

SUBJECT TEACHING GUIDE

321 - Design Project for an embedded system

Master's Degree in computing engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Master's Degree in computing engineering			Type and Year	Optional. Year 2
Faculty	Faculty of Sciences				
Discipline	Optional Subjects				
Course unit title and code	321 - Design Project for an embedded system				
Number of ECTS credits allocated	3	Term	Semester based (1)		
Web	https://moodle.unican.es/				
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	HECTOR POSADAS COBO				
E-mail	hector.posadas@unican.es				
Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 3. DESPACHO PROFESOR (S3006)				
Other lecturers					

3.1 LEARNING OUTCOMES
- To be able to design and develop embedded systems by integrating hardware and software technologies in multidisciplinary contexts
- To be able to evaluate and optimize the performance of a system considering HW and SW alternatives
- Ability to tackle the design of real complex embedded systems

4. OBJECTIVES

Implementation of co-design methodologies of complex embedded systems

Ability to develop and optimize embedded SW in mono- and multi-processor systems

HW design and development of the HW/SW communication mechanisms

Verification and debugging of HW/SW embedded systems

6. COURSE ORGANIZATION

CONTENTS

1	Project introduction. Introduction to the flight simulator. Body and world coordinates. Information available from sensors. Development of a guidance algorithm with the flight simulator (Software in the loop).
2	Usage of sensors and actuators to manage a mobile system. Application of an IMU device to obtain information. Combination with the simulator.
3	Development of the HW platform. HW / SW communication. Integration of the guidance algorithm in the HW platform. Integration and test with the simulator (Hardware in the loop).

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Description Embedded design project	Laboratory evaluation	No	Yes	100,00
TOTAL				100,00
Observations				
The presentation of the results for the practical activities can be done in second call, previous contact with the responsible lecturer. If the quota of 'honor rates' of the subject is completed in the ordinary evaluation, the students who present themselves to the recovery will not be able to qualify for any 'honor rate'.				
Observations for part-time students				
With part-time students, hours of laboratory access and flight test will be negotiated that are compatible with their scheduling restrictions				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

E. A. Lee & S. A. Seshia: "Introduction to Embedded Systems: a Cyber-Physical Systems Approach", UC Berkeley, 2^o Ed, 2015

D. Gajski, S. Abdi, A. Gerstlauer: "Embedded System Design: Modeling, Synthesis and Verification", Springer, 2010.

M. Barr, A. Massa: "Programming Embedded Systems", O'Reilly, 2007.