

ELEG 4233 - INTRODUCTION TO INTEGRATED CIRCUIT DESIGN

Fall Semester, 2007

Catalog Data: 2006-07 ELEG 4233. Introduction to Integrated Circuit Design (II). Credit 3. Design and Layout of large scale digital integrated circuits using CMOS Technology. Topics include MOS devices and basic circuits, integrated circuit layout and fabrication, dynamic logic, circuit design and layout strategies for large scale CMOS circuits., estimation and optimization of logic speed. Prerequisite: ELEG 3213, 4203.

Textbook: *CMOS VLSI Design: A Circuits and Systems Perspective*, by Neil H.E. Weste & David Harris, Third Edition

Reference: None.

Coordinator: R. Brown, Associate Professor of Electrical Engineering.

Goals: The goal is to teach students how to design and layout large scale digital integrated circuits.

Prerequisite by Topic:

1. Digital and analog electronics.
2. Elementary understanding of PN junctions.

Topics:

1. MOSFET Review (1 class)
2. Static CMOS Gates (2 classes)
3. Transmission Gates (1 class)
4. Dynamic Storage (1 class)
5. Multiplexers (1 class)
6. Latches & Registers (2 classes)

7. Overview of Semiconductor Fabrication (2 classes)
8. A Simplified CMOS Process (2 classes)
9. Layout of Static CMOS Gates (2 classes)
10. Simplified CMOS Geometric Design Rules (1 class)
11. Design Partitioning & Layout of Large Circuits (3 classes)

12. MOSFET I/V Characteristics & Parasitic Capacitance (1 class)
13. Non-Ideal MOSFET Characteristics at Small Line Widths (2 classes)
14. Mid Term Exam (1 class)
15. Inverter D.C. Characteristics & Threshold (2 classes)
16. Switch-Level RC Delay Model for Inverters (2 classes)

17. The Shallow Trench Isolation CMOS Process (2 classes)
18. Sheet Resistance & MOSIS Electrical Design Rules (1 class)
19. MOSIS Scalable CMOS Geometrical Design Rules (2 classes)
20. RC Delay Models for Gates & Networks & Logical Effort (5 classes)
21. Minimizing Delay in Gate Networks (4 classes)

22. Adder Design & Layout (3 classes)

Computer Usage:

Type of Computer Usage: none
Minimum Usage: none
Computers: none
Languages: none
Operating Systems: none

ABET category content as estimated by faculty member who prepared this course description:

Engineering Science: 0.5 credit or 17%.
Engineering Design: 2.5 credits or 83%.

* Three 50 minute classes per week.

Prepared By: _____ Date: _____