UT-2200: UNDERGROUND CONSTRUCTION I

Cuyahoga Community College

Viewing: UT-2200 : Underground Construction I

Board of Trustees:
October 2024

Academic Term:
Fall 2025

Subject Code
UT - Utilities Technology

Course Number:
2200

Title:
Underground Construction I

Catalog Description:
Develop a working knowledge of construction specifications for buried and underground utility systems and practice construction methods in dedicated lab activities. Focus on gas, water, sewer, and communications utilities. Site restoration and safety protocols will be reviewed. Students will perform operations for horizontal directional drilling, basic excavation, and basic maintenance of utility pipes through dedicated lab activity. Students need to be 18 years of age or older due to equipment use during lab activities, per Occupational Safety and Health Administration (OSHA) regulations.

Credit Hour(s):
3

Lecture Hour(s):
1

Lab Hour(s):
6

Requisites

Prerequisite and Corequisite
UT-2000 Equipment Operations I or concurrent enrollment; and CNST-2050 Advanced Construction Safety, or concurrent enrollment; and CNST-2090 Utility Locating and Traffic Flagging

Outcomes

Course Outcome(s):
Explain the functions of horizontal directional drilling machines and excavating equipment.

Essential Learning Outcome Mapping:
Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):
1. Identify sizes of horizontal directional drilling machines.
2. Identify bucket sizes.
3. Identify drop-down hole equipment.
4. Identify drilling fluid systems.

Course Outcome(s):
Identify horizontal directional drilling machine project drill path criteria.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Identify drill path design and profile.
2. Recognize directional accuracy and tolerance.
3. Recognize product-pipe considerations.
4. Recognize machine size selection.
5. Explain soil condition requirements.

Course Outcome(s):

Conduct operation of horizontal directional drilling machine and excavating equipment.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Develop a work plan.
2. Test soil conditions.
3. Evaluate site.
4. Select proper drilling fluids.
5. Perform drilling operations.
6. Recognize OSHA Guidelines for Horizontal Directional Drilling.
7. Restore site post-construction.

Course Outcome(s):

Utilize horizontal directional drilling tracking and surveying systems.

Essential Learning Outcome Mapping:

Not Applicable: No Essential Learning Outcomes mapped. This course does not require application-level assignments that demonstrate mastery in any of the Essential Learning Outcomes.

Objective(s):

1. Identify different systems for tracking.
2. Perform a wireline method for tracking.
3. Perform a walkover method for tracking.
4. Identify interference and machine location systems.
5. Perform a horizontal directional drilling survey.

Methods of Evaluation:

1. Quizzes
2. Written Assignments
3. Exams
4. Lab Activities
5. Participation
6. Projects

Course Content Outline:

1. Construction drawings of utility systems
    a. Utility site plans
    b. Examples of civil plan/profile drawings
2. Horizontal directional drilling process

   a. Drilling operations
   b. Pipe installation
   c. Drilling tools
   d. OSHA guidelines
   e. Work zone safety
3. Down-hole equipment
   a. Drill bits
   b. Drill pipe
   c. Down-hole tools
4. Work plan
   a. Soil conditions
   b. Drilling path
   c. Drilling fluids
5. Tracking and surveying
   a. Walkover system
   b. Wireline system
   c. Location system
   d. Surveying in rock formations
   e. Surveying in water crossings
   f. Construction monitoring
   g. Work zone safety
   h. OSHA guidelines
6. Utility system components
   a. Installation of conduits and cables
   b. Repair and removal of conduits and cables
   c. Installation of tracer wires, pedestals, access points
   d. Joining conduits/pipes
   e. Trench bedding and shoring

Resources

Willoughby, D. A. (2005) *Horizontal directional drilling: Utility and pipeline applications*, McGraw-Hill.

Hayes, J. (2024) *FOA reference guide to fiber optics*, The Fiber Optic Association Inc.

Resources Other

1. Al-Bayati, A. & Panzer, L. (2021*). Underground Utilities for Construction Practitioners and homeowners*. ASCE Press.
2. ASTM F1962-11. (2011). *Standard guide for use of maxi-horizontal directional drilling for placement of polyethylene pipe or conduit under obstacles, including river crossings*. ASTM International.
3. OSHA and the American Pipeline Contractors Association (APCA) Alliance. (2008). *Horizontal directional drilling best practices for operators*. https://www.americanpipeline.org/images/safetyzone/BestPractices/English/HorizontalDirDrilling_Operators.pdf
4. OSHA Cooperative Program. *(2024). Backhoe operation best practices for supervisory personnel and operators.* American Pipeline Contractors Association.
5. Ditch Witch. (2024). *CX Series Operators Manua*l.
6. TT Staff. (2024). Horizontal directional drilling guide. Trenchless Technology. https://trenchlesstechnology.com/hdd-guide/

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