

PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

ELECTRIC CIRCUITS I W/LAB
EET 1010

Class Hours: 3.0

Credit Hours: 4.0

Laboratory Hours: 3.0

**Date Revised: Fall
2001**

Note: This course is not intended for transfer credit.

Catalog Course Description:

An introductory course in DC and AC circuits. Topics include atomic structure, current and voltage, resistance and power. Ohm's Law and series and parallel circuits are covered. Transient response for capacitors and inductors are also discussed. The course includes fundamental AC concepts and phasor calculations for impedance, voltage, and current in RLC circuits. There will also be discussion of ladder logic and introduction to motors and transformers.

Entry Level Standards:

Students entering this course must have college-level math skills.

Prerequisites:

None

Corequisite:

MATH 1730 or 1731

Textbook(s) and Other Reference Materials Basic to the Course:

Textbook:

Circuit Analysis: Theory and Practice. Robbins and Miller. Delmar Publishers. 2nd Edition.

References:

Electrical Circuit Analysis – Boylstadt

Parts Kit:

Approximate Cost: \$5.00

I. Week/Unit/Topic Basis:

Week	Topic
1	Lecture: Introduction to Electrical/Electronic Industry, units, atomic structure, current voltage, insulators, conductors and semiconductors, ammeters and voltmeters Lab: Introduction to lab and instrument measuring voltage and current with DMM and using Electronics Workbench EWB.
2	Lecture: Resistance, wire tables, temperature effects, color code, ohmmeters, Ohm's Law, power, energy, efficiency, wattmeters, series circuits Lab: Series Circuits

- 3 Lecture: Series and parallel circuits, voltage law, current law, equivalent resistance equations, internal resistance of voltage sources
Lab: Parallel Circuits breadboard and EWB.
- 4 Lecture: Series-parallel circuits. Analysis, applications.
Lab: Series-Parallel Circuits breadboard and EWB.
- 5 Lecture: Continuation of series- parallel circuits especially shorts and opens.
REVIEW and TEST
Lab: Continued Series-Parallel Circuits and introduction to the oscilloscope.
- 6 Lecture: Capacitance, electric field, dielectric strength, leakage current, transients, charging and discharging, energy
Lab: Introduction RC transient circuits breadboard with oscilloscope and EWB.
- 7 Lecture: Continued transients in R-C
Lab: Capacitors - Charging and Discharging
- 8 Lecture: Inductance, Faradays Law, R-L transients, storage and decay cycles, steady state DC, RLC circuits REVIEW AND TEST
Lab: Inductors - Storage and Decay using EWB.
- 9 Lecture: AC fundamentals, frequency, period amplitude and phase relationships.
Introduction to phasors degrees and radians
Lab: AC fundamentals using the oscilloscope and EWB.
- 10 Lecture: Impedance concepts and R, L, C AC circuit complex numbers analysis
Lab: Impedance in AC circuits
- 11 Lecture: Power in AC circuits, apparent, real, reactive power and power factor. Also transformer basics
Lab: Series AC circuits
- 12 Lecture: Ohms law and AC series and parallel circuits. REVIEW and TEST
Lab: Transformer basics
- 13 Lecture: Introduction to ladder logic and controls
Lab: Introduction to relays and control circuits.
- 14 Lecture: Introduction to DC motors and generators
Lab: A continuation of control circuits.
- 15 Lecture: Introduction to AC motors and generators
Lab: Introduction to motors
- 16 FINAL EXAM

II. Course Objectives*:

- A. Understand the nature of electricity and electronics as it has evolved. I, II
- B. Have a conceptual knowledge of the nature of the atomic structure and how it relates to electrical materials and electrical operations. II, V
- C. Understand the basic laws: Ohm' s Law, Kirchoff Voltagem Law, and Kirchoff' s Current Law. II, III

- D. Recognize series, parallel, series-parallel, multi-source, bridges, and other circuits. II, III
- E. Solve DC circuits for complete solution. II, III, V, VI
- F. Know the nature of inductance and capacitance and understand their behavior in transient circuits. I
- G. Be proficient in setting up any circuit studied in class as a laboratory experiment and make necessary voltage and current measurements. II, III, IV, VI
- H. Use an oscilloscope to observe transients on R-L and R-C circuits. II, III, IV, VI
- I. Use Electronics Workbench to solve any circuits studied. II, III, V

*Roman numerals after course objectives reference goals of the EET program.

