820322 - EEEN - Energy Storage

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 748 - FIS - Department of Physics
Academic year: 2019
Degree: BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: José López López
Others: Primer quadrimestre:
JUAN ANTONIO GARCÍA-ALZÓRRIZ PARDO - T11
JOSE LOPEZ LOPEZ - T11

Requirements

SISTEMES ELECTRÒNICS - Prerequisite

Degree competences to which the subject contributes

Specific:
2. Analyse and simulate specific energy systems.
3. Understand the fundamentals of automatic control methods.

Transversal:
1. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.

Teaching methodology

- Class of theory where the program is explained and are oriented and discuss the topics studied by students autonomously.
- Practices Laboratory.
- Students will perform two different projects; a transversal project in coordination with the other subjects of the 6th semester of Grade Energy and a second project (distance learning) in group with specific content of the course.

Learning objectives of the subject

To know the main energy storage technologies and their applications
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### Study load

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<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 45h 30.00%</th>
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<td>Hours medium group: 0h 0.00%</td>
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<td>Hours small group: 15h 10.00%</td>
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<td>Guided activities: 0h 0.00%</td>
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<td>Self study: 90h 60.00%</td>
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### Content

| 1. Introduction. Fields of application: generation, transmission and distribution, final customer. | Learning time: 9h  
Theory classes: 3h  
Self study: 6h |
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| 2. Storage of electricity in batteries. Batteries. Parameters. Regulations. | Learning time: 33h 30m  
Theory classes: 7h 30m  
Laboratory classes: 6h  
Self study: 20h |
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| (ENG) 3. càrrega i supervisió de bateries. Electrònica de potència. Convertidors estàtics. Sistemes de gestió de bateries (BMS). | Learning time: 22h 30m  
Theory classes: 3h  
Laboratory classes: 6h  
Self study: 13h 30m |
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Theory classes: 4h 30m  
Self study: 7h 30m |
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| 5. Compressed air energy storage (CAES). Geological CAES facilities. CAES facilities in the world | Learning time: 12h  
Theory classes: 4h 30m  
Self study: 7h 30m |
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## 6. Other forms of energy storage: Storage superconductors (SMES), pump, flywheel, supercapacitors, fuel cell.

**Description:**

### Learning time: 31h
- Theory classes: 10h 30m
- Laboratory classes: 3h
- Self study: 17h 30m

## 7.- Applications: Electric Vehicle, uninterruptible power supplies (UPS), renewable energy, microgrids, smartgrids.

**Description:**

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<th>Learning time: 30h</th>
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<td>Theory classes: 12h</td>
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<td>Self study: 18h</td>
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**Qualification system**

Final Note: Exam (40%) + Transversal Work (25%) + Laboratory (20%) + Especific Work (15%)
Reevaluation exam is not necessary

**Bibliography**