



Course Code ECE-520	Course Title Introduction to Digital VLSI Design	ECTS Credits 8
Department Engineering	Semester Fall or Spring	Prerequisites ECE-111, ECE-220, ECE-310
Type of Course Elective	Field Engineering	Language of Instruction English
Level of Course 2 nd Cycle	Year of Study 1 st	Lecturer Dr Stelios Neophytou
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

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 Contents:

- 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, Design Project, Research Literature overview and Presentation, Final Exam.

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Neil Weste and David Harris	CMOS VLSI Design A Circuits and Systems Perspective (3 rd Edition)	Addison Wesley	2005	0-321-14901-7

Recommended Textbooks/Reading:

Authors	Title	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	
E. D. Fabricius	Introduction to VLSI Design	Mac-Graw Hill	1991	