Course guides
295124 - 295II334 - Wearable Devices

Unit in charge: Barcelona East School of Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.
Degree: MASTER’S DEGREE IN INTERDISCIPLINARY AND INNOVATIVE ENGINEERING (Syllabus 2019). (Optional subject).

Academic year: 2021 ECTS Credits: 6.0 Languages: English

LECTURER
Coordinating lecturer: Cosp Vilella, Jordi
Others: Martinez Garcia, Herminio Nescolarde Selva, Lexa Digna

PRIOR SKILLS
Electronic Systems, Computing

REQUIREMENTS
Data acquisition & Instrumentation

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEMUEII-19. Develop translational applications with the aim of achieving a better understanding of physiological phenomena of clinical relevance and for the design of new applications in areas that have an impact on the health care of people. (Specific competence of the Healthcare and Biomedical Applications specialty)

General:
CGMUEII-01. Participate in technological innovation projects in multidisciplinary problems, applying mathematical, analytical, scientific, instrumental, technological and management knowledge.
CGMUEII-05. To communicate hypotheses, procedures and results to specialized and non-specialized audiences in a clear and unambiguous way, both orally and through reports and diagrams, in the context of the development of technical solutions for problems of an interdisciplinary nature.

Transversal:
05 TEQ. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.
06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.
03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours small group</td>
<td>22,0</td>
<td>14.67</td>
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<tr>
<td>Guided activities</td>
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<td>2.67</td>
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<tr>
<td>Self study</td>
<td>102,0</td>
<td>68.00</td>
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Total learning time: 150 h

CONTENTS

Wearable sensors technologies

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

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

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

Full-or-part-time: 28h
Theory classes: 4h
Laboratory classes: 4h
Self study: 20h

Microcontrollers and programmable system-on-a-chip devices

Description:
The microcontroller system and programmable devices. Constituent elements Comparison and criteria for the election.

Specific objectives:
Understand the different available programmable systems with their advantages and disadvantages for wearable devices.

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

Full-or-part-time: 30h
Theory classes: 4h
Laboratory classes: 4h
Guided activities: 2h
Self study: 20h
### Wireless communication and data storage

**Description:**
Característiques i ús dels diferents protocols de comunicació sense fil: NFC, bluetooth, ANT

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

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

**Full-or-part-time:** 30h
- Theory classes: 6h
- Laboratory classes: 4h
- Self study: 20h

### Microcontroller programming

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

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

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

**Full-or-part-time:** 30h
- Theory classes: 4h
- Laboratory classes: 6h
- Self study: 20h

### Design and implementation phases

**Description:**
Concept, feasibility, validation, verification, product, regulations.

**Full-or-part-time:** 32h
- Theory classes: 4h
- Laboratory classes: 4h
- Guided activities: 2h
- Self study: 22h

### GRADING SYSTEM

Final exam, Group assessments, Laboratory assessments

### EXAMINATION RULES.

To be determined
BIBLIOGRAPHY

Basic: