Electronic Instrumentation

Academic Year: (2023 / 2024) **Review date: 09-01-2024**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: VAZQUEZ GARCIA, MARIA CARMEN

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

OBJECTIVES

By the end of the course, students will have:

1. A coherent knowledge of their branch of engineering including some at the forefront of the branch in electronic instrumentation.
2. The ability to apply their knowledge and understanding of electronic instrumentation to solve engineering problems and being able to elaborate arguments and to defend them.
3. The ability to solve problems with initiative, creativity, critical reasoning and transmitting them.
4. An understanding of design methodologies, and an ability to use them in the design of electronics instrumentation systems with specific requirements.
5. The ability to design and implement experiments and use appropriate equipment, tools and methods, developing lab skills.
6. An understanding and knowledge of the basics of Electronics.
7. An understanding of applicable techniques and methods in electronic instrumentation, and of their limitations.

DESCRIPTION OF CONTENTS: PROGRAMME

Introduction to electronic instrumentation, metrological characteristics and measurement errors.
Signal conditioning for electronic sensors: circuits, amplifiers and introduction to modulation techniques.
Electronic sensors for the measurement of different physical magnitudes, their characteristics and conditioning circuits.
Applications of A / D conversion, D / A conversion and introduction to data acquisition in instrumentation systems.

LEARNING ACTIVITIES AND METHODOLOGY

The teaching methodology will include:

Magisterial Lectures, where the students will be presented with the basic knowledge they must acquire. Students will be supplied with lecture notes and key reference texts which will enable them to complete and acquire a more in depth knowledge of the subject.

Problems Lectures, these are aimed at solving exercises and examples within the context of real case studies. These classes will be complimented with the resolution of practical exercises on behalf of the student.

Laboratory Practical Sessions

Group tutorials

ASSESSMENT SYSTEM

FINAL EXAM. (45%) Global assessment of knowledge, skills and capacities acquired throughout the course. A minimum mark is required to be able to be evaluated in the continuos assessment process.

CONTINUOUS EVALUATION. Assesses papers, projects, class presentations, debates, exercises, internships and workshops throughout the course. Specifically there will be 2 individual tests (25%), and 8 deliverables (30%) including theoretical designs, simulations and experimental results.

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

BASIC BIBLIOGRAPHY

- Alain S Morris Measurements and Instrumentation Principles, Elsevier, 2012
- Clyde F.Coombs Jr Electronic Instrument Handbook, McGraw-Hill Professional, 2000
- García M. A. Pérez Instrumentación Electrónica, Thomson, 2004
- R. Pallás Areny O. Casas Sensores y acondicionadores de señal, Mancorbo, 2003
- U.A.Bakshi, A.V.Bakshi Electronic Instrumentation, Technical Publications, 2009

ADDITIONAL BIBLIOGRAPHY

- Bannister B. R. Whitehead D.G Instrumentación Transductores e Interfaz, Addison-Wesley Iberoamericana, 1994
- C. VAZQUEZ E. GARCIA OCW INSTRUMENTACION ELECTRONICA, http://ocw.uc3m.es/tecnologia-electronica/instrumentacion-electronica-i, 2008
- Lázaro A.M. Problemas resueltos de instrumentación y medidas eléctricas, Marcombo, 1998
- Pallás Areny R.. Sensores y acondicionadores de señal: Problemas Resueltos, Marcombo, 2008

BASIC ELECTRONIC RESOURCES

- C VAZQUEZ D IZQUIERDO . MEDIDA DE TEMPERATURA. PRACTICA LABORATORIO: https://media.uc3m.es/video/5b3013018f420863d08b9827
- C VAZQUEZ E GARCIA . OCW INSTRUMENTACIÓN ELECTRÓNICA I: http://ocw.uc3m.es/tecnologia-electronica/instrumentacion-electronica-i
- C VAZQUEZ, E GARCIA ET ALL . EQUIPAMIENTO BASICO LABORATORIO: https://media.uc3m.es/video/5b3012b18f420863d08b772d