



PERSONA CIENCIA EMPRESA
Universitat Ramon Llull

ASIGNATURA: THEORY OF CIRCUITS

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: 3

Number of credits ECTS: 6

Language/s: Spanish

DESCRIPTION

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

The study of electrical circuits represents a fundamental knowledge of electrical engineering and electronics. This course provides basic knowledge of electrical circuits, their operation and analysis techniques to solve, so adequately in an electrical circuit operating conditions.

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

1. Ability to understand and apply technical knowledge in electrical theory and circuitry necessary for the practice of industrial engineering. [E2]
2. Knowledge of materials science and technology that enables them to learn new methods and theories and given a versatility to adapt to new situations [E3]
3. Ability to solve problems with initiative, decision making, creativity, and critical thinking. [E4]
4. Ability to develop, plan and implement analytical and numerical methods for mathematical modeling in the field of industrial engineering. [E7]
5. Knowledge and use of the principles of circuit theory and electrical machines [CR4]

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

Linear algebra, differential calculus and Physical Principles of Engineering

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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.-The Basics.
- 2.-Elements circuits.
- 3.-Basic Law.
- 4.-analysis methods and theorems of circuit
- 5.-signals and waveforms.
- 6.-sinusoidal stationary regime. Analysis of circuits in the sinusoidal steady.
- 7.-Power in sinusoidal steady.
- 8.-polyphase circuits. Power in polyphase circuits.
- 9.-frequency response, filters and resonance.
- 10.-in transient analysis.
- 11.-Method of the Laplace transform. Application of electric circuits.
- 12.-magnetically coupled circuits.
- 13.-circuit analysis using SPICE and PSPICE.
- 14.-circuit analysis using Matlab.
- 15.-Wave analysis by Fourier method.

METHODOLOGY

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

Training activities	ECTS Credits	Competences
Sessions presentation of concepts (A1)	2	E2, E3, E7, CR4
Sessions for resolution of exercises, problems and cases (A2)	1	E2, E3, E4, CR4
Seminars (A3)	-	
Personal mandatory activities professor-student (A4)	-	
Practical work / laboratory (A5)	0,5	E4, E7, CR4
Oral and writing presentations (A6)	-	
Personal study activities by students (A7)	2	E2, E3, E4, E7, CR4
Evaluation activities (exams, tests,...) (A8)	0,5	E2, E3, E4, E7, CR4
TOTAL	6	

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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 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 have different electrical and software capable of simulating different circuits so we can analyze them. We propose different circuits and students with devices and equipment placed at their disposal will have to analyze and present the results.

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 (A)	65%	E2, E3, E4, CR4
Examination / s Partial / s / control / s scheduled / s (B)	20%	E2, E3, E4, CR4
Activities done in class (C)	-	
Reports realizats work (E)	-	
Modeling, Proposed, etc.. (G)	15%	E4, E7, CR4
Laboratory reports (H)	-	
Practical work / lab (I)	-	
Participations (K)	-	

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 principles of analysis and synthesis of electrical circuits.
- Objective 2:
Students must demonstrate their capacity to solve problems.
- Objective 3:
Students must demonstrate that they have acquired the ability to identify, formulate and solve electrical circuits

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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 grades of experimental or field (ET) and two exams (EP1 and EP2). The weights of each of these parties will be formed:

$$ET \text{ EP1 } 0.15 + 0.10 + 0.10 + 0.65 \text{ EF} = \text{NF EP2}$$

$$EC \text{ ET} = 0.15 + 0.10 + 0.10 \text{ EP1 EP2}$$

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.

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

To evaluate the skills E2, E3, and CR4 used as an indicator of the notes and final exams. For the evaluation of competition and E4 CR4 used as an indicator of midterm grades, and final experimental studies and field
For the evaluation of competition E7, the indicator used is the experimental or field.

TEXTBOOKS (recommended and accessible to students.)

- JACK E. KEMMERLY, WILLIAM H. Hayter. Jr. "Circuitos in Engineering Analysis." Ed. McGraw-Hill, 2001
- SANJURJO RAFAEL, EDUARDO LAZARO, PABLO DE MIGUEL "circuitos eléctricos Theory." Ed McGraw-Hill 1997
- JOSEPH A. EDMINISTER, Mahmood NAHVI "Circuitos eléctricos" Ed. McGraw-Hill 1997
- M.PARRA VALENTIN, Angel Perez, Antonio Pastor, JESUS ORTEGA. "Circuitos Theory I and II" Ed. UNED 1991.
- Shabbir P. "Circuitos Eléctricos. Single-phase systems and Trifásicos "Ed. PPU 2009.
- S.D. SCOTT "Introduction to Analysis Circuitos" Ed. McGraw-Hill 1998
- CHARLES K. ALEXANDER, MATTHEW N.O. SADIKU, "Principals of Circuitos Eléctricos" Ed. McGraw-Hill 2002
- A. Bruce Carlson "Theory Circuitos" Ed. Thomson Paraninfo 2002.

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HISTORICAL DOCUMENT

EARLIER CHANGES

11 february 2011, Dr. Pere Palacín Farré

LAST REVISION

11 february 2011, Dr. Pere Palacín Farré