ECE 411 – Circuit Theory

Fall 2024

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More TBA

Lecture Hour: 9:30-11:00am TTH, **Room**: ETC 2.136

Lab Hour: 1:00-3:00pm (17015), 4:00-6:00pm (17020), 7:00-9:00pm (17025), **Room**: EER 1.512

Office Hours: 11:00-noon or by appointment, **Location**: EER 4.864

TA/UGA Office Hours: Office hours and location(s) will be posted on Canvas.

Course Description: This course provides a systematic, in-depth treatment of the design and analysis of (mostly) linear electric circuits and their associated circuit components. Topics covered will include the following: capacitance and inductance; RC, RL, and RLC circuits; operational amplifiers and op-amp circuits; sinusoidal steady-state analysis and phasors; an introduction to solid-state electronic devices; frequency response and Bode plots; passive and active filter circuits; frequency-domain analysis; Laplace transforms and applications to circuit analysis; Fourier series and transforms; two-port networks. Laboratory exercises are a key component of the course.

Prerequisite: Completion of ECE 302 (Dodabalapur) or ECE 302H (Hanson) during Fall 2022 with a grade of at least C–. Credit with a grade of at least C– or concurrent registration in M 427J or M 427K, and in PHY 303L and 105N.

Required Text: F. T. Ulaby, M. M. Maharbiz, & C. M. Furse, Circuit Analysis and Design (Michigan Publishing, 2018) [same as Circuits (National Technology & Science Press, Third Edition, 2016) by the same authors].

Supplementary References: C. K. Alexander and M. N. O. Sadiku, Fundamentals of Electric Circuits, 4th Edition (McGraw Hill, 2009). P. Horowitz and W. Hill, The Art of Electronics, 3rd Edition (Cambridge University Press, 2015). J. W. Nilsson and S. A. Riedel, Electric Circuits, 9th Edition (Prentice Hall, 2011). A. V. Oppenheim, A. S. Willsky, and S. Hamid Nawab, Signals and Systems, 2nd Edition (Pearson, 1997).

Grading:

Homework 10%

Laboratory 10%

Semester Exams 50% (2 exams during semester, 25% each)

Final Exam 30%

Your final course grade will be determined using these course components and weightings. Per University policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence. Class attendance is not considered explicitly in computation of your course grade, but is strongly recommended as an important part of your learning process. Each course component will be graded on a curve, rather than an absolute scale, for translation of numerical to letter grades. This will almost certainly result in your receiving a higher letter grade than if the traditional absolute scale were employed. Final grades will be assigned using +/- grade increments.

Notes on exam grading: For exam problems, reasoning and analysis are typically as or more important than the final answer. You should explain your reasoning clearly and show all work. Be sure to erase or cross out any work you do not want to be considered in grading. If you demonstrate mastery of the key concepts required to solve a problem, you will receive substantial credit even if the final answer is not completely correct. Conversely, a correct final answer without explanation or justification will typically receive very limited credit. Any requests for exam regrades must be made in writing with an explanation of the issue in question, and within one week of your receiving your original graded exam. If an exam regrade is requested, the entire exam may be regraded and your total score may increase or decrease.

Drop Policy: All adds and drops should be discussed with your academic advisor. The last day to drop this course without permission from the Dean and the department advisor is the twelfth class day. After this day, drops are not approved unless students can demonstrate "good cause", i.e. health or personal problems that did not exist at the end of the official add and drop period. Academic performance, such as making poor exam grades, is not a valid reason to drop. University add/drop policies and information may be found at the UT Austin Registrar's web site: https://registrar.utexas.edu/students/registration/after/add-drop.

Policy on Collaboration: Discussion of course material and homework problems is permitted (and encouraged!). However, each student should work through the homework problems (and write up their solutions) independently. For additional details please see the section of this syllabus on Policy on Academic Integrity.

Course Policy on Academic Integrity:

Ethics and integrity in both academic and professional affairs should be part of your education at UT Austin. Academic integrity is a serious matter and will be treated as such in ECE 411. My hope is that this will be beneficial to your education both technically and in a much broader sense.

While I am confident that the large majority of students will naturally adhere to the university's guidelines and regulations regarding academic integrity, I provide below an explicit statement of course policy in this regard.

Homework: ECE 411 course policy is that discussion of course material, including homework problems, is allowed and indeed encouraged. However, each student should work through assigned homework problems and write up their solutions independently. Problem-solving is an extremely useful skill in itself, and in addition is the only really effective way to learn the material!

