820019 - TMS - Environmental Technologies and Sustainability

**Coordinating unit:** 295 - EEBE - Barcelona East School of Engineering  
**Teaching unit:** 748 - FIS - Department of Physics  
**Academic year:** 2019  
**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)  
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 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:** BARBARA SUREDA CARBONELL

**Others:**  
Primer quadrimestre:  
OLGA ALCARAZ SENDRA - M21, M22, M23, T21  
NÚRIA BORRÀS CRISTÒFOL - M11  
IRENE LÓPEZ PEÑA - M12, M31  
BARBARA SUREDA CARBONELL - M11, M12, M31, M32, T11, T12  
ALBERT TURON FLORENZA - M21, M22, M23, M32

### 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.
Learning objectives of the subject

- To give students an overview of the state of the world that focuses on limitations and imbalances.
- To analyse the concept of sustainable development and develop the ability to apply it in engineering.
- To make students aware of environmental and sustainable technologies and of their applications in the field of engineering: energy, transport, construction, etc.
- To analyse the role of technoscience and the social and environmental impact of technology.
- To apply the concepts and methods of the sustainability paradigm in the design, implementation, operational and decommissioning stages of any engineering project.
- To analyse existing systems and current and future problems in decision making on a global level.

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 30h</th>
<th>20.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group: 0h</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Hours small group: 30h</td>
<td>20.00%</td>
<td></td>
</tr>
<tr>
<td>Guided activities: 0h</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Self study: 90h</td>
<td>60.00%</td>
<td></td>
</tr>
</tbody>
</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>
</tr>
<tr>
<td>0.5 Agenda</td>
<td></td>
</tr>
<tr>
<td>0.6 Programming Jobs</td>
<td></td>
</tr>
<tr>
<td>0.7 Bibliography</td>
<td></td>
</tr>
</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>
</tr>
<tr>
<td>1.5 The globalization</td>
<td></td>
</tr>
</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. Sustainable Human Development

<table>
<thead>
<tr>
<th>Learning time: 40h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 8h</td>
</tr>
<tr>
<td>Practical classes: 8h</td>
</tr>
<tr>
<td>Self study: 24h</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Learning time: 25h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 5h</td>
</tr>
<tr>
<td>Practical classes: 5h</td>
</tr>
<tr>
<td>Self study: 15h</td>
</tr>
</tbody>
</table>

**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
4. Policies and technologies for sustainability

<table>
<thead>
<tr>
<th>Description:</th>
<th>Learning time: 25h</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1. Ethical dimension and corporate responsibility of companies and individuals</td>
<td>Theory classes: 5h</td>
</tr>
<tr>
<td>4.2. Methodologies for sustainability</td>
<td>Practical classes: 5h</td>
</tr>
<tr>
<td>4.3. Sectoral policies</td>
<td>Self study: 15h</td>
</tr>
</tbody>
</table>

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 = 38%; exercises, dossier of practical problems = 14%; final examination = 38%; 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.
The students will be able to access the re-assessment test that meets the requirements set by the EEBE in its Assessment and Permanence Regulations (https://eebe.upc.edu/ca/estudis/normatives-academiques/documents/eebe-normativa-avaluacio-i-permanencia-18-19-aprovat-je-2018-06-13.pdf)
820019 - TMS - Environmental Technologies and Sustainability

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-?].


Others resources:

https://www.un.org/sustainabledevelopment/es/objetivos-de-desarrollo-sostenible/