

SYLLABUS

MODULE 1

Module 1: Introduction to Subsea Production

Learning Outcomes

On successfully completing this module you will have an understanding of:

- The background factors that led to the development of offshore production systems
- How and where oil and gas can form in the Earth and how it is located
- The importance of the geological information to predict how oil will flow
- How a well is drilled
- Different types of oil flow
- The factors that will make oil flow from the source to the production facility
- Flow assurance issues, which must be correctly assessed for each development

Course Content

- Introduction to offshore production
 - Background to offshore production systems
 - Global oil and gas reserves and fields
 - Introduction to offshore exploration and drilling
- Introduction to subsea engineering
 - Building blocks
 - SPS (Subsea Production Systems) and URF (Umbilicals, Risers and Flowlines)
 - Other elements
 - Systems design
- Types of subsea completions
 - Extensions to existing platforms
 - Tie-backs to existing production hosts
 - Production systems for floating hosts: FPSOs (Floating Production, Storage and Offloading systems) and FPVs (Floating Production Vessels)
 - Well to beach developments (gas fields)
- Flow assurance for subsea production systems
 - Hydraulics
 - Wax
 - Hydrates

SYLLABUS

MODULE 2

Module 2: Wellheads, Xmas Trees and Manifolds

Learning Outcomes

On successfully completing this module you will have an understanding of:

- The functions of the following:
 - Subsea wellhead
 - Tubing hanger system
 - Subsea Xmas trees
 - The subsea systems interface
 - The drilling template and manifolded systems
 - Well clusters.
- A comparison between the dual-bore tree, horizontal ("spool") tree and the advantages of the electric tree.
- Design issues involved in the choice of a template or manifolded system.
- The effect of the IMR (inspection, maintenance and repair) philosophy on the well design.
- The factors that affect oil flow and design requirements to maintain flow.

Course Content

- Wellheads
 - Drilling subsea wells
 - Wellheads as part of drilling and production operations
 - Blowout preventers
 - Design and functions
 - Installation
 - Examples
- Xmas trees
 - Types of trees
 - Dual bore vertical trees and spool/horizontal trees
 - Design and function
 - Suppliers
 - Installation
 - New developments (drill through and all electric trees)
 - Examples
- Manifolds
 - Templates
 - Types of manifolds (wells clustered around manifold or template manifold)
 - Design and functions
 - Installation
 - Examples

SYLLABUS

MODULE 3

Module 3: Pipelines, Flowlines and Risers

Learning Outcomes

On completing this module you will have an understanding of:

- The issues affecting the routing of pipelines and flowlines
- How pipelines are connected
- The reasons why pipelines are set in trenches
- The purpose of riser systems and why they are of key importance to platform safety
- The five basic configurations of dynamic flexible risers and the reasons where and why they might be used

Course Content

- Pipelines and flowlines
 - Design and functions
 - Route survey
 - Pipe selection of materials and coatings
 - Installation methods
 - Operations
 - Examples
- