

EE 2303/001 – Electronics I – Spring 2009 (v 1.6 – 03/01/09)

(Download [syllabus.pdf](#))

Instructor: Professor Ronald L. Carter, 532 Nedderman Hall
Office Hours: M/W 4:00 to 5:00 PM, T/Th 2 to 3 PM, additional hours by appointment
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Class Meetings: Monday and Wednesday, 2:30 PM to 3:50 PM, Room 106 Nedderman Hall.

Teaching Assistant: Paras Shah. 247 ELB, Office Hours T/Th 10:00 to 12:00 AM, in IEEE Office on Wednesday 10:00 AM to 1:00 PM, paras.shah55@gmail.com

Attendance Policy: Attendance at every class session for the entire 80-minute period is required. A test (1 hour) or quiz (15 minute) will be given every week as shown on the schedule. Attendance is required for the final exam period (2 hours, 20 minutes) as scheduled.

Catalog Listing: EE 2303. ELECTRONICS I (3-0) Characteristics and circuit models for semiconductor diodes, bipolar junction transistors (BJTs), and field-effect transistors (FETs). Circuit applications of diodes. DC biasing and stability of circuits containing diodes, BJTs, and FETs. Introduction to mid-band single stage small signal analysis of BJT and FET circuits. Prerequisite: EE 2315; EE 2446, or concurrently; MATH 2326.

Course Learning Goals and Objectives: To learn to use and apply the fundamental concepts of nonlinear electronic circuits. Nonlinear, piecewise linear, and large and small signal analysis and design concepts will be emphasized. The concepts learned will be applied to the p-n diode, bipolar junction and field effect transistors. DC biasing schemes for these devices will be developed.

Topics: Introduction to electronic design and the design process.
Basic amplifier concepts
Diodes and diode circuits
Bipolar junction transistors
Field-Effect Transistors

Stated ABET Course Objectives: The objective of the course is to give the students a good understanding of the basic principles of analog electronics circuit analysis, and to prepare them for electronic circuit design and applications, as well as digital electronics. In particular, we strive to: 1) motivate the study of electronics, 2) introduce the students to the concept of modeling of nonlinear circuit elements, 3) develop analysis techniques for circuits involving such elements (large dc and small ac signal analysis), 4) build confidence by developing competence in circuit simulation (Pspice), 5) design of simple electronic functional modules (e.g. voltage regulator, inverters, amplifiers) using nonlinear and active circuit elements (diodes and transistors).

Relationship of course to BSEE Program Learning Outcomes:

Outcome	Coverage
(a) an ability to apply knowledge of mathematics, science, and engineering	Extensive
(b) an ability to design and construct experiments, as well as to analyze and interpret data	Minor
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	Minor
(d) an ability to function on multidisciplinary teams	Minor
(e) an ability to identify, formulate, and solve engineering problems;	Extensive
(f) an understanding of professional and ethical responsibility	None
(g) an ability to communicate effectively	Moderate – written communication

(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	None
(i) a recognition of the need for, and an ability to engage in lifelong learning	Minor
(j) a knowledge of contemporary issues	None
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	Extensive

Text: *Electronics, 2nd edition*, by Allan R. Hambley, Prentice Hall, Upper Saddle River, NJ, © 2000.

- Text Web site is <http://cw.prenhall.com/bookbind/pubbooks/hambley/>.
- Some problem solutions at <http://cw.prenhall.com/bookbind/pubbooks/hambley/chapter0/custom5/>.

Reference Texts: (Books on reserve in the Science and Engineering Library are marked ^R.)

- ^R*Electronic Devices and Circuit Theory, 6th Ed.*, by Boylestad and Nashelsky, ©1996, Prentice-Hall.
- ^R*Analog Electronics: an Integrated PSpice Approach*, by T. E. Price ©1997, Prentice-Hall.
- ^R*Principles of Electronic Circuits, 2nd Edition*, by Stanley Burns and Paul Bond, PWS Publishing Company, Boston, MA, ©1997.

