

EE 221 – Circuits II

Spring 2012

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Office hours: TR 9:30 – 11:00 am, or by appointment

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Office hours: M 10am-12pm, 3-5 pm, R 9-11 am, F 10am – 12 pm

Meeting Time: The course will meet TR in 323 RMB, 11:00 am – 12:15 pm

Course Text: *Introduction to Electric Circuits – 8th Ed.*, Richard C. Dorf and James A. Svoboda, Wiley, 2010 (ISBN: 978-1119946564 (B&W version), or 978-0470521571 (full color version))

EE221 URL: <http://www.engr.uky.edu/~gedney/courses/ee221>

Expected Outcomes: The following competencies should be imparted to the students:

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 resistive and 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.

Homework policy: Homeworks will be assigned each week and due on each Tuesday at the *beginning* of class. The homework assignments will be distributed through the EE221 web page accessible from the URL listed above. No late homework will be accepted. Students finding difficulty understanding a particular topic or homework problem are encouraged to meet with the TA or the instructor during his/her office hours. Homework problems are intended to help the students develop **outcomes 1-6**.

Weekly Exam policy: There will be an in class exam most every week plus a comprehensive final exam. The exam may be given at any time during a class period and will typically be allotted 10 minutes. The exam material can be anything covered in class or homework prior to that lecture period. The lowest 2 exam scores will be dropped. Failure to write an exam will result in a score of zero. **No makeup exams will be given.** Upon the receipt of a graded exam, if you have any question regarding the grading, it must be submitted in writing to the instructor within 24 hours from the time the exam was returned. The exams are intended to evaluate the degree to which **outcomes 1-6** are being achieved.

Unethical Behavior: Any unethical behavior, plagiarism, falsifying data, cheating, etc., will result, at a minimum, in a zero score for the exam or project and further action following University of Kentucky regulations (c.f., Sections 6.3 and 6.4 of <http://www.uky.edu/StudentAffairs/Code/Section%20VI.pdf>). Homework solutions can be discussed with your colleagues but the work you submit must be your own.

Attendance: If a student is to be absent from class for an extended period of time (two classes or more), the Instructor must be notified in advance, if possible, or by the second class of the absence.

Electronic Devices: Students will need an engineering calculator that can handle complex linear algebra. When completing homework's, students are encouraged to use calculation software such as MathCad 15

(<http://studentdiscounts.com/mathcad15forwindows.aspx>), or Matlab. Students will also be expected to use Spice (P-Spice Student, or B2SPICE). *During class periods*, students can use calculators or lap top computers for calculation purposes only. Students should not use cell phones, text, email, or surf the web during a class. Students doing so will be asked to leave the class room. *During in class exams*, students can only use calculators. Students may not use a PDA or any other wireless device (including calculator apps on a wireless device) during exams. If a student has a wireless device, it should be powered off during exam periods. Failure to adhere to this will result in a 0 score for that exam.

P-Spice: A student version of p-spice can be downloaded at:

<http://www.electronics-lab.com/downloads/schematic/013/>

(Go to the bottom of the web page, and click on “Download PSPICE 9.1 student version”)

Project: There will be a team project assigned. The project will be performed in teams of no more than 3 students. Students can form their own teams subject to approval by the instructor. The instructor will appoint students to teams who do not propose their own. The project will have four graded components:

- 1) A problem statement and proposed general solution with a timetable and distribution of effort for team members (pre-proposal).
- 2) A Phase I report (consisting of an optimized analytical design),
- 3) A final written report describing the design solution with performance evaluation
- 4) A spiral bound engineering notebook (a technical diary of your work) from *each* team member

Items 1), 2) and 3) are expected to be completed using a word processor and printed out using a high quality printer. Graphs and tables should also be generated electronically. Note that each *team* will only hand in *one* copy of each report due. Each student will be required to hand in an engineering note book, providing a technical diary of their contribution to the project. Notes in the engineering notebook should be written in *pen*, and can contain cut outs from computer print outs for graphs, circuit diagrams, etc. The midterm project is intended to help develop and evaluate student skills related to **outcomes 7-9**.

Final Exam: A comprehensive final exam will be given on Thursday May 3, 2012 in 323-RMB, 1:00 pm – 3:00 pm. Any student having a legal conflict on that exam day will need to notify the instructor *no later* than the class period of Monday, April 16. Anyone failing to notify the instructor after this time will have to take the exam during the scheduled time.

Grading:	11 In Class Exams	35 %
	Midterm Project	20 %
	Final exam (5/2)	30 %
	Homework	15 %

Grade Assessment will be based on your final grade for the course based on the student’s in class exams, homework, midterm project and final exam grades as outlined above. There will be no curving of grades. The letter grade assigned will then be calculated according to the table below.

Final Grade	Letter Grade
90-100 %	A
80-90 %	B
70-80 %	C
60-70 %	D
Below 60 %	E

EE 221 Topical Schedule - Spring 2012

Date	Text Chapter. Section	Topic
R: 1/12	10.5 – 10.8	Review, Phasors and AC circuits
T: 1/17	10.8 – 10.12, 10.15	Review of AC Circuits
R: 1/19	10.13	Complete response of AC circuits (mixed sinusoidal/switched)
T: 1/24	11.1 – 11.3	Instantaneous and Average Power
R: 1/26	11.4 – 11.5	Complex Power
T: 1/31	11.4 – 11.6	RMS Power, Apparent Power, Power Factor
R: 2/2	11.6 – 11.8	Power Factor Correction & Maximum power transfer
T: 2/7	11.9	The Mutual Inductor
R: 2/9	11.10	The ideal transformer
T: 2/14	13.1 – 13.2	Network functions (or transfer functions) of circuits
R: 2/16	13.3	Poles and zeros of network functions
T: 2/21	13.3	The Bode plot
R: 2/23	13.4	Resonant Circuits – series and parallel resonance
T: 2/28	13.5	Frequency response of op-amp circuits
R: 3/1	13.6-13.7	Computing frequency response with SPICE
T: 3/6	16.1 – 16.3	The electronic filter – controlling the frequency response of ckts
R: 3/8	16.4	Second-order filters, Q , and bandwidth
TR 3/13,15	SB	Spring Break – No class
T: 3/20	16.4 – 16.8	Higher-order filters, and simulation of filters
R: 3/22	Notes	Project Assignment
T: 3/27	12.1 – 12.3	Three phase circuits & the Y to Y connected circuit
R: 3/29	12.4 – 12.5	The Delta to Delta connected Circuit & Y to Δ
T: 4/3	12.6	Balanced three-phase circuits
R: 4/5	12.7 – 12.9	Power in three-phase circuits
T: 4/10	17.1 – 17.3	2 port networks,
R: 4/12	17.4	Z and Y network parameters
T: 4/17	17.5	2 port hybrid and ABCD parameters
R: 4/19	17.6 – 17.7	Conversion between two-port params & interconnecting 2 ports
T: 4/24		Review
R: 4/26		Review
R: 5/3	FE	<i>Final exam</i> , 1 – 3 pm (323 CMRS)