ELECTRICAL & COMPUTER ENGINEERING DEPARTMENT
PORTLAND STATE UNIVERSITY

Spring 2015

Course: ECE 241 Introduction to Electrical Engineering

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Office Hours: For current office hours please check:
http://www.pdx.edu/ece/faculty-office-hours

Overview: This course is an introduction to electrical engineering designed for mechanical engineering students. The majority of the course is on electric circuit analysis as you will see in the Fundamentals of Engineering exam. We cover basic analysis of resistive circuits using Ohm's and Kirchoff's laws, then learn simplifying techniques such as series and parallel resistance. The important circuit analysis concepts of node and loop analysis, superposition and equivalent circuits are emphasized. We introduce inductors and capacitors and their behavior in transient circuits. We then explore the concepts of phasors and impedance to analyze ac circuits. Finally we learn how to calculate ac power and to analyze ideal transformer circuits.

The course outcomes are:

1) the ability to analyze resistive circuits using basic laws and more advanced circuit analysis techniques;
2) the ability to analyze transient circuits containing inductors and capacitors;
3) the ability to use phasors and impedance to analyze ac circuits, calculate ac power.
4) The ability to analyze ideal transformer circuits.

TA: Information concerning the names and contact emails for both the course and lab TAs is provided in a separate document on the ECE241 web page.
Also, please make use of my office hours to get help on homework problems and answers to questions we don't have time for in class.
There is also free tutoring available from the IEEE student section; go to http://www.pdx.edu/ece/tutoring-resources for times and location. You can ask your lab TA questions about the class, but their primary duty is the lab.

Text: Electrical Engineering, Principles and Applications, Hambley, 6th Ed. We will mainly use the first five chapters.

Mastering Engineering: Mastering Engineering ("ME") is an online resource from the textbook publisher. You will need to register online at www.masteringengineering.com using the access code that comes with the new textbook or that you purchase separately. *Please do this within a day or two so that any registration problems can be sorted out this week.* When you get registered, you will see the ECE 241 course. The course ID is ECE241SP15. There is an Introduction to ME assignment which is not for credit, but you should work through it just to get used to the system. Please let me know if you have any problems.

Here are a few points concerning using ME:

- You have a limited number of attempts to enter the correct answer; don't burn through them all just trying things randomly! If you are stuck, get help before your attempts are used up.
- It is possible there is an error in the solution on ME, but it is far more likely you've made an error. If you really think the solution is wrong, let me know, but check your work carefully first.
- Be careful of rounding errors in repeated calculations; you can round off your solution, but carry more decimal places through the calculations.

Homework: There will only be a limited number of days after the homework is assigned and then due on ME. Doing the homework is extremely important in this class. The only way to learn the techniques of circuit analysis is by practice! ME will not accept homework after the due date and time.

Exams: There will be three exams (quizzes) during the term and no exam during finals week. Exams may cover any material presented in the class up to the time of each exam. The format for the exams is 20 multiple choice questions. You will need to bring a Scantron form (Form no. 882-E) with you as well as a calculator, and No. 2 pencil and eraser. A student prepared formula sheet may also be used in the exam. This sheet should contain formulas only, **no worked solutions**. It should be no larger than 8.5" x 11" inches, written on one side only. You will need to put your name on your formula sheet and hand it in with your Scantron.

NO make-up exams will be given. If a compelling reason exists why an exam is missed you will need to provide documentation to the instructor .

If you are a student with a documented disability and registered with the Disability Resource Center (DRC), please contact me within the first two weeks of class, and also *email me a few days before each exam to remind me*. DRC can be reached at 725-4150.

Lab: The labs will be posted on the course website, i.e. the instructor's web site in the ECE241 section. Students will need to work with a partner and stay with that partner throughout the term. If you want to work alone or in a group of three you will need to get permission from the TA *and* from the instructor. The lab is an integral part of the course and it is required that the lab and lecture be taken together. The lab is 20% of the total grade. Labs will need to be handed in to the Lab TA in a timely fashion. Circuit parts can be purchased from the IEEE store: http://www.pdx.edu/ece/ieee-store .

Academic Honesty: We take academic honesty very seriously. Our department policy is to report all instances of plagiarism or cheating to the university. If you are not sure what constitutes plagiarism, ask and we'll talk about it. Simply put – turn in only your own work or credit the source.

Software: The program LTSpice will be introduced in this course and used in homework assignments as well as in the lab. LTSpice is also called SwitcherCad III. It is a free program available from Linear Technology at http://www.linear.com/company/software.jsp. You can easily download it to your own computer. There is not a lot of documentation available from LT itself, but there is a lot of other web support. There is a Yahoo group for LTSpice at

http://groups.yahoo.com/group/LTspice/. They have many files for download, including several tutorials and an extensive (290+ page) manual.

MATLAB will also be used though primarily in the lab. If you are not familiar with MATLAB, I suggest you visit the website at www.mathworks.com . Go to Academia, Interactive Tutorials, MATLAB tutorial and check out the MATLAB Fundamentals tutorial under MATLAB On-Ramp. More information on both MATLAB and LTSpice is in the lab.

Also, if you don't have one, now is a good time to invest in a good scientific calculator. You will need one that handles complex numbers and solves linear simultaneous equations for this class.

Grading:

Homework	10%	
3 Exams:	68%	(#1: Wk 4: Wed. **4/22** ; #2: Wk 7: Wed. **5/13**; #3: Wk 10: Wed. **6/03**)
Labs:	20%	
Class Participation:	2%	

Class Participation:
When videos are assigned to be viewed in preparation for a class students are asked to submit a sheet at the beginning of the class which has either of the following: 1) A question regarding the material that was viewed, or 2) a statement as to what was the least clear aspect in the content of the video.

Topics:

In the following list of topics the corresponding section numbers from the textbook (Hambley 6th edition) are indicated. It is highly recommended that students read the corresponding sections in the text as the material is covered in class.

Quiz #1:

1) Definitions: charge, voltage, current, power, energy (Hambley Section 1.2, 1.3)
2) Voltage sources: independent and dependent (1.6)
3) Current sources: independent and dependent (1.6)
4) Resistors, Ohm's law (1.6)
5) Kirchhoff Voltage Law (KVL) (1.5)
6) Kirchhoff Current Law (KCL) (1.4)
7) Resistors in series (2.1)
8) resistors in parallel, conductances in parallel (2.1, 2.2)
9) resistive voltage divider (2.3)
10) resistive current divider (2.3)
11) Nodal analysis (2.4)
    a. Basic
    b. With voltage source
12) Mesh analysis (2.5)
    a. Basic

b. With current sources

13) Non-ideal sources, source transformation (2.6)
14) Thevenin's theorem (2.6)
15) Norton's theorem (2.6)
16) Maximum power transfer (2.6)
17) Superposition (2.7)

Quiz #2:

1) Capacitance (Hambley section 3.1)
2) Capacitances in Series and Parallel (3.2)
3) Physical Characteristics of Capacitances (3.3)
4) Inductance (3.4)
5) Inductances in Series and Parallel (3.5)
6) First order circuits (4.1)
7) DC Steady State (4.2)
8) RL Circuits (4.3)
    a) Response to initial condition
    b) Response to a constant input
9) RC Circuits
    a) Response to initial conditions
    b) Response to a constant input

Quiz #3:

1) AC circuits (steady-state sinusoidal analysis) (Hambley section 5.1 – 5.4)
2) AC power analysis (5.5 – 5.6)
3) Ideal transformer (15.5)