Universitat Autònoma de Barcelona

2022/2023

Electronic Systems and Applications

Code: 102722
ECTS Credits: 6

Degree	Type	Year	Semester
2500895 Electronic Engineering for Telecommunication	OB	3	2

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Vanessa Moreno Font
Raul Aragonés Ortiz

Prerequisites

170/5000
Recommended to have studied subjects:

- Fundamentals of Computing.

- Digital Systems and VHDL.

- Microprocessors and Peripherals.

- Design of Electronic Systems.

Objectives and Contextualisation

The objectives of the course are to provide the basis for the design of electronic systems through digital signal processors as a complement to other solutions of digital systems such as FPGAs and other generic processors. However, multimedia applications and representation of various forms of representation of data, as well as an introduction to graphics processing, will be addressed.

Competences

- Develop personal attitude.
- Develop personal work habits.
- Develop thinking habits.
- Learn new methods and technologies, building on basic technological knowledge, to be able to adapt to new situations.

- Resolve problems with initiative and creativity. Make decisions. Communicate and transmit knowledge, skills and abilities, in awareness of the ethical and professional responsibilities involved in a telecommunications engineer's work.
- Work in a team.

Learning Outcomes

1. Adapt to multidisciplinary and international surroundings.
2. Apply electronics as a support technology in other fields and activities, and not only in the field of Information and Communication Technologies.
3. Assume and respect the role of the different members of a team, as well as the different levels of dependency in the team.
4. Build hardware / software interfaces based on complex platforms.
5. Construct, operate and manage systems for capture, transport, representation, processing, storage, management and presentation of multimedia information, in terms of electronic systems.
6. Design interfaces, data capture and storage devices and terminals for telecommunication services and systems
7. Develop curiosity and creativity.
8. Develop scientific thinking.
9. Develop the capacity for analysis and synthesis.
10. Exploit information and communication technology in observance of an engineer's ethical and professional responsibilities.
11. Identify, manage and resolve conflicts.
12. Maintain a proactive and dynamic attitude with regard to one's own professional career, personal growth and continuing education. Have the will to overcome difficulties.
13. Manage available time and resources. Work in an organised manner.
14. Recognize hardware / software solutions for the implantation of electronic and telecommunication systems.
15. Work cooperatively.

Content

1.Introduction to electronic systems based on DSP.

Design of electronic systems based on DSP.
Examples of applications of electronic systems based on DSP.
Advantages of digital signal processing.
Execution limitations in real time.

2. Representation of data in the use of DSP.

Fixed-point representation
Floating point representation

3. Digital signal processors

Basic aspects and need of the DSP.
Differences between microprocessors and DSP.
Block diagram and functional units.
Selection criteria of a DSP.

4.Methodology, planning and development of Electronic Systems.

Definition of specifications and design flow.
Modeling and Simulation of Electronic Systems.
Management and operation of Electronic Systems.
Legal regulations and ethical considerations.

5. The family of the DSP TMS320C6000

Internal structure
Type and organization of memory.
Entry and exit.
The internal peripherals: McBSP, McASP, DMA.
EMIF interface.
HPI interface.
Vectors of interruption.

6. Introduction to graphics processors

Basics: CCD, CODEC, Compression, representation formats.
The pipeline graphic.
Architectures of a GPU.
GeForce and Radeon families.

Methodology

Theory classes:
Exhibitions on the board of the theoretical part of the syllabus of the course. They give the basic knowledge of the
Subject and directions on how to complete and deepen the contents.

Problem seminars:
The scientific and technical knowledge exposed in the master classes is worked on. They solve problems and it is
They discuss practical cases. With the problems, the capacity of analysis and synthesis, critical reasoning, is promoted
The student is trained in solving problems.
The methodology followed in problems is the following: complete exercises are delivered that have to be solved. In
class is a review of the doubts that have arisen and solved those that the students have had conflicts.
In a problem session, a group is working to solve problems in the synthesis of matter.

Practices:
The practices are realized during the course and they serve to deepen in the practical knowledge of the course matter.
Students will work in groups of 2.
In practice, the student will have to develop the own thinking habits of the subject and work in group.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Seminars	12	0.48	2, 4, 6
Theory classes	26	1.04	2, 5, 9, 6, 10, 14
Type: Supervised			
Laboratory activities	12	0.48	4, 6, 15

Type: Autonomous		
Study	76	3.04

Assessment

The evaluation of the course is broken down into the following items:

1. Evidence of continuous evaluation. The weight in the total of the subject is 50%. You must get at least four at each partial test so you do not have to recover it. Four and a half are required in the average grade of the continuous assessment tests to be able to pass the subject using the notes of items 2 and 3.

2. Laboratory activities. The weight in the total of the subject is 35%. It is indispensable to approve them to pass the subject. There is no established mechanism of recovery of laboratory activities.

3. Evaluation of work. The weight in the total of the subject is 15%. It corresponds to work that the student will do during the course.

There is a final evaluation test to recover the part of the suspended continuous assessment or to raise a note. In this last case, the final grade will be the one obtained in this last test.

Any modification that must occur in this evaluation forecast due to unforeseen circumstances, will be communicated in a way addict to the students.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exercises/Seminars	15%	10	0.4	1, 3, 4, 6, 11, 12, 14, 15
Laboratory activities	35%	10	0.4	2, 4, 6, 13, 12
Theory	50%	4	0.16	2, 5, 8, 9, 7, 6, 10, 14

Bibliography

Federico J. Barerro García, Sergio L. Toral Marín, Mariano Ruíz González: Procesadores digitales de señal de altas prestaciones de Texas Instruments TM: De la familia TMS320C3x a la TMS320C6000, McGraw-Hill-Interamericana de España, 2005.
M.Wolf: Computers as Components: Principles of Embedded Computing Systems Design. Third edition. Morgan Kaufmann Series, Elsevier, 2012.

Software

There is not