Course guide
820323 - GEEEN - Electrical Energy Generation

Last modified: 02/06/2022

Unit in charge: Barcelona East School of Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.
Degree: BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Compulsory subject).
Academic year: 2022  ECTS Credits: 6.0  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: MARIA ELENA MARTIN CAÑADAS
Others:

Primer quadrimestre:
JUAN CRUZ VAQUER - M11, M12
MARIA ELENA MARTIN CAÑADAS - M11, M12

Segon quadrimestre:
JUAN CRUZ VAQUER - M21, M22, M23
MARIA ELENA MARTIN CAÑADAS - M21, M22, M23

PRIOR SKILLS

Alternating current electric circuits analysis

REQUIREMENTS

SISTEMES ELÈCTRICS - Prerequisite

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 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)

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>45,0</td>
<td>30.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

(ENG) Basic principles

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

Full-or-part-time: 30h
Theory classes: 10h 30m
Laboratory classes: 1h 30m
Self study: 18h

(ENG) Technologies of electric generators

Description:

Full-or-part-time: 60h
Theory classes: 21h
Laboratory classes: 3h
Self study: 36h

(ENG) - Generators directly connected to the electricity grid

Description:

Full-or-part-time: 30h
Theory classes: 10h 30m
Laboratory classes: 1h 30m
Self study: 18h
**ENG** Generators connected to the electric grid through a converter (wind and photovoltaic energy)

**Description:**

**Full-or-part-time:** 30h
- Theory classes: 10h 30m
- Laboratory classes: 1h 30m
- Self study: 18h

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**GRADING 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 laboratory practices and the proposed work.

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**BIBLIOGRAPHY**

**Complementary:**

**RESOURCES**

**Hyperlink:**
- Atenea. Hi haurà materials disponibles a la web

**Other resources:**
Licensed software