COURSE DATA

Data Subject	
Code	34937
Name	Digital systems II
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1404 - Degree in Industrial Electronic Engineering	School of Engineering	4	First term

Subject-matter

Degree	Subject-matter	Character
1404 - Degree in Industrial Electronic Engineering	16 - Electronic systems	Obligatory

Coordination

Name	Department
MARTOS TORRES, JULIO	242 - Electronic Engineering
SORET MEDEL, JESUS	242 - Electronic Engineering
TORRES PAIS, JOSE GABRIEL	242 - Electronic Engineering

SUMMARY

The Digital Electronic Systems II course is part of the material of the same name whose overall objective is to teach the basic techniques for analysis and synthesis of digital systems, laying the foundation for subsequent courses that facilitate the study of more complex designs.

It is a compulsory subject that is taught quarterly basis in the fourth year of the Degree in Industrial Electronic Engineering during the second quarter. The curriculum consists of a total of 6 ECTS.

This course is intended for students to learn the basics of digital electronic systems can be found on the market and learn how to make designs with them. Special emphasis is placed on systems based on microcontrollers.

The subject has a theoretical-experimental mixed, so that the theoretical contents are added at a practical level, both resolution of applications on devices such as the realization of practical laboratory work in which exercise the concepts and systems studied, familiarizing students with the material environment and human laboratory work. This is achieved through various real projects that allow acquiring the knowledge and familiarity with different types of digital electronic systems.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

Successfully addressing this subject is recommended that the student has previous knowledge, both theoretical and practical digital electronics must have acquired in the field of Electronic Circuits, scheduled in the first year of this degree as well as in the symbol systems Digital Electronics I Among such prior knowledge include:
- Numbering Systems
- Boolean Algebra
- Maxiterms and miniterms of a logic function.
- Simplification of logic functions: Quine-McCluskey and Karnaugh methods
- Logic famili

1404 - Degree in Industrial Electronic Engineering

- CG3 - Knowledge of basic and technological subjects that allows students to learn new methods and theories and provides them with versatility to adapt to new situations.
- CG4 - Ability to solve problems with initiative, decision-making skills, creativity and critical reasoning and to communicate and transmit knowledge, abilities and skills in the field of industrial engineering (with specific industrial electronics technology).
- CE3 - Knowledge of the basics and applications of digital electronics and microprocessors.
- CE6 - Ability to design analogue, digital and power electronic systems.

This subject allows to obtain the following learning results:

1. Know how to choose the most appropriate type of circuit according to the needs of a design (CG4, CE3).
2. Design an electronic system that meets a set of specifications (CG3, CG4, CE6).
3. Ability to analyse and design digital circuits using microprocessors and other integrated circuits (CG3, CG4, CE6).

4. Apply digital technologies to solve problems and applications in various fields of application (CG4, CE6).
5. To handle the necessary design and programming tools that allows the correct development of a digital system (CG4, CE6).

As a complement to the previous results, this subject also allows to acquire the following social skills and abilities:

- Properly state the technical specification of a project on digital electronic systems.
- Skilfully employ microcontroller-based design and verification tools for projects
- Make designs using different platforms: programmable logic devices, microprocessors, microcontrollers or other computational alternatives.
- Develop an adequate methodology to design algorithms and implement them in real projects, ensuring reusability and facilitating group work.
- Make design decisions during professional project development.

DESCRIPTION OF CONTENTS

1. INTRODUCTION TO MICROCONTROLLER-BASED SYSTEMS

Introduction to Microprocessor: definition, architecture and RTL description.
Introduction to embedded systems: technological alternatives.
The concept of Microcontroller.
Manufacturers and ranges.
Examples and applications.

2. DEVELOPMENT TOOLS

Programs, algorithms and data.
Programming languages.
Synthesis.
Debugging.
IDE tools: examples of use in microcontroller-based applications

3. DESIGN METHODOLOGY

Languages vs computer models.
Sequential programming model.
State Machine Model.
Other advanced models.
Implementations, examples and exercises on microcontrollers.

4. MICROCONTROLLER ARCHITECTURE (I): CORE

Architecture.
Memory map.
Instruction set and addressing modes.
Instruction cycles.
Examples of use. Exercises.

5. MICROCONTROLLER ARCHITECTURE (II): PERIPHERALS

Common peripherals.
I / O ports
Interrupt handler.
Timers / counters. Serial interface (USART).
Power modes manager.
Examples of application. Exercises.

