

Syllabus/Course Information

Course Description:

ECE 204 AC Circuits

Credit Hours: 3R-3L-4C

Term Available: F, W

Prerequisites: PH 113 - Physics III, and either ECE 203 - DC Circuits* or ES 203 - Electrical Systems* or ES 213 - Electrical Systems*, and ES 213L - Electrical Systems Lab* *with a grade of C or better

Corequisites: None

Capacitance, Self and Mutual Inductance. Root-mean-square values of waveforms. Application of phasors to sinusoidal steady state. Impedance of circuit elements. Mesh and Nodal Analysis applied to ac circuits. Thevenin and Norton theorems applied to ac circuits. Single-phase ac power. Power factor correction. Voltage regulation and efficiency of feeders. Balanced three-phase systems. Ideal and non-ideal transformer models. Integral laboratory.

Instructor:

Dr. Carlotta A. Berry, Professor, Electrical and Computer Engineering

office: Moench Hall, F-123

office hours: by appointment or just stop by

campus mail: 110

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phone: 812-877-8657

website: <https://wordpress.rose-hulman.edu/berry123>

Required Textbook:

J.W. Nilsson & S.A. Riedel, Electric Circuits, 12th edition, Prentice Hall, 2023

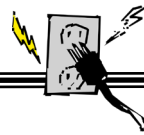
Lab Safety Policy

Review on Moodle course website.

Student Learning Outcomes:

After successfully completing this course, the student should be able to:

1. Develop an understanding of the concept of dc-equivalent (rms) values for various waveforms.
2. Take the circuit theorems, applied in ECE203 to dc circuits, and extend them via phasor analysis to ac circuits.
3. Develop an understanding of single-phase ac circuits and skills to calculate complex power, apparent power, real power, reactive power, and power factor.
4. Develop an understanding of three-phase ac circuits and skills to calculate complex power, apparent power, real power, reactive power, and power factor.



ECE204 AC Circuits

Winter 2024-2025

5. Develop an understanding of the power factor correction concept for ac single-phase and three-phase circuits and skills to calculate the required value of a shunt capacitor to correct the power factor to a certain value.
6. Develop an understanding of transformer concepts and skills to calculate voltage regulation and efficiency given transformer parameters.
7. In laboratory perform calculations and measurements of apparent power, real power, reactive power, power factor, and power factor correction for ac single-phase and three-phase circuits.
8. In laboratory perform calculations and measurements for a single-phase transformer to obtain the transformer equivalent circuit parameters, and then perform voltage regulation and efficiency calculations.

Grading:

Grades will be assigned at the end of the quarter based on the grade weights and grading scale shown below:

		A	90 – 100
Homework (10)	10%	B+	87 – 89
Quizzes (10)	5%	B	80 – 86
Laboratory assignments (9)	15%	C+	77 – 79
Lab Practical Test	5%	C	70 – 76
Midterms (3)	39%	D+	67 – 69
Final Exam	26%	D	60 – 66
		F	Below 60

Independent of point totals:

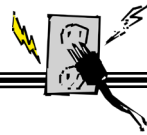
- Your final grade may be adjusted up or down based on intangibles such as interest, effort, timeliness, attendance, and compliance with the cell phone policy.
- You must satisfactorily *complete* all of the lab projects in order to pass the course.
- You must have a *passing* weighted exam average of greater than or equal to 60% to pass the course.
- Exams are very important and as such, you cannot receive more than one letter grade higher than your overall weighted exam/final average.

Examinations:

In this course, examinations make up **70%** of the grade and warrant careful preparation. Examination questions will be based on the lecture material, textbook, homework, and laboratory work. The three midterm tests will be fifty minutes in duration during the regular class meeting time. Midterms and final examinations will be closed book and closed notes. You will be provided with a formula sheet and it is your responsibility to memorize or derive any formula missing from this document. Computers are not allowed on the exams, so learn how to use your calculator to solve simultaneous equations, matrices, and complex number math. The lab practicals will be 75 minutes and open book.

Re-grades:

All requests for re-grades must be made in writing within one week of the return of the assignment or exam. The student should not make any marks on the document and must attach a memorandum that



details a technical justification for the reason for the submission. It should be noted that based upon the request, the grade may increase, decrease, or remain the same.

Quizzes:

There will be weekly quizzes on Moodle. Quizzes will have multiple choice questions on the reading, homework, and class lecture. Quizzes should be completed on your own but are open book and open notes. The purpose of the quizzes is to

- give me feedback on the current level of understanding of the class
- give you feedback on your current level of understanding
- give you practice on problems to prepare for the exam

Homework:

The homework is intended to help you to understand the concepts presented in the course, and to provide you with practice in problem solving.

- Problem sets are due before the bell rings at the beginning of class based upon the course schedule.
- No late homework will be accepted.
- Arrange to turn in homework early if you will be away for job interviews, athletic events, etc.
- The required format is described in the ECE Department's guidelines and standards for writing assignments. It must be in the proper format on engineering paper. It is your responsibility to make your methods and results clear to the grader.

Calculators & Computers:

You will need a calculator that can perform arithmetic with complex numbers (TI-83 plus or better). It is important to learn to do simultaneous equations (or matrix) calculations with your calculator to be successful in this course. You are encouraged to practice doing the homework with the same calculator you will use on the exam. Maple can be used on the homework problems, quizzes or prelabs, but not on the exams.

Laboratory Supplies:

Each student team must purchase an ECE204 kit with breadboard from the parts room before the first lab. Each student team will also check out a Diligent EE board to use for the lab assignments.

Prelabs:

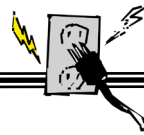
Prelab exercises are due at the beginning of lab before the bell rings. Each student should do the prelab worksheet, this is an individual grade. Any student that has not completed the prelab must do it at the beginning of lab for zero credit.

Laboratory Assignments:

Lab assignments will be performed individually.

Course Policies:

- Students are encouraged to check their RHIT email account or Teams daily for information regarding the class. You are responsible for all information sent to your account from the professor, whether read or not. Students should also regularly check your grades on Moodle to make sure there is not a recording error.



- All students are expected to join in class discussion and all activities with a positive attitude. All students are expected to exhibit an attitude that is appropriate to one studying a profession and such that everyone has an engaging, fulfilling and successful experience. Please also leave the classroom neater than you found it.
- Operating your computer in class for anything other than an approved course activity is not permitted. Students must not hinder the learning environment of their fellow classmates with any other distracting behavior such as talking, sleeping, doing homework, playing on mobile phone or reading the newspaper. Continued disruptive conduct will lead to the student being asked to leave class and marked absent for that class period. The student will remain responsible for all class assignments.

Attendance:

- Regardless of whether formal attendance is taken, attendance at each class is expected. As a rule of thumb, you should consider yourself seriously behind if you miss more than four classes in a four credit-hour course. According to Rose-Hulman Academic Rules and Procedures, "A student whose total absences in a course, excused or unexcused, exceed two per credit is liable to fail the course." ***Eight absences in this course are grounds for failure.***
- If you miss a lab with an excused absence you need to make it up within 1 week without penalty. If you miss a lab without an excused absence, you need to make it up within 1 week and you will receive a grade of zero. ***If you come to lab more than 15 minutes late you need to complete the lab on your own.***
- Missed exams will not be made up. ***The final exam grade will be used to replace a missing test grade in the case of excused absences.*** An excused absence from an examination normally requires advance approval or formal documentation of an emergency. An examination that is missed for an unexcused reason will be given a grade of **zero**. Students are not excused from scheduled exams for intramural athletics or fraternity events.
- If you must be absent from class for any reason including a sports participation, job interview or illness, you must let the instructor know as far in advance as possible.
- Students are responsible for all information presented in class whether present or not.

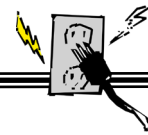
Institute Policies:

Students with Accessibility Needs:

Rose-Hulman is committed to working with students who have special needs or disabilities. Visit [the Accessibility Services website](#) for more information. Requests for academic accommodations must be documented with and approved by the Accessibility Services office before they can be implemented in this course.

Student Well-Being and Academic Success:

Rose-Hulman cares about the well-being of every student. Stress is a normal part of the college experience and is often compounded both by classwork and unexpected challenges outside the classroom. I encourage you to reflect on how you take care of yourself throughout the term, especially before the demands of exams and projects reach their peak. You can reach out to the [Learning Center](#), [Student Academic Success](#) or the [Student Counseling Center](#) (which offers



both online and in-person resources) if you would like assistance. Additional resources to help maintain your work-life balance can be found on the [Campus Life](#) web page and within the [Student Success Guide](#). If you, or someone you know, is struggling, you can let us know through the [Rose Cares](#) system, and someone will reach out.

Academic Integrity:

The [Student Handbook](#) and Rose-Hulman's [Academic Rules and Procedures](#) describe penalties and processes invoked as a consequence if academic misconduct (such as cheating, plagiarizing, or interfering with the academic progress of other students) takes place. It is the responsibility of each student to know and follow Rose-Hulman's rules about academic integrity.

It is expected that any work submitted for assessment represents the intellectual work of the individual(s) submitting the work. Any attempt to pass off the intellectual work of another (including the work generated by Large Language Models like ChatGPT) as their own or without proper attribution is an example of academic misconduct and is subject to the penalties described in the Rose-Hulman Academic Rules and Procedures and Student Handbook documents.

Diversity Statement:

Rose-Hulman Institute of Technology is [committed to being an inclusive community](#) in which the multiplicity of values, beliefs, intellectual viewpoints, and cultural perspectives enrich learning and inform scholarship.

Online Access Requirements:

Rose-Hulman welcomes students from around the world, and encourages faculty, staff and students to travel around the world. However, geopolitical conditions and compliance with export law and regulations prevent us from delivering certain kinds of educational experiences and/or using certain kinds of Institute technologies in some locations. For example, students in locations with limited access to the internet in general, or with restricted access to portions of the internet, or which are embargoed by the U.S. Directorate of Defense Trade, may not be able to successfully complete Rose-Hulman courses.

Emergency Information:

To receive email or text messages regarding emergency situations that may impact campus and, possibly, the delivery of classes, [register for RAVE alerts](#) and/or follow [@Rose-HulmanAlert on Twitter](#). Any announcements about the Institute's ability to offer classes will be shared on [Rose-Hulman's website](#).