

CNST-2230: GAS PIPELINE SYSTEMS

Cuyahoga Community College

Viewing: CNST-2230 : Gas Pipeline Systems

Board of Trustees:

October 2024

Academic Term:

Fall 2025

Subject Code

CNST - Construction Engineering Tech

Course Number:

2230

Title:

Gas Pipeline Systems

Catalog Description:

An introduction to gas pipeline systems. Covers systems drawings, types of pipelines, common safety hazards, system components, common construction methods, maintenance and inspection, and legal requirements of gas pipeline systems. Includes lab activities to reinforce/demonstrate concepts.

Credit Hour(s):

3

Lecture Hour(s):

2

Lab Hour(s):

2

Requisites

Prerequisite and Corequisite

CNST-1290 Construction Print Reading, or departmental approval

Outcomes

Course Outcome(s):

Identify and explain specific parts of a gas distribution system.

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 pipe sizes.
2. Identify material types.
3. Identify valve locations.

Course Outcome(s):

Identify and explain the purpose of maintenance approaches.

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. Explain common safety hazards in gas distribution.
2. Identify common personal protective equipment.
3. Describe inspections used in gas distribution systems.
4. Describe how corrosion impacts gas systems.

Course Outcome(s):

Describe legal elements involved in gas distribution system.

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. Describe protocols for discarding wastewater from construction operations.
2. Describe the importance of record keeping.
3. Describe the state agencies involved in system operation.

Course Outcome(s):

Describe construction methods used when building gas distribution 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. Describe equipment used when installing components of a gas distribution system.
2. Explain the steps involved when replacing a gas distribution line.
3. Describe what needs to be done before the project can be considered fully completed.

Methods of Evaluation:

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

Course Content Outline:

1. Construction Drawings of Gas Systems
 - a. Transmission
 - b. Distribution
 - c. Service lines
 - d. Common facilities
2. Safety Hazards in Gas Distribution
 - a. Material Hazards and Safety Data Sheets (chemical hazards)
 - b. Common personal protective equipment (PPE)
 - c. Equipment modifications for gas safety
 - d. Trenching hazards
 - e. Meters and airing areas out
 - f. Physical hazards (common equipment, temperature, pressurization of system, etc.)
3. Components and Purposes of Gas Distribution System

- a. Gas regulators
- b. Pressure-reducing valves
- c. Compressors
- d. Flow meters
- e. Leak detectors
- f. Check valves
- g. Filters and traps
- h. Control instrumentation
- i. Pumps
- j. Safety valves
- 4. Standard Equipment and Materials
 - a. Pipe types and sizing
 - b. Pipe requirements for material type
 - c. Welding requirements
 - d. Material handling
- 5. Construction Methods
 - a. Ditching
 - b. Stringing
 - c. Pipe preparation
 - d. Change of direction
 - e. Welding and laying pipe
 - f. Backfilling
 - g. Crossings
 - h. Casing installations
 - i. Prefabricated assemblies
 - j. Above-ground pipelines
 - k. Cleanup operations
 - l. Recording
- 6. Maintenance Methods and Inspections
 - a. As-built drawings
 - b. Welding inspection/testing
 - c. Equipment for Testing
 - d. Testing operations
 - e. Defects, repair or renewals, retesting
 - f. Inside pipe chemical cleaning
 - g. Pipe supports
 - h. Corrosion
- 7. Legal Elements of System Management
 - a. Ohio Revised Code/Public Utilities Commission of Ohio
 - b. Ohio Environmental Protection Agency (OEPA)
 - c. Ohio Department of Natural Resources (ODNR)
 - d. Ohio Department of Commerce

Resources

Roberts, D. (2022) *Pipe and excavation contracting revised*, Craftsman Book Company.

Bahadori, A. (2017) *Oil and gas pipelines and piping systems: Design, construction, management, and inspection*, Boston: Elsevier Inc.

Guo, B. & Ghalambor. A. (2016) *Natural gas engineering handbook*, Gulf Publishing Company.

Resources Other

US Department of Transportation - Pipeline and Hazardous Materials Safety Administration. (2022). Phases of pipeline construction: An overview. <https://www.phmsa.dot.gov/technical-resources/pipeline/pipeline-construction/phases-pipeline-construction-overview>

Enerdynamics - Energy KnowledgeBase. (2024). Gas distribution system. <https://energyknowledgebase.com/topics/gas-distribution-system.asp>

Ohio Revised Code. (2012). Section 4905.90 - Natural gas pipeline safety standards definitions. <https://codes.ohio.gov/ohio-revised-code/section-4905.90>

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