PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

CIRCUITS II W/LAB
ECE-2020

Class Hours: 3 **Credit Hours: 4**

Laboratory Hours: 3 **Date Revised: Fall 2015**

Catalog Course Description:

Average, complex, real and imaginary power; effective value of voltage and current; three-phase circuits; delta and wye connections, power measurement using two watt meters; complex frequency; sinusoidal forcing functions and natural response; resonance: general case, special cases in series and parallel circuits; scaling: magnitude and frequency; mutual inductance transformers as circuit elements; linear and ideal transformers as circuit elements; linear and ideal transformers; admittance, impedance and hybrid parameters; trigonometric and complex Fourier series. Course includes three hours of lecture and three hours of laboratory applications each week.

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 be proficient in DC circuit theory, single- and double-energy storage transients, trigonometry, differentiation calculus and integration calculus.

Prerequisites:

ECE 2010

Textbook(s) and Other Course Materials:

William H. Hayt, Jr., Jack E. Kemmerly, and Steven M. Durbin. *Engineering Circuit Analysis.* McGraw Hill, latest edition.

I. Week/Unit/Topic Basis:

Week	Topic
1	Sinusoidal Steady-state response
2	Average power and RMS values
3	Average power and RMS values
4	Polyphase circuits
5	Polyphase circuits
6	Magnetically coupled circuits
7	Magnetically coupled circuits
8	Complex frequency

9	Complex frequency
10	Frequency response and resonance
11	Frequency response and resonance
12	Two-port networks
13	Two-port networks
14	Fourier series
15	Final Exam Period

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. Expand the student's knowledge of analyzing circuits containing independent and dependent voltage and current sources, impedance, admittance, capacitance and inductance using basic analytical techniques developed from fundamental laws, theorems, and elementary network topology. (V, VI)

C. Strengthen performance of steady-state analysis of DC and AC circuits. (V, VI)

D. Enhance the student's understanding of the complex-frequency concept and its use in relating the forced response and the natural response of circuits. (V, VI)

E. Expand the student's knowledge of two-port network analysis and linear modeling of various electronic devices. (V, VI)

F. Foster the ability to analyze periodic functions in both the time and frequency domains. (V, VI)

*Roman numerals after course objectives reference TBRs general education goals.

III. Expected Student Learning Outcomes*:

Students will:

1. Compute correct circuit equations for a broad spectrum of circuits, solve circuit problems with reasonable proficiency, and understand the solutions. (A,B,C,D,E)

2. Defend and use the concepts of instantaneous power, average power, RMS values of voltage and current, apparent power, power factor, and complex power in circuit analysis. (A,B,C)

3. Analyze polyphase circuits involving three-phase wye connections and delta connections. (B,C)

4. Analyze single-phase three-wire circuits. (B,C)

5. Demonstrate use of the wattmeter for power measurement in three-phase systems. (B,C)

6. Describe the concept of complex frequency and apply it to circuit problem solving. (B,C,D)

7. Compare sinusoidal forcing functions and compute natural responses of circuits. (B,D)

8. Define impedance and admittance parameters and describe their relationships to the application of Kirchhoff's laws to the complex forcing functions and complex forced responses. (B,D)

9. Determine the frequency response of a circuit as a function of the neper frequency. (D)

10. Determine graphically the behavior of a circuit by use of the complex frequency plane. (B,D)

11. Demonstrate proficiency in the determination of the frequency response of circuits and the responses related to series resonance, parallel resonance, and other resonant forms. (B,D)

12. Describe magnitude and frequency scaling. (B,D)

13. Describe mutual inductance and energy considerations associated with magnetically coupled circuits. (A,B,C)

14. Describe the linear transformer and ideal transformer concepts and apply to model transformer behavior and analyze circuits involving transformers. (B,C,E)

15. Appraise the methods of analysis for one-port networks. (B,C,E)

16. Appraise methods of analysis for two-port networks. (B,C,E)

17. Define admittance, impedance, and hybrid parameters and use them in simplifying and systematizing linear two-port network analysis. (B,C,E)

18. Describe two-port networks and their use as equivalent circuits for electronic devices to facilitate circuit analysis. (B,C,E)

19. Define the trigonometric form of the Fourier series and defend the use of symmetry. (F)

20. Use the Fourier series as a tool for finding the complete response of circuits to periodic forcing functions. (B,C,F)

21. Determine the complex form of the Fourier series for a periodic function and appreciate its conciseness in circuit analysis. (A,F)

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

IV. Evaluation:

A. Testing Procedures: 90% of grade

Chapter Tests:	**60%**
Homework and Quizzes	**10%**
Final Exam	**20%**

B. Laboratory Expectations: 10% of grade

The laboratories for all ECE courses are an essential part of conveying the concepts to the student. The labs may vary at the discretion of the instructor, but will closely follow the classes in content and in time of presentation so that the student is actually verifying these concepts for himself or herself. The student will be able to apply the theory learned in class. Use of the English language will be evaluated when reviewing the lab reports.

The laboratory grade will be determined by a combination of performance within the lab and the quality and demonstrated comprehension of the lab report. The following is offered as a guide for the instructor:

Performance in labs (subjective)	20%
Lab Reports (neatness and content)	60%
Computer Program	10%
Laboratory Test	10%

C. Field Work:

None

D. Other Evaluation Methods:

None

E. Grading Scale:

Grades for the course will be determined as follows:

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 Disability Services (DS) in order to receive accommodations in this course. Disability Services may be contacted by sending email to disabilityservices@pstcc.edu, or by visiting Alexander 130. More information is available at http://www.pstcc.edu/sswd/.