

ECE 2030: Electric Circuits Fundamentals

- 1. ECE 2030 - Electric Circuits Fundamentals
- 2. 3 credits, 2.5 contact hours, Three 50 minute lectures
- 3. Course Coordinator: Dr. Alan Johnston
- 4. Text Book

Ulaby, Maharbiz and Furse, "Circuit Analysis & Design", Michigan Publishing, 2018.

- 5. Specific Course Information
 - a. Catalog Description Basic concepts, steady-state DC circuit analysis, network theorems, energy storage elements, complete response of first-order circuits, steady-state sinusoidal circuit analysis, AC systems.
 - b. Prerequisites: None; Co-requisites: ECE 2031
 - c. Required for B.S. Electrical Engineering

- 6. Course-specific Goals
 - a. Learn how to analyze electric circuits for voltage, current, and power with sources, resistors, inductors, and capacitors; Learn how to analyze circuits using a variety of techniques including Kirchhoff's Laws, Node Voltage Method, Mesh Currents, and Superposition; Learn how to analyze transient resistor/inductor and resistor/capacitor circuits; Learn how to analyze alternating current circuits using phasors, impedance, and complex power.
 - b.

Student Outcomes						
1	2	3	4	5	6	7
X						

- 7. List of Covered Topics
 - 1. Basic Concepts
 - 2. Resistive Circuits
 - 3. Analysis Techniques
 - 4. Network Theorems
 - 5. Energy Storage Elements & Transient Behavior of First-Order Circuits
 - 6. AC Circuit Analysis
 - 7. 2nd Order Circuits
 - 8. AC Power

Approved by: Dr. Alan Johnston

Class Meetings

Section 001: MWF from 9:10 am to 10:00 am Distance Learning - Johnston

Section 002: MWF from 10:20 am to 11:10 am Distance Learning - Johnston

Section 003: MWF from 9:10 am to 10:00 am Distance Learning - Char

Instructors

Sections 001 and 002:

Dr. Alan Johnston

431B Tolentine

610 -519-4972

alan.johnston@villanova.edu

Office Hours on Zoom by appointment

Section 003:

Mr. Edward Char

408 Tolentine

610 -519-5659

Edward.char@villanova.edu

Office Hours on Zoom by appointment

TA: Courtney Rademacher

crademac@villanova.edu

Office Hours

See above for Office Hours.

Remember that the ECE department also has tutoring hours set up by all the TA's. Schedule will be set shortly after classes start.

Schedule

Class	Date	Topics
1	8/17	Introduction
2	8/19	Charge, current, voltage, ideal elements, voltage and current sources, Ohm's Law, KCL, KVL
3	8/21	Quiz 1 - Practice, series and parallel combination, dependent sources
4	8/24	voltage and current divider, Wheatstone bridge, energy, power
5	8/26	Nodal analysis

6	8/28	Quiz 2, HW#1 due, Supernode
7	8/31	Mesh analysis
8	9/2	Supermesh
9	9/4	Quiz 3, Supermesh continued
	9/7	No Class
10	9/9	Superposition
11	9/11	Quiz 4, HW#2 due, Thevenin
12	9/14	Thevenin continued, Source transformations
13	9/16	Quiz 5, Review
	9/18	Test 1
14	9/21	Go over Test
15	9/23	Maximum power transfer theorem
16	9/25	Quiz 6, HW#3 due, Step and ramp
17	9/28	Capacitors
18	9/30	Capacitor D.C. steady state
19	10/2	Quiz 7, series and parallel combinations, stored energy
20	10/5	Capacitor waveforms and stored energy
21	10/7	Inductors, D.C. steady state
22	10/9	Quiz 8, HW#4 due, series and parallel combinations
23	10/12	Catchup
24	10/14	Quiz 9, Review
	10/16	Test 2
25	10/19	Go over Test, First order RC transients
26	10/21	Multiple switches, time to steady state
27	10/23	Quiz 10, first order RL transients, time to steady state
28	10/26	Sinusoids, phasors
29	10/28	Complex math review
30	10/30	Quiz 11, HW#5 due, standard cosine form, leading and lagging
31	11/2	A.C. circuits, phasor analysis, impedance
32	11/4	Reactance, impedance matching
33	11/6	Quiz 12, Impedance matching continued
34	11/9	A.C. Thevenin circuits
35	11/11	A.C. maximum power transfer theorem
36	11/13	Quiz 13, Maxim power transfer continued
37	11/16	A.C. power
38	11/18	Complex power, reactive power
39	11/20	Quiz 14, HW#6 due, Power factor
40	11/23	Review
	12/4	Final Exam 11:30 – 2pm

Grading Policy

Your final grade will be determined from the following:

- Tests: 40% (Two tests, the lower is 15% and the higher is 25%)
- Homework and Participation: 15%
- Quizzes: 15%
- Final Exam: 30%

The scale used to assign letter grades is:

Numerical Grade	Letter Grade	Numerical Grade	Letter Grade
A	93 to 100	C	73 to 76
A-	90 to 92	C-	70 to 72
B+	87 to 89	D+	67 to 69
B	83 to 86	D	63 to 66
B-	80 to 82	D-	60 to 62
C+	77 to 79	F	Less than 60

Quizzes. There will be a 10 minute quiz at the beginning of class every week, which will be on Friday except for the weeks when there is a test or holiday, in which case it will be on Wednesday. Each quiz will cover the material from class, from the reading, and from the homework since the previous quiz. The quizzes will be closed book, no calculators unless explicitly specified, and no sheet of paper (note sheets). Make sure you get to class on time. Your top ten quiz scores will count; the quizzes with the lowest grades that you have taken will be dropped. However, if you miss a quiz with an unexcused absence, that zero will count and will not be dropped. We will be using the Respondus Lockdown browser with Webcam Monitoring (part of Blackboard) for quizzes, so make sure you have a webcam on your computer or iPad that works.

Tests. The two tests are closed book, no calculators, but a single 8 1/2 × 11 inch sheet of paper with information *in your own handwriting* will be allowed. No excuses for missed exams will be accepted other than certified medical excuses. If your watch stops or your car doesn't start on the day of a test, the zero you get will be the grade that counts for 10%. Makeup tests will not be given. If the test is moved to a different date, at least one week notice will be given. We will be using the Respondus Lockdown browser with Webcam Monitoring for tests as well.

Test 1 9/18
 Test 2 10/16

Material through 9/14
 Material through 10/12

Homework and Participation. There are 6 homework assignments, due as listed on the schedule. Homework submissions are in PDF format only, uploaded to Blackboard. Late homework will have a 25% per week day grade deduction. Homework will count for 12% of the grade. Weekly Participation Activity problems will be assigned each week on a Monday, due by Friday of that week by midnight. The problems are interactive online problems in zyBooks, and are marked as a completion grade percentage (out of 100) only. The participation grade counts for 3% of the grade.

Exam

You are allowed a calculator for the final, as well as 3 “note sheets”. We suggest you keep the ones from the two tests and make up a third from last few topics. Again, the Respondus Lockdown browser with Webcam Monitoring will be used.

Inclusive Classroom

We consider this classroom to be a place where you will be treated with respect; and, we welcome individuals of all ages, backgrounds, beliefs, ethnicities, gender, gender identities and expressions, sexual orientation, and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class.

Attendance

Attendance is expected and assumed. Records of attendance will not be kept, but you are responsible for all material covered in class even if you are absent or late. The excuse that “I was not there when you said that,” is not valid under any circumstances. If you miss a class or part of one, get the material from one of your fellow students, or contact an instructor or a teaching assistant. Where possible, students should inform their instructors if they plan to be late or absent from class. In all cases, students should be prepared to provide documentation to petition for *excused* absences to the Associate Dean for Student and Strategic Programs, Dr. Stephen Jones. Students should use the form:

https://www1.villanova.edu/content/villanova/engineering/students_secure/forms/studentAbsence.html

Excused absences do not count toward a failure in the course for first year students. Absence from class does not release the student from work assigned. Students who miss an in-class obligation (exam, presentation, etc.) due to an excused absence will not be penalized - the instructor may offer a make-up test, arrange an alternative time for a presentation, exempt a student from the assignment, or provide another arrangement.

The University’s list of excused absences for all students includes the following:

- participation in NCAA athletic competitions
- participation in special academic events (e.g., conferences, field trips, project competitions)
- participation in official university business (e.g., student representatives attending meetings related to university governance)
- attendance at significant events involving the immediate family (e.g., funerals, weddings)
- religious holidays - see the University’s policy on Religious Holidays
- college-approved participation in placement activities (e.g., job interviews, graduate school interviews, attending job fairs)
- legally required absence (jury duty, court appearance, short-term military service)
- documented serious illness or disability

Course Materials

Required Online Textbook: zyBooks: <https://learn.zybooks.com/zybook/VILLANOVAECE2030Fall2020> (The first time you will need to click on the Create Account button and follow the instructions).

Free PDF Version for Download: Ulaby, Maharbiz and Furse, “Circuit Analysis & Design”, Michigan Publishing, 2018. <https://www.publishing.umich.edu/publications/ee/> (Note that problem and example numbers are different from zyBooks version)

Academic Integrity

The College of Engineering is committed to creating an environment of academic integrity and ethical decision-making that we hope is reflected in the actions of our students and graduates. As Villanova students, integrity is central to the University mission. As engineers, our code of conduct requires us to place honor and integrity at the forefront of everything we do. As engineering students, it is expected that you will begin to adopt these values and instill them into your work habits. Students violating the academic integrity policy will receive a zero on that assignment or exam and the violation will be reported to the Associate Dean for Academic Affairs.

