Course guide
340003 - SOAC-O1O40 - Sustainability and Accessibility

Last modified: 03/04/2024

Unit in charge:	Vilanova i la Geltrú School of Engineering
Teaching unit:	744 - ENTEL - Department of Network Engineering.
	713 - EQ - Department of Chemical Engineering.
	709 - DEE - Department of Electrical Engineering.
	710 - EEL - Department of Electronic Engineering.
	729 - MF - Department of Fluid Mechanics.
Degree:	BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Compulsory subject).
	BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2009). (Compulsory subject).
	BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Compulsory subject).
	BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2024   **ECTS Credits:** 6.0   **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer:	Rafael Morillas Varón
Others:	Primer quadrimestre:
	JAIME MIRET TOMAS - N1211, N1212, N1221
	RAFAEL MORILLAS VARON - N1011, N1012, N1021, N1111, N1112, N1121, N1211, N1212, N1221, N1311, N1411, N1412
	JOAQUIM OLIVE DURAN - N1011, N1012, N1021, N1111, N1112, N1121, N1411, N1412
	JOSE IGNACIO PERAT BENAVIDES - N1011, N1012, N1111, N1112
	JORDI SEGALAS CORAL - N1311
	MARCEL TORRENT BURGUES - N1121, N1211, N1212, N1221

PRIOR SKILLS

No

REQUIREMENTS

No requirements

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
2. CE16. Basic knowledge and application of environmental technologies and sustainability.

Generical:
1. Accessibility: Know and apply criteria of universal design in different products, environment and services.

Transversal:

02 SCS N1. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 1. Analyzing the world¿s situation critically and systemically, while taking an interdisciplinary approach to sustainability and adhering to the principles of sustainable human development. Recognizing the social and environmental implications of a particular professional activity.

02 SCS N2. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 2. Applying sustainability criteria and professional codes of conduct in the design and assessment of technological solutions.

02 SCS N3. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.

02 SCS. SUSTAINABILITY AND SOCIAL COMMITMENT. Being aware of and understanding the complexity of social and economic phenomena that characterize the welfare society. Having the ability to relate welfare to globalization and sustainability. Being able to make a balanced use of techniques, technology, the economy and sustainability.

05 TEQ N1. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.

TEACHING METHODOLOGY

The course consists of two thematic modules: accessibility and sustainability. The two modules are independent although they are complementary. The course is structured using two methodological lines: project-based learning and adult learning theory.

Module 1- accessibility.
The module consists of two parts: theoretical presentations to the students, and the realization of project along the course inside a working team. The theoretical presentation module focuses its activities to present design strategies and best practices, the group working develops a practical case study.
All documentation of the module will be given to the students the first day of class, through the intranet, accessible in Adobe Acrobat format. The work in groups will in parallel with the exposition of the theoretical. The format of the documentation is in Adobe Acrobat, with the accessibility requirements incorporated correctly.

Cooperative work groups of 4-5 students will be formed. This number has been chosen because different issues will be analyzed: user needs, alternatives on the market today, available technical solutions and business viability. Each member will assume the role and functions assigned by the group, providing a sufficient degree of freedom for a correct integration of student and group cohesion.

Sustainability Module 2
Large group. Lectures presenting the contents. The sessions of presentation of the contents will enable knowledge of the theoretical basis, concepts, methods and results.

Small group. In the working sessions in small groups, students will perform an exercise in groups of 2 people beginning in the class and ending with the delivery of a small dossier with the proposed problem analysis. This analysis will require a complete search for updated technical information. The work will be uploaded to the Digital Campus as a conceptual diagram-poster plus a brief report all in accessible PDF format.

LEARNING OBJECTIVES OF THE SUBJECT

The course aims to provide students with a range of knowledge, skills and ethical values in the context of accessibility, universal design and sustainability. Thus, the subject is conceptually divided into two thematic modules: accessibility and sustainability.

Accessibility module.
It presents the generic concept of accessibility. It seeks to lay the theoretical foundations, such as providing design guidelines and show examples of good practice in the design of tools, environments and services. The course will focus its efforts on the strategies of Universal Design, User Experience, Design Thinking and Emotional Design.
After completing this module, the student should be able to:
- Understanding human diversity as an added value in the design of products, environments and services.
- Know the main concepts of accessibility and design strategies focused on the user.
- Know how to apply design guidelines for everyone in a professional environment.
- Know the main policy and legislative sources.

