

60945 - Electronic sensor networks

Syllabus Information

Academic Year: 2019/20

Subject: 60945 - Electronic sensor networks

Faculty / School: 110 -

Degree: 533 - Master's Degree in Telecommunications Engineering

ECTS: 5.0

Year: 2

Semester: First semester

Subject Type: Optional

Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as

- Lectures, where the theoretical contents of sensor networks in ambient intelligence applications will be presented.
- Laboratory sessions with small groups of students, where they will carry out representative problems, designs and practical assemblies with sensor networks.
- Projects under the teacher's supervision.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, task instructions, the course syllabus, as well as other course-specific learning materials.

4.2.Learning tasks

The course includes the following learning tasks:

Classroom activities (1.96 ECTS: 49 hours):

- A01 **Lectures** (10 hours). In this activity the main contents of the course will be explained and illustrated with a set of representative problems. This activity will take place in the classroom. The materials used in the lectures will be available through the virtual platform Moodle.
- A03 **Laboratory sessions** (20 hours). Sessions are structured in 9 tasks (instructions will be available in advance).
- A06 **Project supervision** (15 hours). Supervision of projects.
- A08 **Assessment** (4 hours). The test and the project.

Autonomous work (3.04 ECTS: 76 hours)

- A06 **Project** (50 hours). The project, done in pairs, is related to the laboratory sessions.
- A07 **Autonomous work and study** (26 hours). Study aimed at achieving adequate monitoring of the course, conducting tasks, exam preparation and tutorials.

4.3.Syllabus

The course includes the following learning tasks:

Lectures

1. Introduction to sensor networks. Applications.
2. Communication protocols in sensor networks. Synchronization. Interoperability.
3. RF nodes design, energy considerations.
4. Embedded intelligence and performance metrics

Laboratory sessions

1. Microcontroller:
 1. Task 1: Understanding the environment - Basic I/O, Timing, UART and ADC
 2. Task 2: Interrupts, PWM and RTCC (Real Time Clock Calendar)
 3. Task 3: Real time operating system. FreeRTOS
2. WIFI:
 1. Task 4: WiFi networking, Exchange TCP data
 2. Task 5: HTTP send and receive data
 3. Task 6: AJAX
 4. Task 7: Low Power
3. ZigBee:
 1. Task 8: Zigbee Networking
 2. Task 9: Zigbee + WIFI

4.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website.

4.5.Bibliography and recommended resources

They will be available at <http://moodle2.unizar.es>:

- Course slides
- Task instructions.
- Supplementary teaching materials: catalogs of manufacturers, component data sheets, manuals laboratory instrumentation, etc.