

## Electrical Troubleshooting (ELTN 1443)



**Credit:** 4 semester credit hours (3 hours lecture, 2 hours lab)

**Prerequisite/Co-requisite:** INMT 1305

### Course Description

Instruction in the maintenance, theory of operation, troubleshooting, and repair of circuits of various residential, commercial, and industrial electrical systems.

### Required Textbook and Materials

1. *Audel Millwrights & mechanics Guide*, Davis & Nelson. 5<sup>th</sup> edition
  - a. ISBN number is 0-7645-4171-4.

### Course Objectives

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

1. Use multimeters to perform tests on electrical equipment (SCANS C3.3; C5.3; C6.2; C7.3; C12.1; C14.3; C15.3; C16.3; C17.3; C18.4; C19.4; C20.5; F1.3; F2.2; F3.5; F4.5; F5.4; F6.3; F7.4; F8.4; F9.5; F10.5; F11.4; F12.4; F13.5; F14.5; F15.3; F16.4; F17.5)
2. Discuss various types of circuits and electrical systems (SCANS C2.2; C3.5; C4.3; C5.5; C6.5; C7.4; C8.1; C11.2; C14.3; C15.5; C16.4; C17.5; C18.5; C19.5; C20.5; F1.3; F2.2; F3.5; F4.5; F5.4; F6.3; F7.5; F8.4; F9.5; F10.5; F11.4; F12.4; F13.5; F14.4; F15.3; F16.4; F17.5)
3. Demonstrate the proper way to test transformers and motors (SCANS C1.3; C2.3; C3.5; C5.4; C6.4; C7.4; C8.1; C13.1; C14.3; C15.5; C16.5; C17.4; C18.4; C19.4; C20.5; F1.2; F2.4; F3.5; F4.5; F5.4; F6.5; F7.5; F8.4; F9.5; F10.5; F11.4; F12.4; F13.5; F14.5; F15.3; F16.4; F17.5)
4. Identify a short circuit, open circuit, and a closed circuit (SCANS C1.3; C3.5; C4.2; C5.5; C6.5; C7.3; C8.2; C13.1; C14.3; C15.5; C16.5; C17.4; C18.4; C19.4; C20.5; F1.2; F2.4; F3.5; F4.5; F5.4; F6.5; F7.5; F8.4; F9.5; F10.5; F11.4; F12.4; F13.5; F14.5; F15.3; F16.5; F17.5)
5. Troubleshoot electric motors and control circuits. (SCANS C1.3; C2.3; C3.5; C5.4; C6.4; C7.4; C8.1; C13.1; C14.3; C15.5; C16.5; C17.4; C18.4; C19.4; C20.5; F1.2; F2.4; F3.5; F4.5; F5.4; F6.5; F7.5; F8.4; F9.5; F10.5; F11.4; F12.4; F13.5; F14.5; F15.3; F16.5; F17.5)

### SCANS Skills and Competencies

Beginning in the late 1980's, the U.S. Department of Labor Secretary's Commission on Achieving Necessary Skills (SCANS) conducted extensive research and interviews with business owners, union leaders, supervisors, and laborers in a wide variety of work settings to determine what knowledge workers needed in order to perform well on a job. In 1991 the Commission announced its findings in *What Work Requires in Schools*. In its

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research, the Commission determined that “workplace know-how” consists of two elements: foundation skills and workplace competencies.

**Course Outline**

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|---|---|
| I. Introduction and safety                        | A. Explain AC and DC Systems              |
| A. Introduce the Faculty                          | B. Explain voltage and safety             |
| B. Discuss basic electrical safety                | VII. Transformers and motors              |
| II. Terminology                                   | A. How transformers work                  |
| A. Discuss basic terminology                      | B. How motors work                        |
| B. Demonstrate props                              | VIII. Circuit condition, Lockout / Tagout |
| III. Electrical Code                              | A. Explain LO/TO                          |
| A. Discuss the electrical Code                    | B. Demonstrate LO/TO                      |
| B. Discuss code of Beaumont                       | IX. Electrical trouble shooting           |
| IV. Circuit specification- AC and DC              | A. Explain troubleshooting                |
| A. Define AC                                      | B. Demonstrate troubleshooting            |
| B. Define DC                                      | X. Work permits                           |
| V. Amperage and voltage testing instruments       | A. Explain need of permits                |
| A. Explain Voltage and Amperage                   | B. Explain authority of permits           |
| B. Test on a DC sys.                              | XI. Inspection and testing –safety        |
| VI. Electrical systems, voltage ranges and safety | A. Inspect Circuit                        |
|   | B. Test a permitted circuit               |

**. 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:

Major test	75%
Class participation	25%

**Course Requirements**

1. The Student will be introduced to Electricity
2. Set up tools for safe work
3. Demonstrate the differences of AC/DC voltage

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4. Use AC/DC testing instruments
5. Connect up wiring
6. Work above ground level

**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. Turn off all cell phones during lectures
4. Headphones may be worn only upon Instructor approval
5. Do not bring children to class.
6. 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 from expulsion from LIT.
7. 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.
8. Proper Dress. It is the student’s responsibility to dress for work in an industrial atmosphere, long pants, shirts with sleeves, substantial footwear (no sandals, flip flops, cloth shoes), safety glasses and hard hats will be required. Students will be required to be clean shaven to be able to achieve a seal in respirators and fresh air packs.
9. 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.
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- j. 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
1-12	Course introduction <ul style="list-style-type: none"><li>• Lecture</li><li>• Lab: Practice</li></ul>	Chapter 22
13/16	A/C Motors <ul style="list-style-type: none"><li>• Lecture</li><li>• Lab: Practice</li></ul>	Chapter 23