EE 5356/7356
VLSI Design and Lab

Instructor: Professor Jinghong Chen
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Lecture: 11:00pm-12:20pm Tuesday and Thursday, Junkins Building 0205
Lab: 5:00pm-7:50pm, Monday, Junkins Building 0215

Course Description

The course explores the design aspects involved in the realization of CMOS integrated circuits/systems from device up to the register/subsystem level. It addresses major design methodologies with emphasis placed on structured full custom design. The course includes the study of the MOS device, critical interconnect and gate characteristics that determine the performance of VLSI circuits. It also includes CMOS logic design from transistor level schematic to layout for fabrication. Students will use state-of-the art CAD tools to verify designs and develop efficient circuit layouts.

Textbook and Other Related Materials

Textbook

CMOS Digital Integrated Circuits: Analysis and Design, by S. M. Kang and Y. Leblebici, McGraw-Hill, Third Ed., 2002.

References

Digital Integrated Circuits, A Design Perspective, by Jan Rabaey, Second Edition Prentice Hall.

Prerequisites

EE 2381 – Digital Computer Logic (Grade of C or better)
EE 3311 – Solid State Device (Grade of C or better)

Grading

Homeworks	20%
Labs and Final Project	20%
Mid-Term Exam 1	15%
Mid-Term Exam 2	15%
Final Exam	30%

Topics Covered (hrs):

1. MOS Transistor Theory: I-V curve, non-ideal effect, DC Transfer Characteristics 4
2. CMOS Inverter Static Characteristics   4
3. CMOS Inverter Dynamic Characteristics   4

4. CMOS Transistor Fabrication Technology	2
5. Combinational Logic Circuit Design	6
6. Alternative Static Logic Circuit Design	4
7. Sequential Logic Circuit Design	4
8. Dynamic Logic Circuit Design	4
9. Propagation Delay and Interconnect	2
10. Power Dissipation and Design for Low Power	2
11. Memory Circuit (SRAM/DRAM/ROM)	4
12. ESD, Packaging, Testing, and VLSI Design Flow	2
13. Mid-Term Exams	
Total	42

Laboratory / Projects

The students are required to complete a design project to meet certain specifications (speed and power dissipation). In the project, the students design, simulate and layout the circuits using Cadence design tools.

Disability Accommodations: If you need academic accommodations for a disability, you must first contact Disability Accommodations & Success Strategies (DASS) at 214-768-1470 or www.smu.edu/alec/dass.asp to verify the disability and to establish eligibility for accommodations. Then you must schedule an appointment with the professor to make appropriate arrangements.

Religious Observance: Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

Excused Absences for University Extracurricular Activities: Students participating in an officially sanctioned, scheduled University extracurricular activity will be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue)