Syllabus
EN291–S10: Nanosystem Computing
Semester I 2005–2006
Tu,Th 1:00pm – 2:20pm

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COURSE DESCRIPTION

Over the past few decades, computer system performance has been driven by improvements in silicon fabrication technology. However, within the foreseeable future, improvements in conventional fabrication will be limited by basic physics, as devices become small enough that the bulk assumptions used in analyzing their performance become incorrect. A number of promising candidates for new basic technologies have been demonstrated in the lab, including single-molecule organic switches and nanotube electron conduits. This course will focus on considering how these new basic devices will impact VLSI and computer architecture, and how we may design systems to take advantage of the opportunities they offer. The goal of this course is to provide a broad understanding of the many fields that are involved in electronic nanotechnology.

Class will include a mix of lectures and discussion on assigned reading of recent publications. Students will be responsible for leading and participating in these discussions. A course project will also be required. Prerequisites: EN164 and EN160 are helpful, but not required.

COURSE MATERIAL

Required: Reading material will be made available from the website throughout the semester.

LECTURES

The first couple of weeks of the course will be devoted to providing the class with an overview of issues in current device technology and their implications for computing. We will also briefly touch on some nanotechnology alternatives. A homework assignment involving CMOS technology will follow these lectures.

DISCUSSION

After the overview, most classes will consist of a discussion of one or two papers on a particular topic in nanotechnology or alternative approaches to computing. All students are expected to read the papers. There will be one discussion leader and two scribes assigned for each class. The discussion leader is responsible for keeping the discussion going and/or preparing a formal presentation of the material. The scribes will jointly create notes summarizing key aspects of the papers and interesting discussions brought up during class. The scribe notes are due within a week of lecture and will be posted on the course webpage. It is expected that *ALL* students be involved in active discussion of the papers (not just scribes and/or discussion leaders).

HOMEWORK

While homeworks are not intended to be a major component of this course, they are intended to give students some appreciation of current design approaches and the tools available for creating these designs in either traditional CMOS or other non-silicon technology.

PROJECT

The project will involve investigating some aspect of nanotechnology or non-conventional computing. Typically, a project will investigate one of the areas discussed during class; however, you are free to propose any appropriate research topic. Group projects (typically groups of two) are encouraged.

GRADING

Following is a *tentative* breakdown for the course grading.

Discussion Leadership: 20%
Scribe Notes: 20%
Class Participation: 15%
Final Project: 35%
Homework: 10%