

West Virginia University
College of Engineering and Mineral Resources
Lane Department of Computer Science and Electrical Engineering

EE 355 Analog Electronics
Fall 2020

Class Info

Meeting Time: 2:00-2:50 MWF
Location: Online
Prerequisites: EE 223, EE 251
Credit Hours: 3 (Lecture)

Instructor

Dr. David W. Graham
dwgraham@mail.wvu.edu
AER 355
304-293-9692

Office Hours (via Zoom/Online)

Mondays and Wednesdays 2:00-3:00; (By appointment Fridays 2:00-3:00)

Recommended Text

Microelectronics: Circuit Analysis and Design, Fourth Edition
By Donald A. Neamen, published by McGraw Hill, Copyright 2010
ISBN: 0073380644

Webpage

The course website will be hosted on eCampus – <https://ecampus.wvu.edu/> (Please check frequently)

Required Items

- A reliable internet connection
- Windows or Mac computer (not on a VM)
- Respondus Lockdown Browser and Respondus Monitor (freely available from the university)
- Webcam and microphone
- Speakers / headphones
- Scan-to-PDF app / software

Recommended Items

- Scientific calculator
- Loose-leaf paper (for quizzes / tests)

Course Description

This course deals with the design, analysis and understanding of analog electronic circuits. Analog electronic circuits find wide applications in many electrical engineering disciplines including signal processing, communication, control systems, biomedical engineering, consumer electronics, and others.

Course Objectives

The objective of this course is to develop in the students an understanding of the various analog electronic circuits as well as the ability to design simple analog circuits to achieve specified performance levels.

Expected Learning Outcomes

1. Students will be able to identify key system-related issues in analog electronic circuits including impedance matching, gain-bandwidth product and loading effects.

2. Students will be able to model BJT and FET transistors and diodes using the small and large signal models.
3. Students will be able to calculate the gain and input/output impedances of several amplifier circuits.
4. Students will be able to design several different types of amplifier circuits for specified parameters.
5. Students will be able to calculate the frequency response of analog circuits.
6. Students will be able to design a simple active filter circuit.
7. Students will be able to design a simple oscillator circuit.
8. Students will be able to design DC power supplies using Zener diode regulators and IC regulator chips.

Attendance

- Lectures will primarily be offered asynchronously.
- Wednesdays are the only day you are required to participate during the regularly scheduled time.
- Mondays will include an optional synchronous session covering weekly announcements, overview/review of the weekly material, and/or example problems followed by Q&A. These sessions will be conducted via Zoom.
- I would strongly recommend that you reserve 2:00-2:50 MWF in case events and/or technical issues cause the class to be moved to additional synchronous methods.

Communication

- All announcements will be made through your MIX e-mail accounts. You must check your MIX account daily.
- E-mail and scheduled office hours are the best way to contact the instructor. I expect to be able to respond to all messages within 24 hours.
- You are responsible for all material presented in class through eCampus.

Homework

Regular homework assignments will be given to help provide understanding of the material and also practice solving problems. Solutions for the homework problems will be provided at the time the problems are assigned. These problems should be completed, but they do not need to be turned in. You are encouraged to discuss these problems with one another.

Participation

You are required to watch all lectures that are posted on the class website. Short on-line “participation quizzes” will be given after many of the lecture videos to gauge your comprehension of the material that has been presented. In some cases, these participation quizzes will need to be completed in order to unlock the subsequent lecture videos and learning material. The participation quizzes will be available for two weeks after they are released; after that time, they will no longer be available for grading.

Quizzes, Tests, and Final Exam

Several quizzes will be given throughout the semester. These quizzes will cover all material that has been presented in class and/or homework up to the date of the quiz, unless otherwise indicated. The duration of the quizzes will generally be between 3-5 minutes, but some may be shorter or longer. These quizzes will be given on Wednesdays at the beginning of the class time, unless otherwise indicated. They will only be available for a limited amount of time before they become unavailable for grading. *The lowest quiz grade will be dropped, so you will not be able to make up a quiz for any reason.*

Three 50-minute tests will be given during the semester. A cumulative Final Exam will be given in the regularly scheduled exam period during finals week.

No smart phones or smart watches may be used during quizzes, tests, or exams for *any* reason. Failure to comply will result in an immediate termination of the quiz, test, or exam with a grade of 0 for that student.

We are expecting to use Respondus Lockdown Browser and Respondus Monitor for all tests, the final exam, and some of the weekly quizzes. More details on how to turn in scanned copies of your work will be provided.

You may be required to provide oral defense of your answers.

The tentative test dates are as follows.

- Test 1 on September 23 from 2:00-2:50pm Eastern
- Test 2 on October 21 from 2:00-2:50pm Eastern
- Test 3 on November 18 from 2:00-2:50pm Eastern
- Cumulative Final Exam on December 7 from 11:00am – 1:00pm Eastern

Assessment

Two options for grading are available – either with or without a Final Exam. If you attempt the Final Exam, you are required to include the Final Exam grade in your overall grade (i.e. Option 1).

Option 1			Option 2		
Test 1	20%		Test 1	28%	
Test 2	20%		Test 2	28%	
Test 3	20%		Test 3	28%	
Final Exam	30%				
Quizzes	10%	(Lowest Quiz Dropped)	Quizzes	14%	(Lowest Quiz Dropped)
Participation	5%		Participation	7%	
Total	105%	(Built-In 5% Extra Credit)	Total	105%	(Built-In 5% Extra Credit)

Grading

A ≥ 90% 90 > B ≥ 80% 80 > C ≥ 70% 70 > D ≥ 60% F < 60%

Make-Up Policy

You are expected to attend all quizzes, tests, and exams at the scheduled time and location. If you will not be able to attend a test or exam for legitimate reasons (e.g. religious observance), let me know within the first week of the semester. Otherwise, you will not be permitted to make up missed tests or exams unless there is documented proof of urgent medical care or an emergency. Any make up tests or exams that are granted may be given as oral examinations, at my discretion. *The lowest quiz grade will be dropped, so you will not be able to make up a quiz for any reason.*

Honor Code

All work you turn in must be completely your own unaided work. I will not tolerate cheating, copying, helping others, or harming others; these are strictly forbidden and are in violation of the university's academic honesty policy, as listed in the undergraduate catalog. Plagiarism and any other forms of cheating will be severely penalized and may result in an F grade for the course or receive no credit for the specific test or exam or component of the course. Students are expected to exhibit the same level of professionalism and integrity that will distinguish them in their professional careers. Both the person who reproduced in whole or in any part from the work of others and the person who allowed the work to be copied will be penalized. Consequences and procedures for dealing with cases of academic dishonesty are outlined in the WVU Student Code of Rights and Responsibilities. For more information, please see the "Academic Honesty Statement" below.

COVID-19 Statement

WVU is committed to maintaining a safe learning environment for all students, faculty, and staff. Should campus operations change because of health concerns related to the COVID-19 pandemic, it is possible that this course will move to a fully online delivery format. If that occurs, students will be advised of technical and/or equipment requirements, including remote proctoring software.

In a face-to-face environment, our commitment to safety requires students, staff, and instructors to observe the social distancing and personal protective equipment (PPE) guidelines set by the University at all times. While in class, students will sit in assigned seats when applicable and wear the required PPE. Should a student forget to bring the required PPE, PPE will be available in the building for students to acquire.

Students who fail to comply will be dismissed from the classroom for the class period and may be referred to the Office of Student Conduct for further sanctions.

If a student becomes sick or is required to quarantine during the semester, they should notify the instructor. The student should work with the instructor to develop a plan to receive the necessary course content, activities, and assessments to complete the course learning outcomes.

Social Justice and Disability Statement

West Virginia University is committed to social justice. I concur with that commitment and expect to foster a nurturing learning environment, based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (293-6700).

Academic Honesty Statement

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at <http://www.arc.wvu.edu/admissions/integrity.html>. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me *before* the assignment is due to discuss the matter.

Statler College Policies for Enforcing Academic Integrity

- Grades assigned during the semester on exams, quizzes, reports, or homework assignments are considered final and are not subject to negotiation for any reason other than an indisputable mistake in grading.
- Use of cell phones, smart wearable devices, or possession of other external communication devices are strictly prohibited during exams, tests, or quizzes administered inside the classroom. Departments may specify acceptable calculators and additional restrictions.
- Common standards of academic integrity prohibit not only cheating or plagiarizing, but also the unethical conduct of trying to obtain grades that the student has not earned. Violations of academic integrity are described in the WVU Catalog: <http://bit.ly/2hDAeUa>.
- Incidents of student misconduct or academic dishonesty will be handled promptly and appropriately in accordance with the WVU Student Conduct Code and Discipline Procedure. The case will be referred to the Office of Student Conduct. Violations may lead to dismissal from the Statler College and expulsion from the University.

Disclaimer

The professor reserves the right to make changes in the syllabus. Any changes that are made will be in, what the professor deems, the best interests of the class.

Tentative Schedule

- Review of Circuit Analysis
- Operational Amplifier Circuits
- Device Physics Overview
- Diode-Based Circuits
- Bipolar Junction Transistors and Circuits
- Frequency Response of Active Circuits
- MOSFET Transistors