EN104 : Digital Electronics

ECTS credits :

1.50

Evaluation :

No description

Number of hours :

Lecture :	16.00
Combined lecture and tutorial classes :	10.00

Teacher(s) :

FABRE Alain
RENAUD Sylvie

Title :

Digital Electronics

Abstract :

Objectives : To investigate the principles and functionnning of the most important digital circuits used on informatic systems.

Contents : The basic properties of the semiconductors are reminded in the first part. The active components (bipolar junction transistors and field effect transistors) used to implement all the digital functions are studied first. Then, the monolithic Integrated-circuit technology is described briefly and the various families of digital integrated circuits, and particularly the CMOS one are fully analysed.

The second part presents the implementation solutions for digital systems. ASICs and PLD architectures are presented, together with the classical hardware description languages (VHDL). Finally, memory ICs architectures and cells are detailed for volatile and non-volatile memories.

Plan :

Part 1 :
- Basic physical properties for semiconductors
- The PN Junction and the junction diode
- The bipolar Junction transistor
- The field effect transistor, JFET
- The MOSFET
- Monolithic Integrated-circuit technology
- Digital Integrated circuits
- Logical Circuits, NMOS and CMOS functions, VLSI circuits.

Part 2 :
- Introduction:industrial context and implementation solutions in digital electronics
- Principles of combinatory and sequential logic
- Basics of Hardware description languages (VHDL)
- ASICs and PLDs
- Non-volatile and volatile memories

Optional practical labs (PR101) illustrate the class.

Prerequisite :

Module IT102 - Semester 1

Document(s) :

Millman J., Grabel A., Microelectronics, Mc Graw Hill Edit.