480071 - BISS - Biodiversity and Socio-Ecological Systems

**Coordinating unit:** 250 - ETSECCPB - Barcelona School of Civil Engineering

**Teaching unit:** 731 - OO - Department of Optics and Optometry

**Academic year:** 2019

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

**ECTS credits:** 5  **Teaching languages:** Spanish, English

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### Degree competences to which the subject contributes

**Specific:**

3. The capacity to apply the methods and tools used in the identification, information management, planning, management, execution and evaluation of programmes and projects in the fields of sustainability and environmental management to specific problems in a collaborative manner.

4. The ability to design, develop and apply, in an integrated and coordinated manner, the theories and analytical techniques of the social, economic and Earth sciences, as well as management and research-action techniques and approaches based on sustainability science and technology in the fields of biodiversity and natural resources, the built environment and services, and production systems and information.

2. The ability to critically analyse theories and perspectives on the traits and properties of the geosphere and biosphere that facilitate and frame the development of socio-environmental systems, as well as the main challenges posed by climate change.

6. The ability to apply the methods and tools used in the integrated management of the natural environment and natural resources in the identification, information management, planning, management, execution and assessment of programmes and projects in the fields of food and rural development.

5. The ability to integrate knowledge of integrated management of the natural environment and natural resources, particularly water and energy resources, in the development and proposal of scientific and technological solutions to challenges to sustainability.

7. The ability to apply the methods and tools used in the integrated management of the natural environment and natural resources in the identification, information management, planning, management, execution and assessment of programmes and projects in water engineering and technology.

**Generical:**

9. Develop and / or implement innovative ideas in a research context by identifying and formulating hypotheses and by submitting to prove objectivity, consistency and viability.

**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.
Learning objectives of the subject

At the end of the course, the student:

Will learn the principles and instruments of ecology. Will understand and be able to analyze the relationships between living organisms and the environment, the structure and dynamics of populations and ecosystems, the metabolism of ecological systems and the available tools for measuring, management and recovery through environmental services.

Will know and understand the interrelationships of water cycles, hydrologic principles, characteristics of different water resources, quantitative and qualitative problems of surface and groundwater, as well as the main treatment technologies and more extended integrated management mechanisms.

Will understand the need of water and energy resources for sustainable human development and will know the changes along the process from the source to the service and supply of resources as well as its security constraints and quality.

Will be able to critically and holistically analyze energy systems at global and local scale, considering the complex relationships between the economy, the environment and society that influence them. Will be able to provide original ideas in the search for solutions and alternatives to current problems.
## Study load

<table>
<thead>
<tr>
<th></th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Guided activities:</th>
<th>Self study:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time:</strong> 125h</td>
<td>30h</td>
<td>0h</td>
<td>0h</td>
<td>15h</td>
<td>80h</td>
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<tr>
<td></td>
<td>24.00%</td>
<td>0.00%</td>
<td>0.00%</td>
<td>12.00%</td>
<td>64.00%</td>
</tr>
</tbody>
</table>
Content

1. Analysis framework and levels of organization.

Degree competences to which the content contributes:
Description:
2. Scales of work. From global ecology to the micro scale.
3. Levels of organization.
5. Composition of living matter.

Related activities:


Degree competences to which the content contributes:
Description:
1. Distribution and abundance of populations.
2. Environmental factors, which affect growth. Ecological niche.
4. Evolutionary strategies and interaction among species.
5. Metabolic diversity. Ecosystem functioning.
6. Food chains and energy flows.

Related activities:
Sessions. Classroom work. Activity 2: Environmental factors that affect living beings.


Degree competences to which the content contributes:
Description:
2. Measure of biodiversity
3. Biodiversity Crisis
4. Worldwide Policy

Related activities:
4. Global and climate changes in aquatic and terrestrial ecosystems.

Degree competences to which the content contributes:

Description:
1. Impacts of climate change.
2. Environmental impacts.
3. Socio-economic impacts.
4. Institutional impacts.
5. Impacts and vulnerability.

