

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

CIRCUITS I
ECE 2010

Class Hours: 3.0

Credit Hours: 3.0

Laboratory Hours: 0.0

Revised: Spring 07

***Designed to transfer.**

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 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.

Entry Level Standards:

Students must be able to follow a logical trail leading from definition through explanation, description, illustration, and numerical example, to problem-solving ability. Students must demonstrate proficiency in algebra, trigonometry, and calculus.

Prerequisites:

CHEM 1110 and CSIT 1050, and 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.

I. Week/Unit/Topic Basis:

Week	Topic
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

II. Course Objectives*:

- A. Effectively communicate with technical and scientific community in the "common language" of electrical definitions, units, and relationships. I, VII
- B. 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. Perform steady-state analysis of DC and AC circuits. V, VI
- D. Comprehend the complete solution for transient analysis for circuits with one and two storage elements. V, VI

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

III. Instructional Processes*:

Students will:

1. Participate in classroom discussions that challenge their abilities to think creatively and visualize complex spatial and mathematical relationships to solve problems. *Mathematics Outcome, Technological Literacy Outcome*
2. Work in teams to solve special problem assignments. These activities are designed to foster interpersonal skills in teamwork and develop and enhance leadership skills, students' abilities to express ideas, and students' abilities to reach consensus solutions for the team through negotiation. *Active Learning Strategy, Communication outcome*
3. Use computers with applications software to simulate, analyze, and predict the behavior of electrical circuits. Compare expected responses to experimental responses of electrical circuits. Use the Internet for special assignments such as locating data sheets on electronic components. Use computers with word processing software to prepare reports. *Mathematics Outcome, Technological Literacy Outcome*
4. Discuss the importance of personal qualities such as personal responsibility, time management principles, self-esteem, sociability, self-management, integrity and honesty in school and in the workplace, and dynamics of change in the workplace.

Social / Behavioral Sciences Outcome, Transitional Strategy

*Strategies and outcomes listed after instructional processes reference TBR's goals for strengthening general education knowledge and skills, connecting course work to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

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

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures:

Chapter Tests:	60%
Homework and Quizzes:	20%
Final Exam:	20%

B. 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. Electronic Work Bench or Multi-Sim may be used at the discretion of the instructor.

C. Field Work:

N/A

D. Other Evaluation Methods:

N/A

E. Grading Scale:

93 - 100	A
88 - 92	B+
83 - 87	B
78 - 82	C+
70 - 77	C

60 - 69 D
Below 60 F

VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all 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 and Student Affairs, may have requirements that are more stringent.

B. Academic Misconduct:

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. In addition to other possible disciplinary sanctions that may be imposed as a result of academic misconduct, the instructor has the authority to assign either (1) an F or zero for the assignment or (2) an F for the course.

C. Accommodations for disabilities:

If you need accommodations because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Please see the instructor privately after class or in his/her office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127 or 131 or by phone: 694-6751(Voice/TTY) or 539-7153.

Posted: [March 23, 2007](#)