

CIRCUIT ANALYSIS

20001 - CIRCUIT ANALYSIS (2024-25)

General

Code: 20001

Lecturer responsible:

MARTINEZ MARIN, TOMAS

Credits ECTS:

6,00

Theoretical credits:

1,50

Practical credits:

0,90

Distance-base hours:

3,60

Departments involved

- **Dept:** PHYSICS, ENGINEERING SYSTEMS AND SIGNAL THEORY

Area: SIGNAL THEORY AND COMMUNICATIONS

Theoretical credits: 1,5

Practical credits: 0,9

This Dept. is responsible for the course.

This Dept. is responsible for the final mark record.

Study programmes where this course is taught

- [DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING](#)

Course type: CORE (Year: 1)

Competencies and objectives

Course context for academic year 2024-25

Circuit Analysis is a core subject that provides tools to understand the behavior of linear electric circuits in their different regimes: direct current, alternating current and transient state.

Course content (verified by ANECA in official undergraduate and Master's degrees) for academic year {0}

UA Basic Transversal Competences

- **CT13** : Capacitat d'adoptar el mètode científic en el plantejament i realització de treballs diversos tant en l'àmbit acadèmic com en el professional.
- **CT6** : Capacitat d'utilitzar la llengua anglesa amb fluïdesa per a accedir a la informació tècnica, respondre a les necessitats de la societat, i poder ser autosuficient en la preparació de la seua vida professional.
- **CT9** : Capacitat de treball en grup.

Specific Competences:>>Basic

- **B4** : Comprensió i domini dels conceptes bàsics de sistemes lineals i les funcions i transformades relacionades, teoria de circuits elèctrics, circuits electrònics, principi físic dels semiconductors i famílies lògiques, dispositius electrònics i fotònics, tecnologia de materials i la seua aplicació per a la resolució de problemes propis de l'enginyeria.

Specific Competences: >> Competences Common to the Telecommunications Branch

- **C3** : Capacitat per a utilitzar eines informàtiques de recerca de recursos bibliogràfics o d'informació relacionada amb les telecomunicacions i l'electrònica.

Exclusive skill taught in this course

No data

Learning outcomes (Training objectives)

No data

Specific objectives stated by the academic staff for academic year 2024-25

OE1. Learning of mathematic tools for analyzing electronic circuits. These tools are useful to work with analog and digital circuits of common use in telecommunications.

OE2. Introduction to the study of signals as mathematical variables, and to the description of components and circuits by means of functions and equations.

OE3. Introduction to the analysis of signals and systems in transformed domains. Equivalence between domains and processing potentials of each of them.

OE4. Introduction to the block analysis of linear systems by using transfer functions.

OE5. First notions about the concept of filtering and the study of selective filters.

Content for academic year 2024-25

Unit 1: Introduction to circuit analysis (OE1)

- 1.1. Introduction and motivation.
- 1.2. Definitions of electric magnitudes.
- 1.3. Active elements: sources.
- 1.4. Definition equations of passive elements.

Unit 2: Systematic methods of linear circuit analysis (OE1)

- 2.1. Introduction and motivation.
- 2.2. Circuit topology: definitions.
- 2.3. Kirchhoff's laws.
- 2.4. Association of elements.
- 2.5. Analysis of simple circuits.
- 2.6. Systematic analysis by node voltages.
- 2.7. Systematic analysis by mesh currents.
- 2.8. Circuit theorems.
- 2.9. Circuits with operational amplifiers.

Unit 3: Circuit analysis in state space (OE1, OE2)

- 3.1. Introduction and motivation.
- 3.2. Systemic approach.
- 3.3. Electric signals: formulation and properties.
- 3.4. Formulation in state space.
- 3.5. Systematic circuit analysis in state space.
- 3.6. Circuits of 1st and 2nd order.
- 3.7. Temporal analysis: transient response parameters.
- 3.8. Circuits with operational amplifiers.

