EECE 2035: Circuits Laboratory 2 Spring 2019

Instructor: Dr. Majeed Hayat Office: Room 289-A, Haggerty Phone: 288–7772; e-mail: majeed.hayat@marquette.edu; web-site: www.professorhayat.com Lectures: Tuesdays, 9:30AM-10:45AM, Olin 202 Labs: Each lab session runs for two hours. See the class schedule for the designated times and locations for your specific section.

Office Hours:

Monday, 2:00PM – 3:00PM Wednesday, 3:00PM – 4:00PM

Course description:

Circuit design, construction and test skills are expanded to include digital circuits and passive and active filters. Emphasis placed on DC, AC and transient response of circuits containing passive and active devices.

Prerequisites:

EECE 2010 and EECE 2015 with a minimum grade of C in each.

Corequisites:

ELEN 2020 or COEN 2020 and EECE 2030.

Note: It is the responsibility of the student to ensure that these prerequisites and corequisites are met. Successful completion of EECE 2035 with the proper sequence of prerequisites is a requirement for graduation.

Course goals:

- Reinforce student knowledge of electrical and electronic circuits with hands-on experiments.
- Reinforce student ability to construct circuits.
- Reinforce student knowledge of the basics of electronic test equipment measurement skills.
- Introduce students to (more) circuit components including digital integrated circuits.

Course objectives: By the end of this course, each student should be able to

- Use the circuit software, Msim, to perform transient and AC sweep simulations.
- Use proper circuit construction techniques with an experimenter's breadboard.
- Use a DMM, power supplies, function generators and oscilloscopes as appropriate to the experiments.
- Build and test various circuit networks.
- Design and understand the functions of various circuit networks, including (but not limited to) RLC networks, power factor correction networks, simple integrators and differentiators, simple passive filters as well as a variety of simple digital circuits.
- Choose standard component values to allow circuits to function per desired specifications.
- Be able to use internet resources to find and view device or component data sheets.
- Describe the physical construction of (simple) transformers and understand the basic physical construction of transformers.

Required materials for experiments (available at the university bookstore):

- EECE 2035 Component Kit
- Marquette University College of Engineering notebook
- EECE Tools Kit (from EECE 2015)
- EECE Cable Kit (from EECE 2015)
- Experimenter's breadboard (from EECE 2015)
- Needle nose pliers (from EECE 2015)

Required texts: Text Books from EECE 2030 and COEN/ELEN 2020.

Course requirements:

Attendance: Attendance is expected for all lecture and laboratory sessions. Excessive absences (equivalent to 2 lectures and/or 2 laboratories) may result in an instructor initiated "Withdrawal for Absence" (WA).

For the purpose of this policy, attendance will be monitored by a combination of the following methods:

- Occasional "roll call" in lecture
- Attendance at regularly scheduled laboratory sessions
- Submission of regularly scheduled pre-laboratory preparations on the scheduled due date(s)
- Submission of regularly scheduled post-laboratory reports on the scheduled due date(s).

Prelab preparation: Each lab will have specific requirements to properly prepare the student for the actual lab work. This preparation may include reading, answering questions, working problems, developing designs, simulating circuits to predict values, preparing data sheets, etc. All pre-lab calculations are to be recorded in your One-Note file. You may be expected to record the results of these calculations on the worksheets for the laboratory, in either the special "pre-lab" section of the worksheets (or in the "laboratory" section of the worksheets as part of the predicted/theoretical portions of data sheets). Most simulation results will also be recorded in your One-Note file. You should get into the practice of bringing the necessary simulation files to lab so that you will be able to modify them for resimulation during the lab period.

Laboratory work: Lab work will focus on building and testing circuits. Most data and analysis work will be recorded in the One-Note file. Results will be transferred to the laboratory worksheets for dropbox submission as the Lab grade. *Due date will be Thursday midnight after the lab session*.

Postlab: Each lab will usually have additional postlab data analysis to be completed based on the data that were acquired during the lab. The questions in the postlab section will specify the required data analysis. You may also be asked to interpret your results. When asked to comment on your experimental results, it is expected that complete sentences will be used and that you will refer to your data and the analysis results *quantitatively*. You are urged to use spreadsheet tools as appropriate to help you analyze your data.

Practical exam: A practical exam will be given near mid-semester. The exam will take place during normal lab time. Each student will work alone on the exam. The exam will test skills in circuit construction, equipment operation, and software usage (Excel, Msim) learned in previous experiments. Each student will be allowed to use their own laboratory notebook during this exam.

Writing assignment: One writing assignment will be given during the semester. This assignment should be typed, clearly written and to the point. The spelling and grammar should be correct. It is the

responsibility of the writer (not the TA or the Instructor) to ensure that adequate proofreading has taken place. A significant portion of the written report grade will be based on how well the report is written.

Lab notebook: Each student will maintain their own Lab Notebook (Marquette University, College of Engineering, Laboratory Notebook). The format as described on the cover of Lab Notebook should be followed. Since each team member has his or her own Lab Notebook, it is expected that there will be duplicate information. However, the team One-Note file should have sufficient information so that an individual student can complete all the assigned work with only the One-Note file.

Policy on missed work:

All missed work will be counted as an absence unless the student has consulted with the instructor within 24 hours of the scheduled due date and the work is then completed in a timely manner.

Due dates:

The One-Note file for each laboratory should be turned in three times.

- Prelab: due on Monday of the lab week not later than noon. Turn in the full One-Note file for the laboratory to the dropbox. The pre-lab materials will be graded before your laboratory section.
- Lab: due on Thursday after the lab no later than midnight. Turn in the full One-Note file for the laboratory to the dropbox, including the data and information from the lab session.
- Postlab: due the following week on Tuesday. Turn in the full One-Note file to the dropbox. The material will be graded by the TA.
- Essay: will be announced in lecture on Jan 29; due date for the essay is Feb. 26 in lecture.

Honor code:

Students are expected to comply with Marquette's Honor Code And Honor Policy: http://bulletin.marquette.edu/undergrad/academicregulations/ and http://www.marquette.edu/provost/integrity-index.php

- Exchange of information during exams and quizzes is strictly prohibited. Specifically, unless specified otherwise by the instructor or lab TA, the use of graphing calculators, cell phones or Smart Watches are prohibited during exams or quizzes.
- Students are encouraged to discuss their lab work across groups, with the understanding that each group creates its reports and completes all the work independently of other groups.
- Each student in a group is expected to participate in all the work that goes into experiments and reporting.

Use of digital devices for non-course related activities:

Unless related to course activities, the use internet browsing, texting, facebooking, tweeting, instagramming, snap chatting, etc. during lectures and labs prevent you from engaging with the class, and it will distract other students.

Grading:

11 labs at 100 pts:	1100 pts*
One practical exam:	200 pts
Writing Assignment:	100 pts
Total:	1400 pts

93 – 100 A; 91 – 92 A–; 89 – 90 B+; 85 – 88 B; 83 – 84 B–; 81 – 82 C+; 77 – 80 C; 75 – 76 C–; 73 – 74 D+; 69 – 72 D; Below 69 F

* Labs 1 - 11 are 100 points each. The three parts of the laboratory will contribute to the total laboratory grade as follows: Prelab Preparation (30), Laboratory (30), and Postlab (40)

Tentative Laboratory Schedule:

Weeks of Jan 14 & 21	MSim Fundamentals (self-paced)
Week of Jan 28	Competency Exam, Lab Procedures Review
	and Transient Response Review
Week of Feb 4	Steady State Response
Week of Feb 11	Designing Reactive Circuits (RL, RC, and RLC)
Week of Feb 25	AC Power and Power Factor Correction
Week of Mar 4	Practical Exam
Week of Mar 11	Spring Break
Week of Apr 1	Transformers
Week of Apr 8	Sequential Circuits
Week of Apr 15	Laplace Transforms – Integration and
	Differentiation
Week of Apr 22	Passive Filters
Week of Apr 29	Active Filters