What is it?

Type: technical elective course for undergraduate students in the Nano-materials Devices and Circuits area

Prerequisite: EE133

Catalog description:
This EE undergraduate course presents device/process simulations and hands-on experience in Integrated Circuit (IC) Fabrication and Characterization techniques. Using a five-mask NMOSFET technology, students will learn fabrication processes of NMOSFET transistors. Electrical evaluation of these devices and simulations of these devices will be performed.

Objectives of this course are as follows:
1) Learn basic theories/skills required for semiconductor device fabrication, characterization and simulation.
2) Learn processes and process modules such as lithography, oxidation, film deposition, etching and metallization.
3) Learn process integration of metal-oxide-semiconductor-field-effect transistors.
4) Learn device characterization techniques.
5) Learn device simulation and process simulation.
6) Learn how to write technical reports and technical papers (IEEE-type).
7) Learn the importance of teaming in a project.
8) Learn how a graduate student normally does research.

How to evaluate?

Units: 4

Grading: letter grade
Course Instruction 50%; Homework 10%; Midterm 10%; Final Examination 30%
Laboratory Instruction 50%; Project 10%; Lab Report (IEEE Transactions on Electron Devices-type paper) 40%
Homework: total 4 piece of homework biweekly
Midterm Exam: 2:10-3:00pm Monday May 2, HMNSS1406
Final Exam: 3:00am-6:00pm 06/09/2008, Show up on time, No make-up examinations
Project Due: (One-month project, pending on the assignment date)
Lab Report Due: Friday June 6

Lab: Project: An IEEE Transaction on Electron Devices journal paper: Reading, outline, summary and evaluation; Device simulation: You, after training, via online simulation www.nanohub.org. Device fabrication: Instructor/TA, at UCR CNSE clean room; Device characterization: You, after training, at Room 228, EBUII; Lab report: Your first IEEE-type journal paper to include device simulation and device fabrication procedures (you learned through course and interactions with TA) and device characterization results.

What are the hours of operation?

Lecture hours: MWF 2:10pm-3:00pm, HMNSS1406
   Lecture starting instruction day: Monday March 31; Ending instruction day: Friday June 6; No lecture on Monday, May 26 (Memorial’s day)

Office hours: M 3:10pm-4:00pm, 439 EBUII

Lab hours: EE136-021: M 6:10pm-9:00pm, EBUII 228
           EE136-022: W 6:10pm-9:00pm, EBUII 228

What if I do not understand the instructor' instruction? Read:

Textbook:
Richard C. Jaeger, Introduction to Microelectronic Fabrication, Modular Series on Solid State Devices, second edition, ISBN: 0-201-44494-1; Coverage to include chapters 1-9, etc.

Other reference reading:
1) Lecture handouts at www.ee.ucr.edu/~jianlin
2) Lab lecture handouts at www.ee.ucr.edu/~jianlin
5) Online reading: nanohub.org
6) EE133 notes

Course topics:
1. Si PN junction and MOSFET device fundamentals
2. Processes such as lithography, oxidation, film deposition, etching and metallization
4. Device characterizations
5. Device simulations
6. Technical paper writing