

## Troubleshooting Distribution Systems (LNWK 2324)



**Credit:** 3 semester credit hours (3 hours lecture)

**Prerequisite/Co-requisite:** None.

### Course Description

Study of power outages and voltage complaints on distributions systems. Includes; lockout-tagout procedures, safety grounds, backfeed, induced voltage, causes of outages and analyzing voltage complaints.

### Required Textbook and Materials

1. Electrical Essentials For Powerline Workers, Wayne Van Soelen
  - a. ISBN number: 0-7668-1080-1
2. OSHA handouts
3. Handout literature

### Course Objectives

Describe causes of power outages; describe lockout-tagout procedures; and describe step and touch potentials. Describe backfeed and induced voltages; analyze voltage problems; and calculate service size from customer load. Explain and apply causes of power outages; explain and apply grounding procedures; and discuss and apply all relevant safety rules and procedures.

1. Identify causes of power outages.
2. Perform procedures for locating, repairing, and restoring power outages.
3. Perform lockout-tag out procedures.
4. Perform protective grounding procedures.
5. Describe step and touch potentials.
6. Identify sources for and hazards from backfeed and induced voltages.
7. Analyze and correct abnormal voltage problems.
8. Calculate service sizes based on customer load.
9. Apply and follow all relevant safety rules and procedures.

### Course Outline

#### I. Causes of Outages

- A. Apparent causes
- B. Blackouts
- C. Hard to find causes

#### II. Locating Outages

- A. Visual inspection
- B. Isolating damage

#### III. Repairing damaged circuits

- A. Breakers and fuses
- B. Lockout-tagout
- C. Air gap and grounds, testing for voltage
- D. Backfeed
  1. Generators

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- 2. Banks
- E. Induced voltage
- IV. Voltage Complaints
  - A. Checking voltage
  - B. Diagnosing voltage problems
    - 1. Connectors
    - 2. Transformer and service size

- 3. Voltage drop
- 4. System voltage correction
- V. Grounding for Protection
  - 1. Grounding Principle
  - 2. Bonding Principle
  - 3. Testing and inspecting grounds
  - 4. Grounding Application

**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><b>Activity</b></i>	<i><b>Percentage</b></i>
Grounding Exam	15%
Trouble Shooting Exam	25%
Grounding Application	20%
Repairing Breaks	20%
Daily Grades	20%
<i><b>Total</b></i>	<i><b>100%</b></i>

**Grade points will be awarded in accordance with the college catalog**

1. Assignments are due on the due date assigned. Late assignments are not accepted.
2. Tests must be taken on the announced date.
3. Daily grades include participation in classroom labs and skill level evaluations.

**Course Requirements**

1. Describe and diagnose different causes of power outages
2. Demonstrate proper grounding and lockout-tagout techniques
3. Describe sources of hazardous voltage
4. Demonstrate proper conductor splicing, line repair
5. Properly check voltage and diagnose customer voltage problems

**Attendance Policy:**

1. 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.

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2. Two absences will result in 1 letter grade drop, three absences drop 2 letter grades.
3. **Four absences result in an F for the semester.**

**Course Policies**

1. No food or 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 point 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 action from daily grade reduction 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. **Turn off all Cell Phones during class, labs and when on the field.** Unauthorized cell phone use will result in a 0 for the daily grade.
9. Do not bring children to class.
10. 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.
11. 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.
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.

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**Course Schedule**

<b>Week</b>	<b>Topic</b>	<b>Reference</b>
1	Course introduction and policies • Lecture	Handouts
2	Power outages • Lecture	Chapter 8
3/4	Power outages • Lecture	Chapter 8
5/6	Power outages • Lecture	Chapter 8
7/8	Power outages • Lecture	Chapter 8
9/10	Grounding • Lecture	Chapter 7, Handouts
11/12	Grounding • Lecture • Grounding Exam • Grounding Practical	Chapter 7, Handouts
13	Conductor repair • Lecture • Practical Exam - Repairing Breaks	Chapter 7
14/15/16	Customer voltage complaints • Lecture • Troubleshooting Exam	Chapter 8

**Contact Information:**

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