

Academic Year: (2024 / 2025)

Review date: 25-04-2024

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: SAN MILLAN HEREDIA, ENRIQUE

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 1

OBJECTIVES

Ability to design electronic and industrial instrumentation systems. The key objectives of the course are:

- Provide principles and practices in the management of measuring instruments.
- Learn the basics of analog and digital signals processing.
- Know the components of data acquisition systems: signal conditioning, A / D converters and D / A, memory and digital processors.
- Know the means and systems for data communication in industrial instrumentation environments.

DESCRIPTION OF CONTENTS: PROGRAMME

1. INTRODUCTION

- 1.1 Introduction to electronic systems.
- 1.2 Introducción to industrial instrumentation systems.

2. MICROCONTROLLER SYSTEMS

- 2.1 Digital systems review (Data representation, registers, counters, architectures).
- 2.2 Introduction to microcontrollers.
- 2.3 Architecture of the reference microcontroller: CPU + peripherals.
- 2.4 Configuring inputs and outputs (analog and digital).
- 2.5 Timers. Time capture and signal generation.
- 2.6 Description of programs using flowcharts.

3. INDUSTRIAL INSTRUMENTATION SYSTEMS

- 3.1 Sensors. Static and dynamic characteristics of sensors.
- 3.2 Conditioning circuits. Wheatstone bridge.
- 3.3 Examples and practical documentation of sensors and amplifiers for instrumentation.
- 3.4 Data acquisition cards and instrumentation SW (LabVIEW).

4. ANALOG ELECTRONIC SYSTEMS

- 4.1 Review of signals and systems. Frequency response of RLC circuits.
- 4.2 Amplification and characteristics of amplifiers: circuits with operational amplifiers. Differential amplifiers. Applications.
- 4.4 Filtering and filter types. Transfer function of first and second order filters. Filter circuits.
- 4.5 Instruments for measuring analog signals.

5. DIGITAL ELECTRONIC SYSTEMS

- 5.1 Description of discrete signals and systems.
- 5.2 Sampling of signals.
- 5.3 Signals quantification and coding.
- 5.4 Sample and hold circuits, AD converters and DA: Features.
- 5.5 Introduction to digital system processing.

ASSESSMENT SYSTEM

% end-of-term-examination:	45
% of continuous assessment (assignments, laboratory, practicals...):	55

The weight of each evaluation activity is:

Practical and lab exercises: 25%

Midterm exam: 30%

Final exam: 45% (minimum mark 4 points)

In the extraordinary examination there are two options: same weights and requirements as in the ongoing evaluation, or 100% of the mark of the final make-up exam.

BASIC BIBLIOGRAPHY

- Miguel A. Pérez García Instrumentación electrónica , Paraninfo, 2014
- Richard S. Figliola Theory and design for mechanical measurements , John Wiley & Sons, 1995
- Tattamangam R. Padmanabham Industrial instrumentation: Principles and Design , Springer, 2000
- Thomas E. Kissell Industrial electronics , Prentice Hall, 2000