



Universitat de Lleida

DEGREE CURRICULUM **EMBEDDED AND UBIQUITOUS SYSTEMS**

Coordination: Fernando Guirado

Academic year 2015-16

Subject's general information

Subject name	EMBEDDED AND UBIQUITOUS SYSTEMS
Code	103056
Semester	2n Quadrimestre 2N Cicle Informàtica i Màster
Typology	Obligatòria
ECTS credits	4.5
Theoretical credits	2.5
Practical credits	2
Coordination	Fernando Guirado
Office and hour of attention	Email to the professor
Department	Informàtica i Enginyeria Industrial
Teaching load distribution between lectures and independent student work	40% lecture 60% autonomous student work
Modality	Presencial
Important information on data processing	Consult this link for more information.
Language	English
Degree	MASTER in Computer Enginneering
Distribution of credits	20% theoretical content 30% classroom activities 50% laboratory
Office and hour of attention	Email to the professor
E-mail addresses	f.guirado@diei.udl.cat

Fernando Guirado Fernández

Subject's extra information

We recommend programming skills in C ++

Most practical course in which the study is based on solving exercises recommended and required. It is essential for individual work skills and acquire the skills set necessary to properly use the tools that work with during the course.

The use of the Virtual Campus is essential to access the resources of the subject notifications about delivery dates exercises, schedule meetings, and finally delivering practical and assessment tests.

Course taught during the 2nd half of the 1st year of the degree.

Subject corresponding to "Computers" in the module "Information Technology"

Learning objectives

University of Lleida strategic competences

- To use office automation tools for the development of technical documents
- Create presentations using office automation tools
- Understand technical documents in English

Degree-specific competences

- Ability to evaluate the hardware and software requirements for the development of embedded and ubiquitous systems
- Understand the concept of embedded system and ubiquitous
- Know how to design, describe i validate embedded electronic systems with industrial application
- Know and be able to use methods and tools for development and debugging of programs implemented with microcontrollers
- Understand and know the different technological options for developing embedded systems
- Identify control requirements, interaction and security you have to give in an embedded system
- Identify requirements of E / S necessary to develop an embedded system

Degree-transversal competences

- Independent learning ability and adaptación to new situations, able to foster creativity and sensitivity for quality
- Analytical skills, organization or planning in the area of computer and embedded systems

Competences

University of Lleida strategic competences

- Master Information and Communication Technologies.
- Master a foreign language.

Degree-specific competences

- Capacity to design and develop computer systems, applications and services to built-in and ubiquitous systems

Degree-transversal competences

- Capacity to draft, design and implement projects and/or give novel solutions, using engineering-related tool

Subject contents

1. Ubiquitous Computing

Introduction

Ubiquitous Computing Characteristics

Input/Output interaction

Middleware Architectures

2. Embedded Systems

Introduction

Embedded systems characteristics

Architecture

Transducers

Bus and communications

Real Time Systems

Methodology

The methodology is based on :

- Theoretical lectures in the classroom.
- Individual exercises.
- Several practical activities

Development plan

During 2015/16 this topic is related to the subjects: Intelligent Systems and Computer graphics and multimedia.

The common goal is to develop a game similar to the "Pacman".

- The topic "Intelligent Systems" is based on adding artificial intelligence to the game characters .
- The topic "Computer graphics and multimedia" will work the graphic issue.

And finally the subject "Embedded Systems and Ubiquitous Computing" the user interaction will be the main goal.

By this reason it is recommended to take this three subjects simultaneously, although it is not considered a requirement.

Scheduling

- 1st week

- Ubiquitous computing
- Introduction to Embedded Systems

- 2nd week

- Development environment – Arduino
- Examples – Sensors and communication

- 3rd week

- Definition of the project. BGC (Biometric Game Controller)
- Biometric parameters

- 4th and 5th weeks

- Proposal definition
- Biometric Control parameters
- Prototype development

To develop the prototype may be necessary to access to the electronics laboratory.

Evaluation

- During the course (30%)

- Technical reports
- Exercises

- PBL – Project Based Learning (70%)

- Analysis and project scope
- Development
- Dissertation defense

Bibliography

BIBLIOGRAFIA BÀSICA

1. *Ubiquitous Computing Fundamentals*: J. Krumm (ed.), CRC Press, 2010
2. *Smart Sensors to Network the World*: D. E. Culler, H. Mulder, Scientific American, Jun 2004.

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1. *Ubiquitous Computing: Smart Devices, Environments and Interactions*: S. Poslad, Wiley, 2009