820140 - EDEE - Electric Drives

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

Teaching staff

Coordinator: SERGI FILLET CASTELLA
Others:

Primer quadrimestre:
SERGI FILLET CASTELLA - T11, T12
GUILLERMO YESTE MAYORAL - T11, T12

Segon quadrimestre:
SERGI FILLET CASTELLA - M11, M12, M13
GUILLERMO YESTE MAYORAL - M11, M12

Prior skills

Requirements

MÀQUINES ELÈCTRIQUES II - Prerequisite

Degree competences to which the subject contributes

Specific:
CEELE-20. Understand machine control and electric drives and their applications.
CEELE-26. Understand automatic regulation and control techniques and their application to industrial automation.

Transversal:
1. 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 master classes by 45%, individual work by 25%, work in groups (cooperative or not) by 30%.

Learning objectives of the subject

Understanding the behaviour of the variable-speed electric drives, under the point of view of a whole set made up of power electronics, electric machines and mechanical loads.
### Study load

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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Learning time</th>
<th>Theory classes</th>
<th>Laboratory classes</th>
<th>Self study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. POWER ELECTRÒNICS AND DRIVES.</strong>&lt;br&gt;<strong>Description:</strong> Classification and basic characteristics of electrical drives.&lt;br&gt;<strong>Specific objectives:</strong> Power electronics for electric drives. Types of electric drives. Performance characteristics. Variable speed operation. Four-quadrant operation.</td>
<td><strong>15h</strong></td>
<td><strong>4h</strong></td>
<td><strong>1h</strong></td>
<td><strong>10h</strong></td>
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<tr>
<td><strong>2. INDUCTION THREE-PHASE ASYNCHRONOUS MOTOR IN STEADY STATE.</strong>&lt;br&gt;<strong>Description:</strong> Application of the steady state induction motor model to the starting process and to variable-speed operation.&lt;br&gt;<strong>Specific objectives:</strong> Equivalent circuits. Motor starting. Variable-speed operation. Variable frequency-fed motor. Constant torque and constant speed operation. Current-fed motor.</td>
<td><strong>19h 40m</strong></td>
<td><strong>7h</strong></td>
<td><strong>1h</strong></td>
<td><strong>11h 40m</strong></td>
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<tr>
<td><strong>3. SYNCHRONOUS MOTORS.</strong>&lt;br&gt;<strong>Description:</strong> Variable-speed drives based on synchronous motor.&lt;br&gt;<strong>Specific objectives:</strong> Classification and equivalent circuits. Voltage and current-fed schemes. Self-commutated systems. Cycloconverters application.</td>
<td><strong>17h 50m</strong></td>
<td><strong>7h</strong></td>
<td><strong>1h</strong></td>
<td><strong>9h 50m</strong></td>
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</tbody>
</table>
## 4. Dynamic Modelling of AC Machines

**Learning time:** 23h 20m  
Theory classes: 9h  
Laboratory classes: 1h  
Self study: 13h 20m

**Description:**
Dynamic models of AC machines.

**Specific objectives:**

## 5. Non Vectorial Control of AC Machines

**Learning time:** 12h 20m  
Theory classes: 3h  
Laboratory classes: 1h  
Self study: 8h 20m

**Description:**
Control techniques for AC machines.

**Specific objectives:**
Classification of control techniques. Scalar control. Vector control. Applications for the asynchronous and the synchronous machines.

## 6. Vectorial Control on Altern Current Machines

**Learning time:** 23h 20m  
Theory classes: 9h  
Laboratory classes: 1h  
Self study: 13h 20m

**Description:**
content english

## 7. Non Conventional Electric Machines

**Learning time:** 8h 30m  
Theory classes: 5h  
Self study: 3h 30m

**Description:**
content english
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Qualification system

The evaluation will be conducted through the assessment by the teacher, with the following weights assigned to evaluated activities:
Team Work: 30%, laboratory practice: 30% Final exam: 40%.

Bibliography

Basic:


