COURSE DATA

Data Subject	
Code	44285
Name	Industrial instrumentation systems
Cycle	Master's degree
ECTS Credits	1.5
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
2199 - M.D. in Electronic Engineering	School of Engineering	1	First term

Subject-matter

Degree	Subject-matter	Character
2199 - M.D. in Electronic Engineering	3 - Industrial electronic	Obligatory

Coordination

Name	Department
GIRBES JUAN, VICENT	242 - Electronic Engineering
SUAREZ ALVAREZ, ISAAC	242 - Electronic Engineering

SUMMARY

In this course are presented techniques and criteria for design, control and test instrumentation systems and virtual instruments. It is taught as a compulsory subject in the Master of Electronic Engineering from the University of Valencia, during the first quarter.

The total workload is 1.5 ECTS. They correspond to 15 on-site hours and 22.5 hours of student individual work.

The purpose of this course is to introduce students to put into practice the techniques and methods for design and develop the control and monitoring of several instrumentation systems. Emphasis will be placed on solving real problems.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

The background needed to properly follow the subject is taught in the subjects dealing with electronic equipment and design. Specifically in the laboratories where the data acquisitions and measurement instruments are used.

OUTCOMES

2199 - M.D. in Electronic Engineering

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Take into account the economic and social context in engineering solutions, be aware of diversity and multiculturalism and ensure sustainability and respect for human rights and equality between men and women.
- Diseñar un sistema, componente o proceso que cumpla unas especificaciones desde diferentes puntos de vista: electrónico, económico, social, ético y medioambiental.
- Demostrar una comprensión sistemática de un campo de estudio y el dominio de las habilidades.
- Realizar un análisis crítico, evaluación y síntesis de ideas nuevas y complejas.
- Ser capaz de fomentar, en contextos académicos y profesionales, el avance tecnológico, social o cultural dentro de una sociedad basada en el conocimiento.
- Capacidad para proyectar, calcular y diseñar productos, procesos e instalaciones en todos los ámbitos de la Ingeniería Electrónica y en particular los de tratamiento de la señal, sistemas digitales y de comunicaciones y electrónica industrial.
- Capacidad para dirigir, planificar y supervisar equipos multidisciplinares.
- Identificar, formular y resolver problemas de los sistemas electrónicos industriales.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.

LEARNING OUTCOMES

After completing the course the student should be able to:

- Configure an industrial instrumentation system
- Know and use appropriately unique electronic equipment.
- Design and implementation of industrial instrumentation system
- Design and implementation of a virtual instrumentation system

DESCRIPTION OF CONTENTS

1. Distributed measurement system

Virtual Instrumentation: goals and applications.
Instrumentation systems: goals and applications.
Architecture: hardware and software.
Distributed measurement systems: goals and applications.

2. Communication buses

Serial: RS232-USB. Standard, configuration and application.
GPIB. Standard, configuration and application.
PXI. Standard, configuration and application.

3. Laboratory

Practice 1.- Virtual instrument: Generation of a system with GPIB communication. Error detection and debugging techniques.
Practice 2.- Compact DAQ. Configuration and design of an instrumentation system.
Practice 3.- MYRIO: FPGA over LV

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	10,00	100
Laboratory practices	5,00	100
Development of group work	2,00	0
Study and independent work	7,50	0
Preparation of evaluation activities	5,00	0
Preparing lectures	1,00	0
Preparation of practical classes and problem	4,00	0
Resolution of case studies	3,00	0
TOTAL	**37,50**	

TEACHING METHODOLOGY

The teaching methods employed in the development of the course are:

a) Theoretical activities.

Expository development of matter with the student's participation in the resolution of specific issues.

b) Practical activities.

Solving practical problems

c) Student's personal work.

Description: Performing outside the classroom to issues and software as well as the preparation of classes and exams (study). This task will be performed individually and try to promote self-employment.

We will use e-learning platforms (LMS) to support communication with students. Through it the student will have access to course materials used in class, as well as solving problems and exercises.

EVALUATION

The evaluation of the course can be overcome by two methods, or continuous assessment or a final exam at the end of the semester.

Continuous assessment:

It is mandatory the assistance to all the sessions. In each lab session it will be required to return the activities proposed in the scripts of different practices (TL). In each session it will be proposed a home work that have to be delivered before the next lab session (TC). At the end of the first and thirth script the students will do a miniproject (MP=0.4*MP1+0.6*MP2).

The subject score is obtained by:

MARK=0.3*TL+0.3*TC+0.4*MP

In each part it is mandatory a **minimum mark of 4**. The working groups are formed only by two persons.

If the student fails the first announcement, in second announcement all the work done during the semester will have a weight of 20% and the student will have to do an exam on the official announcement date. The subject score is obtained by:

MARKsecondannouncement=0.2*NOTA+0.8*exam

In each part it is mandatory a **minimum mark of 4**

Unic assessment:

The student has to submit all the exercises and designs proposed during the semester solved (trabajos) and has to do an exam on the official announcement date. The subject score is obtained by:

NOTA=0.4*trabajos+0.6*exam

In each part it is mandatory a **minimum mark of 4**

REFERENCES

Basic

- LabVIEW Advance Programming Techniques, Rick Bitter, Taqi Mohiuddin, Matt Nawrocki. CRC Press. ISBN0-8493-2049-6.
- Instrumentació virtual, Adquisició, processament i anàlisi de senyals. A. M. Làzaro, D. Biel Solé, J. Olivé Duran, J. Prat Tasias, F. J. Sànchez Robert. Edicions UPC.
- LabVIEW programming, data acquisition and analysis. Jeffrey Y. Beyon. Ed. Prentice Hall PTR.
- LabVIEW for automatitations, semiconductor, biomedical, and other applications. Hall T. Martin, Meg L. Martin. Ed. Prentice Hall PTR.
- LabVIEW graphical programming,. Practical Applications in Instrumentation and Control. Gary W. Johnson. Ed. Mc Graw Hill, 2ª Edición.