

PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

CIRCUITS I
ECE 2010

Class Hours: 3.0

Credit Hours: 3.0

Laboratory Hours: 0.0

Revised: Fall 2016

Catalog Course Description

Fundamental laws of circuit analysis: Ohm's Law, Kirchhoff's voltage and current laws, and the law of conservation of energy; circuits containing independent and dependent voltage and current sources, resistance, conductance, capacitance and inductance are analyzed using mesh and nodal analysis, superposition and source transformations, and Norton's and Thevenin's Theorems; steady state analysis of DC and AC circuits; complete solution for transient analysis for circuits with one and two storage elements.

Prerequisites

MATH 1920

Corequisites

PHYS 2110

Textbook(s) and Other Course Materials

William H. Hayt, Jr., Jack E. Kemmerly, and Steven M. Durbin. Engineering Circuit Analysis. Latest Ed. McGraw Hill.

Week/Unit/Topic Basis

1. Definitions and Units, Experimental Laws and Simple Circuits
2. Circuit Analysis Techniques
3. Circuit Analysis Techniques
4. Circuit Analysis Techniques
5. Circuit Analysis Techniques
6. Inductance and Capacitance
7. Inductance and Capacitance
8. Source Free RL and RC Circuits

9. Driven RL and RC Circuits
10. The Unit Step Forcing Functions
11. Source Free RLC Circuits
12. Driven RLC Circuits
13. Sinusoidal Forcing Function and Phasors
14. Sinusoidal Steady State Response
15. Review, Final Exam

Course Goals

NOTE: Roman numerals after course objectives reference TBR's general education goals.

The course will

- A. Enhance effective communication with technical and scientific community in the "common language" of electrical definitions, units, and relationships. I, VII
- B. Guide students to understand the analysis of circuits containing independent and dependent voltage and current sources, resistance, conductance, capacitance and inductance using basic analytical techniques developed from fundamental laws, theorems, and elementary network topology. V, VI
- C. Enhance a student's ability to perform steady-state analysis of DC and AC circuits. V, VI
- D. Expand comprehension of the complete solution for transient analysis for circuits with one and two storage elements. V, VI

Expected Student Learning Outcomes

NOTE: Capital letters after Expected Student Learning Outcomes reference the course goals listed above.

The student will

1. Itemize the basic units and derived units of the International System of Units which are of interest to circuit analysts. A
2. Define the unit of charge and understand the basic concepts of voltage, current, and power. A
3. Contrast the types of circuits and circuit elements such as resistors, capacitors, and inductors. A
4. Apply Ohm's law and use it in circuit analysis. B,C,D

5. Apply Kirchhoff's voltage and current laws in circuit analysis. B,C,D
6. Demonstrate the technique of analyzing a single-loop circuit and the single-node circuit. B
7. Calculate equivalent sources and resistances using the technique of resistance and source combination. B,C,D
8. Demonstrate voltage and current division. B,C,D
9. Identify symbols for circuit elements and write equations which describe circuit behavior. A,B,C,D
10. Understand and apply nodal analysis and mesh analysis to analyze circuits. B,C,D
11. Demonstrate source transformations in circuit analysis. B,C,D
12. Comprehend and use the concepts of linearity and superposition in circuit analysis. B,C,D
13. Understand and apply Thevenin's and Norton's theorems in circuit analysis. B,C,D
14. Describe trees and general nodal analysis, and links and loop analysis, and be able to use these in circuit analysis. B,C,D
15. Define the characteristics of the inductor and capacitor and the relationships of inductor and capacitor combinations. A,B
16. Describe the concepts of duality and linearity, and the consequences of linearity, and apply these concepts in problem solving. B,C,D
17. Recognize simple and general source-free RL and RC circuits and be able to apply analytical techniques to describe their behavior. B
18. Indicate the properties of the exponential response in RL and RC circuits. B,D
19. Describe the natural and forced responses and be able to quantify the behavior of RL and RC circuits driven by the unit-step forcing function. B,D
20. Apply analytical techniques to quantifying the behavior of source-free series and parallel RLC circuits. B,D
21. Distinguish between the concepts of over damped, critically damped, and under damped RLC circuits, and be able to analyze these circuits. B,C,D
22. Find the complete response of an RLC circuit. B,C,D
23. List the characteristics of sinusoids, and be able to calculate the forced response of circuits to sinusoidal forcing functions. B,C,D

24. Describe and apply the concepts of the complex forcing function, the phasor, and phasor relationships for R, L, and C. B,C,D
25. Define impedance and admittance and their role in circuit analysis. A,B,C,D
26. Describe and use the following in the determination of the sinusoidal steady-state response of circuits: nodal, mesh, and loop analysis; superposition, source transformations, and Thevenin's and Norton's theorems; and phasor diagrams. C
27. Describe and calculate the sinusoidal steady-state response of circuits as a function of radian frequency. C
28. Describe and calculate the sinusoidal steady-state response of circuits as a function of radian frequency. C

Evaluation

Testing Procedures

Chapter Tests(4 total)	60%
Homework and Quizzes	20%
Final Exam	20%

Laboratory Expectations

No specific laboratory assignments are made; Students are encouraged to use PC(s) available in the department to solve algebraic and differential systems of equations. Multi-Sim may be used at the discretion of the instructor.

Field Work

N/A

Other Evaluation Methods

N/A

Grading Scale

93 – 100	A
88 - 92	B+
83 - 87	B
78 - 82	C+
70 – 77	C
60 - 69	D
0 - 59	F

Policies

Attendance Policy

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of Academic Affairs, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of Academic Affairs.

Academic Dishonesty

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one's own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

Please see the Pellissippi State Policies and Procedures Manual, Policy 04:02:00 Academic/Classroom Conduct and Disciplinary Sanctions for the complete policy.

Accommodations for disabilities

Students who need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case of a building evacuation should inform the instructor immediately and privately after class or in her or his office. Students must present a current accommodation plan from a Disability Services (DS) staff member in order to receive accommodations in this course. Contact DS at disabilityservices@pstcc.edu, by calling 865 539 7153 or TTY 865 694 6429, or by visiting Alexander 130. More information is available on the [Disability Services website](http://www.pstcc.edu/sswd/) (<http://www.pstcc.edu/sswd/>).