Unit 4: Analysis in Laplace domain (OE2, OE3, OE4)

- 4.1. Introduction and motivation.
- 4.2. Laplace transform.
- 4.3. Solution of the state equation by Laplace transform.
- 4.4. Circuit analysis of in Laplace domain.
- 4.5. Transformed circuits.
- 4.6. Impedance.
- 4.7. Application of systematic analysis techniques.
- 4.8. Transfer function.
- 4.9. Derivation of the transfer function from the state equation.
- 4.10. Temporal analysis with the transfer function.

Unit 5: Sinusoidal steady state (OE2, OE3)

- 5.1. Introduction and motivation.
- 5.2. Sinusoidal signals.
- 5.3. Derivation of the SSS from the transfer function.
- 5.4. Impedance and admittance.
- 5.5. Phasor transformed circuit.
- 5.6. Application of systematic analysis techniques.
- 5.7. Resonance.
- 5.8. Power in SSS.
- 5.9. Maximum power transfer theorem.

Unit 6: Frequency filtering (OE5)

- 6.1. Introduction and motivation.
- 6.2. Bode Diagrams.
- 6.3. Ideal filters.
- 6.4. Filters of 1st and 2nd order.
- 6.5. Active filters.

Related links

No data

Bibliography

Circuitos eléctricos

Author(s): NILSSON, James W. ; RIEDEL, Susan A.

Issue: México, D.F. : Pearson Prentice Hall, 2005;

ISBN: 978-84-205-4458-8

Category: Sin especificar

Circuitos y señales : Introducción a los circuitos lineales y de acoplamiento

Author(s): Thomas, R. E.

Issue: Barcelona : Reverté, 1992;

ISBN: 84-291-3458-1

Category: Sin especificar

Assessment

Assessment procedures and criteria 2024-25

Ordinary exam

mark = Control1 (15) + Control2 (15) + Theory (50) + Laboratory (20)

Observation: The minimum mark in the final exam in order to consider the continuous evaluation is 4 points. In this convocatory, the recovery of the continuous evaluation is not considered.

Extraordinary exam

mark = MAX[Control1 (15) + Control2 (15) + Theory (50) + Laboratory (20), Theory (100)]

Observation: the final mark will be the maximum between the following two options:

1. Final mark computed as in the previous evaluation: final exam (50%) plus continuous evaluation (50%) carried out during the course. The mark of the continuous evaluation cannot be upgraded.
2. Final mark provided by the final exam, including the recovery of the continuous evaluation.

Recovery: Theory (50%).

The detection of copy or plagiarism will be marked "0" in the corresponding test. The Department and the Polytechnic School or Faculty will be informed about this incident. The reiteration in the conduct in this or other subject will entail the notification to the corresponding vice-rector of the faults committed so that they study the case and sanction according to the legislation.

Description	Criteria	Type	Weighting system
ACTIVIDADES EN EL AULA	During both theory and problems lessons there will be a set of activities that will be evaluated, such as: solving problems in group, solving problems individually, public presentation of concepts, etc. In addition, two tests at week 6 (unit 2) and 12 (units 3 and 4) will be made. These activities are recoverables in extraordinary exams.	ACTIVITIES OF EVALUATION DURING THE SEMESTER	30
PRÁCTICAS DE LABORATORIO	This activity is rated by evaluating the reports of the laboratory experiences, written by the students, which have to be delivered at the end of the sessions. Attendance is compulsory.	ACTIVITIES OF EVALUATION DURING THE SEMESTER	20
TEORÍA	Final theoretical-practical exam, consisting of a number of circuit analysis problems to be solved. In order to pass the course, the mark in this final exam will be necessarily equal or greater than 4 over 10 (recoverable in extraordinary exams).	FINAL TEST	50

Official exam dates for academic year 2024-25

Exam session	Date	Time	Group - Classroom(s) allocated	Comments
(C2) Periodo ordinario para asignaturas de primer semestre	20/01/2025			Teoría
(C4) Pruebas extraordinarias para asignaturas de grado y máster	04/07/2025			Teoría

