340610 - GEEN-R3O09 - Energy Management

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit: 710 - EEL - Department of Electronic Engineering
709 - EE - Department of Electrical Engineering

Academic year: 2015
Degree: MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012).
(Teaching unit Compulsory)
ECTS credits: 5  Teaching languages: Catalan, English

Teaching staff

Coordinator: Font Mateu, Josep
Others: Font Mateu, Josep
Castilla Fernandez, Miguel
Garcia De Vicuña Muñoz De La Nava, Jose Luis

Degree competences to which the subject contributes

Specific:
1. CB6 - Having the knowledge and understanding to provide a basis or opportunity for originality in developing and / or applying ideas, sometimes in a research context
2. CB7 - Students can apply their knowledge and their ability to solve problems in new or unfamiliar contexts within broader (or multidisciplinary) contexts related to their field of study
3. CB9 - Students can communicate their conclusions, knowledge and rationale underpinning these, to skilled and unskilled public in a clear and unambiguous way
4. CC04 - Ability to determine and design the most efficient electric drive for different control applications movement
5. CG02 - Ability to apply the techniques of control and regulation of electric machines for motion control.
6. CEV06 - Ability to analyze and design power electronic converters used in power generation systems distributor energy.
7. CEV07 - Ability to analyze and design power electronic converters used in micro grids and in smart power networks.

Learning objectives of the subject
### Study load

<table>
<thead>
<tr>
<th></th>
<th>Hours large group:</th>
<th>Hours medium group:</th>
<th>Hours small group:</th>
<th>Guided activities:</th>
<th>Self study:</th>
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<tbody>
<tr>
<td><strong>Total learning time:</strong></td>
<td>125h</td>
<td>30h</td>
<td>0h</td>
<td>0h</td>
<td>80h</td>
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### Content

| 1. Introduction to energy management in power systems | **Learning time:** 20h 50m  
Theory classes: 6h  
Self study: 14h 50m |
|---|---|
| **Description:**  
This lesson will introduce the description, modelling, and analysis of power systems. Also it introduces the management and operation of these systems. Parameters and codes. |

| 2. Integration of electrical machines in power systems | **Learning time:** 20h 50m  
Theory classes: 6h  
Self study: 14h 50m |
|---|---|
| **Description:**  

| 3. Management and control of energy storage systems | **Learning time:** 20h 50m  
Theory classes: 6h  
Self study: 14h 50m |
|---|---|
| **Description:**  
Introduction to management and control of energy storage systems. Batteries (including charging and recharging processes), super-capacitors, flywheels, superconductivity |

| 4. Power electronics systems for the integration and energy management in power systems | **Learning time:** 20h 50m  
Theory classes: 6h  
Self study: 14h 50m |
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<tbody>
<tr>
<td><strong>Description:</strong></td>
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| 5. Energy management in microgrids | **Learning time:** 20h 50m  
Theory classes: 6h  
Self study: 14h 50m |
|---|---|
| **Description:**  
This lesson will present both the basic concepts in electrical microgrids and some examples of practical microgrids in operation all around the world. This lesson will also discuss the possibilities, properties and limitations of the energy management systems employed in microgrids. |
### 6. Energy management in smart grids

<table>
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<tr>
<th>Learning time:</th>
<th>20h 50m</th>
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<tbody>
<tr>
<td>Theory classes:</td>
<td>6h</td>
</tr>
<tr>
<td>Self study:</td>
<td>14h 50m</td>
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**Description:**
This lesson will present both the basic concepts of smart grids and some application examples. Besides, the energy management strategies used in this kind of advanced power systems will be discussed.

## Bibliography

**Basic:**


**Others resources:**

- **Audiovisual material**
  - Canó, Projector

- **Computer material**
  - Ordinador Personal, 1 per alumne

- **Programes Informàtics**