# Electronic Instrumentation II

**Academic Year: ( 2023 / 2024 )** **Review date: 25-04-2023**

**Department assigned to the subject: Electronic Technology Department**

**Coordinating teacher: RUIZ LLATA, MARTA**

**Type: Electives ECTS Credits : 6.0**

**Year : 4 Semester :**

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

- Control Engineering
- Electronics Engineering Fundamentals
- Electronic Instrumentation

## SKILLS AND LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study
CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.
CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.
CG1. Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.
CG3. Ability to design a system, component or process in the field of Industrial Technologies to meet the required specifications
CG4. Knowledge and ability to apply current legislation as well as the specifications, regulations and mandatory standards in the field of Industrial Engineering.
CG5. Adequate knowledge of the concept of company, institutional and legal framework of the company. Organisation and management of companies.
CG6. Applied knowledge of company organisation.
CG8. Knowledge and ability to apply quality principles and methods.
CG9. Knowledge and ability to apply computational and experimental tools for the analysis and quantification of Industrial Engineering problems.
RA1. Knowledge and understanding: Have basic knowledge and understanding of science, mathematics and engineering within the industrial field, as well as knowledge and understanding of Mechanics, Solid and Structural Mechanics, Thermal Engineering, Fluid Mechanics, Production Systems, Electronics and Automation, Industrial Organisation and Electrical Engineering.
RA2. Engineering Analysis: To be able to identify engineering problems within the industrial field, recognise specifications, establish different resolution methods and select the most appropriate one for their solution
RA3. Engineering Design: To be able to design industrial products that comply with the required specifications, collaborating with professionals in related technologies within multidisciplinary teams.
RA4. Research and Innovation: To be able to use appropriate methods to carry out research and make innovative contributions in the field of Industrial Engineering.
RA5. Engineering Applications: To be able to apply their knowledge and understanding to solve problems and design devices or processes in the field of industrial engineering in accordance with criteria of cost, quality, safety, efficiency and respect for the environment.
RA6. Transversal Skills: To have the necessary skills for the practice of engineering in today's society.

## OBJECTIVES

By the end of this subject, students will be able to have:
1. Acquired the notions associated with the operation and design of electronic systems for industrial instrumentation.
2. The ability to apply their knowledge to analyze the design of various instrumentation system

and different data acquisition architectures
3. The Ability of applying their knowledge and understanding to the development of instrumentation systems
4. The ability of designing and performing experiments, data analysis and draw conclusions
5. The ability of combining theoretical knowledge and practice to address engineering problems in the field of electronic instrumentation.
6. The ability of employing several methods for an effective communication with the engineering community and society in general

## DESCRIPTION OF CONTENTS: PROGRAMME

1. Analogue processing chain of an instrumentation system:
1.1 Description of signals of the instrumentation systems.
1.2 Review of signal conditioning circuits
1.3 Noise and interference in instrumentation systems.

2. Data Acquisition Systems.
2.1 Integration of analog and digital signals in instrumentation systems:
2.2 Sampling and digital signal processing techniques.

3. Virtual Instrumentation: hardware and software. LabVIEW as reference software for the development of an instrumentation system
3.1 Tuning of the HW, management of resources of the HW
3.2 Implementation of virtual instruments
3.3 Development of modular applications
3.4 Design techniques, user interface and input / output control.

4. Project.

## LEARNING ACTIVITIES AND METHODOLOGY

Lectures and practical classes in the computer room. In the latter students will see examples of the contents presented in the lectures, as well as LabVIEW basics.

Project: Guided practices will be carried out for the assembly of the electronics of an instrumentation system. In addition, based on this system, a development project will be carried out from specifications using data acquisition cards and the LabVIEW software design tool.

## ASSESSMENT SYSTEM

Continuous evaluation based on work assignments (50%), development and documentation of the lab project (20%), and knowledge and skills tests (30%).

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| **% end-of-term-examination:** | 20 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 80 |

## BASIC BIBLIOGRAPHY

- M.A. Perez Garcia, J.C. Alvarez Anton, J.C. Campo rodriguez, G.J. Grillo Ortega Instrumentacion Electronica, Thomson Paraninfo, 2003
- null LabVIEW Core 1 Course Manual, National Instruments Corporation, 2012
- null LabVIEW Core 2 Course Manual, National Instruments Corporation, 2012