

PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

ELECTRICAL CIRCUITS I W/ LAB
EET 1012

Class Hours: 2

Credit Hours: 3

Laboratory Hours: 3

Date Revised: Fall 2016

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.

Prerequisites

None

Corequisites

None

Textbook(s) and Other Course Materials

Robbins, A. H. & Miller, W. C. *Circuit analysis: Theory and practice*. Clifton Park, NY: Delmar Cengage Learning. Latest Edition.

Week/Unit/Topic Basis

Week Topic

1. Lecture: Introduction to SI system of Units, converting Units, Engineering Notation; Lab: MultiSIM
2. Lecture: Voltage and Current; Lab: Ohms Law
3. Lecture: Resistance; Lab: Resistance and Voltage
4. Lecture: Ohm's Law, Power and energy; Lab: Exam 1
5. Lecture: Series Circuits; Lab: Series Circuits
6. Lecture: Parallel Circuits; Lab: Parallel Circuits
7. Lecture: Series-Parallel Circuits; Lab: Combination Circuits
8. Lecture: Capacitors and Capacitance; Lab: Test 2
9. Lecture: Capacitor Charging, Discharging; Lab: Capacitance
10. Lecture: Inductance and Inductors; Lab: Inductance

11. Lecture: Inductive Transients; Lab: Test 3
12. Lecture: AC Fundamentals; Lab: AC Fundamentals
13. Lecture: R, L, and C elements and Impedance Concept; Lab: AC Phase shift
14. Lecture: Power in AC Circuits; Lab: Test 4
15. Final Exam Period

Engineering Technology General Outcomes (Educational objectives)

- I. Apply basic engineering theories and concepts creatively to analyze and solve technical problems
- II. Utilize with a high degree of knowledge and skill equipment, instruments, software, and technical reference materials currently used in industry.
- III. Communicate effectively using developed writing, speaking, and graphics skills.
- IV. Assimilate and practice the concepts and principles of working in a team environment.
- V. Obtain employment within the discipline or matriculate to a four year program in engineering or industrial technology

Engineering Technology Concentration Competencies

NOTE: At the program level, all 6 competencies apply to roman numerals I – V of the Engineering Technology General Outcomes (Educational objectives) listed above.

The students will

- A. Apply the knowledge, techniques, skills, and modern tools for the concentration of study to specifically defined engineering technology activities
- B. Demonstrate the knowledge of mathematics, science, engineering and technology to engineering technology problems using developed practical knowledge
- C. Conduct and report the results of standard tests and measurements, and conduct, analyze and interpret experiment or project results
- D. Function effectively as a member of a technical team
- E. Identify, analyze and solve specifically defined engineering technology-based problems
- F. Employ Written, oral and visual communication in a technical environment

Course Goals

NOTE: Capital letters after course goals reference the competencies of the Engineering Technology concentrations listed above.

The course will

1. Expand student understanding of the nature of electricity and electronics as it has evolved. (A, B, C, E)
2. Improve student conceptual knowledge of the nature of the atomic structure and how it relates to electrical materials and electrical operations. (A, B, C, E)

3. Enhance student understanding of basic electrical circuit parameters: voltage, current, resistance, power, and energy. (A, B, C, E, F)
4. Expand student understanding of basic electrical circuit analysis principles: Ohm's Law, Kirchhoff's Voltage Law, and Kirchhoff's Current Law, Voltage Division, and Current Division. (A, B, C, E, F)
5. Improve student ability to recognize and solve series, parallel, series-parallel circuits. (A, B, C, D, E, F)
6. Improve student knowledge of the nature of inductance and capacitance and their behavior under transient conditions. (A, B, C, D, E, F)
7. Expand student understanding of AC waveform fundamentals, impedance and phasor concepts. (A, B, C, D, E, F)
8. Enhance student understanding of real, reactive, and apparent power in AC systems, as well as power factor. (A, B, C, D, E, F)
9. Improve student proficiency in setting up circuits using laboratory equipment, and using a digital multi-meter and oscilloscope to measure voltage and current. (A, B, C, D, E, F)
10. Use Electrical simulation software to solve circuits studied. (A, B, C, D, E, F)
11. Understand basic electrical safety. (D, E)
12. Demonstrate, as an individual and as a team member, library/information skills, time management skills, problem-solving skills, material management skills, and communication skills. (A, B, C, D, E, F)

Expected Student Learning Outcomes

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

The student will

- a. Begin to develop a sense of history concerning electricity and electronics. (1)
- b. Use scientific and engineering notation and make unit conversions. (1)
- c. Explain the Bohr Atom and the atomic nature of conductors, insulators, and semi-conductors. (2)
- d. Calculate the resistance of a wire, read the color code and use an ohmmeter. (2, 3)
- e. Apply Ohms Law quickly, knowing two of the three variables. (3, 4, 5)
- f. Calculate power, energy and the cost of energy. (3, 4, 5)
- g. Identify flawlessly when resistors are in series or parallel. (3, 4, 5)
- h. Solve any DC parallel circuit for a complete solution. (3, 4, 5)
- i. Solve any series-parallel DC circuit for a complete solution. (3, 4, 5)
- j. Check any complete solution using Basic Laws and know if the solution is correct. (3, 4, 5)

- k. Apply the Voltage Divider Equation and the Current Divider Equation to assist in the solution of series and parallel branches. (3, 4, 5)
- l. Calculate the capacitance of a parallel plate capacitor. (6)
- m. Define a generalized capacitor and relate to the parallel plate capacitor. (6)
- n. Sketch or plot the voltage or current in RC and RL transient circuits. (6)
- o. Use electrical circuit simulation software to observe an RC transient by the slow time constant method or by repetitive switching. (10)
- p. Use DC voltmeters and ammeter to measure the voltage and current in any DC circuit. (9, 10, 11, 12)
- q. Wire any circuit, steady state or transient. (9, 10, 11, 12)
- r. Use electrical circuit simulation software to solve DC circuit problems. (10)
- s. Use an oscilloscope to measure an AC waveform and explore the waveform characteristics. (9, 10, 11, 12)
- t. Calculate inductive and capacitive reactance. (7, 8)
- u. Calculate voltages and currents in an AC circuit. (7, 8)
- v. Calculate real, reactive, and apparent power in an AC circuit. (7, 8)
- w. Measure phase shift in a capacitive AC circuit. (7, 8, 9, 10, 11, 12)

Evaluation

Testing Procedures: 80% of grade

Chapter Tests	40%
Quizzes	20%
Final Exam	20%

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 ten 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%

Field Work

Students shall participate in one class field trip. A report will be required that will be part of the laboratory grade.

Other Evaluation Methods

None

Grading Scale

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

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 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 Disability Services (DS) in order to receive accommodations in this course. [Disability Services](#) (<http://www.pstcc.edu/sswd/>) may be contacted via [Disability Services email](#) or by visiting Alexander 130.