3200212 - ME2 - Electrical Machines II

**Coordinating unit:** 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual 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

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### Teaching staff

**Coordinator:** David Romero Durán  
**Others:** David Romero Durán

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### Prior skills

Students will be expected to have passed Physics, Electrical Systems, Electrical Machines I since the knowledge acquired in those subjects is the foundation on which an understanding of Electrical Machines II will be built.

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### Degree competences to which the subject contributes

**Specific:**  
1. ELE: Ability to calculate and design electrical machines.

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### Teaching methodology

In the lecture sessions, the lecturer presents the subject content. These sessions cover theoretical concepts, explanations about what documentation will be used and work proposals.

In the face-to-face applied sessions, students will solve applied cases.

Independent learning enables students to gain an understanding of each of the concepts covered by the lecturer. This type of learning also includes the completion of assignments.

Group work, done in three-person teams, includes preparation for laboratori sessions and the writing of post-practical reports.

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### Learning objectives of the subject

This subject introduces students to the operation, construction, application and selection principles of electric motors, as well as the design of basic parts that are common to all such machines. Students will learn to use the parameters that govern the various types of motors and interpret their characteristic curves. They will use commercial catalogues and rated quantities to determine the performance of different machines and select the most appropriate one. Students will learn to solve problems related to the behaviour of electric motors analytically, paying special attention to the order of magnitude and the units used in industry.
### Study load

<table>
<thead>
<tr>
<th>Learning Component</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total learning time:</td>
<td>150h</td>
<td></td>
</tr>
<tr>
<td>Hours large group:</td>
<td>30h</td>
<td>20.00%</td>
</tr>
<tr>
<td>Hours medium group:</td>
<td>15h</td>
<td>10.00%</td>
</tr>
<tr>
<td>Hours small group:</td>
<td>15h</td>
<td>10.00%</td>
</tr>
<tr>
<td>Guided activities:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td>Self study:</td>
<td>90h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
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## Content

<table>
<thead>
<tr>
<th>TOPIC 1: ASYNCHRONOUS ALTERNATING-CURRENT MACHINES</th>
<th>Learning time: 66h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 14h</td>
</tr>
<tr>
<td>1.01. Asynchronous (induction) motors.</td>
<td>Practical classes: 6h</td>
</tr>
<tr>
<td>1.02. Moment of a motor.</td>
<td>Laboratory classes: 7h</td>
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<tr>
<td>1.03. Equivalent circuit of asynchronous motors.</td>
<td>Self study: 39h</td>
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<tr>
<td>1.04. Circle diagram.</td>
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<tr>
<td>1.05. Start-up of asynchronous motors.</td>
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<td>1.06. Speed regulation.</td>
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<tr>
<td><strong>Related activities:</strong></td>
<td></td>
</tr>
<tr>
<td>- Case studies</td>
<td></td>
</tr>
<tr>
<td>- Laboratori sessions</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TOPIC 4: DIRECT-CURRENT MACHINES</th>
<th>Learning time: 46h 30m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description:</strong></td>
<td>Theory classes: 8h</td>
</tr>
<tr>
<td>2.01. Construction and principles of direct-current machines.</td>
<td>Practical classes: 6h</td>
</tr>
<tr>
<td>2.02. Armature reaction and commutation.</td>
<td>Laboratory classes: 6h</td>
</tr>
<tr>
<td>2.03. Direct-current motors.</td>
<td>Self study: 26h 30m</td>
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<tr>
<td>2.04. Additional topics.</td>
<td></td>
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<tr>
<td><strong>Related activities:</strong></td>
<td></td>
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<tr>
<td>- Case studies</td>
<td></td>
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<tr>
<td>- Laboratori sessions</td>
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</tbody>
</table>
### TOPIC 3: SYNCHRONOUS MOTORS

**Learning time:** 19h 30m  
Theory classes: 4h  
Practical classes: 2h  
Laboratory classes: 1h  
Self study: 12h 30m  

**Description:**  
3.01. Construction and principles of synchronous motors.  
3.02. Applications.  
3.03. Additional topics.  

**Related activities:**  
- Case studies  
- Laboratori sessions  

### TOPIC 4: SPECIAL MOTORS

**Learning time:** 18h  
Theory classes: 4h  
Practical classes: 1h  
Laboratory classes: 1h  
Self study: 12h  

**Description:**  
4.01. Single Phase Asynchronous Motors.  
4.02. Universal Motor.  
4.03. Stepper motors.  
4.04. Additional topics.  

**Related activities:**  
- Case studies  
- Laboratori sessions  

### Qualification system

First Exam - 15%  
Second Exam - 25%  
Third Exam - 20%  
Fourth Exam - 25%  
Laboratory Exam - 15%  

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.  
If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.
Regulations for carrying out activities

Non-attendance to the laboratory classes is an NP in the assessment items related to the contents taught in these sessions

Bibliography

Basic:

Complementary: