

SYLLABUS
UNDERGROUND POWER LINE CONSTRUCTION AND
TRANSFORMER CONNECTIONS
UTIL-2300

2011

WESTERN NEBRASKA COMMUNITY COLLEGE
DIVISION OF APPLIED TECHNOLOGIES

I. CATALOG DESCRIPTION:

UTIL-2300

Underground Power Line Construction and Transformer Connections

Prerequisite: UTIL-1000, UTIL-1300, UTIL-1400

This course takes an in-depth look at underground power delivery systems, including underground cable, URD terminations, splicing, and fault locating. Safe work practices associated with underground power systems are also discussed. Additionally, transformer connections, single phase and three phase, are covered to provide the student with a working knowledge of primary and secondary voltage ratings and how to achieve different voltage levels according to customer needs. Rural Utilities Service (RUS) specifications for overhead three phase construction are also discussed.

(9/90/135/0/0/15)

II. COURSE OBJECTIVES/COMPETENCIES:

The student will be able to:

- A. Describe basic single phase transformer connections. [PG: E; GE Goals: 1 & 2]
- B. Describe three phase transformer connections using single phase transformers. [PG: E; GE Goals: 1 & 2]
- C. Define the term phase displacement and its relationship to transformer connections. [PG: B; GE Goals: 1 & 2]
- D. Describe the wye-delta transformer connection. [PG: E; GE Goals: 1 & 2]
- E. Describe the wye-wye transformer connection. [PG: E; GE Goals: 1 & 2]
- F. Describe the delta-wye transformer connection. [PG: E; GE Goals: 1 & 2]
- G. Describe the delta-delta transformer connection. [PG: E; GE Goals: 1 & 2]
- H. Construct three phase transformer banks. [PG: E; GE Goal: 2]
- I. Explain underground power line construction. [PG: D; GE Goals: 1 & 2]
- J. Construct an underground power line. [PG: D; GE Goal: 2]
- K. Construct an overhead three phase power line. [PG: D; GE Goal: 2]

III. PROGRAM GOALS:

- A. Demonstrate proficiency in climbing skills
- B. Explain basic electrical principles
- C. Explain the power grid and power delivery systems
- D. Demonstrate skills in Overhead/Underground line construction according to Rural Electrification Administration (REA) standards
- E. Demonstrate competence in transformer connections and the construction of three phase banks
- F. Demonstrate competency in the use and application of Ohm's Law
- G. Develop safe work habits and an understanding of power line safety guidelines and principles in accordance with the American Public Power Association (APPA)
- H. Demonstrate safe and efficient operation of utility service vehicles (digger derrick and bucket truck)
- I. Identify and utilize proper protective equipment
- J. Identify and utilize proper protective grounding equipment
- K. Explain and apply Occupational Safety and Health Administration (OSHA) rules and regulations for power line workers
- L. Demonstrate satisfactory completion of the Merchant Job Training and Safety Program (Workbooks I, II and III) for power line workers

IV. INSTRUCTIONAL MATERIALS:

A. Textbooks:

- 1. Dennis Merchant. *Merchant Job Training and Safety Workbook I, II and III*. Current Edition.
- 2. Shoemaker. *Lineman and Cableman's Handbook*. McGraw-Hill. Current Edition.
- 3. American Public Power Association. *APPA Safety Manual/OSHA Standards*. Current Edition.

B. Learner Supplies:

1. Climbing equipment
2. Hand tools
3. Safety equipment/PPE

V. METHOD OF PRESENTATION:

A. Methods of presentation, although determined by the individual instructor, traditionally include a combination of the following:

1. Lecture
2. Class discussion and group activities
3. Presentation and discussion of solutions to problems, exercises, and projects
4. Lab activities

VI. METHOD OF EVALUATION:

A. Methods of evaluation, although determined by the individual instructor, traditionally include a combination of the following:

1. Unit tests
2. Midterm exam/comprehensive final exam
3. Quizzes, assignments, group activities
4. Projects
5. Attendance and participation

B. Students will receive a course outline/syllabus indicating the instructor's attendance policy (face-to-face presentation), course requirements, and specific grading criteria.

VII. ACADEMIC INTEGRITY:

Academic integrity forms a fundamental bond of trust between colleagues, peers, teachers, and students, and it underlies all genuine learning. At WNCC, there is no tolerance for plagiarism or academic dishonesty in any form, including unacknowledged "borrowing" of proprietary material, copying answers or papers, or passing off someone else's work as one's own.

A breach of ethics or act of dishonesty can result in:

- failure of a paper or exam within a course

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- failure of an entire course (blatant plagiarism, cheating on a test or quiz)
- academic suspension or expulsion from the college

VIII. EQUAL ACCESS STATEMENT:

Western Nebraska Community College is committed to providing equal access to educational opportunities. If you believe that you qualify under the Americans with Disabilities Act (ADA), please contact the Director of Counseling (308-635-6090) as soon as possible to begin a process of documentation review and determination for appropriate accommodation or adaptive strategies.

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