The University of Texas at Tyler
Department of Electrical Engineering

Course: EENG 4331 – VLSI Design (Elective)

Syllabus

Catalog Description:

Design and fabrication of digital integrated circuits. CAD tools for the design, layout, and verification of VLSI circuits; fabrication of CMOS integrated circuits; computer modeling of submicron transistors; static and dynamic CMOS logic design; microprocessor datapath circuits and sub-system design issues; testing and verification of integrated circuits. Three hours of lecture each week.

Prerequisites: EENG 3302 Digital Systems, EENG 3306 Electronics I

Credits: (3 hours lecture, 0 hours laboratory per week)

Text(s): N. H. E. Weste and D. Harris. *CMOS VLSI Design.* 4th edition. Pearson–Addison-Wesley, 2011. ISBN 978-0321-547743

Additional Material: Class Notes; Journal Articles

Course Coordinator: David Hoe, Assistant Professor, Electrical Engineering

Topics Covered: (paragraph of topics separated by semicolons)

VLSI CAD tools; Fabrication of integrated circuits; Modeling submicron transistors; Static and dynamic logic gate design; Datapath design; Subsystem design; Clock Distribution, I/O design; Testing and Verification Issues.

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Objectives[1]: By the end of this course students will be able to:

1. Describe the process flow involved in implementing VLSI designs [1,2,4]
2. Use CAD tools to design, simulate, and implement VLSI designs [1,2,4,5]
3. Select and design with the appropriate CMOS logic circuits for a given application [1,2,4]
4. Summarize the issues involved in scaling to short channel devices [1,2,4]
5. Design circuits used in a microprocessor datapath [1,3,4,5]
6. Explain subsystem design issues [1,2,4,5]
7. Identify issues involved with testing and verifying VLSI designs [1,2,4]

[1] *Numbers in brackets refer to method(s) used to evaluate the course objective.*

Relationship to Program Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering;
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering;[2,4,5,6]
3. have the ability to analyze electrical circuits, devices, and systems;[1,3,6]
4. have the ability to design electrical circuits, devices, and systems to meet application requirements;[5,6]
5. have the ability to design and conduct experiments, and analyze and interpret experimental results;
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods;[1-8]
7. have effective written, visual, and oral communication skills;
8. possess an educational background to understand the global context in which engineering is practiced, including:
   a. knowledge of contemporary issues related to science and engineering;
   b. the impact of engineering on society;
   c. the role of ethics in the practice of engineering;
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams;
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers; [4,5,6,7]

[2]*Numbers in brackets refer to course objective(s) that address the Program Outcome.*

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:	0	hours
Engineering Sciences and Design:	3	hours
General Education Component:	0	hours

Prepared By:	David Hoe	Date:	28 Oct 2009
Modified By:		Date:	19-Aug 2010