

Course guide

230115 - EI - Smart Electronics

Last modified: 25/05/2023

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering.

Degree: BACHELOR'S DEGREE IN TELECOMMUNICATIONS TECHNOLOGIES AND SERVICES ENGINEERING (Syllabus 2015). (Optional subject).
BACHELOR'S DEGREE IN ELECTRONIC ENGINEERING AND TELECOMMUNICATION (Syllabus 2018). (Optional subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: Consultar aquí / See here:
<https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/responsables-assignatura>

Others: Consultar aquí / See here:
<https://telecos.upc.edu/ca/estudis/curs-actual/professorat-responsables-coordinadors/professorat-assignat-idioma>

PRIOR SKILLS

Basic knowledge in electronics, programming, signal processing, probability and statistics.

TEACHING METHODOLOGY

- Lectures.
- Hands-on seminars.
- Individual work (non-face-to-face).
- Short answer tests.
- Exercises.

LEARNING OBJECTIVES OF THE SUBJECT

This introductory and practical course aims to provide the elements necessary to design intelligent electronic systems that, due to various adaptation and control mechanisms, have the ability to learn and generalize the problems of engineering to be solved. Additionally, the use of the mentioned elements in various applications will be illustrated with the help of a series of case studies. The methodology of the course is based on active and PBL techniques so that students can apply and integrate these elements to solve a problem (based on one of the studied cases) through a customized design of an electronic system.

STUDY LOAD

Type	Hours	Percentage
Hours large group	26,0	17.33
Self study	98,0	65.33
Hours small group	26,0	17.33

Total learning time: 150 h

CONTENTS

(ENG) 1. Introducció al sistemes electrònics intel·ligents

Description:

Artificial intelligence: definition and historical perspective. Computational and machine learning. Examples of smart electronic systems.

Full-or-part-time: 46h

Theory classes: 4h

Practical classes: 4h

Laboratory classes: 8h

Self study : 30h

(ENG) 2. Aplicacions dels sistemes electrònics intel·ligents

Description:

Presentation of several practical cases in environmental, biological, medical and home automation applications. Study of the application to video games.

Full-or-part-time: 58h

Theory classes: 5h

Practical classes: 5h

Laboratory classes: 10h

Self study : 38h

(ENG) 3. Disseny de sistemes electrònics intel·ligents

Description:

Fundamentals and elements of smart electronic systems. Basic machine learning mechanisms needed for smart electronics.

Full-or-part-time: 46h

Theory classes: 4h

Practical classes: 4h

Laboratory classes: 8h

Self study : 30h

ACTIVITIES

(ENG) THEORETICAL WORK

Description:

Tests of true / false questions carried out on the teaching intranet and other activities related to the theoretical part.

Full-or-part-time: 12h

Self study: 12h

(ENG) EXERCICIS

Description:

Resolution of a series of deliverables.

Full-or-part-time: 24h

Theory classes: 4h

Laboratory classes: 4h

Self study: 16h

(ENG) PRACTICAL WORK

Description:

Design and testing of a smart electronic system.

Full-or-part-time: 34h

Theory classes: 6h

Laboratory classes: 6h

Self study: 22h

GRADING SYSTEM

The final mark of the course will be obtained from the grade of continuous assessment according to the following criteria:

Theoretical work: 20%

Exercises: 30%

Practical work: 50%

BIBLIOGRAPHY

Basic:

- Alpaydin, Ethem. Machine Learning [on line]. 2nd ed. Cambridge, MA, USA: The MIT Press, 2021 [Consultation: 13/07/2022]. Available on: <https://ebookcentral.proquest.com/lib/upcatalunya-ebooks/detail.action?docID=6684157>. ISBN 9780262542524.

- Silvis-Cividjian, N. Pervasive computing: engineering smart systems. Cham, Switzerland: Springer, 2017. ISBN 9783319516547.

- Xu, Yangsheng; Li, Wen J.; Lee, Ka Keung C. Intelligent wearable interfaces [on line]. Hoboken, NJ: Wiley Interscience, 2008 [Consultation: 03/06/2022]. Available on: <https://onlinelibrary-wiley-com.recursos.biblioteca.upc.edu/doi/book/10.1002/9780470222867>. ISBN 9780470222867.

- Pan, Tianhong; , Zhu, Yi. Designing Embedded Systems with Arduino [on line]. Switzerland: Springer, 2018 [Consultation: 21/07/2022]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/reader.action?docID=4862035>. ISBN 9789811044182.

Complementary:

- Warwick, Kevin. Artificial intelligence: the basics. London: Routledge, 2012. ISBN 9780415564830.

- Huddleston, Creed. Intelligent sensor design: using the microchip dsPIC. Amsterdam ; Boston: Elsevier/Newnes, 2007. ISBN 9780750677554.

- Flach, Peter. Machine learning: the art and science of algorithms that make sense of data. Cambridge: Cambridge University Press, 2012. ISBN 9781107422223.

RESOURCES

Other resources:

Class notes and other multimedia material available on the course intranet.