SUBJECT TEACHING GUIDE

G739 - Automatic Control Systems

Degree in Mechanical Engineering

Academic year 2021-2022

1. IDENTIFYING DATA					
Degree	Degree in Mechanical Engineering			Type and Year	Compulsory. Year 2
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Electronics and Automation Module in Common with the Industrial Branch				
Course unit title and code	G739 - Automatic Control Systems				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web	https://moodle.unican.es/course/view.php?id=3544				
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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Other lecturers	ELIAS REVESTIDO HERRERO

3.1 LEARNING OUTCOMES

- Starting from the principles and mathematical techniques used in Control Engineering, to get to know the methods of analysis and design in the temporal domain and in the frequency domain.
  Knowledge of some software tools for modeling and simulation of systems.

4. OBJECTIVES

Achieve the learning results described in section 3.1 of the subject.

6. COURSE ORGANIZATION	
CONTENTS	
1	INTRODUCTORY CONCEPTS Introduction to Methods and Techniques for Industrial Control. Control systems. Industrial Automation: Definition, Types and Classification, Technology and examples.
2	MODELING OF SYSTEMS AND TRANSFER FUNCTION. The Laplace transform. Mathematical model of physical systems. Transfer function. Block diagrams Linearization of non-linear systems.
3	TEMPORARY ANALYSIS OF CONTINUOUS SYSTEMS. Stability analysis Response analysis in steady state. Analysis of response in transitory regim
4	BASIC CONTROL ACTIONS. Control in open loop and closed loop. Control all-nothing. PID control. Experimental tuning of PID regulators.
5	THE METHOD OF THE ROOTS LOCUS. Introduction. Properties of the roots locus. Rules for the construction of the roots locus. Inverse roots locus. Generalized roots locus. Contour of the roots. Design of regulators through the roots locus.
6	FREQUENCY ANALYSIS OF CONTROL SYSTEMS. Introduction. Sinusoidal transfer function. Representation diagrams of the frequency response. Plotting of the asymptotic Bode diagram. Stability analysis in the frequency domain. Operating specifications in the frequency domain. Design of regulators in the frequency domain.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Written exam	Written exam	No	Yes	30,00
Laboratory evaluation	Laboratory evaluation	No	Yes	20,00
Written exam	Written exam	Yes	Yes	30,00
Laboratory evaluation	Laboratory evaluation	Yes	Yes	20,00
TOTAL				100,00

Observations

Attendance at laboratory practices is compulsory for all students enrolled in the subject

Observations for part-time students

Students enrolled part-time may choose to be assessed by the method described above for other students or by a final exam. This exam will consist of a written part of theory (70% of the weight) and a part of laboratory practices (30% of the weight).

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

INSTRUMENTATION AND CONTROL SYSTEMS. W. Bolton
INGENIERÍA DE CONTROL MODERNA. K. Ogata
SISTEMAS DE CONTROL AUTOMÁTICO. B.C. Kuo
SISTEMAS CONTINUOS DE CONTROL. J.M. Pérez Oria
PROBLEMAS DE INGENIERÍA DE SISTEMAS CONTINUOS. CONCEPTOS BASICOS. J.R. Llata García, E. González Sarabia, D. Fernández Pérez, J. Arce Hernando, J.M. Pérez Oria (Disponible en OCW: http://ocw.unican.es/ensenanzas-tecnicas/automatica)