Sustainability module.
At the end of the course the student should be able to:
- Observe and analyze the complex reality of the world from the perspective of sustainability.
- Knowing the causes that have led to the current situation of non sustainability and in particular about the role of technology.
- Know the basics of the paradigm of human development and sustainability.
- Develop the ability to apply the concept of sustainability in their engineering activities.
- Introduce the practical tools and methodologies for applying industrial ecology, eco-design, waste management and cleaner production in different contexts.
- Know the environmental technologies and their application in the field of engineering.
- Develop critical thinking about environmental problems and its solutions.
- Know the main problems of water pollution, air and waste.
- Understand and know how to apply the balance of energy and matter.

STUDY LOAD

Type	Hours	Percentage
Hours small group	15,0	10.00
Self study	90,0	60.00
Hours large group	45,0	30.00

Total learning time: 150 h

CONTENTS

Mòdul Accessibilitat - Tema 1 ? The user

Description:
The user: in the first chapter the student is introduced to the social, institutional and legislative environment where is necessary to apply the concepts of accessibility and universal design. The chapter concludes by contacting the student with one of the key points in the design phase of any product or service: the end user and their experience. The purpose of this point is to highlight that restrictions on the activities that one can find, as well as deficits of human body parts, are not the central issue under study. Only justify the need for equitable criteria and egalitarian design in mind, and should not divert attention from the central object of study: the application of universal design in all products and services. It consists of:

- Foreword
- Social dimension
- Institutional Framework
- Preliminary Thoughts on the user experience
- Disability

Full-or-part-time: 3h
Theory classes: 1h
Self study : 2h

Mòdul Accessibilitat - Tema 2 ? Basic concepts

Description:
Basics: In this chapter are presented the key definitions with illustrative examples and reflections. It consists of:
- Early Reflections
- Key definitions
- Examples

Full-or-part-time: 8h 30m
Theory classes: 2h
Guided activities: 0h 30m
Self study : 6h

Mòdul d?Accessibilitat - Tema 3 ? Design strategies

Description:
This is one of the central chapters. Universal Design, User Experience, Design Thinking and Emotional Design: It covers the main design strategies. The actual regulations are presented as a paradigm and basis for reflection as well as examples of good practice in implementation. It consists of:
- Universal Design
- User experience
- Design Thinking
- Emotional Design
- UNE rules
- Good practices

Full-or-part-time: 10h 30m
Theory classes: 3h
Guided activities: 0h 30m
Self study : 7h

Mòdul d?Accessibilitat - Tema 4 - Codes

Description:
This topic presents a set of rules on accessibility issues. The goal is to become a real practical application of the concepts in the design strategies. It consists of:
- Working definitions
- UNE rules

Full-or-part-time: 10h 30m
Theory classes: 3h
Guided activities: 0h 30m
Self study : 7h

Mòdul Accessibilitat - Tema 5 ? Architecture accessibility

Description:
This chapter covers specific aspects of the area of architecture that must be taken into account by the engineers in multidisciplinary teams. It provides methodology for analyzing an architectural environment and to properly analyze the Universal Design. It consists of:
- Basic concepts
- Integration with technology

Full-or-part-time: 9h 30m
Theory classes: 2h
Guided activities: 0h 30m
Self study : 7h

Mòdul Accessibilitat - Tema 6 ? Accessibility in the transportation

Description:
Through transport it is clearly established the interrelation between engineering and architecture, referred in the previous chapter. The thread used is the analysis of the current legislation itself, in order to bring the student to the extensive use of standards. It consists of:
- Overall analysis
- Actual regulations

Full-or-part-time: 9h 30m
Theory classes: 2h
Guided activities: 0h 30m
Self study : 7h

title english

Description:
The practical works will be done by groups of 4-5 students. Each group will prepare a work (draft) to be presented at the end of the course. In the practice sessions students can exchange opinions between the groups and the teacher. The draft report will be delivered through the Campus Digital and may make an oral presentation of the results to the rest of the class and teachers. The practices will analyze each of three areas involved: user requirements, state of the art technical solutions and proposals.

Related activities:
Practice 0: Definition of draft accessibility.
Practice 1: Draft - User needs.
Practice 2: Draft - Proposed design.
Practice 3: Draft - Drafting of technical report

Full-or-part-time: 15h
Practical classes: 15h

Mòdul sostenibilitat. Tema 1. The state of the world

Description:
The course begins with an introduction to what is sustainability. The basic concepts to assess the current world from this point of view are given. Basic environmental and social problems affecting our society are listed.