Academic staff



MARTINEZ MARIN, TOMAS
Lecturer responsible

THEORY CLASS: Groups: 1 , 2
PROBLEM PRACTICALS / WORKSHOP: Groups: 2



LOPEZ SANCHEZ, JUAN MANUEL

THEORY CLASS: Groups: 1

PROBLEM PRACTICALS / WORKSHOP: Groups: 1



MESTRE QUEREDA, ALEJANDRO

THEORY CLASS: Groups: 1

PROBLEM PRACTICALS / WORKSHOP: Groups: 1



PALOMARES LORENZO, FERNANDO

LAB PRACTICALS: Groups: 1



VIVES ARAGONES, FRANCISCO PEDRO

LAB PRACTICALS: Groups: 2 , 3 , 4 , 5 , 6

PROBLEM PRACTICALS / WORKSHOP: Groups: 3

Groups

THEORY CLASS

Group	Semester	Morning or afternoon session	Language	No. of enrolled students	
Gr. 1 (THEORY CLASS) : 1 (ARA)	1S	Morning	English	11	<ul style="list-style-type: none">▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING▪ Allowed VISITING STUDENT EEES▪ Allowed INTERNATIONAL MOBILITY PROGRAMME
Gr. 2 (THEORY CLASS) : 2	1S	Afternoon	Spanish	87	<ul style="list-style-type: none">▪ Allowed VISITING STUDENT EEES▪ Allowed INTERNATIONAL MOBILITY PROGRAMME▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING

LAB PRACTICALS

Group	Semester	Morning or afternoon session	Language	No. of enrolled students	
Gr. 1 (LAB PRACTICALS) : 1 (ARA)	1S	Morning	English	11	<ul style="list-style-type: none">▪ Allowed VISITING STUDENT EEES▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING▪ Allowed INTERNATIONAL MOBILITY PROGRAMME
Gr. 2 (LAB PRACTICALS) : 2	1S	Afternoon	Spanish	18	<ul style="list-style-type: none">▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING▪ Allowed INTERNATIONAL MOBILITY PROGRAMME▪ Allowed VISITING STUDENT EEES
Gr. 3 (LAB PRACTICALS) : 3	1S	Afternoon	Spanish	23	<ul style="list-style-type: none">▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING▪ Allowed VISITING STUDENT EEES▪ Allowed INTERNATIONAL MOBILITY PROGRAMME
Gr. 4 (LAB PRACTICALS) : 4	1S	Afternoon	Spanish	13	<ul style="list-style-type: none">▪ Allowed INTERNATIONAL MOBILITY PROGRAMME▪ Allowed VISITING STUDENT EEES▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING





Group	Semester	Morning or afternoon session	Language	No. of enrolled students	
Gr. 5 (LAB PRACTICALS) : 5	1S	Afternoon	Spanish	16	<ul style="list-style-type: none"> ▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING ▪ Allowed VISITING STUDENT EES ▪ Allowed INTERNATIONAL MOBILITY PROGRAMME
Gr. 6 (LAB PRACTICALS) : 6	1S	Afternoon	Spanish	17	<ul style="list-style-type: none"> ▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING ▪ Allowed VISITING STUDENT EES ▪ Allowed INTERNATIONAL MOBILITY PROGRAMME

PROBLEM PRACTICALS / WORKSHOP














Group	Semester	Morning or afternoon session	Language	No. of enrolled students	
Gr. 1 (PROBLEM PRACTICALS / WORKSHOP) : 1 (ARA)	1S	Morning	English	11	<ul style="list-style-type: none"> ▪ Allowed INTERNATIONAL MOBILITY PROGRAMME ▪ Allowed VISITING STUDENT EES ▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING
Gr. 2 (PROBLEM PRACTICALS / WORKSHOP) : 2	1S	Afternoon	Spanish	42	<ul style="list-style-type: none"> ▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING ▪ Allowed VISITING STUDENT EES ▪ Allowed INTERNATIONAL MOBILITY PROGRAMME
Gr. 3 (PROBLEM PRACTICALS / WORKSHOP) : 3	1S	Afternoon	Spanish	45	<ul style="list-style-type: none"> ▪ Allowed VISITING STUDENT EES ▪ Allowed INTERNATIONAL MOBILITY PROGRAMME ▪ Allowed DEGREE IN SOUND AND IMAGE IN TELECOMMUNICATION ENGINEERING


















