295124 - 2951334 - Wearable Devices

**Coordinating unit:** 295 - EEBE - Barcelona East School of Engineering  
**Teaching unit:** 710 - EEL - Department of Electronic Engineering  
**Academic year:** 2018  
**Degree:**  
**ECTS credits:** 6  
**Teaching languages:** English

### Teaching staff

**Coordinator:** Cosp Vilella, Jordi  
**Others:** Martinez Garcia, Herminio  
Nescolarde Selva, Lexa Digna

### Opening hours

**Timetable:** To be determined

### Prior skills

Electronic Systems, Computing

### Requirements

Data acquisition & Instrumentation

### Teaching methodology

Lectures  
Laboratory classes  
Laboratory practical work  
Individual and group work

### Learning objectives of the subject

The aim of this course is to train students in methods to design and use wearable systems

### Study load

| Total learning time: 150h | Hours large group: 22h | 14.67%  
|--------------------------|------------------------|---------  
|                          | Hours medium group: 0h | 0.00%  
|                          | Hours small group: 22h | 14.67%  
|                          | Guided activities: 4h | 2.67%  
|                          | Self study: 102h | 68.00%  

### Content

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<tr>
<th>Wearable sensors technologies</th>
<th>Learning time: 28h</th>
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<tr>
<td></td>
<td>Theory classes: 4h</td>
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<td>Laboratory classes: 4h</td>
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<tr>
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<td>Self study : 20h</td>
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</table>

**Description:**
Introduction to wearable systems. Instrumentation, implementation, available technologies, measure of physiological signals

**Related activities:**
Lectures and application exercises.
Laboratory exercises:
  - Wearable system

**Specific objectives:**
Introduction to wearable systems and the signal acquisition chain

<table>
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<tr>
<th>Microcontrollers and programmable system-on-a-chip devices</th>
<th>Learning time: 30h</th>
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<td>Theory classes: 4h</td>
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<td>Laboratory classes: 4h</td>
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<td>Guided activities: 2h</td>
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<td>Self study : 20h</td>
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**Description:**
The microcontroller system and programmable devices. Constituent elements Comparison and criteria for the election.

**Related activities:**
Lectures and application exercises.
Laboratory exercises:
  - Introduction to the development system for wearable devices

**Specific objectives:**
Understand the different available programmable systems with their advantages and disadvantages for wearable devices
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<table>
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<th><strong>Wireless communication and data storage</strong></th>
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<td><strong>Learning time:</strong> 30h</td>
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<td>Laboratory classes: 4h</td>
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<td>Self study : 20h</td>
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**Description:**
Característiques i ús dels diferents protocols de comunicació sense fil: NFC, bluetooth, ANT

**Related activities:**
Lectures and application exercises.
Laboratory exercises:
Wireless communication system

**Specific objectives:**
Know the different protocols of communications for wearable devices and use them correctly

<table>
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<tr>
<th><strong>Microcontroller programming</strong></th>
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<td><strong>Learning time:</strong> 30h</td>
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<tr>
<td>Theory classes: 4h</td>
</tr>
<tr>
<td>Laboratory classes: 6h</td>
</tr>
<tr>
<td>Self study : 20h</td>
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</tbody>
</table>

**Description:**
Programming the microcontroller. Use of the input / output ports and communication with the sensors.

**Related activities:**
Lectures and application exercises.
Laboratory exercises:
Programming a wearable device

**Specific objectives:**
Program microcontrollers and establish communications with the sensors

<table>
<thead>
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<th><strong>Design and implementation phases</strong></th>
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<td><strong>Learning time:</strong> 32h</td>
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<td>Laboratory classes: 4h</td>
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<tr>
<td>Guided activities: 2h</td>
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<tr>
<td>Self study : 22h</td>
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**Description:**
Concept, feasibility, validation, verification, product, regulations.

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### Qualification system

Final exam, Group assessments, Laboratory assessments
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Regulations for carrying out activities

To be determined

Bibliography

Basic:
