PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

CIRCUITS I
ECE 2010

Class Hours: 3.0 **Credit Hours: 3.0**

Laboratory Hours: 0.0 **Revised: Fall 2014**

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.

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:

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 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

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

III. Expected Student Learning Outcomes*:

Students will:

1. Define the unit of charge and understand the basic concepts of voltage, current, and power. A

2. Contrast the types of circuits and circuit elements such as resistors, capacitors, and inductors. A

3. Apply Ohm's law and use it in circuit analysis. B,C,D

4. Apply Kirchhoff's voltage and current laws in circuit analysis. B,C,D

5. Demonstrate the technique of analyzing a single-loop circuit and the single-node circuit. B

6. Calculate equivalent sources and resistances using the technique of resistance and source combination. B,C,D

7. Demonstrate voltage and current division. B,C,D

8. Identify symbols for circuit elements and write equations which describe circuit behavior. A,B,C,D

9. Understand and apply nodal analysis and mesh analysis to analyze circuits. B,C,D

10. Demonstrate source transformations in circuit analysis. B,C,D

11. Comprehend and use the concepts of linearity and superposition in circuit analysis. B,C,D

12. Understand and apply Thevenin's and Norton's theorems in circuit analysis. B,C,D

13. Describe trees and general nodal analysis, and links and loop analysis, and be able to use these in circuit analysis. B,C,D

14. Define the characteristics of the inductor and capacitor and the relationships of inductor and capacitor combinations. A,B

15. Describe the concepts of duality and linearity, and the consequences of linearity, and apply these concepts in problem solving. B,C,D

16. Recognize simple and general source-free RL and RC circuits and be able to apply analytical techniques to describe their behavior. B

17. Indicate the properties of the exponential response in RL and RC circuits. B,D

18. 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

19. Apply analytical techniques to quantifying the behavior of source-free series and parallel RLC circuits. B,D

20. Distinguish between the concepts of over damped, critically damped, and under damped RLC circuits, and be able to analyze these circuits. B,C,D

21. Find the complete response of an RLC circuit. B,C,D

22. List the characteristics of sinusoids, and be able to calculate the forced response of circuits to sinusoidal forcing functions. B,C,D

23. Describe and apply the concepts of the complex forcing function, the phasor, and phasor relationships for R, L, and C. B,C,D

24. Define impedance and admittance and their role in circuit analysis. A,B,C,D

25. 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

26. Describe and calculate the sinusoidal steady-state response of circuits as a function of radian frequency. C

27. Describe and calculate the sinusoidal steady-state response of circuits as a function of radian frequency. C

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

IV. 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. 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

V. Policies:

A. 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.

B. 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.

C. Accommodations for disabilities:

Students that need accommodations because of a disability, have emergency medical information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his 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 sending email to disabilityservices@pstcc.edu, or visiting Goins 127, 132, 134, 135, 131. More information is available at http://www.pstcc.edu/sswd/.