EECS 245: Electronics Syllabus (Preliminary)

Instructor:
Professor Frank Merat, responsible for the lectures
Office: Glennan 518
Office Hours: TBA, other times by appointment
Email: flm@po.cwru.edu

Laboratory Assistants:
TBA

Grading Issues:
Contact Dr. Merat about all administrative issues such as incorrectly entered grades.

Problems which you feel have been incorrectly graded must be submitted to the instructor along with a clearly written explanation of why you feel the grading was incorrect. Feel free to attach analyses, detailed calculations, etc. to substantiate your argument. **NO ORAL GRADE ARGUMENTS WILL BE ACCEPTED. Always keep a Xerox copy of all such re-grade submissions.**

Textbook: Electronics, 2nd Edition by Allan R, Hambley, Prentice-Hall, 2000, ISBN 0-13-691982-0

Grading:

Weekly homework due Wednesdays at 9:30 am (individual assignments):	20%
Two mid-term exams on lecture part of class	30%
Lab Reports (group assignment):	20%
Laboratory Design Assignment	10%
Final Exam:	20%

Laboratories:
Labs are scheduled to begin the first week of classes. There will be an informal laboratory lecture in the Glennan 308 laboratory every Thursday from 1:15-2:20 in the Glennan 308 Lab unless otherwise announced in class.

Laboratory experiments will be done in assigned groups of two. Each group need only turn in one report. Lab reports are due at the beginning of class the Friday following the date the lab was assigned. Late lab reports will not be accepted without prior approval or the appropriate documentation.

Course Policies
Homework assigned on Wednesday will be due the following Wednesday at the beginning of class. **No late homework will be accepted without prior approval or the appropriate documentation.** Although you can work in groups on the homework assignments, each student is required to turn in his/her own solutions.

All exams are closed book and closed notes. You must work alone on all exams. Calculators may be used during exams, but all programmable calculators must be cleared of all programs and/or data before entering the examination room. Discussion and/or communication with anyone, except the instructor, during an exam is forbidden. Any student who willingly provides information to another student during a quiz or exam is as guilty as the student that receives the information.

Spring Calendar:

January 14th	Classes begin
March 11-15th	Spring break
April 29th	Last day of classes
May 3rd	Final Exam (8am-11am)
May 11th	Final Grades Due (11am)

Tentative Class Schedule:

Date	Topic	Reading Assignment (Hambley unless otherwise noted)	Tentative Lab Assignments
1/14	GrayMark 808; construction practices	PDF on building power supply.	(1/14) F3. Silicon diodes
1/16, 1/18, 1/21	Basic diode behavior; rectifier circuits; voltage regulators	Sections 1.6, 3.1-3.4, 10.5-10.6	(1/21) F5. Half-wave rectifiers
1/23, 1/25	Basic semiconductor concepts; junction physics; high-frequency models	Sections 3.9-3.11	
1/28	Computer Analysis of Circuits; PSpice	Section 3.12; Handout on Computer Analysis of Circuits; PSpice Tutorial	(1/28) F6. DC power supplies
1/30, 2/1, 2/4	Review of Operational Amplifiers; Op-Amp Models; Computer Analysis	Sections 2.1-2.5, 2.7, 2.9	(2/4) F10. (Parts 1-6) Characterization of op-amp circuits
2/6, 2/8, 2/11	Basic operation of BJTs; DC analysis of BJT circuits	Sections 4.1, 4.2, 4.3, 4.4, 4.5	(2/11) F8. Bipolar transistors
2/13, 2/15	Small-signal BJT models; common emitter amplifier	Sections 4.6, 4.7	
2/18	EXAM #1		(2/18) T13. Bipolar transistors and amplifiers

2/20, 2/22	Common Emitter Amplifier	Section 4.7	
2/25, 2/27	Emitter Follower; BJT digital logic	Sections 4.8, 4.9	
3/1, 3/4, 3/6	NMOS Transistors; DC characteristics	Sections 5.1, 5.2, 5.3	(3/4) T11. MOSFET characteristics and applications
3/8	Small Signal Models; common source amplifier	Sections 5.4, 5.6	
3/11-3/15	Source Follower	Section 5.6	(3/11) T12. Principles of amplification (MOSFET)
	SPRING BREAK		
3/18, 3/20, 3/22	JFETs, Depletion Mode MOSFETs; p-channel devices	Section 5.7	(3/18) F13. Characterization and design of emitter and source followers
3/25	Capacitors, Inductors	T&R Sections 6.1-6.2	T&R 6-49, 6-50
3/27, 3/29	Laplace Transforms	T&R Sections 9-1. 9-2	T&R 9-51
4-1	EXAM #2		DESIGN PROJECT F18. Design of AM radio-frequency transmitter and receiver OR F22. Design of analog fiber optic transmission system
4/3	Pole-Zero Diagrams	T&R Section 9-3	
4/5, 4/8	Inverse Laplace Transforms	T&R Section 9-4, 9-5	
4/10, 4/12	Circuit Response Using Laplace Transforms	T&R Sections 9-6, 9-7	
4/15, 4/17	The s-domain, Circuit Analysis in the s-domain	T&R Sections 10-1, 10-2, 10-3, 10-4,10-5, 10-6	T&R 10-51, 10-54
4/19, 4/22, 4/26	Network Functions	T&R Sections 11-1, 11-2, 11-3, 11-4, 11-5	T&R 11-63, 11-67
4/26, 4/29	Digital Logic Circuits: CMOS Inverter, NOR and NAND gates.	Sections 6.1, 6.2, 6.5, 6.6, 6.7	
5/3	FINAL EXAM		

EECS 245 - Electronic Circuits (4.0)

Catalog data: Introduction to diodes, BJT's, and FET's. capacitors and inductors. Analytical methods for circuit design. SPICE simulation of electronic devices. Linear and non-linear circuit models; frequency dependence in models. First and second order circuit dynamics and the Laplace transform. The s-domain: pole-zero diagrams, time-domain design. Concurrent laboratory exercises which reinforce lecture material.

Course web page: coming

Textbooks: Allan R. Hambley, *Supplemental material from Electronics*, Prentice-Hall, 2000, Second.

References: Roland Thomas, *The Analysis and Design of Linear Circuits*, Prentice-Hall, 1994.

Instructor: Frank Merat

Goals: To introduce students to fundamental electrical engineering analysis of electronic circuits. The course concentrates on nonlinear and active devices and circuit elements to complement prior introductory material with linear, passive networks. The goal of this course is to provide a complete set of analytical skills for circuit design with all major classes of (analog) electronic components. Students will also use the use the skills and components in the laboratory. Applications to real engineering problems will be emphasized.

Prerequisites by Topic:

1. ENGR 210
2. Linear circuit analysis
3. Differential and integral calculus
4. Introductory Laplace transforms and complex numbers
5. Basic familiarity with computer usage and programming

Topics:

1. Review of DC Circuits
2. Active Circuits
3. Diodes
4. Bipolar Junction Transistors
5. Field Effect Transistors
6. Capacitance & Inductance (including transformers)
7. 1st & 2nd order Circuits (overview)
8. Laplace Transforms (overview)
9. s-Domain Circuit Analysis

Class / Laboratory Schedule:

11:30 AM - 12:20 PM	Lecture	Weekly
1:15 PM – 2:30 PM	Laboratory Lecture	Weekly

Computer Usage:

Use of PSpice for circuit simulation, modeling and circuit design; Laboratory data reduction and analysis; Class website and broadcast e-mail with homework and exam solutions, supplementary material, and class notices.