820323 - GEEEN - Electrical Energy Generation

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 709 - EE - Department of Electrical Engineering
Academic year: 2018
Degree: BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff
Coordinator: MARIA ELENA MARTIN CAÑADAS
Others: Primer quadrimestre: Gallemí Rovira, Oriol; Cruz Vaquer, Joan
Segon quadrimestre: Cruz Vaquer, Joan

Prior skills
Alternating current electric circuits analysis

Requirements
Sistemes elèctrics

Degree competences to which the subject contributes

Transversal:
4. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.
3. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.
11. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.

Teaching methodology
The subject will be structured in two types of classroom sessions:
- Classes of theory and solved examples: theoretical aspects and worked examples will be explained, and the items autonomously learned by the students will be commented.
- Practice sessions: Experiences will be done at the laboratory of electrical machines and simulations with specialised software may also be performed.

The students will do also off-site tasks including individual and teamwork.

Learning objectives of the subject
The aim of the course is to enable the student to understand and analyze the different technologies of electric generators.

The specific objectives include:
- Understanding the principles of operation of the various electrical machines, focusing on synchronous and induction
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generators
- Analysing the steady-state and transient regimes of the different electrical machines
- Understanding the operation and control principles of the electric generators connected directly to the network
- Understanding the operation and control principles of the electric generators connected to the network through a converter (wind and PV energy)

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

<table>
<thead>
<tr>
<th>(ENG) Basic principles</th>
<th>Learning time: 30h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 10h 30m</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 1h 30m</td>
</tr>
<tr>
<td></td>
<td>Self study : 18h</td>
</tr>
</tbody>
</table>

**Description:**
Basic principles of conversion of electrical energy. Classification of electric generator technologies.

<table>
<thead>
<tr>
<th>(ENG) Technologies of electric generators</th>
<th>Learning time: 60h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 21h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 3h</td>
</tr>
<tr>
<td></td>
<td>Self study : 36h</td>
</tr>
</tbody>
</table>

**Description:**

<table>
<thead>
<tr>
<th>(ENG) Generators directly connected to the electricity grid</th>
<th>Learning time: 30h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 10h 30m</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 1h 30m</td>
</tr>
<tr>
<td></td>
<td>Self study : 18h</td>
</tr>
</tbody>
</table>

**Description:**

<table>
<thead>
<tr>
<th>(ENG) Generators connected to the electric grid through a converter (wind and photovoltaic energy)</th>
<th>Learning time: 30h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 10h 30m</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 1h 30m</td>
</tr>
<tr>
<td></td>
<td>Self study : 18h</td>
</tr>
</tbody>
</table>

**Description:**
Qualification system

The final mark will be calculated according to the following equation:

\[ NF = PR \times 0.2 + EP \times 0.25 + TR \times 0.2 + EF \times 0.35 \]

TF Work
PR Practices
EP Partial Exam
EF Final Exam

This subject will not have a re-evaluation exam.
The marks associated to the generic competence/s evaluation will be the mean value of the marks of the laboratory practices and the proposed work.

Bibliography

Complementary:

Others resources:
Licensed software

Hyperlink
Atenea
Hi haurà materials disponibles a la web