Course guides
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: 2021  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


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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</thead>
<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>
</tr>
</tbody>
</table>

Total learning time: 150 h
# CONTENTS

## 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:**

**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:**
Thermodynamic principles. Ideal thermodynamic cycles: cycles of steam production work (Rankine); power cycles gases (Otto, Diesel, Sabathe). Income heat. Charts and diagrams theoretical real.
Components of petroleum fuels. Technical specifications (calorific value, octane, density, additives, antiknock power, volatility, etc ...). Specifications for the use of bio fuels. Combustion: mass balance and energy balance.

**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

**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

ACTIVITY 1. THEORETICAL EXPLANATION

Full-or-part-time: 88h
Theory classes: 38h
Self study: 50h

ACTIVITY 2. INDIVIDUAL ASSESSMENT TESTS

Full-or-part-time: 2h
Theory classes: 2h

ACTIVITY 3. RESOLUTION OF EXERCISES AND PROBLEMS

Full-or-part-time: 40h
Laboratory classes: 16h
Self study: 24h

ACTIVITY 4. LABORATORY

Full-or-part-time: 10h
Laboratory classes: 4h
Self study: 6h

ACTIVITY 5. DESCRIPTION AND ANALYSIS OF A DOMESTIC ELECTRICAL INSTALLATION

Full-or-part-time: 10h
Self study: 10h
GRADING SYSTEM

BIBLIOGRAPHY

Basic:

Complementary:

RESOURCES

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