COMILLAS
UNIVERSIDAD PONTIFICIA
ICAI ICADE CIHS

Syllabus
2025 - 2026

GENERAL INFORMATION

Data of the subject	
Subject name	Electronics
Subject code	DEA-GITI-222
Mainprogram	Bachelor's Degree in Engineering for Industrial Technologies
Involved programs	Grado en Ingeniería en Tecnologías Industriales y Grado en Administración y Dirección de Empresas [Second year] Grado en Ingeniería en Tecnologías Industriales [Second year]
Level	Reglada Grado Europeo
Quarter	Semestral
Credits	7,5 ECTS
Type	Obligatoria (Grado)
Department	Department of Electronics, Control and Communications
Coordinator	José Daniel Muñoz Frías
Office hours	Request an appointment by email

Teacher Information	
Teacher	
Name	José Daniel Muñoz Frías
Department	Department of Electronics, Control and Communications
Office	Alberto Aguilera 25 [D-219]
EMail	daniel@icai.comillas.edu
Phone	2417
Teacher	
Name	Eduardo Alonso Rivas
Department	Department of Electronics, Control and Communications
EMail	Eduardo.Alonso@comillas.edu
Teacher	
Name	Luis Cucala García
Department	Department of Electronics, Control and Communications
EMail	lcucala@icai.comillas.edu
Teacher	
Name	Santiago Lizón Martínez
Department	Department of Electronics, Control and Communications
Office	Alberto Aguilera 25
EMail	slizon@icai.comillas.edu

Phone	2413
Teacher	
Name	Juan Carlos Maroto Carro
Department	Department of Electronics, Control and Communications
EMail	jcmaroto@icai.comillas.edu
Teacher	
Name	Diego Rodríguez Gómez
Department	Department of Electronics, Control and Communications
EMail	drgomez@icai.comillas.edu
Teacher	
Name	José Gala Escolar
Department	Department of Electronics, Control and Communications
EMail	jgescolar@icai.comillas.edu
Teacher	
Name	Pablo Casado Pérez
Department	Department of Electronics, Control and Communications
EMail	pcasado@icai.comillas.edu
Teacher	
Name	Raul Robledo Cabezuela
Department	Department of Electrical Engineering
EMail	rrobledo@comillas.edu
Profesores de laboratorio	
Teacher	
Name	Alfonso Muñoz Hernández
Department	Department of Electronics, Control and Communications
EMail	amhernandez@icai.comillas.edu
Teacher	
Name	Esther de Juana López
Department	Department of Electronics, Control and Communications
EMail	edejuana@icai.comillas.edu
Teacher	
Name	Jaime de la Peña Llerandi
Department	Department of Electronics, Control and Communications
EMail	jpllerandi@icai.comillas.edu
Teacher	

Name	Jose Luis Herranz Jiménez
Department	Department of Electronics, Control and Communications
EMail	jlherranz@icai.comillas.edu
Teacher	
Name	Luis Miguel Campoy Cervera
Department	Department of Electronics, Control and Communications
EMail	lmcampoy@icai.comillas.edu
Teacher	
Name	Pedro Casatejada Herrera
Department	Department of Electronics, Control and Communications
EMail	pcasatejada@comillas.edu
Teacher	
Name	Ramón Domínguez Ferreiro
Department	Department of Electronics, Control and Communications
EMail	rdominguez@icai.comillas.edu
Teacher	
Name	Raúl Velasco Valencia
Department	Department of Electronics, Control and Communications
EMail	raul.velasco@icai.comillas.edu

DESCRIPTION OF THE SUBJECT

Contextualization of the subject

Prerequisites

Analysis of electrical circuits.

Course contents

Contents

Analog Electronics

Electronic systems, analog and digital signals. Frequency response: basic concepts.

- Signal concept. Introduction to transducers, signal conditioning and electronic systems.
- Representation of signals in the frequency domain. Basic concepts of frequency response. Filtering with first order networks.
- Power of a signal.

Amplifiers and operational amplifiers

- Ideal amplifiers and basic characteristics: gain, input and output resistance and efficiency.

- Operational amplifiers in open loop or with positive feedback: comparators.
- Operational amplifiers in closed loop: basic configurations, and application to signal conditioning.

Diodes, rectifiers and voltage regulators

- Ideal diode and circuits with diodes.
- Real diode. Modelling with constant voltage drop.
- Rectifier circuits.
- Zener diode and voltage regulators.

