390205 - SCE - Energy Systems and Components

Coordinating unit: 390 - ESAB - Barcelona School of Agricultural Engineering
Teaching unit: 745 - EAB - Department of Agri-Food Engineering and Biotechnology
Academic year: 2019
Degree: BACHELOR'S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR’S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AGRICULTURAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR’S DEGREE IN AGRICULTURAL, ENVIRONMENTAL AND LANDSCAPE ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR’S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish, English

Teaching staff
Coordinator: JOAN MAJO ROCA
Others: Joan Majó Roca
Jordi Llop Casamada

Degree competences to which the subject contributes
Specific:
2. Rural engineering: engines and machinery, electrical engineering.

Teaching methodology

Learning objectives of the subject
To track this course is that students achieve a basic vocabulary and an overview of energy systems. It aims to introduce students to the basics of electrical and thermal power systems, their applications, as well as saving technologies and energy efficiency, not to mention environmental issues.
Must be able to know the behavior of electrical systems, machines thermal criteria of energy efficiency and environmental protection. It aims to have the capacity to select and successfully apply these technologies in rural areas, as well as mastering the techniques of calculation introduced the subject.
### Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>40h</th>
<th>26.67%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
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</tr>
<tr>
<td>Hours small group:</td>
<td>20h</td>
<td>13.33%</td>
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</tr>
<tr>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
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</table>
## Content

<table>
<thead>
<tr>
<th><strong>INTRODUCTION TO ENERGY SYSTEMS</strong></th>
<th><strong>Learning time:</strong> 5h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
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<tr>
<td></td>
<td>Self study: 3h</td>
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</table>

**Description:**

**Related activities:**
- Activity 1: Class of theoretical explanation
- Activity 2: Individual final assessment
- Activity 5: Work: Update energy data

<table>
<thead>
<tr>
<th><strong>ELECTRICAL SYSTEMS single and three phase</strong></th>
<th><strong>Learning time:</strong> 45h</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 10h</td>
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<tr>
<td></td>
<td>Laboratory classes: 8h</td>
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<tr>
<td></td>
<td>Self study: 27h</td>
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</tbody>
</table>

**Description:**

Three-phase systems. Connecting generators and receivers in star and triangle. Relations-voltage intensity. Active power, reactive and apparent three-phase systems. Improved power factor receptors balanced.

**Related activities:**
- Activity 1: Class of theoretical explanation
- Activity 2: Individual final assessment
- Activity 3: Solving exercises and problems
- Activity 4: Practice Lab. Measure three phase power systems.
- Activity 5: Work: Description of electrical installation
### ELECTRICAL MACHINES

**Learning time:** 20h  
**Theory classes:** 6h  
**Laboratory classes:** 2h  
**Self study:** 12h

**Description:**  

**Related activities:**  
Activity 1: Class of theoretical explanation  
Activity 2: Individual final assessment  
Activity 3: Solving exercises and problems

### DEFINITIONS AND FUNDAMENTAL CONCEPTS OF THERMAL MACHINES

**Learning time:** 30h  
**Theory classes:** 8h  
**Laboratory classes:** 4h  
**Self study:** 18h

**Description:**  

**Related activities:**  
Activity 1: Class of theoretical explanation  
Activity 2: Individual final assessment  
Activity 3: Solving exercises and problems
<table>
<thead>
<tr>
<th><strong>POWER AND EFFICIENCY OF MOTORS</strong></th>
<th><strong>Learning time:</strong> 30h</th>
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</thead>
<tbody>
<tr>
<td><strong>endothermic</strong></td>
<td>Theory classes: 8h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Self study: 18h</td>
</tr>
</tbody>
</table>

**Description:**

**Related activities:**
- Activity 1: Class of theoretical explanation
- Activity 2: Individual final assessment
- Activity 3: Solving exercises and problems
- Activity 4: Practice Lab.

<table>
<thead>
<tr>
<th><strong>PRODUCTION OF HEAT AND COLD AND MORE EFFICIENT TECHNOLOGIES</strong></th>
<th><strong>Learning time:</strong> 20h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
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<tr>
<td></td>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study: 12h</td>
</tr>
</tbody>
</table>

**Description:**

**Related activities:**
- Activity 1: Class of theoretical explanation
- Activity 2: Individual final assessment
- Activity 3: Solving exercises and problems
### Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACTIVITY 1. THEORETICAL EXPLANATION</strong></td>
<td>Hours: 88h&lt;br&gt;Theory classes: 38h&lt;br&gt;Self study: 50h</td>
<td></td>
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<tr>
<td><strong>ACTIVITY 2. INDIVIDUAL ASSESSMENT TESTS</strong></td>
<td>Hours: 2h&lt;br&gt;Theory classes: 2h</td>
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<tr>
<td><strong>ACTIVITY 3. RESOLUTION OF EXERCISES AND PROBLEMS</strong></td>
<td>Hours: 40h&lt;br&gt;Laboratory classes: 16h&lt;br&gt;Self study: 24h</td>
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<tr>
<td><strong>ACTIVITY 4. LABORATORY</strong></td>
<td>Hours: 10h&lt;br&gt;Laboratory classes: 4h&lt;br&gt;Self study: 6h</td>
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<tr>
<td><strong>ACTIVITY 5. DESCRIPTION AND ANALYSIS OF A DOMESTIC ELECTRICAL INSTALLATION</strong></td>
<td>Hours: 10h&lt;br&gt;Self study: 10h</td>
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</tr>
</tbody>
</table>
Bibliography

Basic:


Complementary:


Others resources:

Hyperlink

Programes informàtics PROPAGUA i PROGASES
http://www.tecnun.es/asignaturas/termo/SOFTWARE/SoftTD.htm