820019 - TMS - Environmental Technologies and Sustainability

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 748 - FIS - Department of Physics
Academic year: 2018
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)
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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.

<table>
<thead>
<tr>
<th>Study load</th>
<th>Hours large group:</th>
<th>30h</th>
<th>20.00%</th>
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<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
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<tr>
<td></td>
<td>Hours small group:</td>
<td>30h</td>
<td>20.00%</td>
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<td></td>
<td>Guided activities:</td>
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<tr>
<td></td>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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</table>
# Content

## 0. Course presentation

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 10h</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 Introduction</td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td>0.2 Teachers</td>
<td>Practical classes: 2h</td>
</tr>
<tr>
<td>0.3 Course objectives</td>
<td>Self study: 6h</td>
</tr>
<tr>
<td>0.4 Syllabus</td>
<td></td>
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<tr>
<td>0.5 Agenda</td>
<td></td>
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<tr>
<td>0.6 Programming Jobs</td>
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<tr>
<td>0.7 Bibliography</td>
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</tbody>
</table>

## 1. State of the world

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 50h</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Ecological phases of mankind</td>
<td>Theory classes: 10h</td>
</tr>
<tr>
<td>1.2 Carrying capacity</td>
<td>Practical classes: 10h</td>
</tr>
<tr>
<td>1.3 The great acceleration; growth and limits to growth</td>
<td>Self study: 30h</td>
</tr>
<tr>
<td>1.4 The anthropocene</td>
<td></td>
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<tr>
<td>1.5 The globalization</td>
<td></td>
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</tbody>
</table>

### 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.
# 2. Sustainable paradigm. Models of development

**Description:**
- Sustainable Development concept
- Mechanist paradigm vs. systemic paradigm. Complexity
- Sustainability examples
- Development models
- 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

**Description:**
- Multilateral international policy
- International reports, data and policies
- 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.
4. Policies and technologies for sustainability

**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.

**Learning time:** 25h
- Theory classes: 5h
- Practical classes: 5h
- Self study: 15h

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**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.
# Bibliography

## Basic:


## 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-?-).