COURSE SYLLABUS

Academic Year: 2020/2021

Identification and characteristics of the course				
Code	501065		ECTS Credits	6
Course title (English)	Circuits analysis			
Course title (Spanish)	Análisis de Circuitos			
Degree programs	Electrical Engineering Degree (industrial branch)			
Faculty/School	Industrial Engineering Faculty			
Semester	4º	Course type (compulsory/optional)	Compulsory	
Module	Specific technology in electricity			
Subject matter	Electric circuits and electric machines			
Lecturer/s				
Name		Room	E-mail	Web page
Eduardo Manuel Cordero Pérez		D.2.2/ D.2.19	educorde@unex.es	
Subject Area	Electrical Engineering			
Department	Electrical Engineering, Electronic and Automatization			
Coordinator (Only if there is more than one lecturer)	Eduardo Manuel Cordero Pérez			

Competencies*

Competencias Básicas	Marcar con una "X"	Competencias Generales	Marcar con una "X"	Competencias Transversales	Marcar con una "X"	Competencias Específicas FB	Marcar con una "X"	Competencias Específicas CRI	Marcar con una "X"	Competencias Específicas TE	Marcar con una "X"
CB1	X	CG1	X	CT1	X	CEFB1		CECRI1		CETE1	
CB2	X	CG2	X	CT2	X	CEFB2		CECRI2		CETE2	
CB3	X	CG3	X	CT3	X	CEFB3		CECRI3		CETE3	X
CB4	X	CG4	X	CT4	X	CEFB4		CECRI4	X	CETE4	X
CB5	X	CG5	X	CT5	X	CEFB5		CECRI5		CETE5	
		CG6	X	CT6	X	CEFB6		CECRI6		CETE6	
		CG7	X	CT7	X			CECRI7		CETE7	
		CG8	X	CT8	X			CECRI8		CETE8	
		CG9	X	CT9	X			CECRI9		CETE9	
		CG10	X	CT10	X			CECRI10		CETE10	
		CG11	X					CECRI11		CETFG	
								CECRI12			

Contents

* The sections concerning competencies, course outline, teaching activities, teaching methodology, learning outcomes and assessment methods must conform to those included in the ANECA verified document of the degree program.

Course outline*
Circuit Theory advanced, magnetic coupling, steady state transformer analysis, transient analysis, two ports network, power, three-phase circuits, metering.
Course contents
Title of unit 1: ACTIVE AND REACTIVE POWER IN BALANCE AND UNBALANCE THREE-PHASE CIRCUITS. Contents of unit 1: 1. Unbalance three-phase circuits' analysis. 2. Active and reactive power metering in balance and unbalance three-phase circuits. 3. Active and reactive power metering methods with one phase wattmeters. 3 and 4 lines. 4. Power quality metering with three phase analyzer. Description of practical activities for unit 1: P1: unbalance circuit analysis.
Title of unit 2: LAPLACE METHOD FOR TRANSIENT STATE ANALYSIS Contents of unit 2: 1. Introduction. 2. Definition and properties. 3. Theorems. 4. Inverse Laplace transform. Methods. 5. Circuits in Laplace form. 6. Circuits with non periodic functions. 7. First order circuits. 8. Second order circuits. Description of practical activities for unit 2: P4: First order circuits. P5: Second order circuits.
Title of unit 3: Symmetrical components. Contents of unit 3: 1. Introduction. 2. Stokvis-Fortescué Theorem. 3. Symmetrical components calculation. 4. Symmetrical components graphic representation. 5. Unbalance and asymmetric ratios. 6. Secuence networks. 7. Power. 8. Power factor.
Title of unit 4: THREE PHASE TRANSFORMERS. Contents of unit 4: 1. Introduction. 2. Connections and couplings. Transformers connection groups. 3. Parallel coupling transformers.

Educational activities *

Student workload (hours per lesson)		Lectures	Practical sessions				Monitoring activity	Homework
Lesson	**Total**	**L**	**HI**	**LAB**	**COM**	**SEM**	**SGT**	**PS**
1	53	10		10	3		1	29
2	48,5	9		8	1,5		1	29
3	24	6					1	17
4	14,5	3						12
Assessment [1]	10	2						8
TOTAL	150	30		18	4,5		3	87

L: Lectures (100 students)
HI: Hospital internships (7 students)
LAB: Lab sessions or field practice (15 students)
COM: Computer room or language laboratory practice (30 students)
SEM: Problem-solving classes, seminars or case studies (40 students)
SGT: Scheduled group tutorials (educational monitoring, ECTS type tutorials)
PS: Personal study, individual or group work and reading of bibliography

Teaching Methodology*

Teaching Methodologies	
1. Explanation and discussion of the theoretical contents.	X
2. Solution, analysis and discussion of previous questions.	X
3. Worshops.	X
4. Practical cases.	X
5. Small group classes monitoring.	X
6. Information searching for the current chapter.	X
7. Individual or group works and tasks.	X
8. Questions and practical cases elaboration.	X

Learning outcomes *

Identify, calculate with the typical circuits variables. Solve circuits in transient state.
Solve transformers questions (load, non load, tests, efficiency…).
Active and Reactive power calculations.
Symmetric components calculations.
Two ports networks calculations.
Know how meter with laboratory instruments.
Know circuit simulation software.

Assessment methods *

[1] Indicar el número total de horas de evaluación de esta asignatura.

Bibliography (basic and complementary)

Basic Bibliography

Dorf, R. C. "Circuitos eléctricos. Introducción al análisis y al diseño." Ed. Marcombo, S.A.

2.-Edminister, J.A. "Circuitos eléctricos" Ed. McGraw – Hill.

3. Fraile Mora, J. "Electromagnetismo y circuitos eléctricos" Servicio de Publicaciones del C.I. de Caminos, Canales y Puertos. Madrid.

4. Parra, V.M. "Teoría de Circuitos (Vol I y II)" Universidad Nacional de Educación a Distancia.

5. Fraile, J. *Máquinas Eléctricas.* Mc Graw-Hill; Madrid, 2008 (6ª edición)

6. Ras, E. *Transformadores de potencia, medida y protección.* Aguilar S.A. Ediciones; Madrid, 1994

7. Cortés, M.; Corrales, J.; Enseñat, A. *Teoría general de Máquinas Eléctricas.* Universidad Nacional de Educación a distancia; Madrid, 1991 (3ª edición)

8. Sanz Feito, J. *Máquinas eléctricas.* Prentice Hall; Madrid, 2002

9. Chapman, S. *Máquinas Eléctricas.* Mc Graw-Hill L; Madrid, 2000 (3ª edición)

10.- Córcoles, Pedra y Salich. Transformadores. Ediciones UPC, 2004 (1ª edición)

Complementary Bibliography

1. Ortega, G.; Gómez, M.; Bachiller, A. *Problemas resueltos de Máquinas Eléctricas.* Thomson Paraninfo, S.A.; Madrid, 2002

2. Kingsley; Kusko; Fitzgerald. *Teoría y análisis de las máquinas eléctricas.* Hispano Europea; Barcelona, 1994

3. Sanjurjo, R. *Máquinas Eléctricas.*Mc Graw-Hill; Madrid, 1989

4. Nasar, S.A. *Máquinas Eléctricas y Electromecánicas.*Mc Graw-Hill; Madrid, 1988

Other resources and complementary materials

http://campusvirtual.unex.es/portal/