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820019 - TMS - Environmental Technologies and Sustainability

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering

Teaching unit: 748 - FIS - Department of Physics

Academic year: 2017

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
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BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)

ECTS credits: 6 Teaching languages: Catalan

Teaching staff

Coordinator: Bàrbara Sureda

Others: Olga Alcaraz, Nuria Borras,José López, Mª. Antònia Majó, Bàrbara Sureda, Albert Turon

Prior skills

None

Requirements

None

Degree competences to which the subject contributes

Specific:

2. Understand the basic applications of environmental technologies and sustainability principles.

Transversal:

1. 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.

Teaching methodology

Expository methods, individual and/or group work, cooperative learning, watching documentaries, directed activities, case studies, tests and examinations.

Learning objectives of the subject

· To give students an overview of the state of the world that focuses on limitations and imbalances.
· For students to analyse the concept of sustainable development and develop the ability to apply it in engineering.

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· To make students aware of environmental and sustainable technologies and of their applications in the field of engineering: energy, transport, construction, etc.
· For students to analyse the role of technoscience and the social and environmental impact of technology.
· For students to apply the concepts and methods of the sustainability paradigm in the design, implementation, operational and decommissioning stages of any engineering project.
· For students to analyse existing systems and current and future problems in decision making on a global level.

Study load

Total learning time: 150h	Hours large group:	30h	20.00%
	Hours medium group:	0h	0.00%
	Hours small group:	30h	20.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

0. Course presentation

Learning time: 10h

Theory classes: 2h
Practical classes: 2h
Self study : 6h

Description:
0.1 Introduction
0.2 Teachers
0.3 Course objectives
0.4 Syllabus
0.5 Agenda
0.6 Programming Jobs
0.7 Bibliography

1. State of the world

Learning time: 50h

Theory classes: 10h
Practical classes: 10h
Self study : 30h

Description:
1.1 Ecological phases of mankind
1.2 Carrying capacity
1.3 The great acceleration; growth and limits to growth
1.4 The anthropocene
1.5 The globalization

Specific objectives:
- Understand the problems of the world from a number of perspectives: economic, environmental, cultural, etc.
- Analyse globalisation as it now stands and its relationship with sustainability.

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2. Sustainable paradigm. Models of development. Sustainable Human Development

Learning time: 40h

Theory classes: 8h
Practical classes: 8h
Self study : 24h

Description:
2.1 Sustainable Development concept
2.2 Mechanist paradigm vs. systemic paradigm. Complexity
2.3 Sustainability examples
2.4 Development models
2.5 Economics and environmental economy, and social economy

Specific objectives:
- Analyse the models of development
- Define the concept of sustainable development.
- Analyse the concept of sustainable development and its various interpretations.
- Analyse the application of the concept of sustainable development from industrial, political, social and economic perspectives.
- Understand the methodologies and instruments used to measure sustainable development.

3. International organizations and multilateral agenda for 2030

Learning time: 25h

Theory classes: 5h
Practical classes: 5h
Self study : 15h

Description:
3.1 Multilateral international policy
3.2 International reports, data and policies
3.3 International Agenda

Specific objectives:
- Understand the historical evolution of the political agenda and the international organizations.
- Analyze the role of the main international organizations.
- Analyze the multilateral agenda for 2030 and the main international treaties.
- Analyze the existing systems for decision-making at the international level

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4. Policies and technologies for sustainability	Learning time: 25h Theory classes: 5h Practical classes: 5h Self study : 15h

Description:
4.1. Ethical dimension and corporate responsibility of companies and individuals
4.2. Methodologies for sustainability
4.3. Sectoral policies

Specific objectives:
- Analyze individual and organizations responsibility to achieve sustainability
- Draw up sustainability paradigms in the design of products and the different methodologies that can be applied to them.
- Understand how sustainability paradigms are specified in production processes and apply the various existing methodologies to specific examples.

Qualification system

Assessment methods: assignments, oral presentations, two examinations (mid-semester and at the end of the year), practical problems and exercises.

Final mark: mid-semester examination = 32%; exercises, dossier of practical problems = 15%; final examination = 43%; attendance = 10%

Absences of practices without justification penalize the final note of dossier of practical problems, progressively:
End note dossier = (1-0.0817 * Nº faults assistance) * Provisional note of dossier of practical problems

Assessment criteria for generic competencies:
Sustainability and social commitment = final mark.

At the end of the semester there will be the reexamination exam.

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Bibliography

Basic:

Xercavins, Josep [et al.]. Desarrollo sostenible. 2005. Barcelona: Edicions UPC, 2005. ISBN 8483018055.

Mendoza Roca, José Antonio [et al.]. Ciencia y tecnología del medio ambiente. 1998. Valencia: Universidad Politécnica. Servicio de Publicaciones, DL 1998. ISBN 8477216894.

Nebel, Bernard J. Ciencias ambientales : ecología y desarrollo sostenible. 6a ed. México [etc.]: Prentice Hall Hispanoamericana, cop. 1999. ISBN 9701702336.

Alarcón Jordán, M.; Àvila Castells, A.; Cunillera i Grañó, J. Canvi climàtic : evidències científiques. Barcelona: Iniciativa Digital Politècnica, 2011. ISBN 9788476536575.

Complementary:

Worldwatch Institute. L'Estat del món ... : informe del Worldwatch Institute sobre el progrés cap a una societat sostenible. Barcelona: Centre Unesco de Catalunya, 199-?]-.

Diamond, Jared M. Colapso : por qué unas sociedades perduran y otras desaparecen. Barcelona: Debate, 2005. ISBN 8483066483.

Cabeza i Díaz, Rafael. L'Aigua, un recurs universal i escàs : iniciació al tractament i utilització racional de l'aigua. Barcelona: Beta, 1997. ISBN 8470913638.