Digital Electronics

Introduction to digital systems

- Introduction to digital systems.
- Analog and digital signals. Sampling theorem.
- Binary systems. Positive and negative logic. Classification of digital systems.
- Numbering systems.
- Logic gates, truth tables, and Boolean logic.
- Design of combinational digital systems and simplification using Karnaugh diagrams.
- Input and output elements: push buttons, transistors, relays, etc.
- Basic combinational circuits: multiplexers and demultiplexers, encoders and decoders, etc.

Microprocessor-based systems

- Structure and basic blocks of a microprocessor.
- Basic principles of microprocessor programming.
- Application to the implementation of logical functions.
- State machines.
- Implementation of state machines in a microprocessor system.

Laboratory

- Lab 1. Introduction to the PSpice simulator.
- Lab 2. Introduction to the laboratory.
- Lab 3. Transducer I.
- Lab 4. Filtering.
- Lab 5. Transducer II.
- Lab 6. Amplification and detection.
- Lab 7. Op-Amp with single power supply.
- Lab 8. Introduction to microcontrollers.
- Lab 9. Final project.

EVALUATION AND CRITERIA

The use of AI to produce full assignments or substantial parts thereof, without proper citation of the source or tool used, or without explicit permission in the assignment instructions, will be considered plagiarism and therefore subject to the University's General Regulations.

Evaluation activities	Evaluation criteria	Weight
Final exam	• Understanding of concepts. • Application of concepts to the resolution of practical problems. • Analysis and interpretation of the results obtained in the resolution of problems. • Presentation and written communication.	45
Mid-grade exam	• Understanding of concepts. • Application of concepts to the resolution of practical problems. • Analysis and interpretation of the results obtained in the resolution of problems. • Presentation and written communication.	20
Laboratory	• Ability to design, assemble and check electronic circuits and systems. • Presentation and written communication. • Team work capacity.	35

Grading

Final grade

Theory: a continuous evaluation is carried out based on the following tests:

- Mid-term exam (EI).
- Final exam (EF1).

The final grade is obtained as follows:

- If EF1≥4 then:
  - T = 0.3×EI+0.7×EF1
- If EF1<4 then:
  - T = Min(0.3×EI+0.7×EF1 , EF1)

Laboratory: two reports are made throughout the course:

- A first report (I1) with the results of practices 1 to 6.
- A final report (IF) with the results of the final project.

In addition to the reports, the student's work in the laboratory (TL) is evaluated, where the completion of the previous work, the functioning of the practices, the student's attitude in the laboratory, etc. are taken into account.

The final laboratory grade is obtained according to the following formula:

- L = 0.3 I1 + 0.3 IF + 0.4 TL

The laboratory grade (L), if pass, is maintained for the extraordinary evaluation.

Final grade: 0.65×T + 0.35×L, with a minimum grade of 5 in both theory (T) and laboratory (L).

Extraordinary evaluation

In the extraordinary evaluationl, the theory grade will be obtained from the final exam of the extraordinary evaluation (EF2) as follows:

- If EF2≥4 then:
  - T = 0.2×EI+0.8×EF2
- If EF2<4 then:
  - T = Min(0.2×EI+0.8×EF2, EF2)

If the laboratory failed in the final grade, a practical laboratory exam will be carried out. The grade of said exam will be the new laboratory grade (L).

The extraordinary evaluation grade is obtained in the same way as in the final grade:

Extraordinary grade: 0.65×T + 0.35×L, with a minimum grade of 5 both in theory (T) and in laboratory (L).

Attendance Rules

Class attendance is mandatory, according to the Academic Regulations of ICAI. The attendance requirements will be applied independently for the theory and laboratory sessions:

- In the case of theory sessions, failure to comply with this rule may prevent taking the exam in the ordinary call.
- In the case of laboratory sessions, failure to comply with this rule may prevent them from taking the exam in the ordinary and extraordinary calls. In any case, unjustified absences from laboratory sessions will be penalized in the evaluation.

BIBLIOGRAPHY AND RESOURCES

Basic References

- Subject slides (available on the course website).
- Sedra-Smith, Microelectronic Circuits, 5ª ed., Oxford U. P., 2006.
- José Daniel Muñoz Frías, Introducción a los sistemas digitales (available on the course website).