6. ADVANCED ISSUES IN DIGITAL SYSTEMS DESIGN

High-speed buses.
Memory map design.
Advanced peripherals.
Reconfigurable platforms and integration on-chip (SoC).

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Attendance at events and external activities	2,00	0
Development of group work	10,00	0
Development of individual work	8,00	0
Study and independent work	10,00	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	2,00	0
Preparing lectures	18,00	0
Preparation of practical classes and problem	22,00	0
Resolution of case studies	8,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The development of the subject is structured around five axes: the theory sessions and problems, the tutorials, the presentation of the continuous evaluation tests, the workshops and finally the laboratories.

In group learning with the teacher (theory sessions and problems), the master lesson model will be used. In the problem sessions, the teacher will explain a series of exercises, which will allow the student to learn to identify the essential elements of the approach and solve them. Participatory method will also be used, allowing students to interact in these sessions and propose solutions (CG4, CE3, CE6).

The students have a schedule of tutorials whose purpose is to solve problems, doubts .... In addition, you can clarify doubts by email or discussion forums of the Virtual Classroom. On a voluntary basis, the student will be able to deliver the resolution of a series of continuous assessment tests (1 per subject) that will help you to understand the subject (CG4, CE6).

The laboratory groups will consist of at most two people, the practices must be organized to prepare them in advance of the session and to resolve them correctly and in the time established therein (CG3, CG4, CE3, CE6).

During the course, there will be different Seminars that will complement what was explained during the course. They aim to serve as a current and market vision in the world of Digital Electronic Systems (CE3).

The Workshops will consist of the complete resolution, in groups of 4 or 5 people, of a real project. Various projects will be considered; Its software resolution and detailed documentation are expected. These activities are not recoverable (CG3, CG4, CE6).

In order to successfully complete the described teaching methodology, the student has available in the Virtual Classroom the following documents:

- Teaching guide
- Transparencies of each theme
- Bulletin of problems
- Continuous assessment tests.
- Practice guide.
- Seminars
- Workshops

EVALUATION

The learning process will be evaluated through the performance of examinations, through the continuous evaluation of the laboratory sessions and from the completion of work. To approve it will be necessary to average a grade equal to or greater than 5/10 provided that each of the parts is equal to or greater than 4/10. The final note is obtained from the following considerations:

- The theory note will be given as a result of the completion on the dates indicated in the official calendar of the individual and written examination. It will consist of a balanced set of issues of a theoretical and practical nature and problems. All questions will be related to the contents of the syllabus, and with similar difficulty to the questions and problems made in class. This score contributes 40% of the final grade (CG3, CG4, CE3).
- The research work proposed by the teacher and carried out by the student individually or in groups during the semester and with a weighting of 30% in the final grade will be evaluated. These activities are not recoverable. Possible modalities include the following: (CG4, CE6)

1. Preparation of seminars-workshops on certain teaching contents that can be presented orally and discussed colloquially.
2. Writing articles on tools, methodologies or designs of digital systems based on microcontroller.

- The laboratory grade will be obtained after an individual examination at the end of the course, which will include a number of questions directly related to the practices carried out. Demonstrated proficiency, proficiency in the use of laboratory equipment and the resolution methodology followed throughout the session will be evaluated. This note contributes 20% to the final assessment (CG4, CE6).
- In addition, through the questionnaire or questions of the teacher, the correct use of each practical session is evaluated. This continuous evaluation of the work done by the student in each laboratory session considers the skill, interest and quality of the results obtained. This assessment contributes 10% of the final grade of the subject (CG4, CE6).

Final Note = (Examination_theo x 0,40) + (Works x 0,30) + (Exam_lab x 0,20) + (Sessions_lab x 0,10)

For students who, for justified reasons, can not attend regularly to the theoretical and laboratory classes, the grade will be obtained from the evaluation of the work, the theory exam and the laboratory examination at the date indicated in the official calendar Of exams. In this case, the overall grade will be given by:

Final Note = (Examination_theo x 0,40) + (Works x 0,30) + (Examination_lab x 0,30)

The works are not recoverable and all the students have the obligation to realize them; Your note will be included in the overall evaluation of the two calls.

In any case, the evaluation system will be governed by what is established in the Regulations for the Evaluation and Qualification of the Universitat de València per a Graus i Màsters

(http://www.uv.es/graus/normatives/2017_108_Reglament_avaluacio_qualificacio.pdf).

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