Course guide
820129 - SEPEE - Electric Power Systems

Unit in charge: Barcelona East School of Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2023  ECTS Credits: 6.0  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer:  JUAN JOSÉ MESAS GARCÍA

Others:
Primer quadrimestre:
JAIME BUSTO ABADIA - Grup: T11, Grup: T12
JUAN JOSE MESAS GARCIA - Grup: T11, Grup: T12

Segon quadrimestre:
JUAN JOSE MESAS GARCIA - Grup: M11, Grup: M12, Grup: M13

PRIOR SKILLS

Those acquired in the subjects CALCULUS, ALGEBRA AND MULTIVARIABLE CALCULUS, NUMERICAL CALCULUS - DIFFERENTIAL EQUATIONS, ELECTRICAL SYSTEMS, CIRCUITS AND SIGNALS, ELECTRICAL MACHINES I / II, LOW AND HIGH VOLTAGE ELECTRICAL INSTALLATIONS I.

REQUIREMENTS

LOW AND HIGH VOLTAGE ELECTRICAL INSTALLATIONS I - Prerequisite
ELECTRICAL MACHINES II - Prerequisite

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEELE-23. Carry out calculations for the design of power lines and electric power transmission systems.
CEELE-24. Understand electrical power systems and their applications.

Transversal:
07 AAT N3. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

TEACHING METHODOLOGY

The teaching methodology used in this subject can be divided into three parts:

- Master classes: theory and problems (30%)
- Laboratory sessions (10%)
- Individual work based learning (60%)
LEARNING OBJECTIVES OF THE SUBJECT

To provide knowledge on overhead line calculation and electric power systems:

- Components, structure and functions of the electric power transmission and distribution system.
- Overhead lines: Electrical parameters. Equivalent circuits. Steady state analysis. Overhead line calculation by using the per unit system (p.u.).
- Transformers: Types, connections and equivalent circuits.
- Overhead line mechanical calculation: Types of supports. Calculation of the sag. Calculation of cable stresses. Influence of temperature and other atmospheric conditions. Calculation of state change. RLAT.

STUDY LOAD

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

Introduction

Description:
Components, structure and functions of the electric power transmission and distribution system.

**Full-or-part-time**: 6h 30m
Theory classes: 1h 30m
Self study: 5h

Overhead lines 1

Description:
Electrical parameters. Equivalent circuits.

**Full-or-part-time**: 17h 30m
Theory classes: 4h 30m
Laboratory classes: 3h
Self study: 10h

Overhead lines 2

Description:
Steady state analysis.

**Full-or-part-time**: 35h
Theory classes: 12h
Laboratory classes: 3h
Self study: 20h
## Overhead lines 3

**Description:**
Overhead line calculation by using the per unit system (p.u.).

**Full-or-part-time:** 11h  
Theory classes: 3h  
Laboratory classes: 3h  
Self study: 5h

## Transformers

**Description:**
Types, connections and equivalent circuits.

**Full-or-part-time:** 35h  
Theory classes: 12h  
Laboratory classes: 3h  
Self study: 20h

## Load flow in power systems

**Description:**

**Full-or-part-time:** 32h  
Theory classes: 9h  
Laboratory classes: 3h  
Self study: 20h

## Overhead line mechanical calculation

**Description:**
Types of supports. Calculation of the sag. Calculation of cable stresses. Influence of temperature and other atmospheric conditions. Calculation of state change. RLAT.

**Full-or-part-time:** 13h  
Theory classes: 3h  
Self study: 10h
GRADING SYSTEM

The final Mark of the Subject (N_Asig) is calculated, rounded to the nearest tenth, using the formula

\[ N_{Asig} = 0.306 \times N_{ExPar} + 0.494 \times N_{ExFin} + 0.20 \times N_{Prac} \]

where

- \( N_{ExPar} \) is the Midterm Exam Mark
- \( N_{ExFin} \) is the Final Exam Mark
- \( N_{Prac} \) is the Practice Mark

IMPORTANT REMARKS:

- IT IS COMPULSORY to carry out the practice assignments proposed in the laboratory sessions to pass the subject.
- This subject does NOT have a Re-assessment Exam.

EXAMINATION RULES.

- The Midterm Exam and the Final Exam are individual, in-person and written.
- In addition to writing utensils, it is only permitted to have one sheet with formulas (a single original handwritten A4 sheet) to be delivered to the professor at the end of each of the exams, and a calculator without external connectivity (no mobile phone or tablet can be used as such).
- Maximum punctuality is kindly requested.

BIBLIOGRAPHY

Basic: