

UT-2210: UNDERGROUND CONSTRUCTION II

Cuyahoga Community College

Viewing: UT-2210 : Underground Construction II

Board of Trustees:

October 2024

Academic Term:

Fall 2025

Subject Code

UT - Utilities Technology

Course Number:

2210

Title:

Underground Construction II

Catalog Description:

Capstone course in Utilities Technology program. Working practice of construction methods for buried and underground utility systems by dedicated lab activities. Advanced methods for gas, water, sewer and communications utilities. Site restoration and safety protocols will be demonstrated. Students will perform operations for horizontal directional drilling, excavation, installation and maintenance of utility pipes. Students need to be 18 years of age or older due to equipment used 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, and UT-2200 Underground Construction I, and CNST-2050 Advanced Construction Safety

Outcomes

Course Outcome(s):

Conduct operation of horizontal directional drilling machine.

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 and set up work zone.
 4. Perform drilling operations.
 5. Perform vacuum operations.
 6. Install communication pipe and cable.
 7. Recognize OSHA Guidelines for Horizontal Directional Drilling.
 8. Restore site post-construction.
 9. Perform pressure tests and/or leak detection.
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Course Outcome(s):

Conduct operation of compact excavation machines.

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 and set up work zone.
 4. Perform trench digging operation at set depth and slope.
 5. Install trench base underlayment.
 6. Insert utility pipe of required length.
 7. Perform utility pipe pressure and leak test.
 8. Backfill trench with specified material.
 9. Restore site with finish grading.
 10. Recognize OSHA Guidelines for Excavation and Trenches
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Methods of Evaluation:

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

Course Content Outline:

1. Construction drawings 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. Cable installation
 - e. OSHA guidelines
3. Work plan
 - a. Soil conditions
 - b. Drilling path
 - c. Trenching path
 - d. Work zone safety
 - e. Site restoration
4. Excavation and trenching process
 - a. Trench digging operations
 - b. Trench bedding and shoring
 - c. Cut material laydown
 - d. Use of rotating laser level to maintain slope
 - e. Aggregate underlay
 - f. Pipe installation and connections
 - g. Pressure and leak tests
 - h. OSHA guidelines

Resources

Al-Bayati, A. & Panzer, L. (2021) *Underground utilities for construction practitioners and homeowners*, ASCE Press.

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

Resources Other

Hayes, J. (2024). *FOA reference guide to fiber optics (2nd ed.)*. The Fiber Optic Association Inc.

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.

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

OSHA Cooperative Program. *Backhoe operation best practices for supervisory personnel and operators*. American Pipeline Contractors Association. <https://www.americanpipeline.org/images/safetyzone/BestPractices/English/BackhoeOperation.pdf>

Ditch Witch. (2024). *Cx series operators manual*.

TT Staff. (2024). Horizontal directional drilling guide. Trenchless Technology. <https://trenchlesstechnology.com/hdd-guide/>

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