Spice References: (Books on reserve in the Science and Engineering Library are marked^R.)

- ^R*MicroSim PSpice for Windows, 2nd ed*, by Goody, Prentice-Hall, Upper Saddle River, N.J., ©1998.
- ^R*Computer-Aided Circuit Analysis Using PSpice* by Walter Banzhaf, Regents/Prentice Hall, Englewood Cliffs, NJ, ©1992
- ^RSPICE: A Guide to Circuit Simulation and Analysis Using PSpice, 3rd ed., by Paul W. Tuinenga, Prentice Hall, Englewood Cliffs, NJ, ©1995.
- *Schematic Capture with MicroSim Pspice: for Windows 3.1, 4th Ed.*, by Herniter, ©2000, Prentice-Hall
- PSpice™ is available by download from <http://www.orcad.com/Product/Analog/Analog.asp> or from the UTA HKN chapter at <http://hkn.uta.edu>. It is also at the text web-site.
- Prof. Dillon's excellent tutorial for PSpice™ is at <http://rock.uta.edu/dillon/pspice/>

Problems: The problem assignments shown in the syllabus have been selected for your study, but will not be collected or graded. The problems selected are designated in the assignments as Prob m,n,o ... etc. The study of the problems assigned will be helpful in preparing for the quizzes and tests. For more examples, see:

- *Schaum's Outline of Theory and Problems of Electronic Devices and Circuits*, by Jimmie J. Cathey, McGraw-Hill, ©1988, ISBN: 0070102740.

Grade Calculation (tentative):

$$\text{Grade} = 0.30 \cdot \text{Quiz Average} + 0.25 \cdot \text{Test Average} + 0.20 \cdot \text{Project} + 0.25 \cdot \text{Final}^*$$

(*25% to 50% of the final will be review from the first two tests.)

Grading Scale (tentative):

- A = 90 and above
- B = 75 to 89
- C = 60 to 74
- D = 50 to 59
- F = 49 and below

Project Assignment: Download the assignment at <http://www.uta.edu/ronc/2303/project1.pdf>. A second part may be assigned.

Student Evaluation of Teaching: Students will complete evaluation forms at the end of the semester.

Drop Policy: See <http://www.uta.edu/catalog/general/academicreg> and <http://www.uta.edu/uta/acadcal/>

Lecture, Assignment, Quiz and Test Schedule

(Lecture notes, when published, are at <http://www.uta.edu/ronc/2303/lectures>. Streaming video of each lecture is available at <http://tinyurl.com/ee2303echo>.)

(The Vice President for Student Affairs/Dean of Students will be responsible for determining whether classes will be cancelled or delayed and if University offices will be closed or opened late. Information may be obtained by calling 972-601-2049 or visiting www.uta.edu. If an official University closure is effective during one of the scheduled class sessions, the assignment for that session will be due at the next session.)

