820731 - ESEC - Power System

Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 748 - FIS - Department of Physics
Academic year: 2018
Degree: MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Teaching unit Compulsory)
MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Teaching unit Compulsory)
ECTS credits: 5
Teaching languages: English

Teaching staff
Coordinator: Freixa Terradas, Jordi
Others: Villafáfila Robles, Roberto
Freixa Terradas, Jordi

Opening hours
Timetable: To arrange by e-mail

Degree competences to which the subject contributes

Specific:
CEMT-2. Identify and describe the components of electrical systems (production, transportation, distribution, markets, procurement and consumption) and evaluate the technological solutions used in the production of electricity.

Teaching methodology
Theoretical lectures
Practical sessions
Guided work

Learning objectives of the subject
To describe the different technologies related to the production of electric energy
To have an insight into the more significant aspects of electricity transportation and distribution
To apply the acquired knowledge to solve practical cases

Study load

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

<table>
<thead>
<tr>
<th>Topic 1: Introduction</th>
<th>Learning time: 3h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 2h</td>
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<td></td>
<td>Self study: 1h</td>
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</tbody>
</table>

- This first topic describes the main characteristics of the structure of the Spanish power system, concerning both demand and production.

- **Specific objectives:**
  - To give the students a general overview of the Spanish power system.

<table>
<thead>
<tr>
<th>Topic 2: Electrical energy production</th>
<th>Learning time: 35h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 14h</td>
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<tr>
<td></td>
<td>Guided activities: 7h</td>
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<td>Self study: 14h</td>
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</tbody>
</table>

- Description of different technologies of electrical energy production: Coal-fired power plants, combined cycle power plants, nuclear power plants, hydroelectric power plants, wind parcs and solar facilities (FV and thermal-solar).

- For each one of these technologies the operating principle, equipment, environmental impact and other relevant aspects are presented.

- **Related activities:**
  - Resolution of practical cases

<table>
<thead>
<tr>
<th>Topic 3: Transport and distribution</th>
<th>Learning time: 26h</th>
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</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 10h</td>
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<tr>
<td></td>
<td>Guided activities: 6h</td>
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<tr>
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<td>Self study: 10h</td>
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- Description of the main characteristics of transport and distribution infrastructures (transmission and distribution systems, transforming stations and conversion stations).

- Analysis of the technological aspects related to the grid regulation.

- **Related activities:**
  - Calculation of power lines.
  - Resolution of practical cases.

- **Specific objectives:**
  - To give the students a general overview of the Spanish power system.
  - Students should know the difference between transport and distribution.
  - They should be aware of the causes of electrical energy losses during its transport and distribution in order to reason about maximum lengths of the grid.
  - Students should know the main characteristics of transport and distribution infrastructures.
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**Qualification system**

- Evaluation of the guided activities
- Final exam

**Bibliography**