820129 - SEPEE - Electric Power Systems

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 709 - EE - Department of Electrical Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: JUAN JOSÉ MESAS GARCÍA
Others: Primer quadrimestre:
     JUAN JOSE MESAS GARCIA - T11, T12
     JOSEP SEGARRA MULLERAT - T11, T12

Opening hours

Timetable: Specified by the professor during their first class, and then available in Atenea.

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

INSTAL·LACIONS ELÈCTRIQUES DE BAIXA I ALTA TENSIÓ I - Prerequisit
MÀQUINES ELÈCTRIQUES II - Prerequisit

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

<table>
<thead>
<tr>
<th><strong>Introduction</strong></th>
<th><strong>Learning time:</strong></th>
<th><strong>Description:</strong></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>6h 30m</td>
<td>Components, structure and functions of the electric power transmission and distribution system.</td>
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<thead>
<tr>
<th><strong>Overhead lines 1</strong></th>
<th><strong>Learning time:</strong></th>
<th><strong>Description:</strong></th>
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<tbody>
<tr>
<td></td>
<td>17h 30m</td>
<td>Electrical parameters. Equivalent circuits.</td>
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<th><strong>Overhead lines 2</strong></th>
<th><strong>Learning time:</strong></th>
<th><strong>Description:</strong></th>
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<tr>
<td></td>
<td>35h</td>
<td>Steady state analysis.</td>
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<th><strong>Overhead lines 3</strong></th>
<th><strong>Learning time:</strong></th>
<th><strong>Description:</strong></th>
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<tbody>
<tr>
<td></td>
<td>11h</td>
<td>Overhead line calculation by using the per unit system (p.u.).</td>
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<th><strong>Transformers</strong></th>
<th><strong>Learning time:</strong></th>
<th><strong>Description:</strong></th>
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<tbody>
<tr>
<td></td>
<td>35h</td>
<td>Types, connections and equivalent circuits.</td>
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The final Mark of the Subject (N_Asig) is calculated, rounded to the nearest tenth, using the formula

\[ N_{\text{Asig}} = \text{MAX} (0.30 \cdot N_{\text{ExPar}} + 0.50 \cdot N_{\text{ExFin}} + 0.20 \cdot N_{\text{Prac}} ; 0.80 \cdot N_{\text{ExFin}} + 0.20 \cdot N_{\text{Prac}}) \]

where

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

**IMPORTANT REMARK:** This subject does NOT have a Re-assessment Exam.

### Regulations for carrying out activities

- 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:


