
Lane Department of Computer Science and Electrical Engineering

EE 224: Electrical Circuits Lab

Spring 2020

1 - Credit hour

- Instructor:** Talha Iqbal
Office: 304 AERB
Email: *ti0001@mix.wvu.edu*
Office Hours: By Appointment
- Class Location:** G-25, Engineering Sciences Building
- Class Time:**
- | | | |
|-----|---|-------------|
| 006 | M | 5 - 7:50 PM |
| 003 | W | 2 - 4:50 PM |
- Reference Book:** Fundamentals of Electric Circuits, By Charles K. Alexander and Matthew N.O. Sadiku, 6th ed., McGraw Hill
Handouts will be provided in the lab.
- Course Objectives:** The objective of this course is to provide students with the fundamental skill sets required in the design and analysis of basic electrical circuits, using resistors, capacitors and inductors with the help of devices such as power supplies, oscilloscopes, function generators, multimeters and simulation software such as LTSPICE.
- Expected Learning Outcomes:**
1. Be able to design RC and RL circuits and to analyze transient responses of voltages of its parameters.
 2. Be able to design RLC circuits and to obtain different responses of both parallel and series circuits with respects to input signals.
 3. Be able to solve second order circuits and to get familiar with over-damped, under-damped and critically-damped voltages and currents responses.
 4. Be able to determine and plot frequency responses of parallel and series RLC resonant circuits and calculate resonant frequency, bandwidth and quality factor.
 5. Be able to design basic digital transmission circuit, which addresses the problem with limitation of communication speed.
 6. Be able to measure the phase difference between two signals in electric circuits.
 7. Be able to design electric circuits and measure power and power factor of certain load and to improve power factor.
 8. Be able to design basic passive (with RC) and active (with Schmitt Trigger) filter.

- Required Material:**
- Lab Kit:** Each student is expected to bring an Electrical Engineering Laboratory Kit to lab each week.
 - Computation Notebook:** To keep notes, results and any other information pertaining to the lab by the student for each lab experiment.
 - USB Drive:** To transfer data off specific equipment e.g. oscilloscope.

Grade Distribution:

Attendance	5 %
Lab Performance	20 %
Lab Reports	25 %
Quiz 1 & 2	10 + 10 %
Lab Practical Evaluation	20 %
Portfolio	10%

Grading Policy:

A	≥ 90 %
B	80 - 89.99 %
C	70 - 79.99 %
D	50 - 69.99 %
F	< 50 %

1. Lab Guidelines

1.1 Missed Labs

Students are expected to attend every laboratory session. Not attending a lab session will result in a grade of **ZERO** for that lab, unless an acceptable excuse is presented **BEFORE** the lab session. It is the student's responsibility to contact the instructor to setup a time for a make-up lab. Make-up labs will be handled on an individual basis at the instructor's discretion. There will be **NO MAKE-UPS** for the quizzes and final evaluation.

1.2 Tardiness

Students arriving after the listed lab start time are solely responsible for obtaining the missed information. It is not the instructor's responsibility to explain the material that was missed during the tardiness. However, if a student shows up over **HALF AN HOUR LATE** to the lab, he will not be permitted to conduct the lab experiment unless acceptable notification of tardiness was communicated prior to the lab. If the course has any other items at the beginning of the lab that is missed (i.e. quiz), the student will receive a **ZERO** for said missed item.

1.3 Lab Report Submission

A **soft copy** of each lab report must be turned in through ecampus (**must be in pdf format**) by the official next lab start time (**one report per group**). Any assignment not submitted by the due date will receive an automatic **20% grade deduction per 24 hours**. Please contact the instructor **BEFORE** the due date if you need to discuss an exception to an assignments due date. The lab report format will be shared through ecampus.

1.4 Lab Notebook

You are expected to keep a record of your observations and results of each lab in your lab notebook (**one notebook per student**).

1.5 Lab Stations and Groups

At the end of each experiment, the students are responsible for leaving the bench in a better state. The lab instructor will check the lab benches after each lab and **DEDUCT POINTS** from benches that are not cleaned properly. Students will be working in **groups of TWO**.

1.6 The Role of the Lab Instructor

By now you have completed at least one EE/CpE labs and should be able to use most of the laboratory instruments and taking good measurements. However, your lab instructor will answer specific questions; often with another question to help you understand the situation rather than just give you something else to memorize. Please note that the lab instructor **will not troubleshoot** your circuits for you but will help you through it.

1.7 Academic Integrity

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 West Virginia University Academic Catalog at <http://catalog.wvu.edu/undergraduate/coursecredittermsclassification/#academicintegritytext>. 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.

1.8 Portfolio

At the end of the semester, all the work you have done throughout the laboratory experience needs to be compiled into a single pdf file (**one per student**) and submitted through ecampus. The detailed format of the file will be discussed by the end of the semester.

2. List of Experiments:

Week	Tentative Dates	Experiment
1	Jan 13, 15	Introduction
2	Jan 22, 27	Phase Difference Measurement
3	Jan 29, Feb 3	Power Measurement
4	Feb 5, 10	Power Factor Correction
5	Feb 12, 17	Time Constants – Series RC Circuit w/ DC Applied (Quiz 1 due)
6	Feb 19, 24	Natural and Step Responses of a Series RLC Circuit
7	Feb 26, Mar 2	Study of Damped Responses
8	Mar 4, 9	Series and Parallel RLC Resonant Circuits
9	Mar 11, 16	
10	Mar 18, 23	Wye-Delta Transformations
11	Mar 25, 30	Digital Data Transmission System
	April 1, 6	Practice Session (Quiz 2 due)
12	April 8, 13	Lab Practical Evaluation
13	April 17 (noon)	Portfolio Submission Deadline

This is a tentative schedule of the experiments and can vary depending on the course schedule.

Social Justice:

West Virginia University is committed to the Social Justice. I concur with that commitment and expect to maintain a positive 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 and national origin. Any suggestions as to how further and open the environment in this class, will be appreciated and given serious consideration. If you are a person with disability and anticipate any type of special accommodation for the participation in the class, please advise me and make appropriate arrangements with Disability services (293-6700).