

## 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 - Prerequisit

### 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

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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### Content

<p>1.- Introduction. Fields of application: generation, transmission and distribution, final customer.</p>	<p>Learning time: 9h Theory classes: 3h Self study : 6h</p>
<p>Description:</p>	
<p>2.- Storage of electricity in batteries. Batteries. Parameters. Regulations.</p>	<p>Learning time: 33h 30m Theory classes: 7h 30m Laboratory classes: 6h Self study : 20h</p>
<p>Description:</p>	
<p>(ENG) 3.- Càrrega i supervisió de bateries. Electrònica de potència. Convertidors estàtics. Sistemes de gestió de bateries (BMS).</p>	<p>Learning time: 22h 30m Theory classes: 3h Laboratory classes: 6h Self study : 13h 30m</p>
<p>Description:</p>	
<p>4.- Thermal Energy Storage. Storage in Tanks. Thermal salts. Thermal Energy Concentration Systems</p>	<p>Learning time: 12h Theory classes: 4h 30m Self study : 7h 30m</p>
<p>Description:</p>	
<p>5. Compressed air energy storage (CAES). Geological CAES facilities. CAES facilities in the world</p>	<p>Learning time: 12h Theory classes: 4h 30m Self study : 7h 30m</p>
<p>Description:</p>	

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<p>6. Other forms of energy storage: Storage superconductors (SMES), pump, flywheel, supercapacitors, fuel cell.</p>	<p>Learning time: 31h Theory classes: 10h 30m Laboratory classes: 3h Self study : 17h 30m</p>
<p>Description:</p>	
<p>7.- Applications: Electric Vehicle, uninterruptible power supplies (UPS), renewable energy, microgrids, smartgrids.</p>	<p>Learning time: 30h Theory classes: 12h Self study : 18h</p>
<p>Description:</p>	

### Qualification system

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

### Bibliography