Last update: 10-07-2017

820140 - EDEE - Electric Drives

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering

Teaching unit: 709 - EE - Department of Electrical Engineering

Academic year: 2017

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:

Fillet Castella, Sergi

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 INFORMATI0N 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

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

1. POWER ELECTRÒNICS AND DRIVES.

Learning time: 15h

Theory classes: 4h
Laboratory classes: 1h
Self study : 10h

Description:
Classification and basic characteristics of electrical drives.

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

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

Learning time: 19h 40m

Theory classes: 7h
Laboratory classes: 1h
Self study : 11h 40m

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

Specific objectives:
Equivalent circuits. Motor starting. Variable-speed operation. Variable frequency-fed motor. Constant torque and constant speed operation. Current-fed motor.

3. SYNCHRONOUS MOTORS.

Learning time: 17h 50m

Theory classes: 7h
Laboratory classes: 1h
Self study : 9h 50m

Description:
Variable-speed drives based on synchronous motor.

Specific objectives:
Classification and equivalent circuits. Voltage and current-fed schemes. Self-commutated systems. Cycloconvertes application.

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

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: 40%, laboratory practice: 20% Final exam: 40%.

Bibliography

Basic:

Mohan, Ned. Advanced electric drives: analysis, control, and modeling using MATLAB / Simulink. 2014. Wiley, ISBN 9781118485484.

El-Sharkawi, M. A. Fundamentals of electric drives. Pacific Grove, CA: Brooks/Cole, 2000. ISBN 0534952224.

Dubey, G. K. Fundamentals of electric drives. 2ª ed. Baupur: Alpha Science International, 2001. ISBN 9781842650837.

Boldea I., Nasar S. A. Electric drives. 2nd ed. Boca Raton [etc.]: CRC Press, 2006. ISBN 9780849342201.