

# EE 211 and EE212

## Circuit Analysis for Engineers

### Summer 2018 Syllabus

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Office Hours: Monday 1 – 3:30 pm, Tuesday 9 – 11 am and 1 – 4 pm  
Other times and virtual office hours by appointment.

Note: These office hours are for May 14 through August 10. Office hours are cancelled Tuesday July 10. Specific hours will be announced for the final exam.

#### **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 integrated circuit – 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.

#### **Prerequisites**

Physics 212

## Required Course Materials

The course material consists of two items:

- Textbook: Electric Circuits, 10th edition, by James W. Nilsson and Susan A. Riedel (Pearson, 2015)
- 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.

**Note:** If you are repeating EE211/212, your previously purchased subscription to Mastering Engineering will give you access for 18 months from the date of purchase. You will need to link to the current semester's site, however -- SU18EE211EE212. If you are repeating outside the 18 month subscription window, you will need to purchase access again.

You have 3 options for purchasing the course materials:

- Option 1: Custom soft-covered version of the textbook, eBook, and access to Mastering Engineering. For about \$135 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 SU18EE211EE212.
- Option 2: eBook and access to Mastering Engineering. For about \$98, 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. Finally, you connect to the EE 211/212 site using course ID SU18EE211EE212. If you choose Option 2, please be aware that being able to view both the course text and the homework assignment simultaneously is advantageous. (Think dual monitors or laptop + tablet...)
- Option 3 (not recommended): Access to Mastering Engineering without the eBook. For about \$61 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>. 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. Finally, you connect to the EE 211/212 site using course ID SU18EE211EE212. Note: You will still have to obtain the textbook via another source.

## 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.

### Course Website

We will use Canvas (<http://canvas.psu.edu/>) for this course. The Course Schedule of Activities in the Canvas site gives the scheduled dates of all primary homework assignments and exams.

### Communication

I will communicate information to you using announcements generated on the Canvas Announcements tab. These announcements will be emailed to your Penn State email account; they will also persist on the Announcements tab so you can refer to them as needed. Please be sure to read everything I send to you via these announcements.

### Course Presentation Structure

Although this course is online, it is structured to provide regular accountability. Homework assignments have due dates and exams are also scheduled for specific dates. The course is online allowing you work at your own pace, but, you must work within limits imposed by the scheduled dates. 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 and 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 provided on Canvas and should be considered part of the syllabus.

### Extraordinary Circumstances

Unexpected things happen. When extraordinary circumstances arise that interfere with your ability to meet scheduled course dates, please contact me as soon as you are aware of these circumstances. Even if the extraordinary circumstance occurs suddenly, I still generally expect you to communicate with me **prior** to the scheduled homework or exam date. Just a quick email or phone message is all that's necessary.

All extraordinary circumstances will be handled on a case-by-case basis. Some issues are fairly common and are listed:

- University-approved curricular and extra-curricular activities – Verifiable documentation is required. ROTC units, varsity and club sports, will be familiar with necessary documentation. For other activities, the student should obtain a letter or class absence form, indicating the anticipated absence, from the unit or department sponsoring the activity. The documentation must be provided to the instructor at least two weeks prior to the exam. Typically, homework will be due as scheduled, but, this is handled case by case.
- Religious holiday – In the case a religious holiday conflicts with a scheduled exam, the student must notify the instructor at least two weeks prior to the exam. Typically, homework will be due as scheduled, but, this is handled case by case.
- Illness – For short-term illness, must notify the instructor by email PRIOR to the exam time or assignment due date. If you have a long-term medical issue that may require ongoing accommodations, please make the instructor aware of the matter immediately. Documentation confirming you illness from a medical practitioner or SDR may be requested.
- Family Emergency – You must notify the instructor by email PRIOR to the exam time or assignment due date. Documentation confirming the emergency may be requested. Given the vast array of family emergencies the instructor will provide precise guidance as to what constitutes adequate documentation.

### Calculator

While taking exams, you will be permitted to use a “purpose built” calculator; phones, tablets etc., will not be permitted. The math on exams is designed to be solvable with a basic calculator such as a TI – 30. However, it is useful to be able to solve systems of equations and do calculations with complex numbers as well. A calculator like the TI 80’s family of calculators can be helpful. Please practice using your calculator while doing your homework so you are comfortable using it on the exams. Also, consider getting a phone App that emulates your calculator. That way you can use “your” calculator whenever you have your phone. Many of the TI 80’s family is emulated by Wabbitemu for Android. If you have additional suggestions, please pass them along.

### 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. 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. During summer, homework is assigned every week and the due dates and times of the primary assignments are indicated on both the Course Schedule of Activities in the Canvas site and in Mastering Engineering. **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 assignments vary in length and difficulty and are worth differing point values; because of this, no homework grades will be dropped. The total number of points earned during the semester is used to determine your homework grade. Each primary homework assignment after the first will have an Adaptive Follow-up opportunity. Adaptive Follow-up assignments are due two (2) days following the primary assignment. Adaptive Follow-up assignments consist of additional problems chosen to give you the opportunity to work problems similar to those that caused you difficulty with in the primary assignment. Students who receive a 90% or better on the primary assignment will “test out” of the

Adaptive Follow-up and receive credit for it. If you score less than 90%, you will need to work the problems to receive credit. I will use your Adaptive Follow-up score as a form of “extra credit”; at the end of the semester, I will add your Adaptive Follow-up score to the corresponding primary assignment score. Scores on the assignment will be capped at 100% of the primary assignment score.