Related activities:

5. Mitigation, adaptation and ecosystems resilience.

Degree competences to which the content contributes:

Description:
1. Biophysical limits of the planet
3. Biofilms as complex communities.
4. Resilience and adaptation. Adaptive strategies at different scales.
5. Vulnerability and resilience.
6. Mitigation.

Related activities:

6. Ecosystem services.

Degree competences to which the content contributes:

Description:
1. Environmental and ecosystem services.
2. Economic valuation of environmental goods and services. Methods and tools.
4. Case studies.

Related activities:
Sessions. Classroom work.

7. Natural resources.
### Degree competences to which the content contributes:

**Description:**
1. History and environmental impact of resource use.
2. Sustainable Development.
4. Agriculture and environment.
5. Planning. Territorial planning. Physical planning with ecological basis.

**Related activities:**
Sessions. Classroom work. Activity 7: Impact of agriculture on climate change.

### 8. Integrated and sustainable natural resources management.

#### Degree competences to which the content contributes:

**Description:**
3. Lifecycle Assessment (LCA).
4. Sustainability criteria in territorial planning.
5. Frameworks. DPSIR models. Population management
6. Natural treatment systems.
7. Good practices for adaptation to climate change.

**Related activities:**
Sessions. Classroom work. Activity 8: Analysis of EIA conducted in mobility infrastructure.
### Planning of activities

| A1. ORGANIZATIONAL LEVELS | Hours: 0h 25m  
Theory classes: 0h 25m |
|----------------------------|----------------------|
| **Description:**       | Micro scale to macro scale  
Presentation highlighting the connection between the different scales of work in ecology. |
| **Support materials:** | Presentation in PDF |
| **Descriptions of the assignments due and their relation to the assessment:** | No |

| A2. CARBON CYCLE AND FOSSIL FUELS | Hours: 0h 30m  
Theory classes: 0h 30m |
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Impact of fossil fuels on the carbon cycle video.</td>
</tr>
<tr>
<td><strong>Support materials:</strong></td>
<td>Video</td>
</tr>
<tr>
<td><strong>Descriptions of the assignments due and their relation to the assessment:</strong></td>
<td>Synthesis and analysis problem</td>
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</tbody>
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| A3. ENVIRONMENTAL FACTORS THAT AFFECT LIVING THINGS | Hours: 0h 30m  
Theory classes: 0h 30m |
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<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Identify factors in the growth of living things environmental factors. Workgroups</td>
</tr>
<tr>
<td><strong>Descriptions of the assignments due and their relation to the assessment:</strong></td>
<td>Ordered list of factors</td>
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| A4. ARTICLES ON BIODIVERSITY. WORKGROUPS | Hours: 1h  
Theory classes: 1h |
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<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Review articles</td>
</tr>
<tr>
<td><strong>Support materials:</strong></td>
<td>Scientific articles</td>
</tr>
<tr>
<td><strong>Descriptions of the assignments due and their relation to the assessment:</strong></td>
<td>Abstract, keywords and problematic.</td>
</tr>
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</table>
### A5. B. Holling, Resilience and Biophysical Limits of the Planet

**Description:**
- Video

**Support materials:**
- Video (English)

**Descriptions of the assignments due and their relation to the assessment:**
- No

**Hours:** 0h 25m  
Theory classes: 0h 25m

### A7. Impact of Agriculture on Climate Change

**Description:**
- Video

**Support materials:**
- Video (English)

**Descriptions of the assignments due and their relation to the assessment:**
- No

**Hours:** 0h 15m  
Theory classes: 0h 15m

### A8. EIA Analysis in Mobility Infrastructure

**Description:**
- EIA review and analysis. Workgroups

**Support materials:**
- EIA

**Descriptions of the assignments due and their relation to the assessment:**
- EIA critical analysis

**Hours:** 1h  
Theory classes: 1h

### Qualification system

- **EV1:** Written test (PE). 30%
- **EV2:** Oral test (PO). 0%
- **EV3:** Individual or group coursework (TR). This includes results and reports and their oral presentation. 50%
- **EV4:** Class and laboratory attendance and participation (AP). 0%
- **EV5:** Performance and quality of group work (TG). 20%
Bibliography

Basic:


