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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

Teaching staff

Coordinator: David Romero Durán

Others: David Romero Durán

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.

Degree competences to which the subject contributes

Specific:

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

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.

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.

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Study load

Total learning time: 150h	Hours large group:	30h	20.00%
	Hours medium group:	15h	10.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

TOPIC 1: ASYNCHRONOUS ALTERNATING-CURRENT MACHINES

Learning time: 66h

Theory classes: 14h
Practical classes: 6h
Laboratory classes: 7h
Self study : 39h

Description:
1.01. Asynchronous (induction) motors.
1.02. Moment of a motor.
1.03. Equivalent circuit of asynchronous motors.
1.04. Circle diagram.
1.05. Start-up of asynchronous motors.
1.06. Speed regulation.

Related activities:
- Case studies
- Laboratori sessions

TOPIC 4: DIRECT-CURRENT MACHINES

Learning time: 46h 30m

Theory classes: 8h
Practical classes: 6h
Laboratory classes: 6h
Self study : 26h 30m

Description:
2.01. Construction and principles of direct-current machines.
2.02. Armature reaction and commutation.
2.03. Direct-current motors.
2.04. Additional topics.

Related activities:
- Case studies
- Laboratori sessions

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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.

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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:

Fraile Mora, Jesús. Máquinas eléctricas. 6a ed. Madrid: McGraw Hill, 2008. ISBN 9788448161125.

Mazón, Javier [et al.]. Guía de autoaprendizaje de máquinas eléctricas. Madrid: Pearson Educación, 2008. ISBN 9788483224908.

Martínez Barrios, Luis. La máquina eléctrica en problemas. Barcelona: Edicions UPC, 1993. ISBN 8476533020.

Cortés Cherta, Manuel. Curso moderno de máquinas eléctricas rotativas. Barcelona: Editores Técnicos Asociados, 1970-1989. ISBN 8471461374.

Complementary:

Ras Oliva, Enrique. Transformadores de potencia, de medida y de protección. 7a ed. Barcelona: Marcombo, 1988. ISBN 8426706908.

Sanz Feito, Javier. Máquinas eléctricas. Madrid: Prentice Hall, 2002. ISBN 8420533912.

Chapman, Stephen J. Máquinas eléctricas. Bogotá: McGraw Hill, 1993. ISBN 9586001253.

Pérez Donsión, Manuel. Motores síncronos de imanes permanentes. Santiago de Compostela: Servicio de Publicaciones e Intercambio Científico, 1990. ISBN 8471916223.

Richardson, Donald V. Máquinas eléctricas rotativas y transformadores. México: Prentice-Hall Hispanoamericana, 1990. ISBN 9868809535.