

## SUBJECT TEACHING GUIDE

### G1005 - Modelling and Simulation of Systems

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

Academic year 2025-2026

1. IDENTIFYING DATA					
Degree	Degree in Industrial Electronic Engineering and Automatic Control Systems			Type and Year	Compulsory. Year 4
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Subject Area: Automation and Systems Control Module: Specific Technology				
Course unit title and code	G1005 - Modelling and Simulation of Systems				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. TECNOLOGIA ELECTRONICA E INGENIERIA DE SISTEMAS Y AUTOMATICA				
Name of lecturer	JOSE RAMON LLATA GARCIA				
E-mail	ramon.llata@unican.es				
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 2. DESPACHO (S2017)				
Other lecturers	LUIS GARCIA RODRIGUEZ				

### 3.1 LEARNING OUTCOMES

- Knowledge and capacity for modeling and simulation of dynamical systems
- Knowledge of automatic regulation and control techniques and their application in industrial automation

**4. OBJECTIVES**

To show several types of dynamical systems and their characteristics .  
 Define and expose the most common representation formalism of dynamical systems  
 Present the main techniques Systematic modeling techniques using graphs  
 Modeling techniques have different experimental systems  
 Exposing the properties and methods of modeling and simulation Discrete Event Systems.  
 To expose different systems simulation techniques.  
 Present and train students in the use of various software tools for modeling and simulation of dynamic systems.

**6. SUBJECT PROGRAM**

CONTENTS

1	INTRODUCTION, INTERNAL AND EXTERNAL REPRESENTATION OF DYNAMIC SYSTEMS
2	ANALYTICAL AND SYSTEMATIC MODELING TECHNIQUES
3	SYSTEM IDENTIFICATION
4	MODELLING BY USING ARTIFICIAL INTELLIGENCE TECHNIQUES
5	Modeling and simulation of dynamical random systems
6	Modelling and Simulation Discrete Event Systems
7	Computer Simulation

**7. ASSESSMENT METHODS AND CRITERIA**

Description	Type	Final Eval.	Reassessn	%
Continuous assessment based on several practical tasks. In order to pass the subject students must obtain, at least, 5 points in practical tasks	Work	No	Yes	40,00
Continuous assessment based on several written exams In order to pass the subject students must obtain, at least, 5 points in written exams.	Written exam	No	Yes	60,00
212 / 5.000 Resultados de traducción Resultado de traducción Students who have not completed the continuous assessment will take a written exam in which all the contents seen in the subject will be evaluated and the weight of this exam will be 100% of the	Written exam	Yes	No	0,00
<b>TOTAL</b>				<b>100,00</b>

Observations

several practical tasks and several written exams will be carried out and evaluated during the course.  
 Remote evaluation, of these same exams, is planned in the case of a new health alert by COVID-19 making it impossible to conduct the evaluation in person.

Observations for part-time students

Students must pass the written exam.  
 Students must pass a laboratory test.  
 Remote evaluation, of these same exams, is planned in the case of a new health alert by COVID-19 making it impossible to conduct the evaluation in person.

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

### BASIC

- Bosch, Paul P. J. van den. Modeling, identification and simulation of dynamical systems / P. P. J. van den Bosch, A. C. van der Klauw. 1994
- Cassandras, Christos G. Discrete event systems : modeling and performance analysis / Christos G. Cassandras. 1993
- Cellier, François E. Continuous system modeling / François E. Cellier. 1991
- Franklin, Gene F. Digital control of dynamic systems / Gene F. Franklin, J. David Powell, Michael L. Workman. 1998
- Franklin, Gene F. Feedback control of dynamic systems / Gene F. Franklin, J. David Powel, Abbas Emani-Naeini. 1994
- Ljung, Lennart. System identification : theory for the user / Lennart Ljung. 1999
- Ogata, Katsuhiko. Ingeniería de control moderna / Katsuhiko Ogata
- Ogata, Katsuhiko. Sistemas de control en tiempo discreto / Katsuhiko Ogata. 1996
- Pham, Duc Truong. Neural networks for identification, prediction and control / Duc Truong Pham and Liu Xing.
- Rowell, Derek. System dynamics : an introduction / Derek Rowell, David N. Wormley.
- Söderström, Torsten. System identification / Torsten Söderström, Petre Stoica. 1989