### Degree competences to which the subject contributes

**Specific:**
- CEENE-250. Knowledge of the principles of operation of electric power transmission and distribution systems.
- CEENE-28. Explain the operating principles of power conversion systems and their application to transport and distribution systems.

**Transversal:**
- 2. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

### Teaching methodology

The course uses the methodology exhibition by 30%, 10% in laboratories, individual work on self by 60%. We performed a transversal project on the theme of the course.

### Learning objectives of the subject

Technologies in the field of transport and distribution of electricity
Application of the technologies of transportation and distribution of electricity to the current electrical systems
# Study load

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

| Introduction | Learning time: 6h 30m  
Theory classes: 1h 30m  
Self study: 5h |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Introduction. Structure components and functions of the distribution system and electricity transmission</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>Understanding the transmission system and power distribution including economic and comparison of different systems</td>
</tr>
</tbody>
</table>

| Overhead lines and cables 1 | Learning time: 17h 30m  
Theory classes: 4h 30m  
Laboratory classes: 3h  
Self study: 10h |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Electrical parameters. Equivalent circuits</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>Knowing the electrical parameters of overhead lines and cables for power transmission</td>
</tr>
</tbody>
</table>

| Overhead lines and cables 2 | Learning time: 35h  
Theory classes: 12h  
Laboratory classes: 3h  
Self study: 20h |
<table>
<thead>
<tr>
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<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Overhead lines and cables: Steady state analysis</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>Ability to perform steady state analysis of overhead lines and cables</td>
</tr>
</tbody>
</table>

| Overhead lines and cables 3: pu | Learning time: 11h  
Theory classes: 3h  
Laboratory classes: 3h  
Self study: 5h |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Calculate the system with pu an overhead lines and cables</td>
</tr>
<tr>
<td><strong>Specific objectives:</strong></td>
<td>Ability to perform calculations in pu</td>
</tr>
</tbody>
</table>
### Transformers

**Description:**
Transformers: Types, connections, equivalent circuits

**Specific objectives:**
Ability to model transformers for system analysis

<table>
<thead>
<tr>
<th>Learning time:</th>
<th>35h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>12h</td>
</tr>
<tr>
<td>Laboratory classes:</td>
<td>3h</td>
</tr>
<tr>
<td>Self study:</td>
<td>20h</td>
</tr>
</tbody>
</table>

### Load flow in power grids

**Description:**

**Specific objectives:**
Ability to perform load flow in power grids

<table>
<thead>
<tr>
<th>Learning time:</th>
<th>32h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>9h</td>
</tr>
<tr>
<td>Laboratory classes:</td>
<td>3h</td>
</tr>
<tr>
<td>Self study:</td>
<td>20h</td>
</tr>
</tbody>
</table>

### Electricity distribution

**Description:**
Elements and definitions of the distribution system. Radial network structure. Planning.

**Specific objectives:**
Knowing the specific elements of the electrical distribution, namely the differences in the transport system and be able to perform an analysis of the electrical distribution system.

<table>
<thead>
<tr>
<th>Learning time:</th>
<th>13h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes:</td>
<td>3h</td>
</tr>
<tr>
<td>Self study:</td>
<td>10h</td>
</tr>
</tbody>
</table>

### Qualification system

The evaluation was carried out by the assessment by the teacher. Partial controls account for 40%, the last control 40% and 20% practice of the final grade. Generic competence (solvent use source of information) is a separate grade. This subject has no reassessment test.

### Regulations for carrying out activities

Calculators are permitted.
820331 - TDEE - Electrical Energy Transmission and Distribution

Bibliography

Basic:


