Coordinating unit: 240 - ETSEIB - Barcelona School of Industrial Engineering
Teaching unit: 721 - FEN - Department of Physics and Nuclear Engineering
709 - EE - Department of Electrical Engineering

Academic year: 2019
Degree: MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Teaching unit Compulsory)
MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Teaching unit Compulsory)
ERASMUS MUNDUS MASTER'S DEGREE IN ENVIRONMENTAL PATHWAYS FOR SUSTAINABLE ENERGY SYSTEMS (Syllabus 2013). (Teaching unit Optional)

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 24.00%</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Guided activities: 15h 12.00%</td>
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<tr>
<td></td>
<td>Self study: 80h 64.00%</td>
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</tbody>
</table>
# Content

<table>
<thead>
<tr>
<th><strong>Topic 1: Introduction</strong></th>
<th><strong>Learning time:</strong> 3h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
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<td>Self study : 1h</td>
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**Description:**
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><strong>Topic 2: Electrical energy production</strong></th>
<th><strong>Learning time:</strong> 35h</th>
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<tbody>
<tr>
<td></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:**
Description of different technologies of electrical energy production: Coal-fired power plants, combined cycle power plants, nuclear power plants, hydroelectric power plants, wind parks and solar facilities (FV and thermalsolar). 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><strong>Topic 3: Transport and distribution</strong></th>
<th><strong>Learning time:</strong> 26h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 10h</td>
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<tr>
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<td>Guided activities: 6h</td>
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<td>Self study : 10h</td>
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**Description:**
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:**
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.
Qualification system

Evaluation of the guided activities
Final exam

Bibliography