Key:

* - Required in Lighthouse

Black text – Must remain in the syllabus as written

Green text – Explanatory text

Blue text – May be modified, but must be in the syllabus

Please remove this page before printing and or distributing this syllabus.

ENGR 2405 – Electrical Circuits I

Class Information

Synonym:
Section:
Location:
Class Times:

Instructor Specific Information

Name:
Email**:**
Phone Numbers**:** *(instructor's office phone or Voice Box for adjunct instructors)*
Office Hours:
Office Location: *campus, building, and room number*
Include information on how conferences outside of office hours can be arranged.
Other Information: *Other avenues for contacting the professor, as appropriate (through BlackBoard, e.g.) As a general rule, instructors should avoid interacting with students through social media or providing personal phone numbers.*

Course Description

Credit Hours: 4
Classroom Contact Hours per week: 3
Laboratory Contact Hours per week: 3

Principles of electrical circuits and systems. Basic circuit elements (resistance, inductance, mutual inductance, capacitance, independent and dependent controlled voltage, and current sources). Topology of electrical networks; Kirchhoff's laws; node and mesh analysis; DC circuit analysis; operational amplifiers; transient and sinusoidal steady-state analysis; AC circuit analysis; first- and second-order circuits; Bode plots; and use of computer simulation software to solve circuit problems. Laboratory experiments supporting theoretical principles presented in lectures involving DC and AC circuit theory, network theorems, time, and frequency domain circuit analysis. Introduction to principles and operation of basic laboratory equipment; laboratory report preparation.

Course Rationale/Objectives

This is a statement on the purpose of class and its broad educational goals. One can describe relationships to subsequent courses, general education, service-learning, appreciation of the arts, civic engagement, or whatever seems appropriate.
Departments may wish to develop a statement for all instructors to use for each course offered.
Example statement:
This course is a comprehensive introduction to the fundamentals of electric circuits intended. This course is intended to develop student skills in analyzing and solving a

variety of linear DC and AC circuits through calculations, computer simulations, and lab experiments.

Course Prerequisites:
- MATH 2414 and PHYS2426, or equivalents
- Co-requisite: MATH 2420 (or previous credit)

Required Texts/Materials
Any required textbooks, homework systems, and materials should be listed here
- Alexander, Charles / Sadiku, Matthew, Fundamentals of Electric Circuits, 7th Ed.
- Computer with SciLab and LTSpice circuit simulator (free software downloads)
- Scientific calculator (graphing not required)

Instructional Methodology
Example statement:
This is a lecture with a lab course which includes time for class discussions, demonstrations, student projects, labs and/or activities guided by the instructor.

Student Technology Support
Austin Community College provides free, secure drive-up Wi-Fi to students and employees in the parking lots of all campus locations. Wi-Fi can be accessed seven days a week, 7 am to 11 pm. Additional details are available at **Student Technology Services**.
Student Technology Services offers phone, live-chat, and email-based technical support for students and can provide support on topics such as password resets, accessing or using Blackboard, access to technology, etc. To view hours of operation and ways to request support, visit **Student Technology Services.**

Copyrighted Materials

Student Learning Outcomes

Course-Level Student Learning Outcomes:
Upon successful completion of this course, the student will be able to:
- Explain basic electrical concepts, including electric charge, current, electrical potential, electrical power, and energy
- Apply concepts of electric network topology: nodes, branches, and loops to solve circuit problems, including the use of computer simulation.
- Analyze circuits with ideal, independent, and controlled voltage and current sources.

- Apply Kirchhoff's voltage and current laws to the analysis of electric circuits.
- Explain the relationship of voltage and current in resistors, capacitors, and inductors.
- Derive and solve the governing differential equations for a time-domain first-order and second-order circuit, including singularity function source models.
- Determine the Thévenin or Norton equivalent of a given network that may include passive devices, dependent sources, and independent sources in combination.
- Analyze first and second order AC and DC circuits for steady-state and transient response in the time domain and frequency domain.
- Derive relations for and calculate the gain and input impedance of a given operational amplifier circuit for both DC and frequency domain AC circuits using an ideal operational amplifier model.
- Apply computer mathematical and simulation programs to solve circuit problems.
- Prepare laboratory reports that clearly communicate experimental information in a logical and scientific manner.
- Conduct basic laboratory experiments involving electrical circuits using laboratory test equipment such as multimeters, power supplies, signal generators, and oscilloscopes.
- Predict and measure the transient and sinusoidal steady-state responses of simple RC, RL, and RLC circuits.
- Predict the behavior and make measurements of simple operational-amplifier circuits.
- Relate physical observations and measurements involving electrical circuits to theoretical principles.
- Evaluate the accuracy of physical measurements and the potential sources of error in the measurements.

