

# Course guide 230607 - SBMIC - Systems Based on Microprocessors

Unit in charge: Teaching unit:	Barcelona School of Telecommunications Engineering 710 - EEL - Department of Electronic Engineering.		Last modified: 11/05/2022
Degree: Languages: English	Academic year: 2022	ECTS Credits: 5.0	
LECTURER			

Coordinating lecturer:	JORDI SALAZAR
Others:	MANEL DOMÍNGUEZ, VICENTE JIMÉNEZ

# **DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES**

#### Specific:

Ability to use programmable logical devices, as well as to design analog and digital advanced electronics systems. Ability to design communication devices, such as routers, switches, hubs, transmitters and receivers in different bands.
Ability to develop electronic instrumentation, as well as transducers, actuators and sensors.

#### Transversal:

3. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

4. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

### **TEACHING METHODOLOGY**

- Lectures
- Application classes
- Laboratory classes
- Individual work (distance)
- Exercises
- Other activities
- Short answer test (Control)
- Extended answer test (Final Exam)



# LEARNING OBJECTIVES OF THE SUBJECT

Learning objectives of the subject:

The aim of this course is to provide students with an understanding of microprocessor-based systems and their use in instrumentation, control and communication systems. Topics covered in the course include, microprocessor architecture and organization, bus architectures, memory and I/O subsystems, timing and interfacing, peripheral controllers and programming in the 'C' language.

Learning results of the subject:

- To know how microprocessor based systems can be applied.

- To understand the architecture and operation of a microprocessor system.

- To be able to use a microprocessor development system to prepare and run a program.

- To be able to implement microprocessor-based systems, including both hardware and software, using a specific microprocessor or microcontroller

# **STUDY LOAD**

Туре	Hours	Percentage
Self study	86,0	68.80
Hours large group	26,0	20.80
Hours small group	13,0	10.40

#### Total learning time: 125 h

# CONTENTS

### 1. Introduction

#### **Description:**

Course description. Programmable electronic systems. Architecture of a microprocessor system.

**Full-or-part-time:** 16h Theory classes: 4h Self study : 12h

### 2. The CPU

**Description:** ALU, registers, control unit and datapath. Instruction sets: RISC and CISC. Bus cycles

**Full-or-part-time:** 20h Theory classes: 4h Laboratory classes: 2h Self study : 14h



# 3. Interfacing memory

### **Description:**

Types of memory: ROM and RAM. Interfacing memory to the processor: Address decoding and timing.

Full-or-part-time: 29h Theory classes: 6h Laboratory classes: 3h Self study : 20h

# 4. The I/O subsystem

**Description:** I/O interfaces, programmed and interrupt-driven I/O. DMA

**Full-or-part-time:** 22h Theory classes: 4h Laboratory classes: 4h Self study : 14h

#### 5. Advanced microprocessor systems

**Description:** Pipelined and superscalar processors. Memory Hierarchy and Cache

Full-or-part-time: 16h Theory classes: 4h Self study : 12h

#### 6. Software development tools

**Description:** Development process, Integrated development environment, Testing and debugging tools, RTOS

**Full-or-part-time:** 22h Theory classes: 4h Laboratory classes: 4h Self study : 14h

### **ACTIVITIES**

# LABORATORY

# Description:

Continuous assessment of laboratory exercices to develop along the course.

# EXERCISES

### **Description:**

Exercises to strengthen the theoretical knowledge.



# SHORT ANSWER TEST (CONTROL)

**Description:** Mid term control.

# **EXTENDED ANSWER TEST (FINAL EXAMINATION)**

**Description:** Final examination.

# **GRADING SYSTEM**

Final examination: 60% Mid-term exam 15% Laboratory assessments: 25%

### **BIBLIOGRAPHY**

### **Basic:**

- Clements, A. Microprocessor systems design: 68000 hardware, software, and interfacing. 3rd ed. Boston: PWS, 1997. ISBN 0534948227.

#### **Complementary:**

- Laplante, P.A.; Ovaska, S.J. Real-time systems design and analysis : tools for the practitioner. 4th ed. Hoboken, New Jersey: Wiley, 2012. ISBN 978-0-470-76864-8.