SAN FRANCISCO STATE UNIVERSITY

School of Engineering

ENGR205 Electrical Circuits

Summer 2010

Bulletin Description:

Engr 205 Electric Circuits (**Class work = 3 unit**)
Prerequisites: PHYS 230. Can be taken concurrently with MATH 245 and ENGR 206 (Circuits Labs) and 290-2 (Introduction of PSPICE). Circuit analysis, modeling, equivalence, circuit theorems, PSpice simulation. Ideal transformers and operational amplifiers. Transient response of 1st-order circuits. AC response, phasor analysis, AC impedance, AC power.

Textbook

S. Franco, *Electric Circuits Fundamentals*, Oxford University Press, 1995.

Coordinator:

Sergio Franco, Professor of Electrical Engineering

Prerequisites by Topic:

Basic electricity and magnetism
Basic calculus and analytic geometry
Solution of systems of linear algebraic equations
Basic linear differential equations
Complex numbers

Course Objectives[1]:

Present fundamental circuit analysis techniques [A.1, B.1]
Introduce circuit equivalence and modeling [A.1, B.1]
Develop physical insight and intuition for problem solving [A.1, B.1]
Use of PSpice simulation as a verification tool [B.3]

[1]Indices in brackets refer to educational objectives and outcomes of the School of Engineering.

Topics:

Electricity, signals, and circuits
Circuit analysis techniques
Network theorems and circuit modeling
Dependent sources, ideal transformers, amplifiers
Op amps and basic instrumentation applications
Energy-storage elements
Natural, forced, transient, and steady-state responses

Phasor algebra, impedance, and AC circuit analysis Power calculations PSpice Simulation examples.

Professional Component:
Engineering Sciences: 67%
Engineering Design: 33%

Performance Criteria[2]:

Objective 1

1.1 The student will demonstrate an ability to formulate circuit equations and solve for multiple unknowns. [1, 2, 3]
1.1 The student will demonstrate an ability to perform transient analyses of 1st-order circuits. [1, 2, 3]
1.2 The student will demonstrate an ability to extend resistive-circuit analysis techniques to AC circuits using phasor algebra. [1, 3]

Objective 2

2.1 The student will demonstrate an understanding of the i-v characteristics of sources and basic R, L, and C elements, their idealized models, and the practical limitations of such models. [1, 2]
2.2 The student will demonstrate a knowledge of how to apply ideal transformer and op amp models to the analysis of basic circuit configurations. [1, 2, 3]
2.3 The student will demonstrate how to apply circuit reduction techniques to simplify circuits or portions thereof. [1, 2, 3]

Objective 3

3.1 The student will demonstrate an understanding of terminology, concepts, and methodology common to engineering. [1, 2, 3]
3.2 The student will demonstrate an ability to apply a structured methodology to solve analytical as well as design-oriented problems. [1, 2]
3.3 The student will demonstrate an ability to recognize inadmissible circuit configurations and unrealistic results. [1, 2, 3]

Objective 4

4.1 The student will be aware of the limitations of computer simulation in engineering. [1]
4.2 The student will demonstrate a skill in inputting a circuit description to the computer. [1]
4.3 The student will demonstrate a skill in running successful simulations and compare with hand calculations. [1]

[2] Numbers in brackets refer to evaluation methods used to assess student performance.

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Instructor:
Summer 2010
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Class/Laboratory Schedule:
MWF 9:00-11:45AM.

Date	Content	Comments
Jun 7, 2010	First Meeting	Registration with Permit
Jun 10, 2010	Components; Kirchhoff's laws; Basic resistive circuits;	***It is on Thursday***
Jun 11, 2010	Node analysis	
Jun 14, 2010	Loop analysis	
Jun 16, 2010	Superposition	
Jun 18, 2010	Thevenin and Norton Theorem	Last Day Add/Drop
Jun 21, 2010	Dependent source circuits; mid-term	mid-term
Jun 23, 2010	Op-amp circuits; capacitor; inductor;	
Jun 25, 2010	First order transient circuits	Request for CR/NR deadline
Jun 28, 2020	Second order transient circuits	
Jun 30, 2010	AC circuits; phasor;	
Jul 2, 2010	Frequency response	No class on July 4th
Jul 7, 2010	Power Calculation; Transformer	
Jul 9, 2010	Final	

Midterm: Monday, June 21
Final Friday, July 9

Grading policy

	No.	Points/ assignment	Total
Homework	10	2	20
Quiz	10	3	30
Midterm	1	20	20
Final	1	30	30

A	A-	B+	B	B-
>90%	85% ~ 89%	80% ~ 84%	75% ~ 79%	70% ~ 74%

C+	C	C-	D+	D	D-
65%~69%	60%~64%	55%~59%	50%~54%	45%~49%	40%~45%

1. No late homework accepted. Solutions to the homework assignments are posted in iLearn. For each assignment, two randomly selected problems will be graded.
2. All exams are closed book. No cheat sheet allowed
3. No make-up exams and no incomplete grades without a serious and verifiable medical justification. No changes in the exam dates. No exceptions.

Relationship to Other Courses:

This is a required course of all engineering students. Concurrent enrollment in Engr 206, Circuits and Instrumentation, is strongly recommended. Important note: If you are taking Engr 205 and Engr 206 concurrently, and decide to withdraw from Engr 205, you will automatically be dropped also from Engr 206. Engr 205 is a prerequisite to Engr 300, Engr 305, Engr 306, Engr 353, and Engr 356. Mastery of the Engr 205 material is essential for good performance in the EE curriculum in general. Some upper division courses require a grade of C or better in this course, as specified in the bulletin.

Note to CE and ME Majors:

Engr 205 meets the ABET[3] requirement that you take at least one course in a non-major engineering subject. Moreover, the material you learn in this course will prove extremely useful when you will take the EIT exam – something students tend close to graduation, when their minds are still fresh from their undergraduate studies. In the past, the accompanying lab, ENGR 206, used to

be mandatory for all SFSU engineering majors, but now CE majors are exempt. However, if you envision pursuing a CE career that will require field measurements, you may wish to take also ENGR 206 to gain hands-on experience with standard instrumentation and measurements (oscilloscopes, signal generators, multimiters, etc.)

[3]ABET (Accreditation Board for Engineering and Technology) is the agency responsible for accrediting college programs such Engineering at SFSU.

Disability Statement Policy

Students with disabilities who need reasonable accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the reasonable accommodations process. The DPRC is located in the Student Service Building and can be reached by telephone (voice/TTY 415-338-2472) or by email (dprc@sfsu.edu). For more information, please check http://www.sfsu.edu/~dprc.

Observance of Religious Holidays:

I will make reasonable accommodations for students to observe religious holidays when such observances require students to be absent from class activities. Please inform your absence ahead of the time so that I can make some arrangements.

Important Rules:

If any student is **caught cheating as specified by the university handbook**, I will **report it to the department and strongly recommend University policy** including a **final grade of "F"** in the course.