



Course Syllabus

Course Code	Course Title	ECTS Credits
ECE-420	Introduction to Digital VLSI Design	6
Prerequisites	Department	Semester
ECE-111, ECE-220, ECE-310	Engineering	Fall or Spring
Type of Course	Field	Language of Instruction
Elective	Engineering	English
Level of Course	Lecturer(s)	Year of Study
1 st Cycle	Dr Stelios Neophytou	4 th
Mode of Delivery	Work Placement	Corequisites
Face-to-face	N/A	None

Course Objectives:

Give an introductory perspective of the modern digital Very Large Scale Integration circuits examining technology, design analysis and performance. Provide hands-on experience of layout level design and simulation.

Learning Outcomes:

After completion of the course students are expected to be able to:

- Explain the VLSI technology and discuss the main issues of the modern microchips manufacturing process.
- Analyze and design VLSI circuits using layout editor and other CAD tools for the evaluation and simulation of their designs.
- Define and utilize higher abstraction level design methods and hardware description languages.
- Estimate the engineering cost of designing, verification, fabrication and testing of modern VLSI circuits.
- Describe the VLSI technology and understand the main issues of the modern microchips manufacturing process.

Course Content:

- Introduction to CMOS logic.
- Fabrication and layout of MOS circuits.
- Logic design, circuit design and physical design.
- MOS transistor theory.

- Ideal and non-ideal I-V characteristics.
- DC transfer characteristics
- Switch Level RC delay models
- CMOS processing technologies
- Circuit Characterization and performance evaluation.
- Delay estimation using standard models.
- Logical effort and transistor sizing.
- Interconnect and wire engineering.
- Fundamentals of circuit simulation.
- Combinational MOS Logic Circuits.
- Circuit Families.
- Standard design strategies.
- Design methodologies.
- Design flow and economics.
- Principles of manufacturing testing and verification.
- Design for reliability.

Learning Activities and Teaching Methods:

Lectures, Lab Presentations and Tutorials, Lab and Homework Assignments.

Assessment Methods:

Homework, Lab Reports, Mid-Term, Project, Final Exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Neil Weste and David Harris	CMOS VLSI Design: A Circuits and Systems Perspective (4th Edition)	Pearson	2010	0-321-54774-8

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
J. M. Rabaey, A. Chandrakasan, B. Nikolic	Digital Integrated Circuits-A Design Perspective (2 nd Edition)	Prentice-Hall	2003	
N. H. E. Weste, K. Eshraghian, M. J. Sebastian Smith	Principles of CMOS VLSI Design: A Systems Perspective with Verilog/VHDL Manual (2nd Edition)	Addison Wesley	1998	
D. A. Pucknell, K. Eshraghian	Basic VLSI Design	Prentice-Hall	1995	

