que se resolve unha situación problemática concreta a partires dos coñecementos que se traballaron, que pode ter solucións múltiples.
Guest lecture / keynote speech	Exposición oral complementada co uso de medios audiovisuais e a introducción dalgunhas preguntas dirixidas aos estudantes, coa finalidade de transmitir coñecementos e facilitar a aprendizaxe.
Laboratory practice	Metodoloxía que permite que os estudantes aprendan efectivamente a través da realización de actividades de carácter práctico, coma demostracións, exercizos, experimentos e investigacións.
Objective test	A proba obxectiva escrita ten o obxectivo de comprobar se o alumno adquiriu as competencias fixadas como obxectivo desta materia.
Multiple-choice questions	Realízase polo menos unha proba de resposta múltiple, para a comprobación dos coñecementos adquiridos, en horario de clase.
Supervised projects	Metodoloxía deseñada para promover a aprendizaxe autónoma dos estudantes, baixo a tutela do profesor en escenarios variados (académicos e profesionais). Está referida prioritariamente á aprendizaxe do "como facer as cousas";. Supón unha opción baseada na asunción por parte dos estudantes da responsabilidade pola súa propia aprendizaxe. Este sistema de ensinanza baséase en dous elementos básicos: a aprendizaxe dependente dos estudantes e o seguimento de esa aprendizaxe polo profesor tutor.

Personalized attention	
Methodologies	Description
Laboratory practice Supervised projects Guest lecture / keynote speech Problem solving Multiple-choice questions	Cada alumno dispón para a resolución das súas posibles dúbidas e/ou problemas, das correspondente sesións de tutoría personalizada que pode realizarse de forma presencial no horario establecido ou de forma non presencial por correo electrónico.

Assessment			
Methodologies	Competencies	Description	Qualification
Laboratory practice	B1 B2 B13 B14 C3 C2	A súa realización e valoración positiva é imprescindible para aprobar a materia.	10

