Electronic Instrumentation

Academic Year: (2023 / 2024) **Review date: 24-04-2023**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: TORRES ZAFRA, JUAN CARLOS

Type: Compulsory ECTS Credits : 3.0

Year : 2 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Mathematics, Physics, Programming and Technical Drawing.

OBJECTIVES

Upon successfully completing this course, students will be able to:

1. Possess and understand key knowledge and aspects of electronic instrumentation, including some cutting-edge developments in the field.
2. Apply their knowledge of electronic instrumentation in a professional manner, able to develop and defend arguments and solve problems in the area of electronic instrumentation.
3. Solve problems with initiative, creativity, critical reasoning, and be able to convey them.
4. Apply their knowledge to develop and implement circuit and component designs in electronic instrumentation systems that meet specific requirements.
5. Design and conduct experiments in the area of electronic instrumentation systems, and analyze and interpret the results obtained.
6. Possess fundamental knowledge of electronics.
7. Understand applicable methods and techniques in the field of electronic instrumentation and their limitations.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to Instrumentation Systems
- Block diagram of an electronic instrumentation system.
- Capture of physical quantities and simple sensors.
- Instrumentation systems in robotics
2. Sensors, signal conditioning and signal acquisition
- Static and dynamic characteristics of sensors
- Conditioning circuits, modulation techniques and signal filtering
- Signal acquisition
3. Measurement systems and basic sensors
- Temperature and strain measurements
- Position measurements. Contact and presence detectors.
- Pressure, force and torque measurements
4. Measurement system and advanced sensors
- Distance measurement with optical and ultrasonic sensors
- Orientation sensors and inertial units (IMUs), Image and video sensors.

LEARNING ACTIVITIES AND METHODOLOGY

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.

TUTORING SESSIONS.
Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher. Subjects with 3 credits have 2 hours of tutoring/ 100% on- site attendance.

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

WORKSHOPS AND LABORATORY SESSIONS.

Subjects with 3 credits have 2 hours with 100% on-site instruction.

ASSESSMENT SYSTEM

FINAL EXAM.
Global assessment of knowledge, skills and capacities acquired throughout the course. The percentage of the evaluation varies for each subject between 60% and 0%.

CONTINUOUS EVALUATION.
Assesses papers, projects, class presentations, debates, exercises, internships and workshops throughout the course. The percentage of the evaluation varies for each subject between 40% and 100% of the final grade.

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

BASIC BIBLIOGRAPHY

- Fraden J Handbook of modern sensors, Springer, 2016
- Fraile Mora Instrumentación Aplicada a la Ingeniería, Garceta, 2012

ADDITIONAL BIBLIOGRAPHY

- M A Pérez García Instrumentación Electrónica, Paraninfo, 2014