EE 211 and EE 212
Circuit Analysis for Engineers
Spring 2015 Syllabus

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Office Hours: Tue 6 – 9 pm, Wed 5 – 9 pm, Thu 6 – 9 pm

1. Introduction

This course provides an introduction to some fundamental principles in electrical engineering for non-EE majors. Electronic devices are pervasive today and touch every engineering discipline. We are all familiar with smartphones, tablets, PCs, GPS navigational devices, music players, TV, radio, radar, and hundreds of other inventions developed by electrical engineers. While you may not be an EE major, there will be many times in your careers and in your personal life when you will need to have at least a basic understanding of electrical and electronic systems.

This course will introduce you to the fundamental concepts of charge, current, voltage, power, and energy, followed by the circuit analysis techniques needed to understand how electrical systems work. We will introduce the fundamental electrical components – resistors, capacitors, and inductors, and a fundamental electronic component – the operational amplifier (op amp). Op amps have applications in interfacing the output of physical transducers that measure force, acceleration, temperature, pressure, etc., to the inputs of measurement systems. The course concludes with practical exposure to single and three-phase electrical power distribution and electrical safety. After completing the course you should be able to at least be conversant with electrical engineers who may be customers, clients, or team members.

2. Prerequisites

Physics 212

3. Course Website

We will use ANGEL (https://www.cms.psu.edu) for this course. All course email communication will be done through ANGEL as well. Emails from your instructor will also be sent to your PSU access account.
4. Required Course Materials

The course material consists of two items:


Access to Mastering Engineering: an online homework submission system that also includes additional problems with worked out solutions, additional problem-solving videos, and other learning aids.

You have 3 options for purchasing the course materials:

**Option 1 (best value for your money): Custom soft-covered version of the textbook, eBook, and access to Mastering Engineering**

For $123.35 you can purchase the textbook + access to Mastering Engineering + e-text from the bookstore as part of a bundle. Once you purchase the textbook/Mastering Engineering bundle from the bookstore, go to [www.pearsoncustom.com/pa/psu_engineering](http://www.pearsoncustom.com/pa/psu_engineering) and click on Register Here. Once you accept the license agreement, you’ll be prompted to either sign in (if you already have a Mastering account from another course) or to set up a new Mastering account. Once you set up and/or sign into your account, use the access code that came with your book to complete the registration. Finally, you connect to the EE 211/212 site using course ID EE211EE212SP15.

**Option 2: eBook and access to Mastering Engineering**

For $92.50, you can purchase access to Mastering Engineering + e-text (no physical textbook). Go to [www.pearsoncustom.com/pa/psu_engineering](http://www.pearsoncustom.com/pa/psu_engineering) and click on Purchase Access. You'll be prompted to either sign in (if you already have a Mastering account from another course) or to set up a new Mastering account. Once you set up and/or sign into your account, you continue to the purchase of Mastering Engineering access for $92.50. Finally, you connect to the EE 211/212 site using course ID EE211EE212SP15.

**Option 3 (not recommended): Access to Mastering Engineering without the eBook**

For $60.50 you can purchase JUST access to Mastering Engineering (no physical textbook, no e-book). The URL for THIS purchase is different. Go to [https://register.pearsoncmg.com/reg/buy/buy1.jsp?productId=324221](https://register.pearsoncmg.com/reg/buy/buy1.jsp?productId=324221). You'll be prompted to either sign in (if you already have a Mastering account from another course) or to set up a new Mastering account. Once you set up and/or sign into your account, you continue to the purchase of Mastering Engineering access for $60.50. Finally, you connect to the EE 211/212 site using course ID EE211EE212SP15. Note: This 3rd option is not recommended because you will still have to obtain the textbook via another source.

5. Educational Objectives

This course is designed to provide a fundamental education in electrical circuit analysis techniques to non-electrical engineering majors. Students should be able to do the following upon completion of this course:

1. Understand the basic electrical quantities of charge, current, voltage, power, and energy;
2. Analyze simple DC resistive circuits using Ohm's law and Kirchhoff's current and voltage laws;
3. Understand the difference between ideal sources and practical sources and source transformation techniques;
4. Apply nodal and loop/mesh circuit analysis methods;
5. Analyze basic inverting and noninverting op-amp circuits;
6. Understand the principle of linearity and the technique of superposition;
7. Apply Thévenin’s and Norton’s theorems to simplify complex circuits;
8. Understand the properties of resistors, capacitors, and inductors;
9. Find the energy stored in capacitors and inductors in DC steady-state circuits;
10. Determine the transient response for series RL and RC circuits;
11. Perform basic algebraic operations using complex numbers;
12. Apply phasor analysis to AC circuits;
13. Determine various electrical power quantities and find the criteria for maximum power transfer;
14. Use ideal transformers in basic circuits;
15. Understand residential electrical basics and electrical safety issues;
16. Understand the fundamental properties of three-phase power.

6. Lectures

Although this course is online, it is structured as if it were a typical classroom course. For example, there are no scheduled activities during holidays and breaks. However, since the course is online you may work at your own pace, but within limits. You can always work ahead but you must never fall behind schedule. Homework due dates are firm, as are exam dates. Do not email your instructor to ask for exceptions to this policy; if you have another commitment then work ahead; i.e., submit your assignment early instead of asking to submit it late. A detailed schedule of the course showing daily lecture topics, related textbook chapter and sections, homework assignments, and exams dates is available on ANGEL.

7. Homework

Understanding the course material and doing well on exams requires proficiency in solving problems. The only way to become proficient at solving problems is to practice, practice, and practice. Think of this process as analogous to learning to play piano or the violin – it will take time and effort on your part. Homework problems are designed to give you this needed practice. They are assigned weekly and are due by 6:00 AM on Monday mornings. Homework assignments vary in length and difficulty and are worth differing point values. The total number of points earned during the semester is used to determine your homework grade. Late homework submissions will not be accepted for any reason. There will be no exceptions to this policy so please do not ask. Work ahead if you need to but do not get behind schedule. Homework is completed online using the Mastering Engineering website.

All homework is completed online using Mastering Engineering. You must purchase access to Mastering Engineering in order to complete this course. See section 4 of the syllabus for different purchase options.

Some important details about submitting homework answers in Mastering Engineering:

- You will have 4 chances to get the right answer to each homework question. You will not be penalized for incorrect answers (except in the case of multiple-choice homework questions).
- Some questions give you the chance to ask for hints. You will not be penalized for utilizing these hints, so feel free to use them whenever you are stuck.
- For homework questions with multiple parts, you must provide an answer (or press Give Up) for **each** part in order to earn credit for **any** of the parts of that question. For example, if you answer parts (a) – (c) of a 4-part question and do not answer (d) at all, you receive no credit for **any** of the parts. However, if you answer (d) incorrectly or press Give Up (revealing the correct answer), you **do** receive credit for the other parts. Bottom line: don’t leave questions or parts of questions unfinished.
- Although all students will have similar homework problems, each student will have unique questions/answers to prevent blatant copying of answers.
8. Exams

Midterm exams are 90 minutes in length (the final exam is 110 minutes) and are conducted at the Testing Center www.testing.psu.edu for students at University Park. Students can sign up online for a time slot that fits their schedule. Time slots are available between 8 AM and 11 PM on the days that exams are scheduled. Students will receive an email from the Testing Center prior to each exam with instructions on how to sign up for an exam time.

Students who are not at University Park will need to obtain a proctor for their exams and make arrangements to have the exams administered locally. **Proctor arrangements must be made 2 weeks in advance of each exam.** Proctor information and a proctor request form are available in ANGEL.

9. Grading Policy

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework</td>
<td>Submitted on Mastering Engineering</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm Exam 1</td>
<td>At the Testing Center or proctored if you are not at University Park</td>
<td>80%</td>
</tr>
<tr>
<td>Midterm Exam 2</td>
<td></td>
<td>Each exam (including the final) is worth 20% of your total course grade.</td>
</tr>
<tr>
<td>Midterm Exam 3</td>
<td></td>
<td></td>
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<tr>
<td>Final Exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
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Grades will be posted and available online – homework grades on Mastering Engineering and exam grades on ANGEL. Final course grade will be determined based on the following breakdown:

<table>
<thead>
<tr>
<th>Score</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93-100</td>
<td>A</td>
</tr>
<tr>
<td>90-92</td>
<td>A-</td>
</tr>
<tr>
<td>87-89</td>
<td>B+</td>
</tr>
<tr>
<td>83-86</td>
<td>B</td>
</tr>
<tr>
<td>80-82</td>
<td>B-</td>
</tr>
<tr>
<td>77-79</td>
<td>C+</td>
</tr>
<tr>
<td>70-76</td>
<td>C</td>
</tr>
<tr>
<td>60-69</td>
<td>D</td>
</tr>
<tr>
<td>&lt; 60</td>
<td>F</td>
</tr>
</tbody>
</table>

10. Your Responsibilities to Participate in the Course

Active participation includes, but is not limited to, the following:

- Watching the online lectures;
- Reading the textbook;
- Completing weekly homework assignments;
- Using office hours and the online ANGEL discussion group when assistance is needed;
- Completing the exams

11. Academic Integrity

PSU’s Academic Integrity Policy states that “Academic Integrity is the pursuit of scholarly activity in an open, honest and responsible manner . . . Upholding academic integrity in the classroom is a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception.”¹ What does this mean? It means that if you are dishonest in the completion of your academic work, we (your professors and TAs) can’t honestly assess your knowledge and abilities.
and the University can’t honestly certify your degree. Thus, breaches in academic integrity compromise the University’s mission of teaching, learning, and evaluation of that learning.

Upholding academic integrity in the classroom is also important for another very practical reason -- practicing academic integrity in the classroom helps prepare you for the engineering profession, which demands ethical behavior. The National Society of Professional Engineers (NSPE) has a detailed code of ethics that practicing engineers are expected to follow. Failure to follow this code as a practicing engineer can result in losing your job and losing your Engineering license. Even more seriously, a lapse in ethics when designing or building some product can lead to injury or death. When you read these codes, you’ll notice that they adhere to the same basic ethical principles as Penn State’s academic integrity policy – honesty, truth, responsibility, fairness and respect. Thus, practicing academic integrity now will prepare you for resolving the ethical challenges that you will face as an engineer – challenges that you will have to resolve with integrity, often on the spur of the moment.

Our responsibility as professors and TAs is to help you practice academic integrity by being clear what that means in this particular class:

**Integrity in completing homework** – Each student is expected to complete his or her own online HW assignment. Consultation with other students on approaches to solving a problem is allowed, but having another student complete any part of your HW for you is not allowed. Because every student gets slightly different HW problems and because you get immediate feedback from *Mastering Engineering* regarding your answer, there is no need to compare answers with other students.

**Integrity in taking exams** – Any attempt to gain an unfair advantage in the completion of your exam is considered an academic integrity violation. Students are not permitted to communicate (orally, in writing, or electronically) with other students during an exam and are not permitted to discuss exam content with students who have not yet taken the exam. Likewise any unauthorized use of additional items during an exam (calculator, formula sheet, notes, other students’ exams, smart phone, etc.) is strictly forbidden.

Not only are we (students, TAs and professors alike) responsible for our own integrity, but we are collectively responsible for the integrity of the entire class. This means that if you become aware of others violating the integrity standards of the class, you should say and do something. For example, you may call your classmates out on their behavior or let us professors/TAs know what is going on. Likewise, as professors and TAs, it is our responsibility to the entire class to deal with lapses in academic integrity whenever we become aware of them. Academic integrity violations will be handled through established university procedures.

If you have any questions about the Academic Integrity policy in this class, please don’t hesitate to contact us professors and TAs. The College of Engineering has additional guidelines related to academic integrity at: [http://www.engr.psu.edu/AcademicIntegrity/default.aspx](http://www.engr.psu.edu/AcademicIntegrity/default.aspx)

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1 Faculty Senate Academic Integrity statement: [http://senate.psu.edu/policies/47-00.html#49-20](http://senate.psu.edu/policies/47-00.html#49-20)


12. Disabilities

Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services Web site at http://equity.psu.edu/ods/.

In order to receive consideration for course accommodations, you must contact ODS and provide documentation (see the documentation guidelines at http://equity.psu.edu/ods/guidelines/documentation-guidelines). If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with your instructor as early in the course as possible. You must contact ODS and request academic adjustment letters at the beginning of each semester.