Specifically, each student is responsible for working out and writing up their own solutions to each homework assignment. Discussion of the course material and problems is encouraged, but practices such as allowing a classmate to copy your homework solutions, or a group working out a problem solution together which everyone then copies down and turns in, are forbidden. Use of problem solutions obtained from other students, over the web, etc. is forbidden. Students violating course policy on homework will receive a warning possibly followed by a grading penalty and further disciplinary action, in accordance with university policy.

Examinations: In general you will be allowed to use a calculator, writing implements and erasers, and the exam question/answer sheets during exams. Any other allowed materials will be specified in advance of each exam. Students who are caught using unauthorized materials during an exam, copying from a classmate on exams, continuing to work on an exam after time has been called, or violating exam or course rules in some other manner are likely, at a minimum, to receive a score of zero on that exam and may be subject to further disciplinary action, again in accordance with university policy.

For further information: Additional information concerning UT Austin's policy on conduct and academic integrity is posted on the UT Austin web site at http://deanofstudents.utexas.edu/conduct/.

Laboratory: The laboratory sessions for this class are in-person only, and occur once per week for two hours at the times indicated for your unique number. Although there are lab sessions scheduled every week, there are only six labs scheduled for the semester. For weeks during which you don't have labs scheduled, the TA(s) will conduct recitation/review sessions. These are,

essentially, review and problem-solving sessions that will help you solidify your understanding of the material covered in the course, and also an opportunity for you to ask questions about either the labs or the material covered in our regular classes.

The instructors for the laboratory component of the class are the TAs/UGAs. All lab issues, including lab grading, should be discussed with your TA/UGA. Participation in all lab sessions is required except for documented illness or religious observance approved in advance. Per University policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day.

Laboratory sessions will start the week of 01/09/2024. The laboratory manual is available on Canvas as a pdf file.

Accommodation for Religious Observances: By UT Austin policy, you must notify me of your pending absence at least fourteen days prior to the date of observance of a religious holy day. If you must miss a class, an examination, a work assignment, or a project in order to observe religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence. If there is uncertainty regarding the precise date of a religious observance due to lunar cycles, etc., you still must inform me at least 14 days prior to the earliest possible date of the observance and provide the probable range of dates for the observance.

Students with Disabilities: The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of Services for Students with Disabilities (SSD). Additional information on this subject is posted on the UT Austin web site at https://diversity.utexas.edu/disability/. If you feel you may be entitled to accommodation under these policies, please consult with the appropriate offices early in the semester. Evaluation and approval take time, and typical adjustments cannot be applied retroactively.

Sources of Help: Like most engineering, science, and math courses, ECE 411 builds knowledge in a rapid step-by-step process throughout the semester. Each step assumes you have mastered the prior material. If you fall behind by even a few days, it can be difficult to catch up. If you do not understand something, ask questions in class, come to office hours, and/or take advantage of the other sources of help that are available. Get help quickly; do not wait! UT also provides resources to help you with nonacademic issues. A search of the UT website is often a good place to start.

The best way to get help from the instructor is during office hours. If you are not able to make it to my scheduled office hours, I am often available at my office on the EER 4.864. If you would like to meet outside scheduled office hours, it is generally best to arrange a time and location with me in advance. Email is typically the best way to reach me. Please mention ECE 411 in the subject of any email.

The ECE Undergraduate Student Advising Office in EER is the best place to start if you have issues related to advising, registration, add/drop, or issues with the UT bureaucracy in general.

The Engineering Student Services and Advising (ESSA) Office in ESS can assist with many issues. Their web page is http://www.engr.utexas.edu/academics/undergraduate-education/academic-advising.

Emergency Preparedness and Classroom Evacuation Instructions: Every member of the university community must take appropriate and deliberate action when an emergency strikes a building, a portion of the campus, or entire campus community. Emergency preparedness means we are all ready to act for our own safety and the safety of others during a crisis. It takes an effort by all of us to create and sustain an effective emergency preparedness system. Information on emergency preparedness is posted on the class Canvas site. In addition, specific instructions provided to us on classroom evacuations is included just below for your reference.

Classroom Evacuation for Students: All occupants of university buildings are required to evacuate a building when a fire alarm and/ or an official announcement is made indicating a potentially dangerous situation within the building.

Familiarize yourself with all exit doors of each classroom and building you may occupy. Remember that the nearest exit door may not be the one you used when entering the building.

If you require assistance in evacuation, inform your instructor in writing during the first week of class.

For evacuation in your classroom or building:

1. Follow the instructions of faculty and teaching staff.

2. Exit in an orderly fashion and assemble outside.

3. Do not re-enter a building unless given instructions by emergency personnel.