340229 - GSEP-E7P09 - Management of Electric Power Systems and Energy Saving Methods

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit: 709 - EE - Department of Electrical Engineering
Academic year: 2018
Degree: BACHELOR’S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ECTS credits: 6
Teaching languages: Catalan

Teaching staff
Coordinator: Ramon Caumons Sangrà
Others: Ramon Caumons Sangrà

Degree competences to which the subject contributes

Specific:
1. CE24. Knowledge of electrical power systems and its applications.

Transversal:
2. SUSTAINABILITY AND SOCIAL COMMITMENT. Being aware of and understanding the complexity of social and economic phenomena that characterize the welfare society. Having the ability to relate welfare to globalization and sustainability. Being able to make a balanced use of techniques, technology, the economy and sustainability.
3. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

Teaching methodology

- In the lectures will be presented and developed the theoretical foundations of programmed materials. Consist of theoretical explanations complemented by activities to encourage participation, discussion and critical analysis by students.
- In the kinds of problems were raised and solved exercises for the areas covered. Students have to solve, individually or in groups, indicating problems.
- It will realised group work or individual work during the year related to a specific topic of the course.

Learning objectives of the subject

On this subject the pricing of electricity, energy conservation, energy efficiency, energy audits and energy certification is.
In power systems programming is generating.
### Study load

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

| -1: Pricing of electricity. | Learning time: 25h  
Theory classes: 7h 30m  
Laboratory classes: 2h 30m  
Self study: 15h |
|----------------------------|--------------------------------------------------|
| **Description:**           | 1. General billing on electricity. Liberalisation of the electricity sector.  
2. Billing energy.  
3. Practical considerations about the compensation of the reactive power.  
4. Types of compensation: Global, partial and individual.  
5. Determination practical battery capacitors for reactive power compensation of a facility? Setup.  

| -2: Energy savings. | Learning time: 25h  
Theory classes: 7h 30m  
Laboratory classes: 2h 30m  
Self study: 15h |
|---------------------|--------------------------------------------------|
| **Description:**    | 7. Introduction  
8. Primary sources of energy.  
9. Units of energy.  
10. Current energy situation.  
11. Efficiency and energy saving.  
13. Legislative Framework. Basic Document HE. RITE  
15. CO2 Emissions |

| -3: Energy audit. | Learning time: 25h  
Theory classes: 7h 30m  
Laboratory classes: 2h 30m  
Self study: 15h |
|-------------------|--------------------------------------------------|
| **Description:**  | 16. Introduction.  
18. Data Collection.  
19. Accounting energy.  
21. Energy services companies.  
22. Rating investment: NPV, IRR ... |

**Description:**
23. Introduction.
24. Regulations.
26. Software certification.
27. Examples

**Learning time:** 25h
- Theory classes: 7h 30m
- Laboratory classes: 2h 30m
- Self study: 15h

### -2: Energy efficiency in facilities and equipment.

**Description:**
28. Air.
29. Ventilation.
30. Lighting.
32. Electrical installation.
33. Systems of regulation and control.
34. Maintenance.
35. Efficient water management.
38. Section economic and ecological cables in LV.

**Learning time:** 25h
- Theory classes: 7h 30m
- Laboratory classes: 2h 30m
- Self study: 15h

### -4: Scheduling generation

**Description:**
40. Programming Time static.
41. Startup and Shutdown "unit Commitment."
42. Hydrothermal Office.
43. Optimization methods

**Learning time:** 25h
- Theory classes: 7h 30m
- Laboratory classes: 2h 30m
- Self study: 15h
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<table>
<thead>
<tr>
<th>Description:</th>
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<tbody>
<tr>
<td>1: Power measurement: The meter and the network analyzer.</td>
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<tr>
<td>2: Energy audit of a building.</td>
</tr>
<tr>
<td>3: Energy certification of a building</td>
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</tbody>
</table>

| Learning time: 0h |
| Guided activities: 0h |

**Qualification system**

60 % theory.
40 % practices.

**REEVALUATION:**
The reevaluation part of the subject corresponds to the exams (X%).
According to EPSEVG regulations:
- The reevaluation will be possible if the subject with a final grade equal to or greater than 3.0 has been suspended.
- The final grade of the subject after the reevaluation will have a maximum value of 5.0.

**Regulations for carrying out activities**

- The written tests are classroom and individual.

**Bibliography**

Basic:


