Course guide  
820140 - EDEE - Electric Drives

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: 2022  
ECTS Credits: 6.0  
Languages: Catalan

LECTURER

Coordinating lecturer: 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

Advanced electrical Machines course

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 40%, individual work by 30%, 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>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>
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</tbody>
</table>

Total learning time: 150 h

CONTENTS

1. POWER ELECTRÔNICS AND DRIVES.

Description:
Classification and basic characteristics of electrical drives.

Specific objectives:
Power electronics for electric drives. Types of electric drives. Performance characteristics. Variable speed operation. Four-quadrant operation.

Full-or-part-time: 15h
Theory classes: 4h
Laboratory classes: 1h
Self study: 10h

2. INDUCTION THREE-PHASE ASYNCRONOUS MOTOR IN STEADY STATE.

Description:
Application of the steady state induction motor model to the starting process and to variable-speed operation.

Specific objectives:

Full-or-part-time: 19h 40m
Theory classes: 7h
Laboratory classes: 1h
Self study: 11h 40m

3. SYNCHRONOUS MOTORS.

Description:
Variable-speed drives based on synchronous motor.

Specific objectives:

Full-or-part-time: 17h 50m
Theory classes: 7h
Laboratory classes: 1h
Self study: 9h 50m
### 4. Dynamic Modelling of AC Machines

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

**Specific objectives:**
- Introduction of space-phasors.
- Three-phase to two-phase transformation.
- Power balance and electromechanical torque.
- Deduction of steady state equivalent circuit.
- Applications.

**Full-or-part-time:** 23h 20m
- Theory classes: 9h
- Laboratory classes: 1h
- Self study: 13h 20m

### 5. Non Vectorial Control of AC Machines

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

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

**Full-or-part-time:** 12h 20m
- Theory classes: 3h
- Laboratory classes: 1h
- Self study: 8h 20m

### 6. Vectorial Control on Altern Current Machines

**Description:**
content english

**Full-or-part-time:** 23h 20m
- Theory classes: 9h
- Laboratory classes: 1h
- Self study: 13h 20m

### 7. Non Conventional Electric Machines

**Description:**
content english

**Related competencies:**
- CEELE-20. Understand machine control and electric drives and their applications.
- 06 URI N3. 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.

**Full-or-part-time:** 8h 30m
- Theory classes: 5h
- Self study: 3h 30m
GRADING SYSTEM

The evaluation will be conducted through the assessment by the teacher, with the following weights assigned to evaluated activities:
Team Work: 25%, laboratory practice: 25% Final exam: 50%.

EXAMINATION RULES.

The final test will have three parts, linked to the different types of activities carried out during the course.
Issues related to group work: 20%
Issues relatee to lab sessions: 20%
Questions related to the course theory: 60%

BIBLIOGRAPHY

Basic: