340610 - GEEN-R3009 - Energy Management

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

Academic year: 2019
Degree: MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012).
(Teaching unit Optional)
ECTS credits: 5
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: Blanqué Molina, Balduino
Others: Castilla Fernandez, Miguel
Blanqué Molina, Balduino

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
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

The main objective.
### Study load

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group: 30h</th>
<th>24.00%</th>
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<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h</td>
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<tr>
<td></td>
<td>Hours small group: 15h</td>
<td>12.00%</td>
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<td>Guided activities: 0h</td>
<td>0.00%</td>
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<tr>
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<td>Self study: 80h</td>
<td>64.00%</td>
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# Content

| 1. Electrical Power Systems Applied to Industry. | Learning time: 10h 25m  
Theory classes: 3h  
Self study: 7h 25m |
|-----------------------------------------------|--------------------------------------------------|
| **Description:**  
Introduction to electrical energy.  
This lesson will introduce the description, modelling and analysis of power systems. | |

| 2. Introduction to Energy Management. | Learning time: 10h 25m  
Theory classes: 3h  
Self study: 7h 25m |
|--------------------------------------|--------------------------------------------------|
| **Description:**  
Introduction to the management and operation of electric power systems.  
Electrical engineering LV, MV and HV.  
Energy audit (Industry 4.0). | |

| 3. Integration of electrical machines in power systems. | Learning time: 20h 50m  
Theory classes: 6h  
Self study: 14h 50m |
|--------------------------------------------------------|--------------------------------------------------|
| **Description:**  

| 4. 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. | |
### 5. Power electronics systems for the integration and energy management in power systems.

**Description:**
Power electronics systems for the integration and energy management in power systems.

**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.

**Learning time:** 20h 50m
- Theory classes: 6h
- Self study: 14h 50m

### 7. Energy management in smart grids.

**Description:**
This lesson will present both the basic concepts of smartgrids and some application examples. Besides the energy management strategies used in this kind of advanced power systems will be discussed.

**Learning time:** 20h 50m
- Theory classes: 6h
- Self study: 14h 50m
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Bibliography

Basic:


Others resources:

MATLAB-Simulink-Simpower.

Audiovisual material

Canó, Projector

Computer material

Ordinador Personal, 1 per alumne

Programes Informàtics