Full-or-part-time: 15h
Theory classes: 6h
Self study : 9h

Mòdul sostenibilitat. Tema 2. The sustainability paradigm and the sustainable politics

Description:
This subject develops the concept of sustainable development from different points of view and multidisciplinary definitions. The principles of sustainability are enunciated. What is quality of life? The relationship between technology and sustainable development is established taking into account the limits of growth. The subject ends by explaining the role of the engineer in sustainable development.

Full-or-part-time: 15h
Theory classes: 6h
Self study : 9h

Mòdul sostenibilitat. Tema 3. Systemic and sustainable development models

Description:
This topic focuses sustainability as a concept to be applied to a real case from many points of view, i.e. systemically. A description of the environmental tools which evaluate and could improve the impact of a product or service is provided. Special mention is made to eco-design methodologies.

Full-or-part-time: 15h
Theory classes: 6h
Self study : 9h

Mòdul sostenibilitat. Tema 4. Energy

Description:
This topic is related to the relation between energy and development, analyzing global and local energy use. How much conventional energy "is there" in the world? Environmental impacts of energy are analyzed, focusing on emissions of pollutants. Proposed solutions at technological and governmental level are evaluated. The concept of efficiency and the role that engineers and governments have in their implementation are analyzed. Renewable energies are evaluated. Can be ?the renewables? the solution for a sustainable development.

Full-or-part-time: 15h
Theory classes: 6h
Self study : 9h

Mòdul sostenibilitat. Tema 5. Resources and waste

Description:
The global use, the environmental and social issues related to mineral resources are evaluated. The use of water in the world is analyzed: in agriculture, industry and households with special mention of contamination. Waste management is evaluated in the first world from the point of view of their classification and responsibilities. The management of municipal and industrial waste in Catalonia is evaluated. Cleaner production concept is introduced with real examples.

Full-or-part-time: 15h
Theory classes: 6h
Self study : 9h

GRADING SYSTEM

The score for the course of SOAC is calculated from the partial notes of accessibility and sustainability at 50%, , in each one a grade equal to or greater than 4 must be obtained in order to calculate the final grade.. Conducting both modules it is considered a prerequisite to be able to pass the course.

Accesibilidad
This module follows project-based learning methodologies. Groups of 4 students must complete a project-draft at the end of the course. Each group will perform a series of partial work (TP) along the course and assessment tests (EX). Finally, these partial works will be incorporated in a draft technical report (MT), which will be defended orally before a panel of teachers of the subject.

Nota_Accesibilidad = 0.5 EX + 0.3 MT + 0.2 TP

Sostenibilidad
The evaluation of this module is calculated from the personal examination (EX) and the practical work (TP) to be held in small groups.
Nota_ Sostenibilidad = 0.7 EX + 0.3 TP

The final grade will be calculated as

NOTA_ SOAC = 0.5 Nota_Accesibilidad+ 0.5 Nota_ Sostenibilidad

BIBLIOGRAPHY

Basic:
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- Dresner, Simon. Els Principis de la sostenibilitat [on line]. Barcelona: Edicions UPC, 2009 [Consultation: 10/03/2022]. Available on: https://upcommons.upc.edu/handle/2099.3/36834. ISBN 9788498800715.
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- "Accesibilidad en televisión digital". UNE 153030:2008 IN. Madrid: AENOR, 2008.
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- "Accesibilidad universal. Parte 2: Sistema de gestión de la accesibilidad". UNE 170001-2:2007. Madrid: AENOR, 2007.
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- "Vehículos automóviles. Accesibilidad de los mandos en los vehículos de turismo". UNE 26316:1983. Madrid: AENOR, 1983.
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- "Accesibilidad en las playas y en su entorno". UNE 41512:2001. Madrid: AENOR, 2001.
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- "Reglas de seguridad para la construcción e instalación de ascensores. Aplicaciones particulares para los ascensores de pasajeros y de pasajeros y cargas. Parte 70: Accesibilidad a los ascensores". UNE-EN 81-70:2018. Madrid: AENOR, 2018.
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Complementary:

- "Aplicaciones informáticas para personas con discapacidad. Requisitos de accesibilidad al ordenador. Hardware.". UNE 139801:2003. Madrid: AENOR, 2003.
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