EE 382V – Computer-Aided Circuit Design for Deep Submicron VLSI

Fall 2004

Instructor:	Prof. Michael Orshansky
Lecture Hours:	MW 11:00-12:30 PM, ENS 126
Office Hours:	Tuesday 4-6pm
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Course Number:	16190
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This course reviews the major components of the modern computer-aided circuit design flow. An important motivation for the course is to explore the directions in which computer-aided circuit design evolves as it copes with the challenges brought about by the increased complexity of deep submicron silicon technology. The course will survey the major disruptive technological trends, and study their impact on timing analysis and physical design. It will also explore the techniques in computer-aided design for testability, reliability, and manufacturability. The course will build the links between solid-state technology, circuit design, and CAD, and will be of interest to students in all these areas.

Prerequisites
Digital Integrated Circuit Design (360S) *or consent of the instructor*
Solid-State Electronic Devices (339) and Algorithms (360C): *recommended*

Tentative Course Plan
1) Overview of the CAD flow
2) Basics of logic synthesis
3) Review of CMOS technology and fabrication
4) Graph theory and computational complexity
5) Partitioning
6) Floorplanning and placement
7) Global and detailed routing
8) Static timing analysis and delay modeling
9) Timing closure and physical synthesis
10) Noise sources in timing analysis and PD
11) Performance and power optimization
12) CAD for manufacturability
13) Statistical timing analysis
14) Statistical design techniques for robustness

Reader
The required course reading material will be collected in the form of a reader.

References
- S. Hassoun and T. Sasao, *Logic Synthesis and Verification*, Kluwer Academic Publishers, 2002. ISBN 0-7923-7606-4.
- N. Sherwani, *Algorithms for VLSI Physical Design Automation*, Kluwer Academic Publishers, 3rd Edition, 1999, ISBN: 0-7923-8393-1.

- S.M. Sait, H. Youssef, *VLSI Physical Design Automation: Theory & Practice* World Scientific Publishing Company, Incorporated, 1999, ISBN: 0-07-707742-3.
- T. Cormen, C.E. Leiserson and R.L. Rivest, *Introduction to Algorithm*, McGraw-Hill, 1989. ISBN 0-262-03141-8.

Exams and homework assignments
There will be two midterm exams. Several homework assignments will be given out in the course of the semester.

Project
The class project may be either a theoretical or practical investigation of open problems in areas discussed in the course. The projects will be carried out in groups of two people. The students will write a series of reports throughout the semester, and will present the project results in class at the end of the semester. Both the quality of results and the quality of written and oral presentation will determine the project grade.

Grading
20% Homework, 20% Midterm #1, 20% Midterm #2, 40% Project
Collaboration on homework assignments and projects is encouraged. Turning in identical homework solutions is considered cheating.

Academic dishonesty
Academic dishonesty in any form will not be tolerated. Academic dishonesty includes but is not limited to cheating on exams and homework assignments, interfering with another student's work, and plagiarizing.