Instructor: Dr. K. D. Donohue  
Office: 201 Davis Marksbury Bldg.  
Phone: 859-257-4004  
Hours: Tue. 3:30-5:00pm and Thr. 10:00am-12:00pm or appointment  
Email: donohue@engr.uky.edu  
WebPage: http://www.engr.uky.edu/~donohue/  

Teaching Asst: Mr. Riasad Badhan  
Office: 349 ASTECC Bldg.  
Hours: Wed. and Fri. 10:30AM-12:30PM  
Email: riasad.badhan@uky.edu  

Class Meetings: Room 287 Chem-Phys, TR 2:00pm to 3:15pm.

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.


Grading Policy: Your grade will be based on:
12 homework assignments for 12%  
10 highest quiz scores for 30%  
1 design project for 22%  
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: 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. In addition, student who do not actively participate in the group project will not be given credit for the project score. It is important to respond to team interactions in emails and meetings. Extended period of no contact, could result in being dropped from the project.

**Office Hours:** Instructor and TA office hours are primarily for the students with questions about the material covered in the course. In addition, discussions regarding broader issues related to careers, research, and applications 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. Bring documentation of your attempts so we can comment directly on your approach.

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

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

Items 1 and 2 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 and 2. 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](http://www.eurekalabbook.com/Studentnote.html) or from the IEEE parts store here on campus [http://www.engr.uky.edu/~ieee/](http://www.engr.uky.edu/~ieee/).

**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/Section%20VI.pdf](http://www.uky.edu/StudentAffairs/Code/Section%20VI.pdf) (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.
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<td>Appendix Ch8:1-6</td>
<td>Course Introduction, Review Phasors &amp; Complex Numbers</td>
<td>8.3, 7, 9, 23, 25, 28 (Due 9/1)</td>
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<td>2</td>
<td>8-30, 9-1</td>
<td>Ch8:7-8</td>
<td>Review AC circuits (impedance, phasors, nodal, mesh, superposition, equivalent circuits)</td>
<td>8.3, 37, 41, 44, 53, 54, 60 (also solve 33 and 37 with SPICE) (Due 9/8)</td>
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<td>Ch9:1-6</td>
<td>(Quiz 1) Instantaneous and Average Power, Maximum Power Transfer, RMS Power, Apparent Power, and power factor</td>
<td>9.2, 3, 9, 15, 16, 32, 40, 43, 44, 60, 73, 78 (for 9.3 also use Matlab to plot instantaneous power, assume $\omega=377$ rads/sec) (Due 9/15).</td>
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<td>(Quiz 2) Transfer functions, complex frequency, poles &amp; zeros, Resonant Circuits, Computing transfer functions, dB’s and Bode Plots</td>
<td>12.3, 4, 7, 8, 18, 24, 25 (also use Matlab to plot the phase and magnitudes for 18, 24 and 25) 37, 39, 47, 50 (Due 9/22)</td>
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<td>(Quiz 6) 2-Port Networks – the Impedance, Admittance, Hybrid, Transmission parameters,</td>
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<td>(Quiz 7/8) Parameter relationships, Cascading/combining 2 port parameters, project discussions/feedback</td>
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<td>(Quiz 9) Mutual Inductance, Energy in magnetic coupled circuits, Analysis of mutual inductors</td>
<td>10.5, 8, 13, 18, 19, 25, 32 (Due 11/3)</td>
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<td>(Quiz 10/11) Examples of magnetically coupled circuits, Ideal Transformers, Examples of circuits with transformers</td>
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<td>(Quiz 12) More on Complex Power &amp; Power Conservation, Power Factor Correction, Applications of Power</td>
<td>9.69, 78, 83, 86, 89, 95 (Due 11/17)</td>
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<td>Three phase circuits, Balanced Y-Y and Y-Δ three phase circuits, Balanced Δ-Y and Δ-Δ three phase circuits</td>
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<td>Review</td>
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