390432 - TBR - Biological Treatment of Waste

Coordinating unit: 390 - ESAB - Barcelona School of Agricultural Engineering
Teaching unit: 745 - EAB - Department of Agri-Food Engineering and Biotechnology
Academic year: 2018
Degree: BACHELOR'S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6

Teaching languages: Catalan, Spanish

Degree competences to which the subject contributes

Specific:
1. Biological processes for treating of organic waste.

Transversal:
2. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 3. Taking social, economic and environmental factors into account in the application of solutions. Undertaking projects that tie in with human development and sustainability.

Teaching methodology

- Theory classes: To explain the concepts and promote the participation of students
- Classroom / cabinet practices: To solve problems and study case related to the subject.
- Laboratory practice: A 2h laboratory session for the recognition and identification of organic materials, especially those that can be evaluated by means of biological treatments or products resulting from the treatments.
- Technical visits: To know the operation of industrial facilities for biological treatment of organic waste.

Learning objectives of the subject

The student, upon successful completion of the subject, will be able to:
- Know the social, economic, regulatory and environmental framework for the management of organic waste
- Know the main characteristics of organic waste and interpret the analytical parameters useful for the evaluation of organic waste.
- Understand the scientific and technical foundations of the biological processes used for the treatment of organic waste.
- Evaluate the characteristics of the products resulting from the biological treatment of organic waste and contrast them with other organic materials.
# Study load

<table>
<thead>
<tr>
<th>Study load</th>
<th>Total learning time: 150h</th>
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</thead>
<tbody>
<tr>
<td>Hours large group:</td>
<td>40h</td>
</tr>
<tr>
<td>Hours medium group:</td>
<td>0h</td>
</tr>
<tr>
<td>Hours small group:</td>
<td>20h</td>
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<tr>
<td>Guided activities:</td>
<td>0h</td>
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<tr>
<td>Self study:</td>
<td>90h</td>
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</tr>
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<td>Self study: 90h</td>
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</table>

**Learning time:** 150h

## Content

### Introduction and organic waste

**Learning time:** 29h
- Theory classes: 7h
- Laboratory classes: 2h
- Self study: 20h

**Description:** content english

### Biological Treatments

**Learning time:** 112h
- Theory classes: 29h
- Laboratory classes: 18h
- Self study: 65h

**Description:** content english

### Elements for the Choice of the Treatment System

**Learning time:** 9h
- Theory classes: 4h
- Self study: 5h

**Description:** content english
### Planning of activities

<table>
<thead>
<tr>
<th>ACTIVITY 1: THEORY LECTURES</th>
<th>Hours: 86h</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 38h</td>
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<tr>
<td></td>
<td>Self study: 48h</td>
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**Description:**
38 h classroom sessions. Items for this activity are described in the contents section.

**Specific objectives:**
Indicated in the contents of every topic.

<table>
<thead>
<tr>
<th>ACTIVITY 2: EXAMS</th>
<th>Hours: 2h</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
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**Description:**
Individual written test at mid-course.
Individual written test at the end of the course.

**Support materials:**
Exam statement, calculator.

**Descriptions of the assignments due and their relation to the assessment:**
Solved exam.

**Specific objectives:**
Assess the maturity of the knowledge and skills acquired in the sessions of lectures and in the resolution of problems and applied cases.

<table>
<thead>
<tr>
<th>ACTIVITY 3: CASE STUDY AND LABORATORY</th>
<th>Hours: 50h</th>
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<tbody>
<tr>
<td></td>
<td>Laboratory classes: 12h</td>
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<td></td>
<td>Self study: 38h</td>
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</tbody>
</table>

**Description:**
b) Study of the processes of anaerobic digestion and composting. Process and technology design.
c) In the laboratory, recognition, basic analysis and identification of organic materials from various activities with special attention to those that can be biologically treated.

**Support materials:**
Exercises, problems and cases proposed. Computer and calculator. Different documents.

<table>
<thead>
<tr>
<th>ACTIVITY 4: VISIT TO FACILITIES</th>
<th>Hours: 12h</th>
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<tr>
<td></td>
<td>Laboratory classes: 8h</td>
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<tr>
<td></td>
<td>Self study: 4h</td>
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**Description:**
T2 technical visits of 4 hours (8 hours). Visit to industrial facilities for biological treatment of organic waste and other types of treatment / destination. One will be carried out at some anaerobic digestion and composting system with a high capacity capacity. Another one will be made to a simpler installation.
Support materials:
- Questionnaire of the visit. Appropriate clothing and shoes.

Descriptions of the assignments due and their relation to the assessment:
- Filled questionnaire, where the degree of understanding of the installation, the environmental and management problem that is solved, the social aspects of this and the conditions for the correct operation and operation of the global project are reflected.

Qualification system

The final grade of the subject (Nfinal) will be obtained by weighting the different tests and works evaluated during the course:

N1: Individual assessment tests. There will be 2 exams, one in the middle of the semester and the other in the end, Weight 40% (20% each)
N2: Contextualisation of waste and relation with the regulations (Practice 1), Weight 5%, Qualification of the anaerobic digestion process development report (Practices 2 and 3) Weight 10%, Evaluation of the process development report Composting (Practices 4 and 5) Weight 10%, Qualification of the recognition and identification of biological process material in Laboratory (Practice 6) weight 5%
N3: Qualification of the oral presentation of the management of organic waste through the processes of anaerobic digestion and composting, weight 10%
N4: Qualification of the technical visits report Weight 5% (2.5% each)
CG: Generic competence (average of N3, practice 6 and N4) weight 15%
- Exams are compulsory.
- Attendance to practices is mandatory and the realization of the same can not be done individually.
- The absence of technical visits or practice 6 (laboratory) will imply a score of 0 that is not recoverable or compensable.

Nfinal = 0.4 * N1 + 0.3 * N2 + 0.1 * N3 + 0.05 * N4 + 0.15 * CG

Additionally, activities and / or deliverables may be proposed to make a note on previous evaluations.
Bibliography

**Basic:**


**Complementary:**


