Syllabus
2022 - 2023

TECHNICAL SHEET OF THE SUBJECT

Data of the subject	
Subject name	Electric and Electronic Circuits Laboratory
Subject code	DEA-SAP-235
Mainprogram	Intercambio de la Escuela Técnica Superior de Ingeniería (ICAI - SAPIENS)
Credits	7,5 ECTS
Type	Optional
Department	Department of Electronics, Control and Communications

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SPECIFIC DATA OF THE SUBJECT

Contextualization of the subject

Contribution to the professional profile of the degree

This course is designed to give an introduction to electric circuits, semiconductor devices, and microelectronic circuits.

Prerequisites

A basic knowledge of introductory physics (charge, electric field, currents) and of Calculus is needed.

Competencies - Objectives

THEMATIC BLOCKS AND CONTENTS

Contents - Thematic Blocks

1. Introduction: Charge, current, voltage, power, circuit elements, Ohm's law
2. Kirchhoff's current and voltage laws, voltage and current divisions
3. Node-voltage, mesh-current methods, superposition, and equivalence theorems
4. Operational Amplifier
5. RC and RL circuits, first-order network, step response
6. Sinusoidal excitation and phasors
7. AC steady-state analysis and AC steady-state power
8. Frequency response, passive filters
9. Semiconductor physics
10. Diodes, diode circuit analysis
11. MOS and BJT circuit analysis
12. Electronic circuit and digital information: introduction to logic circuits with diode and transistors

Theory

1. Introduction: Charge, current, voltage, power, circuit elements, Ohm's law
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laboratory

The laboratory approach in this course is project-based. The students will be challenged to design, build, test and optimize small circuits; depending on the project(s), the topics would be any of:

- Network Solving and Equivalent Circuits
- Transient Response
- MOSFET Inverter Circuits
- CMOS Logic Circuits
- CMOS Transient Analysis
- BJT Circuits
- Transistor-Transistor Logic
- Operational Amplifiers
- Nonlinear Op Amp Circuits
- Frequency Response

TEACHING METHODOLOGY

General methodological aspects of the subject

EVALUATION AND CRITERIA

Ratings

Ordinary evaluation period:

The theory grade will be determined by three partial exams during the course, with the same weight.

Weekly homework (graded) will be provided.

The exams are closed notebook, closed textbook and simple calculator. The course will not be graded on a curve, i.e., there is no bound on the numbers of A's, B's, C's etc.

The laboratory will be evaluated with one practical test and a mandatory project (in groups of two or exceptionally three students; details will be given in the laboratory.

The final grade for the course will be weighted as follows: 15% homework, 15% exam #1, 15% exam #2, Exam 3 (Final) 20%, Lab midterm: 15%, Lab final project 20%.

Extraordinary evaluation period/retake:

The student who fails the subject but has passed the laboratory part can retake the theory exam in the extraordinary evaluation period.

In this case, the final grade will be calculated as the mark of the retake exam (60%) and the laboratory and homework (40%).

BIBLIOGRAPHY AND RESOURCES

Basic Bibliography

Essentials of Electrical and Computer Engineering by D. V. Kerns, Jr. and J. D. Irwin, Prentice-Hall, 2004.

Or (you can find it much cheaper used):

Fundamentals of Electronic Circuit Design by D. Comer and D. Comer, Wiley, 2002.

But basically, any good introductory book to electronics will do. The teacher will provide summary sheets and exercises during the course.