

# Mercer County Community College

## Division of Business and Technology

### UTI 108

#### Introduction to Underground Utilities

##### **COURSE DESCRIPTION:**

Provides participants with the knowledge & skills to assist with electric utility underground distribution, construction, maintenance and testing, including safe work practices, construction standards, operating practices, testing procedures and competent person qualifications.

##### **Text: References & Textbooks:**

Handouts Reference Guides  
Underground Construction Manual

Prerequisites: Introduction to the Energy Utility Industry UTI 101

Credits: 5                      Lecture Hours: 4                      Studio/Lab Hours 2

Food and drink are strictly prohibited in classrooms as per health and safety laws. Students may not bring in chemicals or cleaning fluids without the appropriate MSD sheets.
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Course Coordinator: Dominick DeFino

Revised: 10/23/02

**Course Objectives:**

- Conduct inspection & use of personal protective equipment including; hard hat, safety glasses with side shields, flame retardant clothing, rubber gloves, work gloves, work shoes, and dielectric foot wear.
- Participate in atmosphere testing of manholes using the environmental testers, such as Cannonball, in accordance with procedures in the Underground Construction Manual – Safety Section.
- Participate in the opening & entry of various field manholes & hand holes using hooks, setup work area protection, setup traffic control devices in accordance with Underground Construction Manual.
- Identify & explain the purpose of safety tags including; (Red) Blocking, (Red/Yellow) Workers Blocking, (White) Caution, Permissive & Defective Equipment tags in accordance with Underground Construction Manual – Safety Section..
- Participate in a Tailboard Conference (pre & post job briefing), which allows associates to discuss each job assignment, including all potential hazards, safety issues, & facility evacuation routes.
- Setup, field maintenance, & operation of propane furnace & torch used in the heating of solder and compounds for cable splicing.
- Identify & practice handling of tools/equipment used in cable splicing, (Conventional & BUD) construction and maintenance of underground.
- Prepare lead sleeves and dress to cable dimension in accordance with requirements in Underground Construction Manual for specific cable.
- Identify various types of cables, connectors, splices & terminators used in the Underground system, using the Underground Construction Manual as reference.
- Identify various types insulation tapes used for specific cable splices, using the Underground Construction Manual as reference.
- Identification & setup of test equipment used for Underground operations, including but not limited to; solenoid voltage tester, atmospheric analyzer, voltmeter, ammeter, continuity tester, Tritector, high impedance voltmeter, 4 /13 KV Phasing Set & solenoid voltage tester.
- Demonstrate the safe work practices & procedures for removal and bagging of small quantities of asbestos from cable splices in accordance with criteria in Personal Safety and Underground Construction Manuals.
- Conduct visual pre-operational inspection of job sites for compliance with State of New Jersey mark out requirements for underground utilities, including the identification of types services by color code.

- Communicate & demonstrate a knowledge of determining soil conditions, personnel safe work practices, spoil positions, and shoring of excavation in accordance with O.S.H.A. regulation 29 - CFR - 1926 Subpart P, Competent Person qualification.
- Apply Underground tools, equipment, & work practices in the construction and repair of conventional / buried underground distribution manholes, handholes & conduits in accordance with procedures within the Underground Construction Manual.
- Install manhole grate shims to maintain level road grade for street repaving; including use of compressor & pneumatic hammers, removal of minimum pavement around structure, raising grates, sizing, & installing shims and leveling manhole in accordance within Underground Construction Manual.
- Install & test single phase secondary and services from polyphase secondary, including verifying voltages, testing for load, and installing watt-hour meters, in accordance with procedures within Underground Construction Manual.

**Evaluation Procedure:**

**Grading Criteria for Participants**

The participants will be individual evaluated on the course content utilizing the following criteria:

- Attendance - Mandatory
- Average of Quizzes = 30 % of Total Grade
- Final Examination = 70 % of Total Grade

**Course/Instructor Evaluation**

The course and instructor evaluation will consist of the following:

- End of Course Reaction Survey which will ask the participant opinion of the course based on within the objectives and outline
- Overall performance of as indicated by participants completion of quizzes, practical & laboratory exercises and final exam
- Instructor observations by PSE&G – Technical Training team to ensure consistence of instructional quality

**Course Content Outline - “Introduction to Underground Utilities ” UTI 108**

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|-----|---|-----------------------------------|
| I.  | Introduction & Orientation                              |                                   |
|     | a. Course Objectives                                    | <i>Lecture 100%</i>               |
|     | b. Schedule (Lecture/Discussion & Laboratory Exercises) | <i>Lecture 100%</i>               |
|     | c. Evaluation System & Grading Criteria                 | <i>Lecture 100%</i>               |
|     | d. General Safety Characteristics                       | <i>Lecture 100%</i>               |
|     | i. Person Protective Equipment                          |                                   |
|     | ii. Environmental monitoring                            |                                   |
|     | iii. Operational Best Practices                         |                                   |
|     | e. Tool & Equipment                                     | <i>Lecture 60% - Hands-on 40%</i> |
|     | f. Manhole Atmospheric Testing                          | <i>Lecture 60% - Hands-on 40%</i> |
| II. | Buried Underground Distribution                         | <i>Lecture 100%</i>               |

- a. Design
  - b. Layout
  - c. Operations
  - d. Work Area Protection
- III. Network Distribution *Lecture 100%*
- a. Design
  - b. Layout
  - c. Operations
- IV. Print Reading *Lecture 100%*
- a. Conventional Underground System
  - b. Primary Overhead/Underground
  - c. Buried Underground Distribution
- V. Test Equipment & Safety Tagging
- a. Testing Procedure *Lecture 100%*
  - b. Test Equipment *Lecture 60% - Hands-on 40%*
    - i. High Voltage
    - ii. Low Voltage
  - c. Safety Tagging *Lecture 100%*
- VI. Manhole, Vaults & Duct Construction
- a. Markout of Underground Facilities *Lecture 60% - Hands-on 40%*
  - b. Design *Lecture 100%*
  - c. Layout *Lecture 60% - Hands-on 40%*
  - d. Repair Procedures *Lecture 60% - Hands-on 40%*
- VII. Underground Cable Installation
- a. Installation Procedure *Lecture 100%*
  - b. Installation Equipment *Lecture 100%*
  - c. Rigging *Lecture 60% - Hands-on 40%*
  - d. Cable Pulling Process *Lecture 60% - Hands-on 40%*
- VIII. Competent Person Qualification *Lecture 100%*
- a. General Regulations
  - b. Protection Systems
  - c. Soil Characteristics
  - d. Shoring
  - e. Handling OSHA Inspections

- IX. Lead Sleeve Preparation
  - a. Cable Splicing Procedures
  - b. Materials & Safe handling *Lecture 60% - Hands-on 40%*
  - c. Sleeve Preparation *Lecture 30% - Hands-on 70%*
  - d.
- X. Meter installations & Final
  - a. Meter Installation Procedure *Lecture 60% - Hands-on 40%*
  - b. Final Exam
  - c. Course Evaluation
  - d. Calculate Final Course Grades