AC Circuits (CETT 1405)

Credit: 4 semester credit hours (3 hours lecture, 4 hours lab)

Prerequisite: CETT 1403

Course Description

A study of the fundamentals of alternating current including series and parallel AC circuits, phasors, capacitive and inductive networks, transformers, and resonance.

Required Textbook and Materials

1. Electronics Fundamentals 8th edition by Thomas L. Floyd
   a. ISBN-10: 0135072956 | ISBN-13: 9780135072950
2. Notebook
3. Calculator
4. Pencil

Course Objectives

Upon completion of this course, the student will be able to:

1. Demonstrate appropriate use of test equipment.
2. Identify various sources of electricity in AC circuits
3. Analyze AC circuits using appropriate mathematical formulas.
4. Troubleshoot various AC circuits using schematic diagrams

Course Outline

Chapter 8 Introduction to Alternating Current and Voltage
8-1 The Sinusoidal Waveform
8-2 Sinusoidal Voltage Sources
8-3 Voltage and Current Values of Sine Waves
8-4 Angular Measurement of a Sine Wave
8-5 The Sine Wave Formula
8-6 Analysis of AC Circuits
8-7 Superimposed DC and AC Voltages
8-8 Nonsinusoidal Waveforms
8-9 The Oscilloscope

Chapter 9 Capacitors
9-1 The Basic Capacitor
9-2 Types of Capacitors
9-3 Series Capacitors
9-4 Parallel Capacitors
9-5 Capacitors in DC Circuits
9-6 Capacitors in AC Circuits
9-7 Capacitor Applications

Chapter 10 RC Circuits
10-1 Sinusoidal Response of RC Circuits
10-2 Impedance and Phase Angle of Series RC Circuits
10-3 Analysis of Series RC Circuits
10-4 Impedance and Phase Angle of Parallel RC Circuits
10-5 Analysis of Parallel RC Circuits

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10-6 Analysis of Series-Parallel RC Circuits
10-7 Power in RC Circuits
10-8 Basic Applications
10-9 Troubleshooting

Chapter 11 Inductors
11-1 The Basic Inductor
11-2 Types of Inductors
11-3 Series and Parallel Inductors
11-4 Inductors in DC Circuits
11-5 Inductors in AC Circuits
11-6 Inductor Applications

Chapter 12 RL Circuits
12-1 Sinusoidal Response of RL Circuits
12-2 Impedance and Phase Angle of Series RL Circuits
12-3 Analysis of Series RL Circuits
12-4 Impedance and Phase Angle of Parallel RL Circuits
12-5 Analysis of Parallel RL Circuits
12-6 Analysis of Series-Parallel RL Circuits
12-7 Power in RL Circuits
12-8 Basic Applications
12-9 Troubleshooting

Chapter 13 RLC Circuits and Resonance
13-1 Impedance and Phase Angle of Series RLC Circuits
13-2 Analysis of Series RLC Circuits
13-3 Series Resonance
13-4 Series Resonant Filters
13-5 Parallel RLC Circuits
13-6 Parallel Resonance
13-7 Parallel Resonant Filters
13-8 Applications

Grade Scale

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

Course Evaluation

Final grades will be calculated according to the following criteria:

Activity	***Percentage***
Major Test/Final Exam	80%
Labs/Homework	20%

Course Requirements

1. Describe the basic structure and characteristics of capacitors and inductors
2. Analyze series and parallel capacitor circuits
3. Describe how a capacitor operates in an AC circuit and in a DC circuit
4. Analyze series and parallel RC and RL circuits
5. Analyze series and parallel inductor circuits
6. Describe how an inductor operates in an AC circuit and in a DC circuit
7. Discuss basic capacitor, inductor, RL and RC applications

8. Analyze series and parallel RLC circuits
9. Analyze RLC circuits for resonance
10. Use a multimeter to measure voltage, current and resistance in a circuit
11. Use oscilloscope to measure voltage in a circuit
12. Troubleshoot circuits using multimeters, oscilloscopes and appropriate mathematical formulas

Attendance Policy:

1. Missing more than 20% of classes will result in an automatic "F" for the course.
2. Absences are counted for unexcused, excused and coming to class late.
3. Missing more than 20% of a class period will count as an absence.
4. Being tardy 3 times equals 1 absence.

Course Policies

1. No food, drinks, or use of tobacco products in class.
2. No foul or harsh language will be tolerated
3. Headphones may be worn only upon Instructor approval
4. Do not bring children to class.
5. No Cheating of any kind will be tolerated. Students caught cheating or helping someone to cheat can and will be removed from the class for the semester. Cheating can result in expulsion from LIT.
6. If you wish to drop a course, the student is responsible for initiating and completing the drop process. If you stop coming to class and fail to drop the course, you will earn an 'F' in the course.
7. All pagers and cell phones must be turned off or on vibrate. NO PHONES ARE ALLOWED DURING EXAMS!!! If you are caught using your phone for texting or talking during an exam, the exam will be taken up and you will receive a grade of zero for that exam.
8. You MUST use a pencil. No work will be accepted if written in pen.
9. No more than two people working together in lab without instructor approval.
10. No copies of work will be accepted. You may work on labs in pairs, but each person must turn in his/her own lab write-up.
11. Write legibly. If I cannot clearly read an answer, it will be counted wrong
12. Internet Usage
    a. Classroom computers have access to the internet.
    b. Student usage of the internet will be monitored.
    c. Proper usage of the internet will be allowed. Used for classroom research or as directed.

d. Any unauthorized use of the internet will not be tolerated.
e. Improper usage of the internet, such as profanity, pornography, gambling, etc… will result in disciplinary action not limited to expulsion from LIT.

Disabilities Statement

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the office in Student Services, Cecil Beeson Building.

Course Schedule

Week	Topic	Reference
1	Intro to AC Current and Voltage • Lecture • Lab: Chapter Exercises	Chapter 8
2	AC Current and Voltage • Lecture • Lab: Chapter Exercises	Chapter 8
3	AC Current and Voltage • Lecture • Lab: Chapter Exercises • Exam One	Chapter 8
4	Capacitors • Lecture • Lab: Chapter Exercises	Chapter 9
5	Capacitors • Lecture • Lab: Chapter Exercises	Chapter 9
6	Capacitors • Lecture • Lab: Chapter Exercises • Exam Two	Chapters 9
7	RC Circuits • Lecture • Lab: Chapter Exercises	Chapters 10
8	RC Circuits • Lecture • Lab: Chapter Exercises	Chapter 10
9	RC Circuits • Lecture • Lab: Chapter Exercises	Chapter 10

Week	Topic	Reference
	• Exam Three	
10	Inductors • Lecture • Lab: Chapter Exercises	Chapter 11
11	Inductors • Lecture • Lab: Chapter Exercises	Chapter 11
12	RL Circuits • Lecture • Lab: Chapter Exercises	Chapter 12
13	RL Circuits • Lecture • Lab: Chapter Exercises • Exam Four	Chapter 12
14	RLC Circuits • Lecture • Lab: Chapter Exercises	Chapter 13
15	RLC Circuits • Lecture • Lab: Chapter Exercises	Chapters 13
16	RLC Circuits • Lecture • Lab: Chapter Exercises • Exam Five	Chapters 13