

## SUBJECT TEACHING GUIDE

### 1033 - Electronics and Instrumentation

Master's Degree in Industrial Engineering

Master's Degree in Industrial Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Master's Degree in Industrial Engineering Master's Degree in Industrial Engineering			Type and Year	Compulsory. Year 1 Compulsory. Year 1
Faculty	School of Industrial Engineering and Telecommunications				
Discipline	Electronics and Instrumentation Industrial Technology Industrial Technologies				
Course unit title and code	1033 - Electronics and Instrumentation				
Number of ECTS credits allocated	5	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. TECNOLOGIA ELECTRONICA E INGENIERIA DE SISTEMAS Y AUTOMATICA				
Name of lecturer	FRANCISCO JAVIER AZCONDO SANCHEZ				
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Other lecturers	ALEJANDRO NAVARRO CRESPIN				

3.1 LEARNING OUTCOMES
- Students acquire the capacity of accomplishing design-oriented analysis of electronic circuits
- Students are equipped with controllers and active filter modeling and design skills in the analog and digital domain
- Students are able to acquire physical magnitudes by means of electrical signal and to perform signal conditioning for a later processing.
- Students are equipped with electronic acquisition system design and characterization skills

#### 4. OBJECTIVES

Equip the students with electronic circuits modeling and design skills using operational amplifiers with the purpose of acquiring information from electrical signals

Equip the students with digital control and processing algorithm design skills as well as the implementation in electronic circuits

Equip the students with the up to date knowledge in analog-to-digital signal conversion and the characterization of this conversion process

Equip the students with signal acquisition design skills to transform variables of interest in electrical signals and perform signal conditioning for a later processing.

Equip the students with the necessary skills to assess an electronic instrument based on the operation range, linearity, precision, accuracy, bandwidth, sampling effect, etc...

#### 6. SUBJECT PROGRAM

##### CONTENTS

1	Design-oriented analysis of electronic circuits. Analog filters implemented with op-amps. Design of digital filters and controllers.
2	Analog-to-digital converters
3	Transducers and signal conditioning circuits

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
It will consist of tests, exercises and/or oral presentations of specific topics to be carried out in class sessions. The follow-up of the subject is evaluated and by its nature it is not recoverable.	Others	No	No	30,00
It will consist of tests, exercises and/or oral presentations of specific topics to be carried out in class sessions. The follow-up of the subject is evaluated and by its nature it is not recoverable.	Laboratory evaluation	Yes	Yes	30,00
Written exam	Written exam	Yes	Yes	40,00
TOTAL				100,00
Observations				
<p>The continuous evaluation is not recoverable since it consists of follow up questions and exercises to identify the attention, participation and degree of understanding of what is discussed in the classes through exercises, small designs or questions and the interaction of the students during the development of the teaching. The continuous evaluation also allows identifying the points to review in the tutorial sessions.</p> <p>In the event that the health criteria make it necessary, the evaluation tests will be carried out following the mixed teaching format, face-to-face in the classroom and outside of it. In the most extreme case that the attendance of all students and teachers at the center is impossible or inconvenient, the evaluation tests will be developed using telematic means. In these cases, the content of the tests, being similar to the face-to-face case, would be totally or partially individualized for each student.</p> <p>In the case of a new health alert for COVID-19 make it impossible to carry out the evaluation in person, the remote evaluation of these same works, practical laboratory exercises and written tests is foreseen.</p>				
Observations for part-time students				
<p>Due to the importance of the continuous and face-to-face assessment in this course, part time students are evaluated under the same criteria than other students. Grading of the assignments is 60% of the final grade. The virtual classroom facilitates the access to the information and intermediate assignments to student with extra university commitments.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Sedra/Smith Microelectronic Circuits Sixth Ed. Oxford University Press
V. Vorperian. Fast analytical techniques for electrical and electronic circuits. Cambridge University Press. 2004.
Miguel Ángel Pérez y otros. Instrumentación Electrónica. Thomson. 2004
Miguel Ángel Pérez. Instrumentación Electrónica: 230 problemas resueltos. Ed. Garceta.
Electronic Filter Design Handbook. Mc Graw Hill 2006
Christophe P. Basso. Linear Circuit Transfer Functions. An Introduction to Fast Analytical Techniques. IEEE Press. Wiley. 2016