



PERSONA CIÈNCIA EMPRESA
Universitat Ramon Llull

TITLE OF COURSE: ELECTRICAL SYSTEMS

MATTER: Electrical, Electronics and Automation Engineering

MODULE: Specific Technology

PROGRAM TITLE: Degree on Industrial Technologies Engineering

GENERAL CHARACTERISTICS*

Type: Basic training, Compulsory elective, Optional
 Final degree project, Practicum

Duration: Quaterly

Semester/s: 6

Number of credits ECTS: 5

Language/s: Spanish, Catalan, English

DESCRIPTION

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

This course begins by studying the most important components of electrical systems (generators, transformers and lines), ignoring details that are more interested in the design of the devices themselves and affecting their dimensionless analysis or per unit. A second part is dedicated to frequency control and tensions at various levels. It presents the major concepts and tools involved in the operation in steady and stable electrical system. The last part of the course focuses on the analysis of the system when any major disruption, whether internal or external, it pulls away from his normal work regime.

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

1. Ability to understand and apply the technical knowledge of electrical systems necessary for the practice of 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. Capacity for implementation of projects in the area of industrial engineering [E9].
6. Knowledge of machine control and electrical drives and their applications [TE1]

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. Circuit analysis techniques. Theory of electromagnetic fields. Applications Electrical Machines

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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. - Introduction to electrical systems
2. - Elements of systems.
3. - Determination of equivalent circuit parameters and elements
4. - Modelling systems
5. - Rates per unit. Definition, choice and change of basis
6. - Systems Analysis
7. - Frequency control and system voltages
8. - Steady. System States
9. - System Stability
10. Analysis Tools
11. - Safety Assessment. Contingency Analysis

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, TE1
Sessions for resolution of exercises, problems and cases (A2)	0,5	E2, E4, TE1
Seminars (A3)	-	
Personal mandatory activities professor-student (A4)	-	
Practical work / laboratory (A5)	0,5	E4, E7, E8, E9, TE1
Oral and writing presentations (A6)	-	
Personal study activities by students (A7)	2	E2, E4, E7, E8, E9
Evaluation activities (exams, tests,...) (A8)	0,5	E2, E4, E7, E8, E9
TOTAL	5	

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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 is taught conducting lectures, in which explains the basics of each topic, and problem classes in which students must consolidate the knowledge and methods taught in lectures. At the end of each chapter of the content is devoted to one to two hours of class to the resolution by the teacher of the problems that students have had prior work at home. In addition to a better understanding of theoretical concepts, students will perform analysis and case studies on the operation of electrical systems. To do so, students at the end of the lectures, will conduct a series of assemblies and laboratory simulations.

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, TE1
Examination / s Partial / s / control / s scheduled / s	20%	E2, E4, E7, TE1
Experimental	15%	E7, E8, E9, TE1

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

Objective 1:

The student should demonstrate understanding of the principles of operation of electrical systems.

Objective 2:

The student must demonstrate the ability to solve problems.

Objective 3:

The student must demonstrate that it has acquired the ability to analyze and implement the various elements of the systems.

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

The course grade (NF) consider continuous evaluation (CE) and a final exam (EF). Continuous assessment (EC) consist of scores of the experimental and laboratory (TEL) and two exams (EP1 and EP2). The weights of each of these parts in the final grade will be:

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TEL + 0.10 0.15 + 0.10 EP1 EP2 + 0.65 EF = NF

TEL EC = 0.15 + 0.10 + 0.10 EP1 EP2

However, to pass the course you must obtain a minimum grade both continuous evaluation (CE) and the final exam (EF). The two parties must obtain a grade equal to or higher than 4 out of 10.

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

For the evaluation of E2 and E4 skills will be used as an indicator of the notes and final exams.

For the assessment of competence E7, is used as an indicator notes midterms, finals and the experimental work and field

For assessment of skills E8 and E9, the indicator used is the experimental or field

TEXTBOOKS (recommended and accessible to students.)

- STEVENSON WILLIAM D "Análisis de Sistemas Eléctricos de Potencia" Ed. McGraw-Hill, 2011
- BERGEN A.R. "Power System Analysis" Ed Prentice-Hall, 1986
- THEODORE WILDI. "Tecnología de los sistemas eléctricos de potencia" Ed. Hispano Europea, 1983
- WEEDY B.M "Sistemas Eléctricos de Gran Potencia" Ed Reverté.
- 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
- RAS OLIVA "Transformadores de potencia de medida y de protección" Ed. Marcombo Boixareu Editores.
- C.F. GUILBERT. "Ensayo de Máquinas eléctricas" Ed. J.B. Baillére e Hijos

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HISTORICAL DOCUMENT

EARLIER CHANGES

February 29, 2012, Dr. Pere Palacín Farré

LAST REVISION

February 29, 2012, Dr. Pere Palacín Farré