67234 - Microelectronic Design

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	527 - Master's in Electronic Engineering
ECTS	5.0
Course	1
Period	First semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The process of teaching and learning designed for this subject is based on the following. It will involve three different training activities with increasing student participation as the course progresses: lectures, laboratory sessions and workshops (T6 activities).

- Face-to-face sessions will have an eminently practical orientation. In the more theoretical lectures, the basis of mixed-mode microelectronic design will be presented, setting out the fundamental aspects of the design flow.
- The second training activity will focus on the laboratory sessions in small groups, where the students will work with microelectronic design CAD tools.
- The third activity (T6) is workshop orientated, where the autonomous student work will be encouraged to achieve as

a result the complete design of a mixed IC. The required material to develop these activities will be provided to the student well in advance.

5.2.Learning activities

The program, offered to the students to achieve the learning goals, includes the following activities:

IN PERSON ACTIVITIES.

- **Lectures (A01) and exercises and cases solving (A02):** In this activity, the fundamental contents of the subject will be presented, with a practical orientation based on the mixed microelectronic design. This activity will take place in person. The necessary materials will be available to students through the ADD.
- **Laboratory sessions (A03):** This activity is structured in 5 practical sessions of 3 hours each. The scripts will be available to students in the ADD well in advance. In these sessions, the required CAD tools for microelectronics design will be used, so that students will acquire the skills and abilities necessary to address a mixed IC design.
- **Tutoring sessions (A05):** Personalized teacher-student sessions in order to mentor the proposed works.
- **Evaluation tests (A08):** Evaluation activity includes performing a global test.

NOT IN PERSON ACTIVITIES.

- **Study (T7):** This activity includes personal work aimed at achieving adequate pursuit of the subject, conducting lab sessions and the proposed works and the tutoring process.
- **Workshops and/or seminars (T6):** In this activity both T6 type activities and the reports elaboration associated to lab sessions are included. In order to meet the request result, students will have the material provided by the teacher, manufacturers of integrated circuits and on-line resources. The student autonomy, the quality of the solution, and the participation of each of the group members will be considered in the evaluation process for each job.

5.3.Program

The distribution into thematic units of the theoretical program of the subject is as follows:

- UNIT 1: Introduction
- UNIT 2: CMOS submicronic technologies
  - Technological process
  - Devices, characterization and modelling
- UNIT 3: Analog design flow
- UNIT 4: Digital design flow
- UNIT 5: Design of analog-digital mixed systems

5.4.Planning and scheduling

Both theoretical classes and laboratory sessions are held according to the schedule set by the centre (available on the corresponding website). The other activities will be planned depending on the number of students and will be announced well in advance.

Each teacher will inform of the particular tutoring hours.

5.5.Bibliography and recomended resources

1. Basic teaching materials. Available in http://add.unizar.es (To access this resource, the student must be enrolled in the subject).

- **Slides.** They are considered the notes of the subject.
- **Practices scripts.**

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- **Supplementary teaching materials.** Set of useful materials for the course: catalogs of manufacturers, component data sheets, CAD tools manuals, etc.

2. Reference books:

- CMOS Circuit Design, Layout and Simulation; R. Jacob Baker; Wiley-IEEE Press, 3rd Edition, 2010; ISBN:978-0-470-88132-3.
- CMOS Mixed-Signal Circuit Design; R. Jacob Baker; Wiley-IEEE Press, 2nd Edition, 2009; ISBN: 978-0-470-29026-2.
- Digital VLSI Chip Design with Cadence and Synopsys CAD Tools; E. Brunvand; Addison-Wesley, 2010; ISBN:978-0-321-54799-6.
- Electrónica Digital, Aplicaciones y Problemas con VHDL; J.I. Artigas, L.A. Barragán, C. Orrite, I. Urriza; Prentice Hall, 2002.
- Analog Integrated Circuit Design; D. Johns, K. Martin; John Wiley & Sons, Inc., New York, 1997.
- CMOS Sigma-Delta Converters: Practical Design Guide; J.M. de la Rosa, R. del Río; Wiley-IEEE Press, 2013; ISBN 978-1-119-97925-8.
- VHDL for Designers; S. Sjoholm and L. Lindh; Prentice Hall, 1997; ISBN: 0-13-473414-9.
- Operation and Modeling of the MOS Transistor; Y. Tsividis; Oxford University Press, 2nd Edition, 1999; ISBN: 0-19-517014-8.