

## 29844 - Real-Time Systems

### Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	440 - Bachelor's Degree in Electronic and Automatic Engineering
ECTS	6.0
Year	4
Semester	First semester
Subject Type	Optional
Module	---

### **1.General information**

#### **1.1.Introduction**

#### **1.2.Recommendations to take this course**

#### **1.3.Context and importance of this course in the degree**

#### **1.4.Activities and key dates**

### **2.Learning goals**

#### **2.1.Learning goals**

#### **2.2.Importance of learning goals**

### **3.Aims of the course and competences**

#### **3.1.Aims of the course**

#### **3.2.Competences**

### **4.Assessment (1st and 2nd call)**

#### **4.1.Assessment tasks (description of tasks, marking system and assessment criteria)**

### **5.Methodology, learning tasks, syllabus and resources**

#### **5.1.Methodological overview**

- The course will be based on combining theoretical explanations with practical exercises and laboratory work.

- Lectures will provide theoretical and practical concepts of real-time systems, illustrated with examples. For these examples a real-time kernel and a specific microcontroller will be used.

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- Students will be organized by groups of two. Each group will develop a project.

### 5.2.Learning tasks

Classroom activities: 2.4 ECTS (60 hours)

1) Course lectures (type T1) (30 hours).

Lectures of theoretical and practical content. The theoretical and practical aspects of real-time systems is presented, illustrating them with examples. Student participation is considered very important in order to acquire the learning outcomes and skills needed.

2) Case studies (type T2) (15 hours).

Different case studies will be worked out at the classroom. Students are encouraged to prepare them in advance.

3) Lab (type T3) (15 hours).

Five sessions of three hours each in which the working groups will develop the assigned project with the teacher assistance.

Personal work: 3.6 ECTS (90 hours)

4) Project (T6 type) (40 hours).

Two-person course projects will be assigned.

5) Personal study (type T7) (46 hours).

Student Personal study of the theoretical issues and resolution of problems.

6) Evaluation (T8) (4 hours).

Evaluation is also a learning tool with which the student checks the degree of understanding and assimilation reached. Assessment will be based on the project assignment and a final examination.

### 5.3.Syllabus

1. Real-time systems introduction.

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2. The microcontroller F2812
3. Concurrency in applications. Priorities and time.
4. Real-time kernels. Structure, tasks and time. SYS-BIOS.
5. Deadline Monotonic Scheduling.
6. Resource sharing between tasks.
7. Priority inheritance and priority ceiling protocols.
8. Aperiodic tasks.
9. Fault Tolerance.

### 5.4.Course planning and calendar

Timetables for classroom and laboratory sessions will be published prior to the beginning of the course at the web of the EINA <https://eina.unizar.es/> and EUPT <https://eupt.unizar.es/>

### 5.5.Bibliography and recommended resources