The University’s academic integrity policy can be found here:

<https://www1.villanova.edu/villanova/provost/resources/student/policies/integrity.html>.

The College of Engineering has adopted the following exam guidelines:

- Students must arrive before the start of the exam. Under exceptional circumstances a student may need to arrive late, but he/she can enter the exam no later than 5 minutes after the start of the exam.
- All cell phones must be turned off and stored away until the student exits the exam room.
- The official Villanova class attendance policy must be followed when requesting excuses for absences or lateness to an exam.
- Each student must write and sign the following statement, *"I have neither given nor received any unauthorized assistance in the completion of this exam."*
- Students can work together on homework, but each person must turn in a copy in their own handwriting.

Adherence to the Student Code of Conduct and the CARITAS Commitment

Students are expected to act in a professional and respectful manner to their fellow students, faculty, and staff. Students should become acquainted with and understand the responsibilities set forth in the Student Handbook, especially those in the sections on Policy and Regulations. Adherence to University regulations is expected and required for successful completion of the program of studies. Enforcement within the classroom of policies regarding classroom behavior is the responsibility of the faculty member. All other discipline problems are to be referred to the Dean of Students.

Students, faculty, and staff are expected to comply with the [CARITAS Commitment](#). Students must wear masks, practice social distancing and good hygiene, wipe down their work area upon arrival and departure, and request an excused absence if they are not feeling well.

Online Expectations

To foster a professional environment, please wear appropriate clothes, mute if you are not talking to cut down on background noise, refrain from eating, and select an appropriate setting when we are meeting online.

Students with Disabilities

It is the policy of Villanova to make reasonable academic accommodations for qualified individuals with disabilities. If you are a person with a disability please contact me after class or during office hours to make arrangements.

If you have a non-physical disability you need to register with the Learning Support Office by contacting 610-519-5176 or at learning.support.services@villanova.edu as soon as possible. Registration is needed to receive accommodations.

The Office of Disability Services collaborates with students, faculty, staff, and community members to create diverse learning environments that are usable, equitable, inclusive and sustainable. The ODS provides Villanova University students with physical disabilities the necessary support to successfully complete their education and participate in activities available to all students. If you have a diagnosed disability and plan to utilize academic accommodations, please contact and register with Gregory Hannah, advisor to students with disabilities @ 610-519-3209 or visit the office on the second floor of the Connelly Center.

The Learner's Studio

Villanova's Learners' Studio provides free 1:1 and small group (max of 10 students) content tutoring for over 100 courses on campus (excludes writing, math, and entry level VSB courses). From quick homework clarification questions to prep for final exams, we can help! Our peer tutors are each endorsed by two faculty members and are trained according to CRLA national standards. Pop in as-needed or book a regular weekly session to supercharge your academic success. Sessions can be 30 or 60 minutes in length. We are located in Old Falvey 301.

Walk-ins welcome, or book in advance online:

1. Visit Villanova.mywconline.com
2. Register for an account and select "The Learners' Studio" from the drop-down menu on the sign-in page
3. Use the "limit to" menu to locate your course by code (For example, PHY 2400). This feature will sort the schedule and show you all tutors approved to cover your class
4. White boxes represent available sessions. Click any white box to book

Don't see your class listed? Request a tutor for a missing subject with this link: tutorrequest.villanova.edu

For more information, contact juliana.studer@villanova.edu 610-519-5862.

Electronics Policy

The use of electronic devices, such as phones, laptops, tablets, etc., during class is generally fine, unless you become a disturbance to others.

Students are prohibited from making any audio or visual recordings (including taking photographs) of lectures, discussions, or other classroom activities, unless a student (1) has written permission in advance from the instructor, or (2) is permitted to record under terms and conditions as approved by the University's Office of Disability Services or Learning Support Services. Students who have received approval to record classes as an academic accommodation must provide supporting documentation from the Office of Disability Services or Learning Support Services in advance of any recording. Students may use authorized recordings only for the purposes of individual study in the course, and may not disseminate or share them with a wider audience without explicit permission.

Copyright Policy

The materials used in Villanova University courses ("Course Materials") generally represent the intellectual property of course instructors, third parties and/or the University which may not be disseminated or reproduced in any form for public distribution (e.g., sale, exchange, etc.) without the written permission of the course instructor. Course Materials include all written or electronic documents and materials, including syllabi, current and past examination questions/answers, and presentations such as lectures, videos, PowerPoints, etc., provided by a course instructor. Course Materials may only be used by students enrolled in the course for academic (course-related) purposes.

Published course readings (book chapters, articles, reports, etc.) available in Blackboard are copyrighted material. These works are made available to students through licensed databases or fair use. They are protected by copyright law, and may not be further disseminated or reproduced in any form for distribution (e.g., uploading to websites, sale, exchange, etc.) without permission of the copyright owner.

Follow these links for more information about [intellectual property](#), [copyright](#), and [computer acceptable use](#).

Adherence to the Student Code of Conduct

Students are expected to act in a professional and respectful manner to their fellow students, faculty, and staff. Students should become acquainted with and understand the responsibilities set forth in the Student Handbook, especially those in the sections on Policy and Regulations. Adherence to University regulations is expected and required for successful completion of the program of studies. Enforcement within the classroom of policies regarding classroom behavior is the responsibility of the faculty member. All other discipline problems are to be referred to the Dean of Students.

Professorial Duties

It is important to note that teaching is one of the many duties that professors perform as part of their job responsibilities. In addition to teaching, professors perform research, advise graduate students, edit journals and review journal articles, serve on committees for the university and professional societies, travel to conferences to remain abreast of current developments and to present their results... to name just a few.



GENERAL GUIDELINES

- **For general emergencies and to report a crime:**
 - Get to a safe place if possible
 - **Call (610) 519-4444**
- **In an emergency evacuation (including but not limited to a fire alarm):**
 - Move quickly and safely to the nearest exit
 - Close doors and windows if time permits
 - Do not use elevators
 - Assist disabled individuals who cannot evacuate themselves by proceeding with them
 - Proceed with them to the nearest fire stairway or safe haven and wait inside with the doors closed until rescue personnel arrive to assist. Immediately get word to rescue personnel of the exact location of the disabled individual
 - Remain a safe distance from the building and be aware of responding emergency vehicles

MEDICAL EMERGENCIES

- - Do not move a seriously injured or ill person unless the situation is life threatening
 - Call Public Safety at (610) 519-4444
 - Give the dispatcher your name, location, and telephone number and as much information as possible regarding the nature of the injury or illness
 - Do not hang up until the dispatcher ends the call
 - Administer first aid if you are trained to do so. Otherwise remain with the victim until Public Safety or medical personnel arrive

SHELTER IN PLACE

- Shelter in place is design to keep you safe while indoors if dangerous environmental conditions exist, such as extreme weather or a hazardous materials release. **If a shelter in place is ordered:**
 - If outside, seek shelter in the nearest building, preferably in an interior room with few windows
 - Close all exterior doors, windows and any other openings to the outside
 - Avoid overcrowding by selecting several rooms if necessary
 - Monitor Nova Alert and email for further instructions
 - Report any emergency or unusual condition to Public Safety
 - Do not leave the building until receiving the "all clear" from a police officer, Public Safety officer, Nova Alert, email or website communication

UTILITY FAILURES AND ELEVATOR EMERGENCIES

- **Report utility failures to Facilities Management by calling (610) 519-4420 during normal business hours. After hours, report utility failures to Public Safety by calling (610) 519-4444.**

ALCOHOL EMERGENCIES

- Consuming too much alcohol can result in serious injury or even death. **Call Public Safety at (610) 519-4444 if a person:**
 - Cannot be roused by shaking or shouting
 - Has cold, clammy or bluish skin
 - Is disoriented, incoherent, or cannot stand, walk or talk
 - Sustained a blow to the head or any injury that caused bleeding
 - Has shallow or irregular breathing
 - Drank alcohol in combination with other drugs

IN AN ACTUAL FIRE

- - Activate the fire alarm system by pulling a fire alarm station on your way out of the building
 - Leave the building via the nearest exit
 - Do not use elevators
 - Feel doors before opening, and close doors and windows as you leave if safe to do so
 - Report the fire to Public Safety by calling (610) 519-4444 once outside
 - If trapped, keep the doors closed and place cloth under them to keep out smoke
 - Signal for help by hanging an object (e.g., such as a jacket or shirt) out window to attract attention

LOCKDOWN

- An imminent threat of violence may be cause for a lockdown of all or part of campus. Some exterior doors will lock automatically. Emergency responders will lock others manually. The goal is to limit exposure of students, faculty and staff to danger by preventing dangerous persons from entering campus buildings. **If a lockdown is ordered:**
 - Stay Inside! Do not leave the building unless an imminently dangerous situation arises inside. If outside, seek shelter in the nearest building
 - Take shelter in a lockable room if possible
 - Close windows, shades and blinds, and avoid being seen from outside the room if possible
 - Monitor Nova Alert and email for updates and further instructions. A description of the actor will be disseminated as soon as possible using these methods
 - Report any emergency or unusual condition to Public Safety
 - Use discretion in admitting anyone into a secure building. Require that all backpacks and other bags be left outside at least 30 feet from the building. Require that the person seeking shelter open all outer garments for visual inspection before allowing entry
 - Once in a secure location, do not leave until receiving the "all clear" from a police officer, Public Safety officer, Nova Alert, email or website communication