Centre	**University College of Engineering of Vitoria-Gasteiz**
Name of subject	**26003 – Microelectronics**
Qualification	**Degree in Industrial Electronic Engineering and Automatics**
Type	**Elective**
Credits	**6 ECTS**
Year	**4**
Term(s)	**2nd**
Department	**Electronic Technology**
Language	**Spanish**

Outcomes / Objectives

In this subject, students acquire a sound level of knowledge of CMOS technology. Students also attain basic knowledge of full-custom chip design. Lastly, students are introduced to programmable logics, from basic to more complex logic devices, performing designs with the use of VHDL hardware description languages.

Syllabus

CMOS technology. Introduction to CMOS technology. Characteristics of MOS transistors. Technological parameters. Effects of technologies. CMOS inverter. Transfer functions. CMOS inverter with capacitive load. Power consumption. Basic gates. Analogue switch. Systematic design of logic circuits. Integrated circuit design. Full-custom integrated circuit design. Design rules. Basic designs. Programmable logic devices. Introduction to programmable logic devices. PROM, PLA, PAL and PLS array structures. Programming procedures. Macrocells. FPGA. VHDL hardware description languages. VHDL hardware description language. VHDL commands. Basic circuit design with VHDL. Encoders, decoders, comparators, multiplexors, binary, decimal and programmable counters, design with state machines. PLD recording. Designs with Altera education board or pLED EPM3064A board.

Methodology

Teaching Method

Face-to-Face Teaching Hours								
Lectures	**Seminars**	**Classroom practice**	**Lab. practice**	**Computer sessions**	**Clinical practice**	**Workshops**	**Industrial workshops**	**Field practice**
30			**30**					
Student Hours of Non Face-To-Face Activities								
Lectures	**Seminars**	**Classroom practice**	**Lab. practice**	**Computer sessions**	**Clinical practice**	**Workshops**	**Industrial workshops**	**Field practice**
45			**45**					

Assessment System

General criteria

Clarification regarding assessment

Compulsory materials

Cards with programmable logic devices

Bibliography

Basic Bibliography

- Electrónica Digital. Tomo III, Microelectrónica y tomo IV Tecnología CMOS, Pollán T. PUZ 3ª ed. 2007- Tecnología CMOS. J.A. Sainz 2009

In-depth Bibliography

- MicroWind manuals
- Diseño de circuitos y sistemas integrados. Rubio, Altet, Aragonés, González, Mateo, Moll. Ediciones UPC
- VHDL Lenguaje estándar de diseño electrónico, Terés et al. Mc Graw-Hill, 1997
- The designer's guide to VHDL Ashenden. Peter Morgan Kaufmann 1996
- Digital integrated circuits. A design perspective, Rabaey. Prentice Hall 1996
- Principles of CMOS VLSI design. A system perspective, Weste, Eshraghian. Addison-Wesley 1994