Timetables

THEORY CLASS



Group	Start date	End date	Day	Start time	End time	Lecture room
1	09/09/2024	20/12/2024	LUN	10:30	11:30	0016P2008 
1	09/09/2024	20/12/2024	MIE	10:30	12:00	0016P1001 
2	09/09/2024	20/12/2024	LUN	15:00	16:30	A2/C02 
2	09/09/2024	20/12/2024	MIE	15:00	16:00	A2/C02 

LAB PRACTICALS

Group	Start date	End date	Day	Start time	End time	Lecture room
1	01/10/2024	01/10/2024	MAR	10:00	11:30	0014PB010 
1	22/10/2024	22/10/2024	MAR	10:00	11:30	0014PB010 
1	12/11/2024	12/11/2024	MAR	10:00	11:30	0014PB010 
1	26/11/2024	26/11/2024	MAR	10:00	11:30	0014PB010 
1	17/12/2024	17/12/2024	MAR	10:00	11:30	0014PB010 
2	03/10/2024	03/10/2024	JUE	18:30	20:00	0014PB010 
2	24/10/2024	24/10/2024	JUE	18:30	20:00	0014PB010 
2	14/11/2024	14/11/2024	JUE	18:30	20:00	0014PB010 
2	28/11/2024	28/11/2024	JUE	18:30	20:00	0014PB010 
2	19/12/2024	19/12/2024	JUE	18:30	20:00	0014PB010 
3	30/09/2024	30/09/2024	LUN	19:00	20:30	0014PB010 
3	21/10/2024	21/10/2024	LUN	19:00	20:30	0014PB010 
3	11/11/2024	11/11/2024	LUN	19:00	20:30	0014PB010 

Group	Start date	End date	Day	Start time	End time	Lecture room
3	25/11/2024	25/11/2024	LUN	19:00	20:30	0014PB010 
3	16/12/2024	16/12/2024	LUN	19:00	20:30	0014PB010 
4	30/09/2024	30/09/2024	LUN	20:30	22:00	0014PB010 
4	21/10/2024	21/10/2024	LUN	20:30	22:00	0014PB010 
4	11/11/2024	11/11/2024	LUN	20:30	22:00	0014PB010 
4	25/11/2024	25/11/2024	LUN	20:30	22:00	0014PB010 
4	16/12/2024	16/12/2024	LUN	20:30	22:00	0014PB010 
5	03/10/2024	03/10/2024	JUE	17:00	18:30	0014PB010 
5	24/10/2024	24/10/2024	JUE	17:00	18:30	0014PB010 
5	14/11/2024	14/11/2024	JUE	17:00	18:30	0014PB010 
5	28/11/2024	28/11/2024	JUE	17:00	18:30	0014PB010 
5	19/12/2024	19/12/2024	JUE	17:00	18:30	0014PB010 
6	01/10/2024	01/10/2024	MAR	18:00	19:30	0014PB010 
6	22/10/2024	22/10/2024	MAR	18:00	19:30	0014PB010 
6	12/11/2024	12/11/2024	MAR	18:00	19:30	0014PB010 
6	26/11/2024	26/11/2024	MAR	18:00	19:30	0014PB010 
6	17/12/2024	17/12/2024	MAR	18:00	19:30	0014PB010 

PROBLEM PRACTICALS / WORKSHOP

Group	Start date	End date	Day	Start time	End time	Lecture room
1	09/09/2024	20/12/2024	LUN	11:30	12:30	0016P2008 
2	09/09/2024	20/12/2024	MIE	16:00	17:00	A2/C02 

Group	Start date	End date	Day	Start time	End time	Lecture room
3	09/09/2024	20/12/2024	JUE	16:00	17:00	A2/C02 