PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

CIRCUITS II W/LAB
ECE 2020

Class Hours: 3                   Credit Hours: 4
Laboratory Hours: 3               Date Revised: Spring 2011

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 wattmeters; complex frequency: sinusoidal forcing functions and natural response; resonance: general case, special cases in series and parallel circuits; scaling: magnitude and frequency; mutual inductance and transformers as circuit elements; linear and ideal transformers as circuit elements; admittance, impedance and hybrid parameters; trigonometric and complex Fourier series. Course includes 3 hours of lecture and 3 hours of laboratory applications each week.

Entry Level Standards:

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

Prerequisites:

ECE 2010

Co-requisites:

MATH 2110 & PHYS 2120

Textbook(s) and Other Course Materials:


I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sinusoidal Steady-state response</td>
</tr>
<tr>
<td>2-3</td>
<td>Average power and RMS values</td>
</tr>
<tr>
<td>4-5</td>
<td>Polyphase Circuits</td>
</tr>
<tr>
<td>6-7</td>
<td>Magnetically Coupled Circuits</td>
</tr>
<tr>
<td>8-9</td>
<td>Frequency Response and Resonance</td>
</tr>
<tr>
<td>10-11</td>
<td>Complex Frequency</td>
</tr>
<tr>
<td>12-13</td>
<td>Two Port Network</td>
</tr>
<tr>
<td>14</td>
<td>Fourier Series</td>
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</tbody>
</table>
II. Course Goals*:

The course will

A. Enhance student ability to effectively communicate with technical and scientific community in the "common language" of electrical definitions, units, and relationships. (I)

B. Enhance student ability to analyze 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, VII)

C. Enhance student ability to perform steady-state analysis of DC and AC circuits. (V, VI, VII)

D. Enhance student ability to understand the complex-frequency concept and its use in relating the forced response and the natural response of circuits. (V, VI, VII)

E. Enhance student ability to understand two-port network analysis and linear modeling of various electronic devices. (V, VI, VII)

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

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

III. Expected Student Learning Outcomes*:

Students will: be able to:

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.
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)


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

Exams 50%
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.

C. Field Work:

None

D. Other Evaluation Methods:
None

E. Grading Scale:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93 - 100</td>
<td>A</td>
</tr>
<tr>
<td>88 - 92</td>
<td>B+</td>
</tr>
<tr>
<td>83 - 87</td>
<td>B</td>
</tr>
<tr>
<td>78 - 82</td>
<td>C+</td>
</tr>
<tr>
<td>70 - 77</td>
<td>C</td>
</tr>
<tr>
<td>60 - 69</td>
<td>D</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
</tr>
</tbody>
</table>

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 the Learning Division, 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 the Learning Division.

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.

C. Accommodations for disabilities:

Students who 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 going to Goins 127, 132, 134, 135, 131 or by phone: 539-7153 or TTY 694-6429. More information is available at www.pstcc.edu/departments/swd/.

D. Other Policies: