Online courses | GAS SYSTEM FUNDAMENTALS

enerdynamics
The Energy Education Experts

Course length: 3 hours
Subscription: 45 days
Cost: $295
Prerequisites: None

A comprehensive overview of the gas system

This Gas System Fundamentals online course bundle focuses on the physical gas system and takes learners on a tour through the transmission, storage, and distribution systems. It is designed for anyone who needs to better understand the key components of the gas physical system and how the system is designed, built, maintained, and operated using these components. It is appropriate for new engineers and other operations employees as well as industry professionals from other work groups that interact with the gas operations department. Topics covered include basic concepts of natural gas, key gas components and how they are utilized in gas systems, system construction and maintenance, system operations, and emergency response.

WHO WILL BENEFIT FROM THIS COURSE?

- New engineers without a gas background
- Employees in operations who need a broader understanding of the overall system
- Gas utility professionals who interact with construction, maintenance, or operations departments
- Employees with customer account management, customer services, sales, or marketing responsibilities who need to be able to explain the gas system to customers
- Attorneys involved in gas-related cases or contracting
- Finance, public relations, or regulatory professionals who need to understand the physical gas system

WHAT PARTICIPANTS WILL LEARN

- The basic characteristics of natural gas and its key properties, the different types of natural gas, and the ways in which it is measured
- How the components of the gas delivery system work
- How gas transmission, storage, and distribution facilities are planned and designed
- How gas transmission, storage, and distribution facilities are constructed and maintained to ensure they operate safely and reliably
- The role of gas system operations in providing services to users of the gas system and in responding to emergencies

COURSE AGENDA

Basic Concepts of Natural Gas

- Definition/composition
- Where does natural gas come from?
  - Manufactured gas
  - Renewable natural gas (RNG)
  - Associated gas
  - Raw gas
  - Pipeline quality gas
- Gas quality
- Other types of natural gas
  - Liquefied natural gas (LNG)
  - Responsible natural gas
  - Renewable natural gas
  - Synthetic natural gas
- Gas units
  - Volume
  - Energy content
  - Pressure
  - Heating value
- Typical usage
- Key properties
  - Combustibility
  - Compressibility
- Pressure
  - Gas flow
  - Storage
  - Safety
- The ideal gas law
- Environmental impacts

Key Components of a Natural Gas Delivery System

- Where does gas come from?
- Overview of the gas delivery system sectors
- MAOP
- Pipe
  - Materials
  - Design considerations
  - Steel pipe
    - Geometry
    - Strength
    - Toughness
    - Weldability
    - Applications
  - Plastic pipe
    - Geometry
    - Strength
    - Crack resistance
    - Applications
  - Cast iron pipe
- Valves
  - Functions

  - Types of valves
    - Ball
    - Plug
    - Gate
    - Spring
  - Valve operation
    - Manual handwheel operated
    - Automatic local control
    - Manual piston-assist
    - Remote control
- Compression
  - Compression equipment
  - Function of compression
  - How compression works
  - Prime movers
    - Gas turbines
    - Reciprocating engine
    - Electric motor
  - Compression types
    - Centrifugal
    - Reciprocating
  - Support systems
  - Controls
  - Emergency shutdown systems
- Regulators
  - Types of regulators
    - Spring-loaded
    - Pilot-operated
- Meters
  - Function of meters
  - Meter types
    - Diaphragm
    - Turbine
    - Ultrasonic
    - Rotary
    - Orifice
  - Smart meters
- Monitoring
  - Manual
  - SCADA system
  - Odorant equipment

Gas System Planning and Design

- Balancing benefits and costs
- Transmission
  - Layout of a transmission system
  - Components
  - Planning process
  - Capacity design
  - Modeling
  - System design
  - Economic optimization
- Distribution
  - Layout of a distribution system
  - Components
  - Planning process
  - Capacity design
  - Service levels
  - Modeling
  - System design
  - Economic optimization
- Storage
  - Layout of a storage system
  - Injection components
  - Withdrawal components
  - Capacities
  - Cycling rate
  - Planning process
  - Capacity design
  - Modeling

Gas System Construction and Maintenance

- Roles of construction and maintenance
- Safety
- Construction
  - Alignment and surveys
  - Rights-of-way
  - Transmission pipeline construction
  - Distribution pipeline construction
  - Documentation
  - Geographic Information Systems (GIS)
- Maintenance
  - Integrity management
  - Key maintenance items
    - Pipelines
    - Compressors
    - Valves
    - Regulators
    - Storage
    - Odorizer systems
    - Meters
- Asset management
  - Infrastructure risks
  - The asset management system
  - Asset families
  - Asset management plan
  - Records and information management
- Regulatory compliance
  - Why regulatory compliance is critically important
  - Who the regulators are
  - Which regulations affect construction, maintenance, and operations
  - Operator qualification
  - Cybersecurity
  - Approvals for new projects

Gas System Operations and Emergency Response

- Gas system operations
  - Market affiliate rules
  - Managing line pack
  - Storage injections and withdrawal
  - Monitoring and control
  - Modeling
  - Operations during the flow day
  - Developing the operational plan
  - Scheduling
  - Data management
- Emergency response
  - The importance of emergency response
  - Key steps in emergency response
    - Assess the situation
    - Stop the flow of gas
    - Service restoration
    - Incident analysis