

ECE 103: Fundamentals of Devices and Materials

Winter 2012

Instructor: Deli Wang
Office: EBU1 3808
Tel.: 822-4723; e-mail: dwang@ece.ucsd.edu

Lectures: Tuesday/Thursday: 2:00pm-3:20pm; WLH 2111.

Discussion Session: Tuesday 6:00pm – 6:50pm, WLH 2115; Thursday 6:00pm – 6:50pm SOLIS 109.

Office Hours: Tuesday: 3:30pm-4:30pm or by appointments.

Teaching Assistant/Tutor: Brian Lewis, bwlewis@ucsd.edu; Zhelin Sun, zhelinsun@gmail.com

Office hours: Brian: ThF, TBA; Zhelin MW, TBA

Required Textbook:

Robert F. Pierret, *Semiconductor Device Fundamentals*, (Addison-Wesley, 1996).

Additional References:

Simon M. Sze, *Semiconductor Devices: Physics and Technology*, 2nd Ed., (John Wiley & Sons), 2002.

Donald A. Neamen, *Semiconductor Physics & Devices*, 3rd Edition, (McGraw-Hill), 2002.

Robert F. Pierret, *Advanced Semiconductor Fundamentals*, 2nd Edition, (Prentice Hall) 2002.

Michael Shur, *Physics of Semiconductor Devices*, 1st Edition, (Prentice Hall), 1990.

Charles Kittel, *Introduction to Solid State Physics*, 8th Edition, (John Wiley & Sons), 2004.

Website (to be set up), <http://ece-classweb.ucsd.edu/winter12/ece103/> (announcements, homework, solutions, etc.)

Grading:

Homework	10%	8 HWs, Due on Th before lecture
Midterm 1	20%	2:00-3:20pm, in class, Tu, January 31 (tentative)
Midterm 2	20%	2:00-3:20pm, in class, Tu, February 21 (tentative)
Final Exam	50%	3:00-6:00pm, Th, March 22, 2012

Note: If an exam re-grade is requested, the entire exam may be regarded by the course instructor!

Course Policy on Collaboration: See course handout on Academic Integrity, and information on the web site.

Course Topics:

Topic	Reading (Pierret)
Semiconductor fundamentals	
Crystal structures	Chapter 1
Energy bands, electrons and holes, doping	Chapter 2
Transport properties	Chapter 3
pn Junctions	
pn Junctions electrostatics	Chapter 5
Current-Voltage characteristics	Chapter 6
Small-signal model of pn junction behavior	Chapter 7
Optoelectronic devices	
Light emitting diodes, photodetectors and photovoltaics	Chapter 8
Bipolar Junction transistors	
Fundamentals of bipolar transistor operation	Chapter 10
Detailed static characteristics	Chapter 11
Schottky Diodes	Chapter 14
Field-effect transistors	
Basic principles of field effect devices	Chapter 15
Metal-insulator-semiconductor structures	Chapter 16
Basic Principles of MOSFET's	Chapter 17
Deviation from ideal MOSFET behavior	Chapter 18

Ethics and integrity in both academic and professional affairs should be part of your education at UCSD. Academic integrity is a serious matter as will be treated as such in ECE103. Our hope is that this will be beneficial to your education both technically and in a much broader sense.

While we are confident that the large majority of students will naturally perform in accordance with the university's guidelines and regulations regarding academic integrity, we provide below an explicit statement of course policy in this regard.

Homework:

Discussion of ECE103 course material and homework are allowed and encouraged. However, every student should write his/her own homework. Use of previous exams, homeworks, copying from classmates, allowing others to copy, working out the homeworks together are forbidden. Homeworks are to be handed in class and extensions are not allowed except for extremely exceptional reasons.

Exams:

Midterm and Final are closed book, closed notes, no electronic devices such as laptops, cell phones, PDAs, etc...). ***Allowed Items: Pen/Pencil, Calculator & Blue Book.*** One sheet 8.5"x11" (1 page) is allowed for midterms and (2 pages) for Final. Please follow Instructor/TA instruction during exams. In Addition, students must adhere to class Integrity Policy below. Rescheduling of quizzes and exams under extreme circumstances with compelling and well documented reasons will be allowed with notice to the instructor in advance of the exam date.

You are expected to complete the homework sets, quizzes and exams based on the course standards defined above. Any attempt to receive a grade by means other than your own individual and honest effort and any kind of unauthorized aid will be considered a violation for the course Integrity Policy. Any case of Academic Misconduct will be reported to the Academic Integrity Coordinator and your college Dean. You are responsible to follow

UCSD's Policy on Academic Integrity found at: <http://www-senate.ucsd.edu/manual/appendices/app2.htm>

Please consult with the course instructor shall you have any questions on the above.