COURSE DATA

DATA SUBJECT

Code: 34937
Name: Digital systems II
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1404 - Degree in Industrial Electronic Engineering	Escola Tècnica Superior d'Enginyeria	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1404 - Degree in Industrial Electronic Engineering	Electronic systems	COMPULSORY

COORDINATION

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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

COMPETENCES / LEARNING OUTCOMES

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CE3 - Knowledge of the basics and applications of digital electronics and microprocessors.

CE6 - Ability to design analogue, digital and power electronic systems.

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).

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

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	20,00
Classroom practices	10,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	2,00
Individual or group project	18,00
Independent study and work	20,00
Preparation of lessons	40,00
Preparation for assessment activities	2,00
Resolution of case studies	8,00
Total hours	**90,00**

TEACHING METHODOLOGY

The course is structured around five main components: theory and problem-solving sessions, tutorials, continuous assessment tasks, the microproject, and laboratory sessions.

In group learning with the teaching staff (theory and problem-solving sessions), the lecture method will be used. During problem-solving sessions, instructors will explain a series of sample exercises through which students will learn to identify the essential elements in both the approach and resolution of such problems. A participatory method will also be applied, allowing students to interact in these sessions and propose solutions (CG4, CE3, CE6).

Students have scheduled tutorial hours aimed at resolving problems and questions. Doubts may also be clarified via email or the discussion forums in the Virtual Classroom.

Laboratory groups will consist of a maximum of two people. The lab guides must be reviewed and prepared in advance, to allow proper completion of the tasks within the allocated session time (CG3, CG4, CE3, CE6).

Throughout the course, seminars and/or company visits will be organized to complement the content covered. These activities aim to provide an up-to-date and industry-relevant perspective in the field of Digital Electronic Systems (CE3).

Continuous assessment tasks will involve solving specific questions related to the course content. The microproject will require the complete resolution of a real-world project, carried out in groups of 4 or 5 students. Several projects will be proposed, and students are expected to develop a software solution and deliver detailed documentation. These activities are non-recoverable and must be submitted by the deadlines established by the instructor (CG3, CG4, CE6).

To support the described teaching methodology, the following materials are available on the Virtual

Classroom:

· Course guide.

· Lecture slides for each topic.

· Problem sets.

· Continuous assessment tasks.

· Laboratory session guides.

· Microproject specification document.

EVALUATION

The assessment of the learning process will be based on three parts: theory exam, coursework (continuous assessment tasks and microproject), and laboratory sessions. In order to pass the course, it is necessary to achieve an average grade of **5 out of 10 or higher**, provided that **each of the three parts** receives a minimum score of **4 out of 10.** The final grade will be calculated as follows:

1. The theory exam grade will result from an individual written exam held on the dates indicated in the official calendar. It will consist of a balanced set of theoretical-practical questions and problems. All questions will be related to the course content and of a similar difficulty to those covered in class. This component accounts for **40% of the final grade** (CG3, CG4, CE3).

2. The coursework grade (continuous assessment tasks and microproject) will reflect the work completed individually or in groups during the semester and will contribute **30% to the final grade**. These activities are non-recoverable and must be submitted within the deadlines indicated in the course's Virtual Classroom (CG4, CE6).

3. The laboratory grade represents **30% of the final grade**. For students attending **all lab sessions**, the grade will consist of an **individual lab exam (20%)** and **continuous assessment during the lab sessions (10%)**. The lab exam will involve writing code for a given project and answering related questions. Evaluation will focus on the student's technical skill, familiarity with the hardware, and methodology used (CG4, CE6). Continuous lab assessment will be conducted through quizzes or instructor questions to confirm that students make proper use of each session. It will consider skills, engagement, and the quality of the outcomes (CG4, CE6).

Thus, the overall course grade for students attending all lab sessions will be:

Final Grade = (Theory_Exam × 0.40) + (Coursework × 0.30) + (Lab_Exam × 0.20) + (Lab_Sessions × 0.10)

For students who **do not attend all lab sessions**, the final grade will be:

Final Grade = (Theory_Exam × 0.40) + (Coursework × 0.30) + (Lab_Exam × 0.30)

In all cases, the evaluation system will follow the provisions established in the **Assessment and Grading Regulations of the University of Valencia for Bachelor's and Master's Degrees** (http://www.uv.es/graus/normatives/2017_108_Reglament_avaluacio_qualificacio.pdf).

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