Goals and Objectives of the Course

The purpose of this class is to obtain an understanding of current research and development work in the areas of nano-bio circuits and systems. The specific technologies to be studied include nanodevices, nanoelectronics, systems biology, bioinformatics, and nano-related applications in biology, medicine and communications. Students will gain an understanding of the current state-of-the-art in these areas and learn how engineering advances occur in today's global technology environment. Site visits will be made to universities, R&D laboratories and high-tech companies. We will also attend the premier conference in the circuits and system area, the IEEE International Symposium on Circuits and Systems.

Required Pre-Departure Meetings (during Spring Semester, 2010)

Monday, April 19:  7:00 – 9:00 PM, Walter Library 101:
   Guest presentation by Prof. Stephen Campbell (ECE Dept.) on nanotechnology.  Also, course orientation and logistics – part I (with Adam Pagel).

Thursday, April 22:  7:00 – 9:00 PM, EE/CS 2-260:
   Guest presentations by Prof. Chad Myers (CSE Dept.) and Prof. Marc Riedel (ECE Dept.) on bio-related topics.  Also, introduction to the technical sites to be visited.

Tuesday, May 4:      12:30 – 2:00 PM, ME 1130:
   Course orientation and logistics – part II (with Adam Pagel).

Technical Site Visit Schedule

Wed. May 19  Imperial College, London
   http://www3.imperial.ac.uk/electricalengineering

Thurs. May 20  London Centre for Nanotechnology
   http://www.london-nano.com/

Fri. May 21  University of Cambridge - Nanoscience Centre, Cambridge
   http://www.nanoscience.cam.ac.uk/

Fri. May 21  Wellcome Trust Sanger Institute, Cambridge
   http://www.sanger.ac.uk/

Tue. May 25  University of Oxford
   http://webnix.physics.ox.ac.uk/biophysics/,
   http://www.physics.ox.ac.uk/cm/cmt/research.htm
Fri. May 28  France Telecom, Paris  
http://www.francetelecom.com/en_EN/

Mon. May 31  IEEE International Symposium on Circuits and Systems, Paris  
http://www.iscas2010.org/

Thurs. June 3  Ecole Centrale Paris  
http://www.ecp.fr/index.html

Fri. June 4  University of Pierre and Marie Curie, Paris  

Required Reading (to be completed during Spring Semester, 2010)  
(materials available at the WebVista course site)


Supplementary References  
(materials available at the WebVista course site)


**Other Course Requirements – Before the Seminar**

- Write a two-page introduction to one of the sites that we will visit. (You will also give a presentation about this site to the rest of the class on the day of our visit to that site).

**Other Course Requirements – During the Seminar**

- **Maintain a daily journal.** Record your thoughts, reactions and impressions of each of the sites that we visit. At the technical sites, be sure to carefully and completely record details about the technologies, designs, research directions, key people involved, etc.

- **Participate:** Listen carefully and ask relevant and thoughtful questions. Compare what you are hearing and seeing with what you have already learned in your previous courses and/or past work experience. Share your thoughts and ideas with the group.

**Other Course Requirements – After the Seminar**

- **Write a Final Report:** The written report is due by **4:00 PM, Monday, June 28**. Note that clarity, grammar, spelling, etc. are important so be sure to carefully proof-read your report. **Important:** The report must be written entirely in your own words. Be sure to use the following organization:
  
  o **Summary of Technologies:** Based on what we have learned, select 2 specific topics (1 nano-related topic and 1 bio-related topic) which are of most interest to you. Explain how each of these topics were being investigated at one or more of the sites that we visited. If appropriate, explain the different approaches taken by universities, companies and research labs. This section should be 4 double-spaced pages in length, including figures and tables.

  o **Detailed Technical Analysis:** Select one of the topics you described in the previous section for further analysis. Explain the engineering, scientific and/or mathematical basis for the technology. If appropriate, state and explain the fundamental equations which govern the field. What are the key parameters that should be optimized? What fundamental or practical constraints limit the current state of progress in the area? What will the state of this technology be like 5 years from now? Apply concepts and knowledge gained from the site visits, your previous technical courses, the required reading and supplementary references, and other references to provide additional insights and explanations. This section should be 8 double-spaced pages in length, including figures and tables.

**Grading System**

Site Report/Presentation 10%, Homework 10%, Journal 20%, Participation 30%, Final Report 30%