Homework is completed online using the [Mastering Engineering](#) website. You must purchase access to Mastering Engineering in order to complete this course. See the “Required Course Material” section 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. Except in the case of multiple-choice homework questions, you will not be penalized for incorrect answers.
- 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.
- **Don’t leave questions or parts of questions unfinished.**
  - 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.
  - Leaving part of the primary assignment unfinished will also prevent you from “testing out” of the Adaptive Follow-up.
- Although all students will have similar homework problems, each student will have unique questions/answers to prevent blatant copying of answers.

## Exams

The three midterm exams are 90 minutes in length. Due to construction at the Testing Center, Exam 2, will not be held in the Testing Center for University Park students; I will announce details when they become available. The remainder of the exams will be held at the Testing Center [www.testing.psu.edu](http://www.testing.psu.edu) for students at University Park. Students can sign up online for a time slot that fits their schedule. Students will receive an email from the Testing Center prior to each exam with instructions on how to sign up for an exam time. The final exam is also 90 minutes in length; its location will be announced when published by the registrar.

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. Please complete a proctor information form for your proctor. Proctor information forms are available at the course website. If you keep the same proctor, you don’t need to submit a form for each exam. However, if you change your proctor, you must have the new proctor verified two weeks before the exam. **You are responsible have your proctor verified two weeks prior to each exam.** Failure to do so may result in a grade of zero on the exam.

	Two week deadline prior to each exam:	Exam Dates
Exam 1	May 25	June 6
Exam 2	June 15	TBA
Exam 3	July 6	July 18
Final Exam	July 27	TBA

## Grading Policy

Your homework grades are available in Mastering Engineering for each problem once it's complete. Your homework grades are imported from Mastering Engineering into Canvas after the last homework is due. If you take the exams in the Testing Center, your grade posts to Canvas within a couple minutes of your submission. Proctored exams are hand graded and are typically posted within a couple days of the exam. Your grades are weighted as follows:

Item	Comment	Weighting
Homework	Submitted using Mastering Engineering	20 %
Midterm Exam 1	At the Pollock Testing Center or proctored if you are not at University Park	80 %
Midterm Exam 2		Each exam, including the final, is worth 20 % of your total course grade.
Midterm Exam 3		
Final Exam		
Total		100 %

Final course grades will be determined based on the following breakdown:

Score	Letter Grade
[93, 100]	A
[90, 93)	A-
[87, 90)	B+
[83, 87)	B
[80, 83)	B-
[77, 80)	C+
	C
[60, 70)	D
[0, 60)	F

The grade ranges are indicated using notation for [intervals](#). Specifically, this means that grades aren't rounded up.

### Your Responsibilities to Participate in the Course

In taking a web based course, you are assuming responsibility for your active participation in the course. Active participation includes, but is not limited to, the following:

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

### Academic Integrity

The University defines academic integrity as the pursuit of scholarly activity in an open, honest and responsible manner. All students should act with personal integrity, respect other students' dignity, rights and property, including intellectual property, and help create and maintain an environment in

which all can succeed through the fruits of their efforts<sup>1</sup> (refer to Senate Policy 49-20). Dishonesty of any kind will not be tolerated in this course. Dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Students who are found to be dishonest will receive academic sanctions and will be reported to the University's Office of Student Conduct for possible further disciplinary sanctions<sup>2</sup>

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."<sup>3</sup> 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.<sup>4</sup> 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 homework for you is not allowed. Because every student gets slightly different homework 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

<sup>1</sup> Faculty Senate Academic Integrity statement: <http://senate.psu.edu/policies/47-00.html#49-20>

<sup>2</sup> Academic Administrative Policies and Procedures Manual, G9: <http://undergrad.psu.edu/aappm/G-9-academic-integrity.html>

<sup>3</sup> Faculty Senate Academic Integrity statement: <http://senate.psu.edu/policies/47-00.html#49-20>

<sup>4</sup> Professional Engineers Code of Ethics: <http://www.nspe.org/resources/ethics/code-ethics>

unauthorized use of additional items during an exam, for example, formula sheet, notes, other students' exams, smart phone, is strictly forbidden.

If you are in any doubt regarding whether an action may violate the course's academic integrity guidelines, it is your responsibility to clarify the issue with your instructor.

Not only are 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.<sup>5</sup>

If you have any questions about the Academic Integrity policy in this class, please don't hesitate to contact the instructor. The College of Engineering has additional guidelines related to academic integrity.<sup>6</sup>

## **Accessibility**

Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. The Student Disability Resources Web site provides [contact information for every Penn State campus](#). For further information, please visit the [Student Disability Resources Web site](#)

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, [participate in an intake interview, and provide documentation](#). If the documentation supports your request for reasonable accommodations, your [campus's disability services office](#) will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.

## **Counseling & Psychological Services**

Students who experience personal issues that interfere with their academic performance, social development or satisfaction at Penn State are encouraged to seek confidential assistance from Counseling and Psychological Services (CAPS) Center (<http://studentaffairs.psu.edu/counseling/>). They can be reached at (814) 863-0395. Some of the more common concerns they can help with include anxiety, depression, difficulties in relationships (friends, roommates, or family); sexual identity; lack of motivation or difficulty relaxing, concentrating or studying; eating disorders; sexual assault and sexual abuse recovery; and uncertainties about personal values and beliefs. Crisis intervention is available from Centre County CAN HELP (<http://centrecountypa.gov/index.aspx?NID=593>) at 1-800-643-5432, 24 hours a day, seven days a week.

<sup>5</sup> PSU procedures regarding Academic Integrity violations: <http://www.psu.edu/dept/oue/aappm/G-9.html>

<sup>6</sup> College of Engineering Academic Integrity guidelines: <http://www.engr.psu.edu/AcademicIntegrity/default.aspx>