

67234 - Microelectronic Design

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	527 - Master's in Electronic Engineering
ECTS	5.0
Year	1
Semester	First semester
Subject Type	Optional
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

- Theory sessions with a practical approach, where the basis of mixed-mode microelectronic design will be presented, setting out the fundamental aspects of the design flow.
- Laboratory sessions in small groups, where the students will work with microelectronic design CAD tools.

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- Assignments (T6) oriented towards student autonomous work as a result of 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 tasks

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

Classroom activities (2 ECTS: 50 hours):

- **Theory sessions** (A01 - 15 hours) and **practice sessions** (A02 - 15 hours). The fundamental contents of the course will be presented, with a practical orientation based on the mixed microelectronic design. The necessary materials will be available to students on the virtual platform.
- **Laboratory sessions** (A03 - 15 hours). This activity is structured in different practical sessions that require CAD tools for microelectronics design, so that students will acquire the skills and abilities necessary to address a mixed IC design. The instructions will be available to students on the virtual platform in advance.
- **Tutorials** (A05 - 3 hours). Personalized teacher-student sessions in order to guide exercises and assignments.
- **Evaluation tests** (A08 - 2 hours). A final test.

Autonomous work (3 ECTS: 75 hours):

- **Study** (T7): This activity includes personal study aimed at monitoring the learning process, conducting lab sessions, preparing assignments, and the tutorials.
- **Assignments** (T6). T6 type activities and preparation of lab reports are included. In order to meet the requested results, students will have learning materials provided by the teacher, manufacturers' integrated circuits and on-line resources. The assessment criteria will take into consideration the student autonomy, the quality of the solution, and the participation of all the group members.

5.3.Syllabus

The course will address the following topics:

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

5.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website.

5.5.Bibliography and recommended 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 course.
- Lab session instructions.
- 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. Sjöholm 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.