VNIVERSITAT DE VALÈNCIA

Course Guide
34804 Digital Systems II

COURSE DATA

Data Subject	
Code	34804
Name	Digital Systems II
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1402 - Degree in Telecommunications Electronic Engineering	School of Engineering	2	Second term

Subject-matter

Degree	Subject-matter	Character
1402 - Degree in Telecommunications Electronic Engineering	12 - Digital electronic systems	Obligatory

Coordination

Name	Department
MARTOS TORRES, JULIO	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 second year of the Degree in Electronic Engineering in Telecommunications in 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
maxterms minterms and a logic function.
Simplification of logic functions: methods of Karnaugh and Quine-McCluskey
Logic Famili

OUTCOMES

1402 - Degree in Telecommunications Electronic Engineering

- G3 - Acquisition of the knowledge of the basic and technological subjects that allows students to learn new methods and theories and endows them with the versatility to adapt to new situations.
- G4 - Ability to solve problems with initiative, decision-making and creativity, and to communicate and transmit knowledge, abilities and skills, understanding the ethical and professional responsibility of the activity of a telecommunications technical engineer.
- Capacidad de análisis y diseño de circuitos combinacionales y secuenciales, síncronos y asíncronos, y de utilización de microprocesadores y circuitos integrados.

LEARNING OUTCOMES

This subject allows to obtain the following learning results:

1. Ability to analyse and design digital circuits using microprocessors and other integrated circuits. (CR9)
2. Ability to design digital electronic systems. (CG4, CR9)
3. Apply digital technologies to solve problems and applications in various fields of application. (CG4, CR9)

4. To plan correctly the global structure of a digital system, as well as the interrelationship between its different elements. (CR9)
5. Manage the necessary design and programming tools that allow the proper development of a digital system. (CR9)

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

2.

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

3.

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).
Consumption manager.
Examples of application. Exercises.

6. ADVANCED TOPICS IN DIGITAL SYSTEM DESIGN

Design of microprocessor based systems.
High-speed buses.
Memory map design.
Advanced peripherals.
Considerations in electronic technology and manufacturing modules.
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. (CG3, CG4, CR9)

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, CR9)

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, CR9)

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. (CR9)

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, CR9)

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 assessed through examinations, continuous assessment by laboratory sessions and from performing any work. Be a precondition to pass a note to average less than 5/10 provided that each party is equal to or greater than 4/10. The final grade is obtained from the following considerations:

- The theory grade will be given as a result of the realization on the dates indicated in the official and written individual examination. Consist of a balanced set of questions of a theoretical and practical problems. All questions will be related to the contents of the agenda, and equally difficult issues and problems done in class. This rating accounts for 40% of the final grade.
- The research will evaluate those proposed by the teacher and completed by pupils individually or in groups during the quarter and a 20% weighting in the final grade. Among the possible arrangements can be cited as follows:
    - Preparation of seminar-workshops on specific teaching content that may be presented orally and discussed so colloquial.
    - Writing articles on tools, methodologies or designs of digital systems based on microcontroller.
- The laboratory note will be obtained after conducting an individual review at the end of the course, including a number of issues directly related to the practices. An evaluation of the skill demonstrated mastery in the use of laboratory equipment and solving methodology followed throughout the session. This paper contributes 20% to the final assessment.
- The correct use of each practice session is also evaluated by questionnaire or the teacher's questions. This continuous evaluation of work done by students in each lab session considers the skill, interest and quality of the results. This assessment contributes 10% of the final grade for the course.

The overall grade for the course, for those students who regularly attend classes during the semester, is given by the following expression:

Final Score = (Exam_theory x 0,4)+(Jobs x 0,30)+(Exam_lab x 0,20)+(Sessions_lab x 0,10)

For students who, for good reasons, are unable to attend regular lectures and laboratory, the note shall be obtained from the evaluation of the work, the review of theory and laboratory examination on the date indicated in the official calendar the tests. In this case, the overall score is given by:

Final Score = (Exam_theory x 0,4)+(Jobs x 0,30)+(Exam_lab x 0,30)

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

(https://webges.uv.es/uvTaeWeb/MuestraInformacionEdictoPublicoFrontAction.do?accion=inicio&idEdictoSeleccionado=5639).

REFERENCES

Basic

- Referencia b1: Pont, M. Embedded C. ACM Press, Addison Wesley, 2001. ISBN 020179523X
  Referencia b2: F. Vahid, T. Givargis, Embedded system design: a unified hardware/software introduction. Ed. John Wiley & Sons. 2002.
  Referencia b3: H. Hassan, J.M. Martínez, C. Domínguez, A. Perlés, J. Albadalejo, J.V. Capella, Problemas de microcontroladores de la familia MSC-51 Editorial UPV, 2006
  Referencia b4: Ball, S.R. Embedded mP Systems: Real World Design, 3 Ed. Newnes Elsevier Science, Burlington (MA), 2002. ISBN 0750675349
  Referencia b5: Getting Started. Creating Applications with uVision 4 Keil (http://www.keil.com)
  Referencia b6: Sanchis E. (coord), Martos, J. Gonzalez, V. Torralba, G. "Sistemas electrónicos digitales. Fundamentos y diseño de aplicaciones." 1ª Ed. Servicio de Publicaciones de la Universidad de Valencia. 2002, ISBN 8437055172
  Referencia b7: Floyd T., Fundamentos de Sistemas Digitales, 9ª edición, Ed. Pearson Education, 2007, ISBN 8483220857
  Referencia b8: Wakerly, J.F. Diseño digital. Principios y prácticas. 3º Ed. Pearson Education, Mexico 2001. ISBN 9701704045
  Referencia b9: Pont, M. Patterns for Time-Triggered Embedded Systems. ACM Press, Addison Wesley, 2001. ISBN 0201331381
  Referencia b10: Atmel Microcontroller Data Book. Atmel Co, 2010. http://www.atmel.com
  Referencia b11: Martín, E. Angulo, J.M, Angulo, I, mC PIC. La clave del diseño. Thomson Ed. Paraninfo. 2003. ISBN 8497321995

Additional

- Referencia c1: www.8052.com
  Referencia c2: www.keil.com
  Referencia c3: http://www.cypress.com/
  Referencia c4: http://www.atmel.com
  Referencia c5: http://www.st.com/internet/mcu/family/141.jsp
  Referencia c6: http://www.microchip.com/
  Referencia c7: http://www.renesas.eu/index.jsp
  Referencia c8: http://www.silabs.com/

Referencia c9: http://ee.cleversoul.com/8051.html
Referencia c10: http://micrium.com

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

Contents

The contents initially included in the teaching guide are maintained.

Workload and temporary teaching planning

The different activities described in the teaching guide are maintained with the planned dedication.

The material for the follow-up of the classes of theory/practices allows to continue with the professor of temporary planning so much in days as in schedule, so much if the teaching is face-to-face in the classroom or if it is not.

Teaching methodology

In classroom theory and practices, students will tend to have the maximum physical attendance possible, always respecting the sanitary restrictions that limit the capacity of the classrooms as indicated by the competent public health authorities to the estimated percentage of their usual occupation.

Depending on the capacity of the classroom and the number of students enrolled, it may be necessary to distribute the students into two groups. If this situation arises, each group will attend classroom theory and practical sessions with physical presence in the classroom by rotating shifts, thus ensuring compliance with the criteria for occupying spaces.

The rotation system will be established once the actual enrollment data is known, guaranteeing, in any case, that the attendance percentage of all the students enrolled in the subject is the same.

With respect to laboratory practices, attendance at sessions scheduled in the schedule will be totally face-to-face.

Once the actual enrollment data is available and the availability of spaces is known, the Academic Committee of the Degree will approve the Teaching Model of the Degree and its adaptation to each subject, establishing in said model the specific conditions in which it will be developed teaching the subject.

If there is a closure of the facilities for sanitary reasons that totally or partially affects the classes of the subject, these will be replaced by non-contact sessions following the established schedules.

Evaluation

The evaluation system described in the teaching guide of the subject in which the different evaluable activities have been specified as well as their contribution to the final grade of the subject is maintained.

If there is a closure of the facilities for health reasons that affect the development of any face-to-face evaluable activity of the subject, it will be replaced by a test of a similar nature that will be carried out in virtual mode using the computer tools licensed by the Universitat de València.

The contribution of each evaluable activity to the final grade for the course will remain unchanged, as established in this guide.

Bibliography

The bibliography recommended in the teaching guide.