

EEE 532

Semiconductor Device Theory II

- Objective:** The objective of this course is an advanced understanding of semiconductor physics and the physics and operation of advanced semiconductor devices: heterojunction devices, charge-coupled devices, memories, light emitting diodes, lasers, photodiodes, solar cells, quantum devices, and microwave devices. Wherever possible the emphasis will be on the conceptual understanding of device operation.
- Instructor:** Dr. S. M. Goodnick
Office: ERC-552; Telephone: (480) 965-9572; FAX: (480) 965-3837
E-mail: stephen.goodnick@asu.edu
web: <http://fulton.asu.edu/~goodnick>
- Office hours:** TBD
- Class Hours:** **Mo, Wed 3:30–4:45 pm**; SCOB210
- Textbook:** S.M. Sze and K.K. Ng *Physics of Semiconductor Devices, 2nd Ed.* Wiley, New York, 2007. We will in general follow the book, I but will distribute additional material and will assign papers from time to time for additional reading.
- Homework:** Homework should be done *neatly* and is due at lecture time. You will lose points if the homework is messy. All homework counts, none will be dropped. While you are encouraged to discuss the class material with each other, note that one name goes on a homework submission. Aid, which results in a student submitting work that does not reflect the student's understanding and effort, is a violation of ASU's academic integrity policy. In other words, don't copy each other's homework. *Late Homework will not be accepted without prior permission from the instructor for a valid reason*
- Computers:** Use of software (e.g., MathCad, Matlab, Mathematica, Spreadsheet, TK Solver, etc.) to solve homework problems is recommended because it makes life easier for you.
- Exams:** Intermediate: **Feb. 8th, March 14, 2012**; Final: Wednesday, **May 2, 2012; 12:10pm**. Except for a conflict with another examination or for students who have four or more examinations on one day, no changes can be made in the final examination schedule without prior approval of the Dean. I will not support such requests unless they involve circumstances beyond a student's control. Airline reservations and work schedules are within the student's control.
- Final Grade:**
- | | |
|---------------------|-----|
| Intermediate Exams: | 50% |
| Final Exam: | 30% |
| Homework: | 20% |

$95 \leq A^+ \leq 100$; $90 \leq A < 95$; $85 \leq A^- < 90$; $80 \leq B^+ < 85$; $75 \leq B < 80$; $70 \leq B^- < 75$; $C < 70$

Course Outline

1. Heterojunction Devices: Heterojunction Bipolar Transistors (HBTs), Heterojunction Field Effect Transistors (HEMTs) (3 weeks)
2. Charge-Coupled Devices (2 weeks)
3. Memories (2 weeks)
4. Optoelectronic Devices: Photodiodes, Light Emitting Diodes, Lasers, and Solar Cells (3 weeks)
5. Microwave Transistors, Tunnel Diodes, IMPATT's, Transferred-Electron Devices (3 weeks)
6. Nanoelectronic Devices (1 week)