EE 2301 / 001 – Circuit Analysis I – Summer 2014

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Office Hours: 9:00-10:00 MTWR, or by appointment

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Location: Lecture Q 221 / Laboratory Q 312

Meeting times: Lecture TR 10:00-11:50 am / Laboratory M or W 12:00-2:50

Start Date: 05/20/2014

Pre-requisites: MATH 2253 (Calculus I) and PHYS 2211 (Principles of Physics I)

Textbook: The required textbook is Engineering Circuit Analysis, 8th edition, by Hyat, Kemmerly, and Durbin, McGraw-Hill 2007. An earlier edition of the textbook is permissible with the understanding the student is responsible for accounting for discrepancies in end of chapter homework problems between versions; homework problems refer to those in the 8th edition.

Course Catalog Description: This course introduces basic circuit analysis including resistive circuits, voltage and current sources, analysis methods, network theorems, energy storage elements, and AC steady-state analysis. Techniques for analyzing resistive networks are heavily emphasized. In addition, the physical mechanisms of capacitance and inductance are examined along with analysis of transient responses in circuits containing resistors, capacitors and inductors. Laboratory exercises reinforce the theoretical concepts presented in class and provide various opportunities to become proficient with standard instrumentation used in electrical engineering.

Learning Outcomes:

1. Apply voltage division, current division, element combination, and/or source conversion to analyze or simplify a circuit having series and/or parallel elements.
2. Use nodal or mesh analysis, employing either the supernode or supermesh approach, to write a complete set of equations for a circuit having voltage sources, current sources, and a dependent source.
3. Analyze or simplify a circuit using principles such as superposition, Thevenin/Norton equivalence, maximum power transfer, and delta-wye conversion.
4. Determine the voltage or current equation for an element in a transient RC or RL circuit having a non-zero initial and/or final voltage or current; compute the energy being stored in a capacitor or an inductor.
5. Apply knowledge of phasors and impedances to analyze a sinusoidal steady-state circuit.
6. Use circuit simulation software, such as PSpice or Multisim, to analyze a circuit; use mathematical computation software, such as MATLAB or MATHCAD, to solve or plot circuit equations (1, 6, 11).

Topics Covered Include:

1. Basic components and electric circuits.
2. Kirchhoff's voltage and current laws.
3. Basic nodal and mesh analysis.
4. Thevenin and Norton theorems, maximum power and superposition.
5. Capacitors and inductors.
6. Basic RL and RC 1st order transient circuits.
7. Sinusoidal steady-state analysis.
8. Complex forcing functions, impedance and phasors.

Grading Policy

Homework (15%): Homework is an essential component of the learning experience in this course. Students who successfully complete and understand all the assigned homework problems will find themselves well prepared for the written tests. Content and numerical results are certainly important in homework problems, but problem presentation is of equal importance. This includes a well-conceived diagram when appropriate, an algebraic solution for the desired quantity in terms of given/known quantities, correct and consistent use of notation, units, and significant figures, as well as overall neatness and clarity. The assigned homework sets will be collected during class periods as detailed in the course schedule, and approximately one third of the problems will be graded. The lowest homework problem grade for the semester will be dropped. Each submission may include two students' names. A grade of zero will be recorded for any problem whose solution appears copied, even in part, from any source. Be sure to write the solution "in your own words" when collaborating with students from other groups on the solution method. Students who feel they are unfairly assessed a zero for copying homework may request referring the matter to be resolved by the SPSU Honor Council. The instructor may decide to refer directly to the Honor Council in especially egregious cases or when a student is involved in multiple incidences of copying. Problems are graded according to the rubric:

Problem solution is neat and legible (1 point)
Proper and consistent use of units (1 point)
All work necessary to complete the problem is presented (1 point)
The correct answer is obtained with reasonable accuracy (1 point)

Group exercises (10%): Most lecture periods with a reading assignment will begin with a "five-minute" group exercise. The purpose of these exercises is to stimulate learning of new material in groups of two members. Questions on group exercises will be short and generally require only that students have thoroughly read the day's reading assignment. Examples of question topics include definitions, identifying symbols or notation, and drawing/interpreting diagrams. The lowest group exercise grade for the semester will be dropped. Group exercises are graded as follows

Student(s) names appear on submission (1 point)
Some effort was made (1 point)
Some part of the question is appropriately addressed (1 point)
The answer is reasonably close to the correct answer (1 point)

Laboratory exercises (25%): All students are expected to attend the lab sessions and will be assigned zero grades for missed sessions. Students will generally work in groups of two members. Results of the laboratory exercises will be demonstrated to the laboratory instructor during the last 20 minutes of each session rather than submitting a lab report. The grade for each laboratory will be reflective of the fraction of exercises completed and demonstrated.

Tests (3×10%): Three 1-hour long in-class tests will be used to assess progress in the course. Four function calculators will be allowed on the test, but graphing and programmable calculators are not allowed. Equations sheets are not permitted, although basic equations will be provided along with the test questions. The tests, in general, will be curved in an attempt to maintain an overall class average of a mid C.

Final exam (20%): The format of the comprehensive final exam will be similar to that of the other tests but twice as long in length. The final exam will be scheduled during the standard final exam period.

The scale for the final course grade is as follows, but the final grade cannot be more than one letter grade higher than the highest test score.

A 90-100
B 80-89
C 70-79
D 60-69
F 0-59

Attendance Policy

Forcing everyone to come to every class is not practical. Each student bears responsibility for material covered in class. If students choose to miss class, that is their decision. However, completion of group exercises goes hand-in-hand with attendance. Note also that late arrival to class will result in working alone on group exercises. Class time will be spent explaining the day's content and working problems, under the assumption that all students have read and understood the reading assignment. In general, late assignments are not accepted nor can make-up tests or labs be administered. Laboratory attendance is mandatory; students will receive a grade of zero for missed lab sessions. Extenuating circumstances can result in exceptions to these rules, but agreement must be reached with the instructor in advance of the assignment, test, or lab that will be missed.

Academic Misconduct

At SPSU, academic misconduct is defined as "any act that could have resulted in unearned advantage or that interferes with the appropriate academic progress of others". Any act of academic misconduct can be reported to the Honor Council by the instructor. For more information see www.spsu.edu/honorcode. The application of the definition of academic misconduct for each category of assignment in this course is describes as follows:

Discussion of homework problems among peers and even other sources is wholeheartedly encouraged. A single homework submission is allowed for groups of no more than two members. Note, however, that this submission must be a reflection of the group's work alone. Multiple submissions may follow the same solution process, but they may not be copied, not even in part. If more than one group collaborates on the homework, be sure each group sits down individually to write the solution so that each is written in their own words. Be aware that copying of any kind from any source, including clandestine solution manuals, will be considered a violation of academic integrity. If you have a copy of the solution manual, you are strongly recommended to delete it. Using the solution manual as a crutch when solving homework is detrimental to your learning, and the temptation is great to rely heavily on it when rushed to complete a homework set. The majority of reported academic integrity violations in this course result from students copying from the solution manual. Additionally, possession of the solution manual is unnecessary as you will be provided with solutions of all homework problems after they are due, as well as for non-assigned problems upon request.

Collaboration among group members during group exercises and laboratory assignments is obviously encouraged, but assistance of any kind from outside the group will be considered a violation of academic integrity.

Tests and the final exam are to be reflections of the individual's work alone. Assistance of any kind, other than a simple four-function calculator, such as mobile devices, other class members, notes, equations sheets, etc. will be reported as a violation to the Honor Council.

Disability Statement

If you have a documented disability as described by the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) that may require you to need assistance attaining accessibility to instructional content to meet course requirements, please contact the ATTIC at 678-915-7361 as soon as possible. It is then your responsibility to contact and meet with the instructor. The ATTIC can assist you and the instructor in formulating a reasonable accommodation plan and provide support for your disability. Course requirements will not be waived but accommodations will be made, when appropriate, to assist you to meet the requirements.

Communication

Course material will be disseminated in D2L including lecture notes, homework solutions, old tests, etc. All official course announcements, including instructions when class may be cancelled, will be posted in the D2L course news. Be sure to check D2L regularly. The instructor does not check D2L email; relay all email correspondence to kmcfall@spsu.edu.

Course schedule

Date		Topic	Reading	Assignment due	Laboratory
May	20	Introduction	1.1-1.5, 2.1-2.4		PSpice
May	22	Single loop/node pair	3.1-3.5		
May	27	Series and parallel	3.6-3.8	2.21/33/48, 3.9/21/26/34	ELVIS
May	29	Review/Test 01		3.40/42/55/57	
Jun	03	Nodal analysis	4.1-4.2		Analyze DC circuits
Jun	05	Mesh analysis	4.3-4.6		
Jun	10	Equivalents	5.1-5.3	4.4/14/20/29/38/48	Design DC circuits
Jun	12	Max power/delta-wye	5.4-5.6		
Jun	17	Review/Test 02		5.3/10/15/25/29/50/56	Multi-node circuits
Jun	19	Capacitors/inductors	7.1-7.4		
Jun	24	RL and RC circuits	8.1-8.4		Thévenin
Jun	26	Driven RL/RC circuits	8.5-8.8	7.3/14/17/28/34, 8.7/20/28	
Jul	01	Predicting response	8.9		Oscilloscope and function generator
Jul	03	Review/Test03		8.45/46/52/57/66	
Jul	08	Overdamped circuits	9.1-9.2		Transient RC circuits
Jul	10	Critically/underdamped	9.3-9.4		
Jul	15	Forced RLC circuits	9.6	9.6/16/27/36	Phasors and impedances
Jul	17	Sinusoidal steady-state	10.1-10.3		
Jul	22	Phasors	10.4-10.5		Source-free RL and RC circuits
Jul	24	Using phasors	10.6-10.8	9.52, 10.11/16/24/31/40	
Jul	?	Final Exam			