

Basic Electrical Theory (ELPT 1311)



Credit: 3 semester credit hours (2 hours lecture, 3 hours lab)

Prerequisite/Co-requisite: None

Course Description

Basic theory and practice of electrical circuits. Includes calculations as applied to alternating and direct current.

Required Textbook and Materials

1. Electrical Essentials For Powerline Workers, Wayne Van Soelen
2. Handout literature

Course Objectives

Explain atomic structure and basic values such as voltage, current, resistance, and power; determine electrical values for combination circuits in direct current (DC) and alternating current (AC) containing resistance, inductance, and capacitance; summarize the principles of magnetism; calculate voltage drop based on conductor length, type of material, and size; and utilize electrical measuring instruments.

1. The student will learn how to explain atomic structure and basic values such as voltage, current resistance and power.
2. The student will learn how to determine electrical values for combination circuits in direct current (DC) and alternating current (AC) containing resistance, inductance and capacitance.
3. The student will learn how to summarize the principles of magnetism.
4. The student will learn how to calculate voltage drop based on conductor length, type of material and size.
5. The student will learn how to utilize electrical measuring instruments.

Course Outline

- I. Handouts and History
 - A. Definitions and abbreviations
 - B. Symbols
 - C. Scientific notation
- II. Basic theory and DC
 - A. Energy, matter, atoms
 - B. Electron, flow, current, resistance, voltage
 - C. OHM'S Law, DC circuit
 - D. Circuit analysis, series and parallel circuits
- III. AC theory
 - A. Magnetic fields

Approved mm/yyyy

ELPT 1311
Course Syllabus

- B. AC theory
 - C. AC generation
 - D. AC voltages, RMS, Peak, instantaneous, peak to peak
 - E. AC reactance and power factor
 - F. Single phase AC circuits
- IV. Three phase theory
- A. Three phase power
 - B. Wye systems, wye voltage and current calculations
 - C. Delta systems, Delta voltage and current calculations

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:

| <i>Activity</i> | <i>Percentage</i> |
|----------------------|-------------------|
| Daily Grades | 20% |
| Exam 1 – Symbols | 10% |
| Exam 2 - DC | 20% |
| Exam 3 - AC | 20% |
| Exam 4 – Three Phase | 15% |
| Practical Exam | 15% |
| Total | 100% |

Grade points will be awarded in accordance with the college catalog.
Assignments are due on the due date assigned. Late assignments are not accepted.

Course Requirements

1. Perform circuit analysis using ohm 's law and Kirchoff's laws
2. Explain the effects of and relationship between voltage, current, resistance, and power in electrical circuits.
3. Calculate single phase AC voltage and current values
4. Calculate power required for single phase AC loads
5. Perform proper voltage tests on single phase AC circuits
6. Calculate cost for individual AC loads
7. Calculate three phase wye and delta voltage and current values
8. Perform proper voltage tests on three phase wye and delta systems
9. Calculate power required for three phase loads

Attendance Policy:

- A. Class attendance is important to obtain the educational objectives of this course. Prospective employers may also review your attendance records. Regular attendance and being on time for classes will have a positive effect on your academics and employment opportunities.
- B. Two absences will result 1 letter grade drop, three absences drop 2 letter grades.
- C. **Four absences result in an F for the semester.**

Course Policies

- 1. No food, drinks in class.
- 2. Daily lab grades cannot be made up.
- 3. No make ups for Lab tests.
- 4. Any written test retake has an 80 points as the maximum grade.
- 5. LIT is a tobacco free campus- no tobacco products allowed
- 6. Students must follow safety rules and procedures at all times. Failure to follow safety rules will require disciplinary action not limited to expulsion from LIT.
- 7. Students must have and wear **all required clothing including climbing boots at all times**, and have PPE and tools for participation in ***class and Lab***.
- 8. Students must follow safety rules and procedures at all times. Failure to follow safety rules will require disciplinary action not limited to expulsion from LIT.
- 9. Turn off all Cell Phones during class, lab and when on the field. Unauthorized cell phone use will result in a 0 for the daily grade.
- 10. Do not bring children to class.
- 11. Cheating of any kind will not be tolerated. Students caught cheating or helping someone to cheat can and will be removed from the class for the semester. Cheating can result from expulsion from LIT.
- 12. 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.
- 13. 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 online resource:

<http://www.lit.edu/depts/stuserv/special/defaults.aspx>

Student Code of Conduct Statement

It is the responsibility of all registered Lamar Institute of Technology students to access, read, understand and abide by all published policies, regulations, and procedures listed in the *LIT Catalog and Student Handbook*. The *LIT Catalog and Student Handbook* may be accessed at www.lit.edu or obtained in print upon request at the Student Services Office.

Course Schedule

| Week | Topic | Reference |
|-------|--|-----------|
| 1 | Course introduction and policies <ul style="list-style-type: none">Lecture Electrical definitions and symbolsLab: X | Handouts |
| 2 | Power systems <ul style="list-style-type: none">Lecture: Symbols NotationLab: Chapter exercises | |
| 3/4 | DC Circuits <ul style="list-style-type: none">LectureLab: History and power systems Circuit analysis | Chapter 2 |
| 5/6 | DC Circuits <ul style="list-style-type: none">LectureLab: Circuit analysis | Chapter 2 |
| 7/8 | DC Circuits <ul style="list-style-type: none">LectureLab: Circuit analysis | Chapter 2 |
| 9/10 | AC Circuits <ul style="list-style-type: none">LectureLab: Circuit analysis Chapter Exercises, AC power | Chapter 3 |
| 11/12 | AC Circuits <ul style="list-style-type: none">LectureLab: AC power, load calculations | Chapter 3 |

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Course Syllabus

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|-------|--|-----------|
| 13/14 | Three Phase Power | Chapter 4 |
| | <ul style="list-style-type: none">• Lecture• Lab: Wye Systems | |
| 15/16 | Three Phase Power | Chapter 4 |
| | <ul style="list-style-type: none">• Lecture• Lab: Delta and Wye Systems | |

Contact Information:

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