

## SUBJECT TEACHING GUIDE

### G1015 - Multivariable and Advanced Process Control

#### Degree in Industrial Electronic Engineering and Automatic Control Systems

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Industrial Electronic Engineering and Automatic Control Systems			Type and Year	Optional. Year 4
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Systems and Automation Engineering Optional Module				
Course unit title and code	G1015 - Multivariable and Advanced Process Control				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. TECNOLOGIA ELECTRONICA E INGENIERIA DE SISTEMAS Y AUTOMATICA				
Name of lecturer	LUCIANO ALONSO RENTERIA				
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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. DESPACHO (S2022)				
Other lecturers	ALBERTO PURAS TRUEBA MARIA SANDRA ROBLA GOMEZ				

### 3.1 LEARNING OUTCOMES

-Ability to analyze and design control systems using advanced techniques

### 4. OBJECTIVES

Describe the internal representation systems using state variables.  
Present the possibilities for control of multivariable systems by state feedback.  
Introduction to optimal control systems.  
Study the techniques of nonlinear control systems.

6. COURSE ORGANIZATION	
CONTENTS	
1	<b>CONTROL BY STATE VARIABLES</b> Description of physical systems using state variables. Internal representation of systems. Analysis of control systems with state variables. State transition matrix. Controlabilidad and observability. State feedback. Observer states.
2	<b>OPTIMIZATION CONTROL SYSTEMS</b> Indices of behavior control systems Optimization of continuous and discrete regulators. Linear optimal quadratic regulator.
3	<b>NONLINEAR CONTROL SYSTEMS</b> Description of nonlinear system by descriptive function. Descriptive function of the most common nonlinearities. Stability of nonlinear systems. Control of nonlinear systems.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
First laboratory practical exam	Laboratory evaluation	No	Yes	20,00
First theory exam	Written exam	No	Yes	30,00
Final laboratory practice exam	Laboratory evaluation	Yes	Yes	20,00
Final theory exam	Written exam	Yes	Yes	30,00
TOTAL				100,00
Observations				
The remote evaluation of the work, practical laboratory exercises and written tests is foreseen, in the event of a new health alert by COVID-19 making it impossible to carry out the evaluation in person.				
Observations for part-time students				
For part-time students, a final exam will be held with a theory part and a practical part, with weights of 60% and 40% respectively.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
José Gómez Campomanes. "Automática: Análís y diseño de los sistemas automáticos de control". Ediciones Jucar J. Pérez Oria. "Sistemas continuos de control". Rdiciones TDG. Athans M. and P. Falb. "Optimal Control: An introduction to theory and its applications". Mc Graw-Hill. Callier F. and C. Desoer. "Multivariable Feedback Systems". Springer-Verlag Khilil H. "Non linear systems". Ed. Macmillan.

