

EE221 Circuits II, FALL 2010

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Hours: Mon. 2:00-4:00pm and Tue. 9:00-11:00am or by appointment.

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Hours: Thur. 11:00am-3:00pm

Class Meetings: Room 263 FPAT, TR 3:30pm to 4:50pm.

Expected Student Outcomes: A student who has successfully completed this course should be able to:

1. Perform AC steady-state power analysis on single-phase circuits.
2. Perform AC steady-state power analysis on three-phase circuits.
3. Analyze circuits containing mutual inductance and ideal transformers.
4. Derive transfer functions (variable-frequency response) from circuits containing independent sources, dependent sources, resistors, capacitors, inductors, operational amplifiers, transformers, and mutual inductance elements.
5. Derive two-port parameters from circuits containing impedance elements.
6. Use SPICE to compute circuit voltages, currents, and transfer functions.
7. Describe a solution with functional block diagrams (top-down design approach).
8. Work as a team to formulate and solve an engineering problem.
9. Use computer programs (such as MATLAB and SPICE) for optimizing design parameters and verify design performance.

Text: *Fundamentals of Electric Circuits – 4th Ed.*, Charles K. Alexander & Matthew N. O. Sadiku, McGraw Hill, NY, 2009 ISBN13: 9780077263195

Grading Policy:	Your grade will be based on:
	13 homework assignments for 13%
	10 highest quiz scores for 30%
	1 design project for 21%
	1 final exam for 36%

Letter Grade Assignment: from 100 to 90 pts. => A, from 89 to 80 pts. => B, from 79 to 70 pts => C, from 69 to 60 pts. => D, from 59 to 0 pts. => E

Email List: All students are expected to subscribe to the class email list at:
<http://lists.engr.uky.edu/mailman/listinfo/ee221>
and are responsible for material and information sent to the class via email.

Homework Policy: Homework will be assigned each week on Thursday and due the following Thursday at the *beginning* of class. Homework will be graded based on accuracy as well as organization/neatness. Homework problems must be restated and solutions with intermediate steps clearly shown. Related sections in the book must be read and studied to obtain all the information required to do the homework problems. The lectures will focus on the major concepts and will not cover all details you are expected to know. Late homework will not be accepted. Students finding difficulty understanding a particular topic or homework problem are encouraged to meet with the TA or the instructor during office hours. Homework problems are intended to help the students develop **outcomes 1-6**.

Quiz Policy: There will be a quiz almost every week, where a typically quiz will have a 10-15 minute time limit. In-class quizzes will be closed-note and closed-book. Quizzes that require computer software will be take-home assignments and due the following class period. At least 10 quizzes will be given in the semester. If more than 10 quizzes are given, only the top 10 quiz scores will be used in computing the final grade. Failure to take a quiz at the time it is given will result in a score of zero.

Makeup quizzes will not be given. If you have questions regarding the grading of a particular quiz, discuss it with the instructor by the next class period after it was returned. Quizzes are intended to evaluate the degree to which **outcomes 1-6** are being achieved.

Final Exam: A comprehensive final exam will be given during finals week. Student having conflicts on the exam day will need to notify the instructor immediately to determine what arrangements can be made.

Attendance: Attendance is not formally recorded and has no direct impact on the final grade. However, attendance typically has a significant impact on homework, quiz, test, and project performance. Information presented in the classroom and interactions with the instructor and classmates is a critical part of your professional development and academic growth. Less exposure to discussions of concepts and analyses associated with this course will limit the development of your problem solving skills and understanding of circuits and systems.

Office Hours: Instructor and TA office hours are primarily for the students with questions about the material covered in the course. In addition, broader issues regarding related careers, applications, and professional issues are also encouraged. Office hours are not designed to have the instructor and TA work homework problems for students who have not first studied the material and attempted the problems themselves. It is best to come prepared with specific questions about a lecture, or textbook example, or a problem that you started and could not obtain a proper result for.

Design Project: The assigned project involves a complex open-ended problem that is to be solved by students working in teams of 3 to 4. The instructor will assign students to teams. The project grade has 4 major components:

- 1) A problem statement and proposed general solution with a timetable and distribution of effort for the team (project proposal).
- 2) A Phase I report (consisting of an optimized design on the filter parameter level),
- 3) A final report describing the design solution with performance evaluation (circuit parameter level).
- 4) A bound engineering notebook (a technical diary/record of your work) from each team member.

Items 1 through 3 are expected to be completed using a word processor. Graphs and tables should also be generated electronically. Each team will only hand in one copy of reports required for items 1 through 3. Each student will be required to hand in their own engineering notebook, which provides a technical diary of their work and contributions to the projects. Notes in the engineering notebook can be handwritten and contain pages pasted/stapled in from computer printouts for computer coding, graphs, circuit diagrams, etc. A 48-page student lab book can be purchased from Eureka <http://www.eurekalabbook.com/Studentnote.html> or from the IEEE parts store here on campus <http://www.engr.uky.edu/~ieeef/>

Unethical behavior: The following activities are unethical:

- Using data you did not measure
- Recording values you did not observe
- Copying a portion of work belonging to someone else

Any of these will result in the consequences described in the university's policy on academic dishonesty. (see <http://www.uky.edu/StudentAffairs/Code/part2.html> (section 6.3).

Student Workload: The key to doing well is to maintain a consistent work level throughout the semester. Plan on attending every class meeting and devoting at least 6 to 12 hours weekly for homework and study outside of class time. I recommend blocking out at least 8 hours of time weekly outside of class for this course. If you cannot reasonably fit this time commitment into your schedule for the duration of the semester, I strongly encourage you to drop the course and register for it when you can devote sufficient time to your studies.

Tentative Course Schedule EE221				
Unit	Dates	Text Section	Topics	Homework
1	08/26/10	9	Course Introduction, Review Phasors & Complex Numbers	9.1,3,9,14,(15 use Matlab) 23, 26, 27 (Due 9/2)
2	8- 31, 9-2	10.1-10	Review AC circuits (impedance, phasors, nodal, mesh, superposition, equivalent circuits)	10.7,19,27,32,38,41,45,58, 68,73,78 (also solve 78 with SPICE), 89 (Due 9/9)
3	9- 7, 9	11.1-5	(Quiz 1) Instantaneous and Average Power, Complex Power and Maximum Power Transfer, RMS Power, Apparent Power, and power factor	11.1,4,8,13,17,24,27,36,38,41 (for 11.1 also use Matlab to generate a plot for the instantaneous power) (Due 9/16).
4	9- 14, 16	14.1-4	(Quiz 2) Transfer functions, complex frequency, poles & zeros, Computing transfer functions, dB's and Bode Plots	14. 4, 5, 6, 11, 12 (use Matlab for 13, 15, 16, 18, 21 to do the Bode plots), 22 (Due 9/23)
5	9- 21, 23	14.5-7	(Quiz 3) Resonant Circuits – series resonance, Resonant Circuits – parallel resonance, Passive Filters	14. 25, 28, 29, 30, 35, 38, 50, 51, 54, 56, 59 (Due 9/30)
6	9- 28, 30	14.7-8	(Quiz 4) Active Filter Design, Applications	14. 64, 67, 70, 89 (solve 85 and 89 with SPICE) 93, 96 (Due 10/7)
7	10- 5, 7	Notes	(Quiz 5) More on Active Filters, Parallel and series connections of active filters, Notes Mid Term Project assignment	Assigned in Class (due 10/14)
8	10- 12, 14	19.1-5	(Quiz 6) Port Networks – the Impedance parameters, port Y and h-parameters, 2 port ABCD parameters	Preliminary Report (due 10/21)
9	10 -19, 21	19.6-7	(Quiz 7/8) Parameter relationships, Cascading/combining 2 port parameters, project discussions/feedback	19.3, 6, 12, 20, 26, 31, 36, 47, 62 (Due 10/28)
10	10- 26, 28	13.1-4	(Quiz 9) Mutual Inductance, Energy in magnetic coupled circuits, Analysis of mutual inductors	Phase 1 Project Report (due 11/2) 13.1, 4, 9, 13, 15, 22 (Due 11/4)
11	11- 2, 4	13.4-6	(Quiz 10) Examples of magnetically coupled circuits, Ideal Transformers, Examples of circuits with transformers	13. 33, 37, 45, 48, 54, 55, 63 (Due 11/11)
12	11- 9, 11	11.6-9	(Quiz 11) More on Complex Power & Power Conservation, Power Factor Correction, Applications of Power	11.44, 48, 50, 52, 56, 60, 69, 71, 72, 73 (Due 11/16) Project Due 11/23
13	11 - 16, 18	12.1-6	(Quiz 12) Three phase circuits, Balanced Y-Y and Y- Δ three phase circuits, Balanced Δ -Y and Δ - Δ three phase circuits	12.4, 7, 9, 10, 12, 14, 24, 30 (Due 11/30)
14	11-23, 30	12.7	(Quiz 13) Three phase power, Applications of three-phase circuits	12. 32, 39, 69 (Due 11/7)
15	12-2, 7, 9	Review	Review	
16	12- 16 (Thursday)		Final Exam – 3:30pm to 5:30pm	