EE5381 Foundations in Semiconductors Fall 2012

1. **Instructor: Donald Butler; http://www-ee.uta.edu/eedept/Faculty/Dbutler.htm**
2. **Office Location: NanoFab 202B; Mailbox: 19072**
3. **Phone: (817) 272-1305; Fax: (817) 272-7458**
4. **Email: dbutler@uta.edu**
5. **Office Hours: M11:00AM-12:00noon, Tu4:00-5:00, W2:30-3:30PM**
6. **EE5381-001 Foundations in Semiconductors**
7. **Course Meeting: MWF1:00-1:50 NH105**
8. **Course Description:** A study of basic principles of semiconductors that have direct applications on device operation and fabrication. The course covers basic semiconductor properties, elements of quantum mechanics, energy band theory, equilibrium carrier statistics, carrier transport and generation-recombination processes, semiconductor characterization techniques using resistivity measurement, mobility measurement through Hall effect, defect characterization, carrier lifetime measurement and optical characterization.

9. **Student Learning Outcomes:** Introduce graduate students to properties of semiconductors and selected semiconductor characterization techniques. Students will learn how to solve the one-dimensional Schrodinger equation for electron transport properties, energy band theory, the fundamentals of carrier statistics and carrier transport in semiconductors, generation recombination statistics and carrier lifetimes, electrical and optical properties of semiconductors, the continuity equation and its solution in typical device situations, beyond the drift diffusion model for nanodevices.

10. **Requirements:** no graduate level prerequisites, no special meetings.

11. **Required Text:**
Advanced Semiconductor Fundamentals, Modular Series on Solid State Devices Vol. VI 2nd Edition, by R.F. Pierret, Prentice-Hall 2003.

References (not required):
Semiconductor Material and Device Characterization, D.K. Schroder, Wiley-Interscience 1998, ISBN 0-471-24139-3

Physics of Semiconductor Devices 2nd Ed. by S.M. Sze, Wiley-Interscience 1981.

Semiconductor Fundamentals, Modular Series on Solid State Devices Volume I, by R. F. Pierret, Addison-Wesley 1983.

Physics of Semiconductors and their Heterostructures by Jasprit Singh, McGraw-Hill 1993.

Semiconductors for Micro- and Nanotechnology: An Introduction for Engineers by Jan G. Korvink and Andreas Greiner, Wiley-VCH 2002.

12. **Descriptions of Major assignments and Examinations:**
Midterm Examinations:
1 midterm exam
Final Examination: Final Exam Monday Dec. 10, 11:00AM-1:30PM
Other Graded Assignments (Homework / Projects / Labs / Research Papers):

Homework roughly every other week, Term Paper due at end of semester, Friday Nov. 30, 2012

13. Grading Policy: (may be change by instructor)

Homework 10%; Check **Blackboard** for due dates.
Midterm Exam 25%;
Term Paper 25%
Final Exam 40%

A	>80%
B	70-79.9%
C	60-69.9%
D	50-59.9%
F	<50%

14. Attendance: Attendance is required.

15. Drop Policy: 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. Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/ses/fao).

16. Link to Additional Course Material: http://www.uta.edu/blackboard

17. TA: TBA

18. Missed Exams, Quizzes and Makeup Work: Late homework will be penalized at 50% per day late. Homework is due at the beginning of class. Missed exams and quizzes will be given a makeup only for serious illness or emergency and require a doctors certificate or similar written documentation. Students requiring a makeup exam must make an appointment as soon as possible after the scheduled exam date.

19. Americans With Disabilities Act

The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an

accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

As a faculty member, I am required by law to provide **"reasonable accommodation"** to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with **informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels.**

If you require an accommodation based upon disability, please meet with me in my office during the first week of classes.

21. Academic Dishonesty

At UT Arlington, academic dishonesty is completely unacceptable and will not be tolerated in any form, including (but 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" (UT System Regents' Rule 50101, §2.2). Suspected violations of academic integrity standards will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

22. Student Support Services Available

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may contact the Maverick Resource Hotline by calling 817-272-6107, sending a message to resources@uta.edu, or visiting www.uta.edu/resources.

23. E-Culture Policy:

When sending an email to me, please put the course number as part of the email subject so that I can give it prompt attention.

UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

24. Student Feedback Survey: At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory will be asked to complete an online Student Feedback Survey (SFS) about the course and how it was taught. Instructions on how to access the SFS system will be sent directly to students through MavMail approximately 10 days before the end of the term. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback data is required by state law; student participation in the SFS program is voluntary.

25. 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 syllabus*. 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. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.