Course guide
480091 - TIC - Information and Communication Technologies

Last modified: 03/07/2023

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

Degree: MASTER'S DEGREE IN SUSTAINABILITY SCIENCE AND TECHNOLOGY (Syllabus 2013). (Optional subject).

Academic year: 2023 **ECTS Credits:** 5.0 **Languages:** Spanish, English

LECTURER

Coordinating lecturer: EVA MARIA VIDAL LOPEZ

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
3. Design, develop, apply and evaluate conceptual frameworks, theories, methodologies and techniques typical of ICT in contexts of promoting sustainable development and sustainability.
2. The ability to apply, critically and effectively, conceptual frameworks, data collection and processing techniques, applied statistics, mathematical modelling, systems analysis, geographic information systems, information and communication technologies and industrial ecology to meeting the challenges of sustainability and sustainable development.
4. The ability to apply the methods and tools used in the management of the industrial manufacturing sector, information and communication technologies and measuring, modelling and simulation systems in the identification, information management, planning, management, execution and assessment of programmes and projects in the fields of industrial engineering and engineering project management.
5. (ENG) Aplicar métodos y herramientas avanzados de gestion integrada del sector productivo, los servicios, las tecnologías de la información y las comunicaciones, y los sistemas de medida, modelización y simulación, en la identificación, gestión de la información, planificación, gestión, ejecución y evaluación de programas y proyectos en contextos de promoción del desarrollo sostenible y la sostenibilidad.
6. (ENG) Conocer los impactos ambientales y sociales de la obtención de materia prima y manufacturación de los productos TIC, así como los problemas asociados a las basuras electrónicas (e-waste), las opciones de reciclado y reutilización y los problemas socioambientales asociados al uso de las TIC. Aplicar los conocimientos adquiridos a temas como compra o uso responsable de las TIC.

Transversal:
1. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the subject the student knows and understands the characteristics of information technologies and communications, their applications, potentialities, limits and socio-economic-environmental impacts.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	12,0	9.60
Hours small group	9,0	7.20
Self study	80,0	64.00
Hours large group	24,0	19.20

Total learning time: 125 h

CONTENTS

1. Basic concepts of Information Technology and Telecommunications

Description:
Telecommunication Systems.
Transmission of data.
Types of Networks.
Intranet Internet.
Big Data. Artificial intelligence.
Applications.
Future

Specific objectives:
To know the basic elements of ICT tools. Understand their essential working principle and their power, hardware, and software requirements.

Related activities:
(ENG) Trabajo en el aula en grupos de identificación.
Trabajo individual de recopilación.

Related competencies :
CE28. (ENG) Aplicar métodos y herramientas avanzados de gestion integrada del sector productivo, los servicios, las tecnologías de la información y las comunicaciones, y los sistemas de medida, modelización y simulación, en la identificación, gestión de la información, planificación, gestión, ejecución y evaluación de programas y proyectos en contextos de promoción del desarrollo sostenible y la sostenibilidad.
CE24. The ability to apply the methods and tools used in the management of the industrial manufacturing sector, information and communication technologies and measuring, modelling and simulation systems in the identification, information management, planning, management, execution and assessment of programmes and projects in the fields of industrial engineering and engineering project management.

Full-or-part-time: 19h
Theory classes: 9h
Self study : 10h

2. ICT applications in sustainable human development

Description:
ICTs as a mechanism for human interaction. ICT projects: provision of infrastructure, maintenance, hardware and software development, creation of digital content and services. Criteria for real access. Digital divide. ICTs and the SDGs.

Specific objectives:
To find out how ICT applications can participate in sustainable human development.
To find out, through case studies, which tools are involved in projects directly linked to development and sustainability.

Related activities:
Guided works of analysis of existing ICT projects
Realization of a blog or Wiki

Related competencies :
CE28. (ENG) Aplicar métodos y herramientas avanzados de gestion integrada del sector productivo, los servicios, las tecnologías de la información y las comunicaciones, y los sistemas de medida, modelización y simulación, en la identificación, gestión de la información, planificación, gestión, ejecución y evaluación de programas y proyectos en contextos de promoción del desarrollo sostenible y la sostenibilidad.
CE12. Design, develop, apply and evaluate conceptual frameworks, theories, methodologies and techniques typical of ICT in contexts of promoting sustainable development and sustainability.
CE26. (ENG) Conocer los impactos ambientales y sociales de la obtención de materia prima y manufacturación de los productos TIC, así como los problemas asociados a las basuras electrónicas (e-waste), las opciones de reciclado y reutilización y los problemas socioambientales asociados al uso de las TIC. Aplicar los conocimientos adquiridos a temas como compra o uso responsable de las TIC.
CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

Full-or-part-time: 19h
Theory classes: 9h
Guided activities: 10h

ICT and environment

Description:
Environmental impact of ICT and how ICT can improve the environmental impacts of human activity. eWaste, Green IT, Cloud Computing.

Specific objectives:
To learn what is the real impact of ICT tools on the environment (production, use, end of life).
To learn the possibilities of ICT tools to manage and/or improve the environmental impacts of other technologies

Related activities:
Guided works of analysis of existing ICT projects

Related competencies :
CE28. (ENG) Aplicar métodos y herramientas avanzados de gestion integrada del sector productivo, los servicios, las tecnologías de la información y las comunicaciones, y los sistemas de medida, modelización y simulación, en la identificación, gestión de la información, planificación, gestión, ejecución y evaluación de programas y proyectos en contextos de promoción del desarrollo sostenible y la sostenibilidad.
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CE04. The ability to apply, critically and effectively, conceptual frameworks, data collection and processing techniques, applied statistics, mathematical modelling, systems analysis, geographic information systems, information and communication technologies and industrial ecology to meeting the challenges of sustainability and sustainable development.
CE26. (ENG) Conocer los impactos ambientales y sociales de la obtención de materia prima y manufacturación de los productos TIC, así como los problemas asociados a las basuras electrónicas (e-waste), las opciones de reciclado y reutilización y los problemas socioambientales asociados al uso de las TIC. Aplicar los conocimientos adquiridos a temas como compra o uso responsable de las TIC.
CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

Full-or-part-time: 16h
Theory classes: 6h
Self study : 10h

4. Social impact of ICT

Description:
Contributions of ICT tools in health, education, governance, promotion of human rights, rural development, social and cultural advances, economy...

Specific objectives:
To learn how ICT tools impact, both negative and positively, in different areas of society and culture.

Related activities:
Conducted works of analysis of existing ICT projects

Related competencies :
CE28. (ENG) Aplicar métodos y herramientas avanzados de gestion integrada del sector productivo, los servicios, las tecnologías de la información y las comunicaciones, y los sistemas de medida, modelización y simulación, en la identificación, gestión de la información, planificación, gestión, ejecución y evaluación de programas y proyectos en contextos de promoción del desarrollo sostenible y la sostenibilidad.
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CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

Full-or-part-time: 13h
Theory classes: 3h
Guided activities: 10h

Case Studies

Description:
Analysis of examples and their impacts. Economic, cultural and social context. Ethical issues.
Proposals of ICT projects.

Specific objectives:
From the knowledge of real cases, infer possible future related with ICT impacts.

Related activities:
Guided projects of analysis of existing ICT projects.
Generation of project proposals.

Related competencies :
CE28. (ENG) Aplicar métodos y herramientas avanzados de gestion integrada del sector productivo, los servicios, las tecnologías de la información y las comunicaciones, y los sistemas de medida, modelización y simulación, en la identificación, gestión de la información, planificación, gestión, ejecución y evaluación de programas y proyectos en contextos de promoción del desarrollo sostenible y la sostenibilidad.
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CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.

Full-or-part-time: 18h
Theory classes: 3h
Guided activities: 5h
Self study : 10h

ACTIVITIES

A1. Guided projects of analysis of existing ICT projects.

Description:
Description, benefits, ICT contribution, discussion - defense of the project, weaknesses, possible improvements, ethical issues.

Specific objectives:
Specific objectives: to learn the current status of ICT projects, their implications and to propose improvements.

Material:
Study articles (mostly web-based).

Delivery:
Written work in electronic format.

Related competencies :
CE24. The ability to apply the methods and tools used in the management of the industrial manufacturing sector, information and communication technologies and measuring, modelling and simulation systems in the identification, information management, planning, management, execution and assessment of programmes and projects in the fields of industrial engineering and engineering project management.
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CE04. The ability to apply, critically and effectively, conceptual frameworks, data collection and processing techniques, applied statistics, mathematical modelling, systems analysis, geographic information systems, information and communication technologies and industrial ecology to meeting the challenges of sustainability and sustainable development.
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Full-or-part-time: 20h
Guided activities: 5h
Self study: 15h

A2. STARTING A A BASIC INFORMATION SYSTEM

Description:
Implementation of a basic information system

Material:
Laptop

Full-or-part-time: 20h
Guided activities: 5h
Self study: 15h

GRADING SYSTEM

EXAMINATION RULES.

BIBLIOGRAPHY

Basic:
- Association for Progressive Communications (APC), Humanist Institute for Cooperation with Developing Countries (Hivos). "Focus on ICTs and environmental sustainability". Global information society watch [on line]. 2010 [Consultation: 02/03/2021]. Available on: http://www.giswatch.org/sites/default/files/gisw2010_en.pdf.

Complementary:
- Redes inalámbricas en los países en desarrollo: una guía práctica para planificar y construir infraestructuras de telecomunicaciones de bajo costo. 3a ed. Hacker Friendly, 2008. ISBN 9780977809370.
- Martínez, A. Bases metodológicas para evaluar la viabilidad y el impacto de proyectos de telemedicina [on line]. Washington, DC: Pan American Health Organization, 2001 [Consultation: 02/05/2020]. Available on: http://www.ehas.org/wp-content/uploads/2012/01/libro-bases-metodologicas-para-evaluar-la-viabilidad-y-el-impacto-de-proy-de-telemedicina.pdf. ISBN 9275323631.
- Heeks, R. The ICT4D 2.0 Manifesto: where next for ICTs and international development? Development Informatics Working Paper No. 42 [on line]. Manchester, Reido Unido, 2009 [Consultation: 02/05/2020]. Available on: https://www.escholar.manchester.ac.uk/api/datastream?publicationPid=uk-ac-man-scw:86518&datastreamId=FULL-TEXT.DOC. ISBN 978-1-905469-11-6.
- Real Access / Real Impact Criteria [on line]. Cape Town: Bridges.org, 2007 [Consultation: 02/05/2020]. Available on: https://pasdbp.files.wordpress.com/2008/04/bridgesorg_real_access_real_impact1.pdf.
- ITU. Measuring information society : the ICT development index [on line]. Ginebra: International Telecommunication Union, 2009 [Consultation: 04/05/2021]. Available on: http://www.itu.int/ITU-D/ict/publications/idi/material/2009/MIS2009_w5.pdf. ISBN 9261128319.

RESOURCES

Other resources:
Selected articles on ICT and sustainability.
Web resources:
https://upc-ict4d.blogspot.com/ />http://reciclatgeelectronic.blogspot.com/ />