PHYSICS 711
SEMICONDUCTOR DEVICES AND TECHNOLOGY

INSTRUCTOR: Barbara Neuhauser
Thornton 315 (academic office)
415-338-1468
Thornton 106 (research office)
barbjn@coolchips.sfsu.edu

E-MAIL CONTACT: You may e-mail me about administrative matters. Please do NOT e-mail questions about homework; I have to draw diagrams and wave my hands when I answer physics questions. Please use this subject in your e-mail messages: "PHYSICS 711: your name".

OFFICE HOURS: MWF 11:10 am - 11:45 am in TH 106 (tentative)
Tuesday 1:00 pm – 2:00 pm in TH 106 (tentative)
and by appointment

PREREQUISITES: PHYSICS 230 (Introductory electricity and magnetism)
PHYSICS 450 (Solid state physics)


CONTENT: This course covers the physical principles applicable to the design and fabrication of semiconductor devices. Students are expected to master basic concepts in these areas:

- Semiconductor physics
- Microfabrication technology:
  - Production of silicon wafers
  - Oxidation of silicon
  - Photolithography
  - Wet etching
  - Dry etching
  - Doping processes
- Metal-semiconductor contacts
- pn junctions
- Bipolar junction transistors (BJTs)
- MOS systems
- Field-effect transistors (JFETs and MOSFETs)
- Special-purpose devices: LEDs, solar cells, SSDs, CCDs

LECTURES: Students are expected to attend ALL lectures and to ARRIVE ON TIME for the lectures. Please TURN OFF your cell phone during the lecture!!! A tentative lecture schedule will be provided during the first week of classes. Lectures will discuss appropriate portions of the textbooks and provide extensive supplemental material. Lecture notes often will be handed out so that students can focus on the presentation. Relevant questions that can be answered briefly are welcomed during the lectures. Longer discussions of topics must be deferred to scheduled office hours.
HOMEWORK: Approximately ten problem sets will be assigned during the semester. They will be due at the beginning of the lecture one week after the assignment is handed out. Students are expected to state briefly but clearly the justification for each major step in the solution to a problem. Sloppy homework sets may not be graded. Students may discuss with each other general approaches to the problems, but each student should work out the detailed solutions by him/herself without using solutions obtained from any source.

FAILURE TO HAND IN THE FIRST PROBLEM SET ON TIME MAY RESULT IN THE STUDENT BEING DROPPED FROM THE COURSE. Failure to hand in the remaining problem sets on time may result in a 25% penalty.

EXAMINATIONS:

MIDTERMS: Wednesday, 10 March 2010 (tentative); 4-day take-home exam; Lectures 1 - 16
Wednesday, 28 April 2010 (tentative); 4-day take-home exam; Lectures 17 - 32

Each midterm exam is an open text book (Muller, Kamins, Chan) open lecture note do-it-yourself take-home exam. If the instructor’s workload has sufficient flexibility, each exam will be graded and returned for you to correct as an open-P711-text-book, open-P711-lecture-notes, do-it-yourself take-home exam. Your score will be the average of the two scores.

FINAL EXAM: A take-home final examination will be given out on Wednesday, 19 May 2010 at a time to be determined later, and it will be due at noon on Friday, 21 May 2010. The final exam is an open text book (Muller, Kamins, Chan), open lecture notes, do-it-yourself take-home exam.

The final exam MUST be taken during the scheduled two-day period and must be handed in on time to avoid assignment of a grade of zero. Do not make travel plans that conflict with this schedule. No make-up final exam will be given except in the case of illness or personal crisis.

GRADE: A student must earn at least 50% of the total possible points in order to receive a grade of B- or higher.

| HOMEWORK: 35 % | All homework sets will be included |
| MIDTERM EXAMS: 20 % each | You must take the midterms. |
| FINAL EXAM: 25 % | You must take the final exam. |

CHEATING ON HOMEWORK OR EXAMS WILL RESULT IN FORMAL DISCIPLINARY ACTION BEING TAKEN AGAINST THE STUDENT.

STUDENTS WITH DISABILITIES:

Students with disabilities who need reasonable accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the reasonable accommodations process. The DPRC is located in the Student Service Building and can be reached by telephone (voice/TTY 415-338-2472) or by email (dprc@sfsu.edu).
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STUDENT SURVEY FORM

Please fill out this form and hand it in at the end of the class period. Your completed form will serve as proof of your attendance.

Name: ____________________________________________________________
  (family)                                                            (given)

Major: _____________________________________________________________

Address: ___________________________________________________________________________________
  ___________________________________________________________________________________

Telephone: ______________________ e-mail: ________________________________

Summary of undergraduate and graduate Physics courses already taken:

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<thead>
<tr>
<th>Course</th>
<th>Date Completed</th>
<th>Grade (Optional)</th>
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Comments or questions: ______________________________________________________________________
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