General Education Competencies:

Upon completion of this course, students will demonstrate competence in:

Communication Skills
Develop, interpret, and express ideas and information through written, oral and visual communication that is adapted to purpose, structure, audience, and medium.

Critical Thinking Skills
Gather, analyze, synthesize, evaluate and apply information for the purposes of innovation, inquiry, and creative thinking.

Empirical and Quantitative Skills
Apply mathematical, logical and scientific principles and methods through the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.

Teamwork

Consider different points of view to work collaboratively and effectively in pursuit of a shared purpose or goal.

Course Policies

Faculty should detail their course policies. Many of these policies are defined by departments and will therefore be the same across all courses of that discipline.

Grading System

Grading criteria should be clearly explained in the syllabus. The criteria should specify the number of exams and other graded material (exercises, term papers, homework, assignments, projects, etc.), and the weight assigned to them. Instructors should discuss the format of exams (multiple choice, short answer, essay, matching, combination, etc.). Guidelines for other graded materials, such as homework or projects, should also be included in the syllabus. Having explicit detail in this section helps to more easily resolve issues with student grades should they arise. Links to grading and evaluation rubrics could also be included here.
The grading and testing criteria for Engineering classes can be found at https://sites.google.com/a/austincc.edu/physci-faculty-handbook/instructional-policies/grading-testing-criteria-standards

A student must earn a grade of "C" or better in the laboratory portion of the course as well as a grade of "C" or better in the lecture portion of the course in order to earn a grade of "C" or better in the course. If he or she does not earn a grade of "C" or better in both the lecture and the laboratory sections of the course, then their grade for the course will be a "D" (unless due to their overall course average they have earned an "F" for the course). The grade in each portion, either lecture or laboratory, of the course will be as outlined in the syllabus and the determination of the grades will be as stated in the syllabus

Homework Policy

The instructor should explain their homework policies in detail.

Lab Policy

The instructor should explain their lab policies in detail.

Exam and Test Policies

Information on the instructor's policies should be clearly outlined here. The grading policy must conform to both the Physics, Astronomy, and Engineering department policies and the Engineering program policies as stated on the website at https://sites.google.com/a/austincc.edu/physci-faculty-handbook/instructional-policies/grading-testing-criteria-standards

Attendance/Class Participation

Instructors should clearly express their attendance and class participation policies. If there are specific policies for field or laboratory activities, they could be included here. Some suggested wording is:

*"*Regular and punctual class and laboratory attendance is expected of all students. If attendance or compliance with other course policies is unsatisfactory, the instructor may withdraw students from the class.*"*

And to cover situations where classes are cancelled because of weather or other emergencies:

"In the event the college or campus closes due to unforeseen circumstances (for example, severe weather or other emergency), the student is responsible for communicating with their professor during the closure and completing any assignments or other activities designated by their professor as a result of class sessions being missed."

Withdrawal Policy

This should be clearly stated. The College defines withdrawals as occurring after the official reporting date of the semester, typically the 12th class day. In addition, the Legislature has mandated the Rule of Six (see below). There may also be financial aid issues.

Some possible wording might be:

"It is the responsibility of each student to ensure that his or her name is removed from the rolls should they decide to withdraw from the class. The instructor does, however, reserve the right to drop a student should he or she feel it is necessary. If a student decides to withdraw, he or she should also verify that the withdrawal is recorded before the Final Withdrawal Date. **The Final Withdrawal Date for this semester can be found here on the ACC Academic Calendar page (**https://www.austincc.edu/students/registration/important-dates) The student is also strongly encouraged to keep any paperwork in case a problem arises.

Students are responsible for understanding the impact that withdrawal from a course may have on their financial aid, veterans' benefits, and international student status. Per state law, students enrolling for the first time in Fall 2007 or later at any public Texas college or university may not withdraw (receive a W) from more than six courses during their undergraduate college education. Some exemptions for good cause could allow a student to withdraw from a course without having it count toward this limit. Students are strongly encouraged to meet with an advisor when making decisions about course selection, course loads, and course withdrawals."

Missed Exam/Late Work Policies

Each instructor should clearly express their policies with regard to missed exams, late homework or laboratory exercises, etc. Again, this helps immensely when dealing with student grade disputes.

INCOMPLETES

This policy should also be clearly stated. Note that the completion date for unfinished work cannot be later than the withdrawal deadline for the following semester.

Course Outline/Course Calendar

The syllabus should contain a course outline for the lecture (and laboratory), outlining what students will be doing on what days, identifying test dates and other due dates. Instructors are encouraged to add a statement of variance, such as:

Please note that schedule changes may occur during the semester. Any changes will be announced in class and posted as a Blackboard Announcement (or other resource faculty is using to communicate).

(Optional calendar format)

Date	Lecture	Homework Due	Lab