1 Introduction to Pipeline Design and Materials

1.1 Course Description

This course introduces learners to the critical aspects of design and material selection for a pipeline once the route has been selected. Key topic areas include pipeline system elements, hydraulic and mechanical designs, material selection, and quality management. This course provides learners with foundational knowledge on how pipelines are designed and how the quality management process is important to pipeline design and material selection. Self-assessments are used to reinforce key concepts, and a final graded assessment evaluates the learner's understanding of the material. The online course format allows individuals to review and reinforce the material at their own pace. What sets this course apart is its focus on the foundational aspects of pipeline design throughout the pipeline lifecycle, and the importance of design in delivering products safely and efficiently.

Format:	Online	**Prerequisite Courses & Materials:**	
Duration:	~1 hour	Introduction to the Pipeline Industry	

1.2 Learning Objectives

By the end of the course, participants should be able to:

1. Identify the main elements of a pipeline system.
2. Describe hydraulic and mechanical design
3. Describe the three criteria for pipeline material selection.
4. Identify mechanisms used to ensure quality in material selection, design, manufacturing and procurement, and construction.

1.3 Who Should Take This Course

The course is best suited for:

- Individuals seeking basic knowledge about the design and materials stage of the pipeline lifecycle.
- Individuals considering or pursuing careers in the pipeline industry.

1.4 Course Topics

Main topic areas covered in this course include:

- Background
  - Pipeline Design
  - Pipeline Lifecycle Map
  - The Design Process
  - Material Selection
  - History of Design and Materials
  - Standards and Regulations
- Pipeline System Elements
  - Introduction
  - Design and Feasibility Studies
  - Pipeline System Elements
- Hydraulic Design
  - Hydraulic Design
  - Expected Pattern and Volume of Flow
  - Main Considerations

  - Flow Simulation as a Tool for Hydraulic Design
  - Flow Simulation and J-Curve Graphs
  - Outputs from Hydraulic Design
- Mechanical Design
  - Introduction
  - Main Approaches to Mechanical Design
  - Barlow's Equation
  - Wall Thickness
  - Material Strength
  - Pipe Selection
  - Specific Pressure Design
  - Additional Loading Conditions
  - Constructability
  - Outputs of Mechanical Design
- Material Selection
  - Introduction
  - Selection Criteria
  - Selection Process
  - Properties of Selected Piping Elements
  - Material Selections and Operating Conditions
  - Material Selection for Major Piping Elements
- Quality Management
  - Quality Management
  - What is Quality?
  - Quality Management Focus