CL	DATE	DAY	Q/T	STUDY ASSIGNMENTS
1	21-Jan-09	Wed		Ch 1.1 to 1.11 (*Ch. 1 problems below), review KCL, KVL, Thevenin, Norton, 2-ports, etc.
2	26-Jan-09	Mon		
3	28-Jan-09	Wed	Q1	Ch 2.1 to 2.11 (*Ch. 2 problems below)
4	02-Feb-09	Mon		
5	04-Feb-09	Wed	Q2	Census Date 2/4/09
6	09-Feb-09	Mon		Ch 3.1 to 3.12 (Prob. 4,5,10,11,15,17,22,24,33,36,37,42,43,45,47,51,54,56,58,77,81,87,89)
7	11-Feb-09	Wed	Q3	
8	16-Feb-09	Mon		
9	18-Feb-09	Wed	Q4	
10	23-Feb-09	Mon		
11	25-Feb-09	Wed	T1	Ch 4(Prob. 7,8,10,11,20,21,25,28,35,37,41,42,45,49,53,56,64,65)
12	02-Mar-09	Mon		
13	04-Mar-09	Wed	Q5	Project Assigned
14	09-Mar-09	Mon		Ch 7.2 (Prob. 8,10,14,21,25,27)
15	11-Mar-09	Wed	Q6	
Spring Break 3/16/09 to 3/20/09				
16	23-Mar-09	Mon		
17	25-Mar-09	Wed	Q7	
18	30-Mar-09	Mon		4/3/09 - Last Day to Drop Classes
19	01-Apr-09	Wed	Q8	
20	06-Apr-09	Mon		
21	08-Apr-09	Wed	T2	Ch 5.1-7(Prob. 3,4,7,10,16,17,19,22,23,26,29,32,33,35,39,40,43,47,56,57)
22	13-Apr-09	Mon		
23	15-Apr-09	Wed	Q9	Project Due
24	20-Apr-09	Mon		Ch 7.3 (Prob. 31,32,35)
25	22-Apr-09	Wed	Q10	
26	27-Apr-09	Mon		
27	29-Apr-09	Wed	Q11	
28	04-May-09	Mon		Ch 6.3 to 6.6 (Prob. 30,36,39,40,48,49)
29	06-May-09	Wed	Q12	
30	11-May-09	Mon		Final Exam: 2:00 to 4:30 PM

* Ch 1 Problems: 15, 16, 18, 21, 37, 39, 43, 45, 56.

* Ch 2 Problems: 2, 10, 11, 12, 15, 18, 24, 27, 35, 37, 42, 46, 51, 52, 60, 75, 76.

Corrections: (See book web-site for additional corrections)

Example 2.8 (page 91 in Hambley): $A_v = 1 + R_1/R_2$ *should be* $A_v = 1 + R_2/R_1$

Exercise 2.14 (page 92 in Hambley): b) $V_{smax} = 0.952V$ *should be* : b) $i_{omax} = 25mA$, $V_{smax} = 1.1905V$

Problem 3.9 (a) (page 190 in Hambley): $R = 1.5 \text{ Ohm}$ *should be* $R = 1.5 \text{ kOhm}$.

Notes:

This syllabus may be changed by the instructor as determined by the instructor for reasons of good academic practice.

Quizzes and tests are closed book, no notes, calculator allowed, straight edge recommended.

There will be no make-up, or early exams given. Attendance is required for all tests.

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)

If identical papers are submitted by different students, the grade earned will be divided among all identical papers.

A paper submitted for regrading will be compared to a copy of the original paper. If changed, points will be deducted.

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 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. Classes are held as scheduled during this week and lectures and presentations may be given.

Librarian to Contact: See <http://library.uta.edu/sel/> and <http://libguides.uta.edu/content.php?pid=3545>

Electronic Communication Policy: A UTA listserv is being established for EE 2303. All class communication will be conducted via this list. To sign up, go to <https://listserv.uta.edu/archives/ee2303.html>, click on the link "Join or Leave EE2303", or send e-mail to listserv@listserv.uta.edu with the command "subscribe ee2303 your_name" (without the quotes) in the body of the message. You may receive communication from this listserv at any email address you choose. If you have questions, send email to ronc@uta.edu. In addition, the University of Texas at Arlington has adopted the University "MavMail" address as the sole official means of communication with students. MavMail is used to remind students of important deadlines, advertise events and activities, and permit the University to conduct official transactions exclusively by electronic means. For example, important information concerning registration, financial aid, payment of bills, and graduation are now sent to students through the MavMail system. All students are assigned a MavMail account. Students are responsible for checking their MavMail regularly. Information about activating and using MavMail is available at <http://www.uta.edu/oit/email/>. There is no additional charge to students for using this account, and it remains active even after they graduate from UT Arlington.

Grade Grievance Policy: Forms to report a grade grievance are available in the EE Office.