

**Department of Electrical and Computer Engineering  
University of Massachusetts/Amherst**

**ECE 310: Circuits and Electronics II, Fall 2022**

**Course Synopsis**

Analysis of circuit response to sinusoidal excitation; phasor analysis, impedance, admittance, power, frequency response, transfer functions, Bode plots, filters. Linear analysis of nonlinear circuits; DC biasing of 3 terminal devices, small signal analysis, single device amplifiers, small signal gain and frequency response. Computer and laboratory projects. (4 credits)

**Prerequisites**

ECE 201 (Analytical Tools for ECE), ECE 202 (Computational Tools for ECE), ECE 210 (Circuits and Electronics I)

**Instructors**

Lectures: Robert W. Jackson, 215G Marcus Hall, [jackson@ecs.umass.edu](mailto:jackson@ecs.umass.edu)

Office Hours: TBD

Discussions & Labs: Marinos Vouvakis, 215J Marcus Hall, [vouvakis@umass.edu](mailto:vouvakis@umass.edu)

Office Hours: TBD

**Teaching Assistants**

Minghao Dong [minghaod@umass.edu](mailto:minghaod@umass.edu) Office Hours: TBD

Zheshun Xiong [zxiong@umass.edu](mailto:zxiong@umass.edu) Office Hours: TBD

**Course Meeting Times**

Lectures: MWF, 9:05-9:55 AM, Marston 132

Discussions: Section AA: Marston211, Monday 2:30-3:45

Section AB: Marston211, Monday 4:00-5:15

Labs: Section LL: Marston 221, Tuesday 2:30-5:30 (See schedule)

Section LM: Marston 221, Wednesday 2:30-5:30 (See schedule)

**Grading Scheme**

Letter grade based on the following weights:

(1) Four Pre-lab/Lab Assignments (25%), (2) Four Quizzes(50%), (3) Final (25%)

Note on Homework: There will be no homework collected. In order to prepare for the quizzes, sample problems and solutions will be provided to students.

Notes on Pre-lab/Lab Assignments: Each assignment consists of a Prelab design and then the fabrication and measurement of the designed circuits, the Lab. Prelab assignments must be submitted on Gradescope by 11:59 pm on the due dates. *Late submissions must be perfect and will then receive only a minimum passing grade.* The grade for each assignment will be primarily based on the Prelab quality. The circuits designed in the Pre-lab must be built and demonstrated as described in the Lab before any grade will be recorded. Demonstrations must be completed by the

date shown on the schedule or a penalty will be assessed. *You can not pass the course without completing the labs.*

### **Textbook**

*Foundations of Analog and Digital Electronic Circuits*, by Agarwal and Lang, Morgan-Kaufman publishers

### **Software**

The university has a site license for the online simulator CIRCUITLAB, so students will probably want to use that. Some students may wish to use PSPICE which can be downloaded free from <https://www.orcad.com/resources/download-orcad-lite>. Mac users will need a Windows emulator to run PSPICE. Another alternative is LTSPICE which runs natively on both Windows and MAC.

### **Laboratory Kits**

All students who took the prerequisite course ECE210 already have a laboratory kit that has everything needed for ECE310. If you lost the kit, you will need to purchase the instrumentation module ADALM2000. If you transferred from another institution and completed the prerequisite ECE210 equivalent elsewhere, please see the instructors.

### **Course Goals**

Students completing this course will be able to:

1. Employ the concepts of phasors, impedances, admittances to analyze circuit response to sinusoidal inputs.
2. Develop a familiarity with frequency response including: transfer functions, gain and phase plots, bode plots, filters.
3. Be able to analyze circuits with nonlinear devices in order to design linear single device amplifiers.
4. Be able to analyze the small signal frequency response of single device amplifiers.
5. Be able to analyze the frequency and time response of opamp feedback circuits using simple behavioral models.
6. Design, build and measure basic electronic circuits.

### **ECE ACADEMIC HONESTY POLICY**

An Honor Code Policy has been adopted for all ECE students at UMass Amherst, the result of a joint initiative between students in Eta Kappa Nu (the ECE student honor society) and the Faculty of the ECE Department. The purpose of this policy is to emphasize engineering ethics as an important part of your education and career, and to enhance the value of your ECE degree from UMass. Simply put, the policy requires that each ECE student demonstrate high ethical standards by attesting to personal honesty and integrity for each examination taken and laboratory report completed. The policy fits within the framework of the existing Academic Honesty Policy of the University, and is similar to that used by other universities. Cheating will not be tolerated. A student found cheating on an exam will receive an automatic grade of F on the exam, and likely will fail the course as well.

([http://www.umass.edu/dean\\_students/codeofconduct/acadhonesty/](http://www.umass.edu/dean_students/codeofconduct/acadhonesty/))

## **Accommodation & Inclusive Learning Statement:**

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Your success in this class is important to us. We all learn differently and bring different strengths and needs to the class. The University of Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you have a qualifying disability and require accommodations while participating in this course, please work with Disability Services to have an accommodation letter sent to us in a timely manner. If you have a disability but are not yet affiliated with Disability Services, please register with Disability Services (<https://www.umass.edu/disability/students>). Information on services and materials for registering are also available on their website [www.umass.edu/disability](http://www.umass.edu/disability). If you are eligible for exam accommodations, your exams will be administered by the exam proctoring center. Contact Disability Services immediately, and comply with their exam scheduling policies, including the requirement that you book your exams at least seven days in advance of the exam date. *It is incumbent upon you contact me during the first few weeks of the semester, or shortly following registration with Disability Services, to ensure that your accommodations are being sufficiently met, including extra time and note-taking access, as applicable.* Finally, beyond disability accommodations, if there are aspects of the course that prevent you from learning or make you feel excluded, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course.

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## **Inclusivity Statement:**

The diversity of the participants of this course is a valuable source of ideas, problem solving strategies, and engineering creativity. If you feel that your contribution is not being valued or respected for any reason, please speak with me privately. If you wish to communicate with someone else in the College, speak with Assistant Dean Dr. Paula Rees ([rees@umass.edu](mailto:rees@umass.edu)). You may also report a Climate Incident to campus at [umass.edu/diversity](http://umass.edu/diversity) or anonymously through the College of Engineering Climate Concerns and Suggestions on-line form (<https://tinyurl.com/UMassEngineerClimate>) and/or the Positive and Negative Classroom Experience online form (<https://tinyurl.com/UMassEngineerClassroom>). We are all members of an academic community with a shared responsibility to cultivate a climate where all individuals are valued and where both they and their ideas are treated with respect.