

Department of Electrical and Computer Engineering
520.216 Intro to VLSI
Spring 2008

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| 2007-09 Catalog | This course teaches the basics of switch-level digital CMOS VLSI design. This includes creating digital gates using MOS transistors as switches, laying out a design using CAD tools, and checking the design for conformance to the Scalable CMOS design rules. (3 credit hours/Elective) |
| Prerequisite: | 520.142 Digital Systems Fundamentals |
| Recommended: | 520.213 Circuits |
| Textbook: | <i>Introduction to VLSI Circuits and Systems</i> by John P. Uyemura, (ISBN 0-471-12704-3) and optionally, <i>Physical Design of CMOS Integrated Circuits Using L-Edit</i> by John P. Uyemura, (ISBN 0-534-94326-8). |
| Course Objectives: | The purpose of this course is to familiarize undergraduate students with VLSI layout tools such as L-Edit, Cadence and Magic, in preparation for the more advanced VLSI courses. These objectives are achieved by teaching the students how to design, lay out and simulate static complementary MOS digital circuits, which are the simplest class of VLSI circuits. Each student is required to design, lay out and simulate a project involving 1000 to 2000 transistors. |
| Topics Covered: | <ol style="list-style-type: none">1. Implementing digital logic functions with switches and relays.2. Replacing switches with N and P MOS transistors.3. Laying out transistors.4. Scalable CMOS design rules.5. Converting truth-tables or Boolean equations to static CMOS VLSI circuits.6. Frequently used digital gates, including lookup tables, full adders, latches and pad drivers.7. Producing CIF files for fabrication from layouts.8. Simulating static CMOS VLSI circuits.9. Estimating delay using a simple RC model of the MOS transistor.10. Sizing MOS transistors to account for digital gate fan-out.11. Overview of advanced fabrication processes and MOS device models. |
| Class Schedule: | Three - one hour lectures/ week |

Contribution of Course to Meeting the Professional Component (credit hours):

| Engineering Science | Engineering Science and Design |
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| 3 | |

Relationship of Course to Program Educational Outcomes (\checkmark those that apply):

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| | Apply mathematics, probability and statistics, basic science, and computer science |
| | Design and conduct experiments, analyze and interpret data |
| x | Identify, formulate and solve electrical engineering problems |
| x | Use technical skills and modern engineering tools to design to meet needs |
| | Communicate effectively and work on multidisciplinary teams |
| | Contemporary issues, ethical responsibilities, environmental, health, safety issues |
| x | Engage in life-long learning |

Prepared November 1, 2007 by: Philippe Pouliquen