

SYLLABUS

MODULE 1

Introduction to Pipeline Engineering

This module provides a brief history of the pipeline and technical background to the design of pipelines used in the transport of oil and gas.

Course Content

- Basic pipeline concepts and definitions
- Introduction to the stages of a pipeline project
- Description and general requirements of standards, codes and regulations
- Introduction to the principles of pipeline design, construction and installation
- Wall thickness calculation based on different design codes or standards
 - Case studies on code selection

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MODULE 2

Material Selection and Corrosion Control

The objective of this module is to provide an overview of the material selection process for pipeline fabrication, as well as the method for controlling pipeline corrosion during the pipeline lifecycle.

Course Content

- Introduction to material science including the properties of steel and other materials used for pipeline fabrication
- Process of pipeline material selection, including code/standard requirements
 - Case study
- Manufacturing process, including welding standards, procedures and non-destructive testing (NDT) techniques for qualifications
- Introduction to corrosion, including definition of the corrosion phenomenon and chemical principles
- Types of internal and external corrosion
- Method to prevent or mitigate corrosion in pipelines
 - How corrosion allowance is determined or selected

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MODULE 3

Pipeline Design, Installation and Construction

This module introduces the participant to the design of onshore and offshore pipelines, the different stages of pipeline construction and the pipeline installation methods.

Course Content

- Introduction to different approaches of pipeline design for offshore and onshore
 - Definition of safety and reliability factors
 - Codes
 - Standards
 - Recommended practices
- Introduction to the different pipeline configurations, including pipe-in-pipe, bundles, etc
- Introduction to flexible pipelines – principles and concepts
- Introduction to hydrodynamics around offshore pipelines, including the definition of the different wave theories: current and prediction of the forces acting on an offshore pipeline
- Stress assessment of pipelines, including definition of stress on pipelines and an introduction to fatigue analysis
- Stages of pipeline construction
 - Hydro-testing
 - Commissioning operations
 - Procurement
 - Quality assurance
- Methods of onshore and offshore pipeline installation

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MODULE 4

Pipeline Hydraulic Analysis

The aim of this module is to provide the participant with the flow/hydraulic principles associated with pipelines.

Course Content

- Thermodynamic principles and flow properties of the different flow transported by pipelines
- Basic flow calculations for gases, liquids and multiphase pipelines
- Problems caused by changes in flow condition during the pipeline's operations (wax and hydrate formation, etc)
 - Case studies on prevention
- Exercise on flow calculations

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MODULE 5

Defect Assessment on Pipelines

This module provides a description of defects in pipelines, including pipe manufacturing defects and in-service defects, how they affect pipeline integrity, and how it can be technically assessed.

Course Content

- Definition of the types of defects on pipelines, including failure statistics and the relative causes of pipeline failures
- Failure modes and a description of how pipelines fail
- Defect assessment, including the different codes and standards used to carry out fit-for-purpose assessments of defects and damage
- Design code and standard requirements
- Introduction to pipeline engineering critical assessment (ECA)
- Case studies on pipeline defects
- Exercise on defect identification and assessment

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MODULE 6

Pipeline Integrity: Maintenance, Inspection and Risk Assessment

The objective of this module is to give the participant a review of pipeline integrity assessment, with emphasis on the inspection technologies that are available to detect the defects and anomalies found in pipelines, and monitor the condition of the pipeline.

Course Content

- Pipeline anomalies and defects
- Introduction to principles and applications of the in-line inspection techniques and existing tools
- Survey methods for onshore and offshore pipelines
 - Walking patrol
 - Air survey
 - Remotely Operated Vehicles (ROV)
 - Acoustic
 - Diver
 - Above-ground monitoring techniques
- Principles and application of NDT techniques used to detect and evaluate pipeline defect and damage
- Preparation of integrity management plans for onshore and offshore pipelines