

Academic Year: (2022 / 2023)

Review date: 29-04-2022

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: RUIZ LLATA, MARTA

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Signals, Systems and Circuits. Electronic Engineering Fundamentals

OBJECTIVES

Provide basic skills for the development and use of electronic instruments and equipment to measure, monitor and/or record physical phenomena.

- (1) theory, methodology, and practice of measurement;
- (2) design, development and evaluation of instrumentation and measurement systems and components used in generating, acquiring, conditioning and processing signals;
- (3) hands on electronic instrumentation projects

DESCRIPTION OF CONTENTS: PROGRAMME

1.-Fundamentals concepts: Instrumentation and Measurements

1.1.- Metrological characterization of instruments and measurement systems. Precision, accuracy, resolution and sensitivity.

1.2.- Measurement errors and measurement uncertainty. Error propagation.

2.-Sensors.

2.1.- Sensor characterization

2.2.- Types of Sensors and classification

2.3.- Sensor examples

3.-Electronic Instrumentation systems.

3.1.- Block diagram of an electronic instrumentation system.

3.2.- Introduction to signal conditioning circuits and modulation techniques.

3.3.- Filters.

3.4.- Noise and interference in instrumentation systems.

4.-Sampling and signal acquisition.

4.1.- Analog signal sampling: Nyquist theorem and applications.

4.2.- Analog to digital converters. Working principles, characteristics and types.

4.3.- Digital to analog converters.

5.-Digital signal processing in instrumentation systems

LEARNING ACTIVITIES AND METHODOLOGY

AF1. THEORETICAL-PRACTICAL CLASSES. Knowledge and concepts students must acquire. Receive course notes and will have basic reference texts. Students partake in exercises to resolve practical problems

AF2. TUTORING SESSIONS. Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher. Subjects with 6 credits have 4 hours of tutoring/ 100% on-site attendance.

AF3. STUDENT INDIVIDUAL WORK OR GROUP WORK. Subjects with 6 credits have 98 hours/0% on-site.

AF8. WORKSHOPS AND LABORATORY SESSIONS. Subjects with 3 credits have 4 hours with 100% on-site instruction. Subjects with 6 credits have 8 hours/100% on-site instruction.

AF9. FINAL EXAM. Global assessment of knowledge, skills and capacities acquired throughout the course. It entails 4 hours/100% on-site

MD1. THEORY CLASS. Classroom presentations by the teacher with IT and audiovisual support in which the subject's main concepts are developed, while providing material and bibliography to complement student learning

MD2. PRACTICAL CLASS. Resolution of practical cases and problem, posed by the teacher, and carried out individually or in a group

MD3. TUTORING SESSIONS. Individualized attendance (individual tutoring sessions) or in-group (group tutoring sessions) for students with teacher as tutor. Subjects with 6 credits have 4 hours of tutoring/100% on-site.

MD6. LABORATORY PRACTICAL SESSIONS. Applied/experimental learning/teaching in workshops and laboratories under the tutor's supervision.

ASSESSMENT SYSTEM

The evaluation will consist of a final exam (with a weighting of 40% of the final grade) and a continuous evaluation (60%). It is necessary to obtain a minimum score of 4 out of 10 in the final exam to weight the continuous evaluation. In addition, the completion of the laboratory practices (project) are mandatory.

The continuous evaluation will consist of the following parts:

- (i) Partial exam. Weight 20%.
- (ii) Deliverable exercises: Guided exercises that will be associated with the completion of a questionnaire at the beginning of the session and/or a questionnaire or test at the end of the session. Weight 20%.
- (iii) Practices: Development of a project in the electronics laboratory in small groups. Four sessions of compulsory attendance. Weight 20%.

% end-of-term-examination:	40
% of continuous assessment (assignments, laboratory, practicals...):	60

BASIC BIBLIOGRAPHY

- Cataldo, Andrea, Giaquinto, Nicola, De Benedetto, Egidio, Masciullo, Antonio, Cannazza, Giuseppe, Lorenzo, Ilaria, Nicolazzo, Jacopo, Meo, Maria Teresa, De Monte, Alessandro, & Parisi, Gianluca. Basic Theory and Laboratory Experiments in Measurement and Instrumentation, Springer International Publishing AG, 2020
- Northrop, R.B. Introduction to Instrumentation and Measurements , CRC Press, 2014

ADDITIONAL BIBLIOGRAPHY

- Dominique Placko (editor). Fundamentals of Instrumentation and Measurement, Wiley, 2007
- Peter H. Sydenham, Richard Thorn (Editors) Handbok of Measuring System Design. Volume 1 (Part 3), Volume 2 (Part 5 - section 3, Part 7, Part 8 ç sections 1,2), Volume 3 (Parts 9, 11, 12), Wiley, 2005