



Course guides

295124 - 295II334 - Wearable Devices

Last modified: 04/06/2021

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)

Generical:

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

Type	Hours	Percentage
Hours small group	22,0	14.67
Hours large group	22,0	14.67
Guided activities	4,0	2.67
Self study	102,0	68.00

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:

- Zhu, Yifeng. Embedded systems with ARM cortex-M microcontrollers in assembly language and C. 3rd ed. E-Man Press LLC, 2017. ISBN 9780982692660.
- Di Paolo Emilio, Maurizio. Data acquisition systems : from fundamentals to applied design [on line]. New York, NY: Springer, 2013 [Consultation: 14/04/2020]. Available on: <http://dx.doi.org/10.1007/978-1-4614-4214-1>. ISBN 9781461442141.