Syllabus EE 4329/5340 Semiconductor Device Theory (Fall 2013)

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Office Hours: T/Th 2 pm -3 pm
Course Number, Section Number, and Course Title: EE 4329/5340 Semiconductor Device Theory
Time and Place of Class Meetings: Fall 2013 T/Th 3:30 pm - 4:50 pm NH 111
Description of Course Content:
EE4329: Introduction to semiconductors in terms of atomic bonding and electron energy bands. Equilibrium statistics of electrons and holes. Carrier dynamics; continuity, drift, and diffusion currents; generation and recombination processes, including important optical processes. Introduction to P-N junctions, metal-semiconductor junctions, light detectors and emitters; bipolar junction transistors, junction and Metal-Oxide Semiconductor Field-Effect Transistors (MOSFETs). Prerequisite: Grade of C or better in EE 3444.
EE5340: Quantum mechanics applicable to semiconductor theory. Energy band theory, density of states and effective mass theory. Intrinsic and extrinsic semiconductors, equilibrium statistics for electrons and holes. Transport, generation and recombination of excess carriers. Device equations and physics. Theory and performance of p-n and Schottky diodes, bipolar and MOS transistors.
Student Learning Outcomes: (1) Understanding of semiconductor and electronic device physics and operation principles; (2) Apply the device models to the design of integrated circuits.
Requirements: Prerequisite: EE 3444
Required Textbooks and Other Course Materials:

1. **R. F. Pierret, Semiconductor Device Fundamentals, Addison-Wesley, 1996.**

References:

1. R.S. Muller and T.I. Kamins, *Device Electronics for Integrated Circuits, 3rd Ed.*, John Wiley and Sons, Inc., New York, NY, 2003.
2. S. M. Sze, *Semiconductor Devices Physics and Technology* (2nd Ed.), Wiley, 2002.
3. H.C. Casey, Jr., *Devices for Integrated Circuits*, John Wiley & Sons, Inc., New York, NY, 1999.
4. S. Franco, *Design with Operational Amplifiers and Analog Integrated Circuits, 3nd Ed.*, The McGraw-Hill Companies, Inc., New York, NY, 2001.

Descriptions of major assignments and examinations with due dates:

- Homework (0%): Assigned and self-graded
- Midterm 1: 30%
- Midterm 2: 30%
- Final: 40%

Grading Policy:
A (>=85%); B (>=70% to <85%); C (>=60% to <70%); D (>=50% to <60%); F (<50%).
Attendance Policy: Attendance is required. Students are responsible for all materials covered in class.
Drop Policy: As per University guidelines. See the Registrar's Bulletin or the University Calendar in the front part of the UTA catalog for drop dates.

Topics and schedule (Tentative)

(1) Week 1-3:	**Semiconductor Electronics**	**Ch1**
(2) Week 4-6:	**PN Junctions**	**Ch 4, Ch5**
Week 6:	**Mid-term I (in class)**	
(3) Week 7-8:	**BJT**	**Ch 6, Ch 7**
(4) Week 9:	**M-S junctions**	**Ch 3**
(5) Week 10:	**MOS-C**	**Ch 8**
(6) Week11-12:	**MOSFET**	**Ch 9, 10**
Week 12	**Mid-term II (in class)**	
(7) Week 13-14:	**CMOS**	
(8) Week 15:	**Final review week**	

Americans With Disabilities Act:
The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 - The Rehabilitation Act of 1973 as amended. With the passage of federal legislation entitled *Americans with Disabilities Act (ADA)*, pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.
As a faculty member, I am required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty of their need for accommodation and in providing authorized documentation through designated administrative channels. Information regarding specific diagnostic criteria and policies for obtaining academic accommodations can be found at www.uta.edu/disability. Also, you may visit the Office for Students with Disabilities in room 102 of University Hall or call them at (817) 272-3364.
Academic Integrity:
It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.
"Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Series 50101, Section 2.2)
Student Support Services Available:
The University of Texas at Arlington supports a variety of student success programs to help you connect with the University and achieve academic success. These programs include learning assistance, developmental education, advising and mentoring, admission and transition, and federally funded programs. Students requiring assistance academically, personally, or socially should contact the Office of Student Success Programs at 817-272-6107 for more information and appropriate referrals.
Final Review Week:
A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabi. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. Classes are held as scheduled during this week and lectures and presentations may be given.
E-Culture Policy:
The University of Texas at Arlington has adopted the University email address as an official means of communication with students. Through the use of email, UT-Arlington is able to provide students with relevant and timely information, designed to facilitate student success. In particular, important information concerning registration, financial aid, payment of bills, and graduation may be sent to students through email.
All students are assigned an email account and information about activating and using it is available at www.uta.edu/email. New students (first semester at UTA) are able to activate their email account 24 hours after registering for courses. There is no additional charge to students for using this account, and it remains active as long as a student is enrolled at UT-Arlington. Students are responsible for checking their email regularly.
Make-up Exam Policy:
There will be absolutely no late or make-up mid-term or final examination given unless a written request has been submitted to and approved by the instructor at least two weeks prior to the examination date. As a rule, make-up examinations are several orders of magnitude more difficult than examinations given on the scheduled dates. Please be advised that illness or any other absence on the examination date does not constitute a valid reason for a make-up examination.

The following is an excerpt from the College of Engineering's statement on Ethics, Professionalism, and Conduct of Engineering Students. Read the statement carefully, sign it, and return it to your instructor. You are being provided with a copy for your records. Additional copies of this statement can be obtained from your instructor or the Office of the Dean of Engineering.

STATEMENT ON ETHICS, PROFESSIONALISM, AND CONDUCT FOR ENGINEERING STUDENTS

COLLEGE OF ENGINEERING
THE UNIVERSITY OF TEXAS AT ARLINGTON

The College cannot and will not tolerate any form of academic dishonesty by its students. This includes, but is not limited to cheating on examination, plagiarism, or collusion.

Cheating on an examination includes:

1. Copying from another's paper, any means of communication with another during examination, giving aid to or receiving aid from another during examination;
2. Using any material during examination that is unauthorized by the proctor;
3. Taking or attempting to take an examination for another student or allowing another student to take or attempt to take an examination for oneself.
4. Using, obtaining, or attempting to obtain by any means the whole or any part of an un-administered examination.

Plagiarism is the unacknowledged incorporation of another's work into work which the student offers for credit.

Collusion is the unauthorized collaboration of another in preparing work that a student offers for credit.

I have read and I understand the above statement.

In addition, I understand that, in order to ensure fairness to all students, exams will be proctored and possibly videotaped.

Course number: _____

Student's signature: _____ Date: _____

Student's name, printed: _____

Student's ID number: XXX-XX-_____