Course guide
390205 - SCE - Energy Systems and Components

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.

Degree: BACHELOR’S DEGREE IN BIOSYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR’S DEGREE IN FOOD ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR’S DEGREE IN AGRONOMIC SCIENCE ENGINEERING (Syllabus 2018). (Compulsory subject).

Academic year: 2022  ECTS Credits: 6.0  Languages: Catalan, Spanish, English

LECTURER

Coordinating lecturer: 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

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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>Type</th>
<th>Hours</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Hours small group</td>
<td>20,0</td>
<td>13.33</td>
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<tr>
<td>Hours large group</td>
<td>40,0</td>
<td>26.67</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
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Total learning time: 150 h
## INTRODUCTION TO ENERGY SYSTEMS

**Description:**

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

**Full-or-part-time:** 5h
- Theory classes: 2h
- Self study : 3h

## ELECTRICAL SYSTEMS single and three phase

**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

**Full-or-part-time:** 45h
- Theory classes: 10h
- Laboratory classes: 8h
- Self study : 27h

## ELECTRICAL MACHINES

**Description:**

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

**Full-or-part-time:** 20h
- Theory classes: 6h
- Laboratory classes: 2h
- Self study : 12h
DEFINITIONS AND FUNDAMENTAL CONCEPTS OF THERMAL MACHINES

Description:

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

Full-or-part-time: 30h
Theory classes: 8h
Laboratory classes: 4h
Self study: 18h

POWER AND EFFICIENCY OF MOTORS endothermic

Description:

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

Full-or-part-time: 30h
Theory classes: 8h
Laboratory classes: 4h
Self study: 18h
## PRODUCTION OF HEAT AND COLD AND MORE EFFICIENT TECHNOLOGIES

**Description:**
Cooling systems. Diagram of compression refrigeration cycle. Components of a cooling system. Technologies efficient cooling systems.
CHP: concept, classification, characteristic parameters (REE ratio E / V, PES, etc ...) and application examples. Trigeneration.

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

**Full-or-part-time:** 20h
Theory classes: 6h
Laboratory classes: 2h
Self study: 12h

## ACTIVITIES

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<thead>
<tr>
<th>ACTIVITY 1. THEORETICAL EXPLANATION</th>
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<tbody>
<tr>
<td><strong>Full-or-part-time:</strong> 88h</td>
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<tr>
<td>Theory classes: 38h</td>
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<tr>
<td>Self study: 50h</td>
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<tr>
<th>ACTIVITY 2. INDIVIDUAL ASSESSMENT TESTS</th>
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<tbody>
<tr>
<td><strong>Full-or-part-time:</strong> 2h</td>
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<tr>
<td>Theory classes: 2h</td>
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<tr>
<th>ACTIVITY 3. RESOLUTION OF EXERCISES AND PROBLEMS</th>
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<tr>
<td><strong>Full-or-part-time:</strong> 40h</td>
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<tr>
<td>Laboratory classes: 16h</td>
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<td>Self study: 24h</td>
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<tr>
<th>ACTIVITY 4. LABORATORY</th>
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<tr>
<td><strong>Full-or-part-time:</strong> 10h</td>
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<tr>
<td>Laboratory classes: 4h</td>
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<td>Self study: 6h</td>
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<tr>
<th>ACTIVITY 5. DESCRIPTION AND ANALYSIS OF A DOMESTIC ELECTRICAL INSTALLATION</th>
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<tr>
<td><strong>Full-or-part-time:</strong> 10h</td>
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<td>Self study: 10h</td>
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**GRADING SYSTEM**

**BIBLIOGRAPHY**

**Basic:**

**Complementary:**

**RESOURCES**

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