

EE 231
Analog Electronics I
Course Syllabus (Fall 2013)
Fairfield University School of Engineering

Course Number: EE 231	Course Name: Analog Electronics I
Time: Mon/Thurs 2:00pm - 3:15pm	Course Location: BNW 318
Instructor: Jeffrey N. Denenberg	Final Exam: Friday, 13Dec at 3 pm
Office: Bannow 301C	Hours: Tues, Wed & Fri 11:00 – Noon, Mon-Thurs 4:30 – 5:30
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Course Description:

This is the first course in active and non-linear electronics. Basic principles and technologies to understand, analyze and design electronic circuits will be taught. Electronic device models are described and used in the analysis of circuits using diodes, Bipolar Junction Transistors (BJT) and Field Effect Transistors (FET). Amplifier biasing techniques are presented and analyzed with respect to power efficiency and circuit stability. H-Parameter models are used for low frequency, small signal analysis of Linear Amplifiers. Digital Electronics Circuits, including Gate level & Transistor level Digital Circuits design, are introduced.

Prerequisites: EE213, MA228

Objectives and Outcomes

No.	Objective	Outcome	a – k
0	Role of electronics in the modern world	Students will understand the role and importance of electronics in the modern world.	f, h, i, j
1	Analysis and design using amplifier circuits	Students will be able to analyze and design biasing circuits for amplifiers and relate it to the given requirements.	a, c, e, k
2	Basic BJT and FET amplifier circuits design	Students will be able to design BJT and FET circuits for a given application to meet performance requirements	a, c, e, k
3	Create Small Signal Equivalent circuits for BJT and FET circuits	Students will learn to develop AC equivalent circuits to help in analysis of the amplifier circuits both for BJT and FET	a, c, e, k
4	Analyze small signal frequency response for a given circuit	Students will learn to use small signal AC equivalent circuits in the frequency analysis of transistor amplifiers and evaluation of their performance	a, c, e, k
5	Analyze Gate level & Transistor level digital circuits	Students will learn to analyze and evaluate the performance of basic digital circuits	a, e, k
6	Learn Basic Diode Design & Operation	Students will learn diode principle of operation and basic design steps	a, c, e, k
7	Learn to Design and Application of Basic Op Amps	Students will learn Op Amp concepts and basic design of Op Amps	a, c, e, k
8	Write complete but concise Laboratory reports	Students will report on their laboratory design work.	a, b, c, d, e, f, g, h, i, j, k

Textbook:

Author: [Sedra & Smith](#)
Title: Microelectronic Circuits, 2nd Edition (2010)
ISBN # 0195323033
Publisher: Oxford (OUP)

Performance Indicators and grading:

Two written exams will be given at approximately equal intervals during the term as outlined in the syllabus. The exams will be open book, open notes.

Semester Exams (2)	40%
Final Exam	20%
Homework	20%
Laboratory Reports	20%

Exam grading:

The purpose of the exam is to convey your understand the material; therefore, it is important that you show your work. Even if you feel that the solution to a problem is obvious; you must still explain why it is obvious. Furthermore; if you are asked to solve a problem using a given technique; then please use that technique; otherwise, I have no way to judge your understanding of the technique being tested.

Homework policy:

The purpose of homework:

- A: To give student practice.
- B: To give professor feedback.

Homework will be collected and graded.

Grade is based more on **honest effort** than correct answers.

Homework is due the next class after it is assigned (except when specified). This two week homework cycle gives an intervening class where students can ask questions.

Late homework assignments are not accepted. If you know you have a conflict, please make arrangements ahead for time.

If you know in advance that you will be missing class please contact me to make arrangements regarding homework.

If you understand how to do the homework problems you will have an easier time with the Exams.

Class structure:

Lectures will be the primary source of information. Students are expected to attend every class and to participate in class discussions. Homework assignments will be discussed in class. Students will be expected to work problems in class. You will find it beneficial to review the chapters before the lecture.

Your laboratory reports on your team design projects in the co-requisite EE231L count towards the lecture course grade as well as your Lab grade. This is to encourage you to put in a good effort on and use of the lecture materials in your designs.

Office hours are open for discussion of anything. You can get help with homework, projects, or more detailed explanations of topics covered in class. Feel free to stop by, email me, or make an appointment to meet another time.

Class Topics and Order of Material

Week	Topics	Notes	Text	HW*	Objectives
9/5	Course Introduction and Pre-Requisite Material Review	Multisim: Tutor, Man, Ch. 1	1.1 – 1.2	1.1, 1.4, 1.7, 1.9, 1.11, 1.17, 1.19, 1.21, 1.22, 1.24	0
9/9 9/12	Introduction to Electronics	Ch. 1	1.3 – 1.6	1.27, 1.29, 1.32, 1.34, 1.39, 1.41, 1.66, 1.71	1,2
9/16 9/19	Signals and Amplifiers	Ch. 2	All	2.2, 2.11**, 2.14, 2.18, 2.26, 2.71, 2.92, 2.94, 2.121	1,2,7
9/23 9/26	Semiconductors, PN Junctions, and Fermi-Dirac distributions	Ch. 3 F-D ref.	All	3.1, 3.4, 3.9, 3.13, 3.22, 3.27	1,6
9/30 10/3	Review for Exam 1 Exam 1 (Chapters 1-3)				1,2,6,7
10/7 10/10	Exam 1 Reprise Semiconductor Diodes	Ch. 4	4.1 – 4.4	4.1, 4.13, 4.18, 4.27, 4.32, 4.37	1,2,6,7 6
10/14 10/17	Columbus Day – No Classes Semiconductor Diodes (Cont.)	Ch. 4	4.5 – 4.7	4.49, 4.51, 4.55, 4.63, 4.67, 4.85	6
10/21 10.24	MOS Field Effect Transistors	Ch. 5 with audio notes	5.1 – 5.3	5.1, 5.8, 5.11, 5.17, 5.29, 5.57	2, 3, 4
10/28 10/31	MOS Field Effect Transistors (Cont.)	Ch. 5 with audio notes	5.4 – 5.6	5.69, 5.77, 5.95	2, 3, 4
11/4 11/7	MOS Field Effect Transistors (Cont.)	Ch. 5 with audio notes	5.7 – 5.9	5.102, 5.107, 5.112	2, 3, 4
11/11 11/14	Bipolar Junction Transistors	Ch. 6	6.1 – 6.4	6.1, 6.7, 6.28, 6.29, 6.32, 6.52, 6.73	2, 3, 4
11/18 11/21	Bipolar Junction Transistors (cont.) Review for Exam 2	Ch. 6	6.5 – 6.9	6.94, 6.107, 6.119, 6.137, 6.146, 6.149	2, 3, 4
11/25 11/28	Exam 2 (Chapters 4-6) Thanksgiving – No Classes				
12/2 12/5	Exam 2 Reprise Introduction to Digital Electronics	Logic Families Ch. 13	All	13.1, 13.21, 13.25	2, 3, 4 5
12/9	Course Review				1-8
Friday 12/13 3 PM	Final Exam (Comprehensive)	1-6,13			

*Students to perform outside of class, Most answers (not solutions) are in Appendix I

** Use Multisim to confirm results