III. Instructional Processes*:

Students will:

1. Participate in classroom discussions which challenge their abilities to think creatively and visualize complex spatial and mathematical relationships to solve problems. *Problem Solving and Decision Making Outcome*
2. Work in teams to conduct laboratory experiments and also 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, Problem Solving and Decision Making Outcome, Personal Development Outcome*
3. Use electronic test equipment to test electrical circuits constructed from schematics in the laboratory and acquire data. 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. *Technological Literacy Outcome, Information Literacy Outcome, Numerical Literacy Outcome*
4. Prepare reports on laboratory experiments which include methodology, mathematical analyses of electrical circuit models, a comprehensive comparison of calculated results with experimental results, and conclusions. *Communication Outcome, Numerical Literacy Outcome*
5. 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. *Personal Development Outcome, Cultural Diversity and social Adaptation Outcome, Transitional Strategy*

*Strategies and outcomes listed after instructional processes reference Pellissippi State's goals for strengthening general education knowledge and skills, connecting coursework 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. Begin to develop a sense of history concerning electricity and electronics. A
2. Use scientific and engineering notation and make unit conversions. A
3. Explain the Bohr Atom and the atomic nature of conductors, insulators, and semi-conductors. B
4. Calculate the resistance of a wire, read the color code and use an ohmmeter. B
5. Apply Ohms Law quickly, knowing two of the three variables. C
6. Calculate power, energy and the cost of energy. C
7. Identify flawlessly when resistors are in series or parallel. D
8. Solve any DC series circuits for the voltage across and current through each resistor. (Complete Solution) E
9. Solve any DC parallel circuit for a complete solution. E
10. Solve any series-parallel DC circuit for a complete solution. E
11. Check any complete solution using Basic Laws and know if the solution is correct. E
12. Apply the Voltage Divider Equation and the Current Divider Equation to assist in the solution of series and parallel branches. E
13. Calculate the capacitance of a parallel plate capacitor. F
14. Define a generalized capacitor and relate to the parallel plate capacitor. F
15. Sketch or plot the voltage or current in RC transient circuits. F.
16. State Faradays Law. F
17. Solve R-L transient circuits for storage and decay phases. F
18. Sketch or plot the voltage or current in R-L transient circuits. F
19. Use an oscilloscope to observe an RC transient by the slow time constant method or by repetitive switching. H
20. Use DC voltmeters and ammeter to measure the voltage and current in any DC circuit. G
21. Wire any circuit, steady state or transient. G
22. Use EWB to solve any DC circuit problems. I

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

V. Evaluation:

A. Testing Procedures: 80% of grade

Chapter Tests:	50%
Homework and Quizzes	10%
Final Exam	20%

B. Laboratory Expectations: 20% of grade

The laboratories for all EET courses are an essential part of conveying the concepts to the student. The labs would closely follow the classes in content and in time of presentation so that the student is actually verifying these concepts to his or her self. The student will be able to apply the theory learned in class. The laboratory grade will be determined by a combination of performance within the lab and the quality and demonstrated comprehension of the lab report. There will be at least twelve labs during the semester to go along with the classroom material.

Performance in labs (subjective)	50%
Lab Reports (neatness and content)	30%
Laboratory Test	20%

C. Field Work:

N/A

D. Other Evaluation Methods:

N/A

E. Grading Scale:

A	93 - 100
B	85 - 92
C	70 - 84
D	60 - 69
F	Below 60

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. Attendance is required to all lab sessions unless excused by the instructor. Students missing more than four unexcused sessions will receive an "F" and no credit will be received. Students tardy past half an hour will be considered absent.

B. Student Conduct:

The student is encouraged to read the regulations for student conduct in the PSTCC catalog and handbook.