



PERSONA CIÈNCIA EMPRESA
Universitat Ramon Llull

TITLE OF COURSE: ELECTRIC MACHINES

MATTER: Fundamentals of Electrical, Electronics and Automation Engineering

MODULE: Common to Industry Branch

PROGRAM TITLE: Degree on Industrial Technologies Engineering

GENERAL CHARACTERISTICS*

Type: Basic training, Compulsory elective, Optional

Final degree project, Practicum

Duration: Quarterly

Semester/s: 4

Number of credits ECTS: 5

Language/s: Spanish, Catalan

DESCRIPTION

BRIEF DESCRIPTION AND JUSTIFICATION (the meaning of the course in relation to the studies. Between 100 and 200 words.)

The generation, transmission and distribution of electricity is carried out through three phase power system. This course presents the three-phase electrical systems and later studied all types of machines that can be connected to these systems, both single-phase and three-phase electrical machines (generators, motors and transformers) are in any field of modern daily life. These devices are so common because the power source is clean and efficient, easy to control and transmit over long distances. This course part of the present three-phase systems are given basic, principle of operation and applications of electrical machines to be used to develop industrial projects.

COMPETENCES (of the course made in relation to preassigned competences in this area.)

1. Ability to understand and apply the technical knowledge of electrical machinery necessary for the practice of industrial engineering. [E2]
2. Ability to solve problems with initiative, decision making, creativity, and critical thinking. [E4]
3. Ability to develop, plan and implement analytical and numerical methods for mathematical modeling in the field of industrial engineering. [E7]
4. Ability to develop components, systems, processes or experiments to achieve the requirements. [E8]
5. Ability to implement projects in the fields of industrial engineering [E9].
6. Knowledge and use of the principles of circuit theory and electrical machines [CR4]
7. Understanding the basics of automation and control methods [Cr6]

PREREQUISITES* (modules, matters, courses and knowledge needed to follow the course. Can be stated that courses must have been completed.)

Calculation tools. Operation of electrical circuits. Techniques of circuit analysis. Theory of electromagnetic fields.

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CONTENTS (as a relationship of the chapters that constitute the contents, or topics covered, of the course to a second level detail.)

1. - Three-phase power systems
2. - General principles and basic laws of electrical machines.
3. - Power Transformers (single and three phase)
4. - Transformers, protection and special
5. - Autotransformers (single and three phase)
6. - Synchronous Machines. alternators
7. - AC rotating machines. Induction Motors
8. - DC Rotary machines.
9. - Special machines.

METHODOLOGY

TRAINING ACTIVITIES* (Complete the table relating activities, workload in ECTS credits, and competences.)

Training activities	ECTS Credits	Competences
Sessions presentation of concepts (A1)	1,5	E2, E4, CR4, CR6
Sessions for resolution of exercises, problems and cases (A2)	0,5	E2, E4, CR4, CR6
Seminars (A3)	-	
Personal mandatory activities professor-student (A4)	-	
Practical work / laboratory (A5)	0,5	E4, E7, E8, E9, CR4, CR6
Oral and writing presentations (A6)	-	
Personal study activities by students (A7)	2	E2, E4, E7, E8, E9, CR4, CR6
Evaluation activities (exams, tests,...) (A8)	0,5	E2, E4, E7, E8, E9, CR4, CR6
TOTAL	5	

EXPLANATION OF THE TEACHING METHODOLOGY (justifying the teaching methods used in relation to the competences and course contents. Between 100 and 200 words.)

The course lectures made, which explains the basics of each subject, and problem classes in which students must strengthen the knowledge and methods taught in lectures. At the end of each item of content is devoted to a two-hour class in the resolution of the problems posed by the professor, the students had prior work at home. In addition to a better understanding of theoretical concepts, students will undertake the design and implementation of systems that use electric machines. Therefore, pupils at the end of each machine lectures, will have a number of these assemblies and applications in the laboratory.

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EVALUATION

EVALUATION METHODS* (Fill in the table relating evaluation methods, competences and weight in the qualification of the subject.)

Evaluation Methods	Weight	Competences
final Exam	65%	E2, E4, E7, CR4, CR6
Review / s part / s	20%	E2, E4, E7, CR4, CR6
Follow-up activities	-	
Papers and presentations	-	
Labor experimental or field	15%	E7, E8, E9, CR4, CR6
Proyect	-	
Evaluation of the company or institution	-	
Participation	-	

LEARNING OUTCOMES (Explanation of the achievements of students that allow competences evaluation, relating to competences and evaluation methods.)

• Objective 1:

The student must demonstrate that he understands the operating principles and applications of electrical machines.

• Objective 2:

Students must demonstrate their capacity to solve problems.

• Objective 3:

Students must demonstrate that they have acquired the ability to design and implement various electrical machines.

QUALIFICATION (Explanation of the calculation system of qualifying the course.)

The grade for the course (NF) considers continuous assessment (CA) and a final exam (EF). Continuous assessment (CA) consist of ratings and experimental laboratory (TEL) and two exams (EP1 and EP2). The weights of each of these parties will be formed:

$$0,15 \text{ TEL} + 0,10 \text{ EP1} + 0,10 \text{ EP2} + 0,65 \text{ EF} = \text{NF}$$

$$\text{EC} = 0,15 \text{ TEL} + 0,10 \text{ EP1} + 0,10 \text{ EP2}$$

However, to pass the course must obtain a minimum grade both continuous assessment (CA) and the final exam (EF). In both parties must obtain a grade equal to or greater than 4 out of 10.

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EVALUATION OF COMPETENCES (Defining expressions of calculation for each competence based on corresponding evaluations activities.)

To evaluate the skills E2, E4, and CR4 Cr6 be used as an indicator of the notes and final exams.

For the evaluation of competition E7, CR4 and Cr6 used as an indicator of midterm grades, and final experimental studies and field

To evaluate the skills E8, E9, CR4 and Cr6 indicator used is the experimental or field.

TEXTBOOKS (recommended and accessible to students.)

- STEPHEN J.CHAPMAN "Máquinas Eléctricas" Ed. McGraw-Hill, 2000
- JESÚS FRAILE MORA "Máquinas Eléctricas" Ed. McGraw-Hill, 2008
- RAFAEL SANJURJO. "Máquinas Eléctricas" Ed. McGraw-Hill, 1989
- E. FITZGERALD. "Máquinas eléctricas" Ed. McGraw-Hill, 1992
- MANUEL CORTES. "Curso Moderno de máquinas eléctricas rotativas. Ed. Editores Técnicos Asociados S.A.
- RAS OLIVA "Transformadores de potencia de medida y de protección" Ed. Marcombo Boixareu Editores.
- THEODORE WILDI. "Tecnología de los sistemas eléctricos de potencia" Ed. Hispano Europea, 1983
- GONZÁLEZ y J.C. TOLEDANO " Sistemas polifásicos" Ed. Paraninfo, 1994
- STAFF E.E "Circuitos magnéticos y transformadores" Ed. Reverté
- C.F. GUILBERT. "Ensayo de Máquinas eléctricas" Ed. J.B. Baillére e Hijos

HISTORICAL DOCUMENT

EARLIER CHANGES

11 February 2011, Dr. Pere Palacín Farré

LAST REVISION

11 February 2011, Dr. Pere Palacín Farré

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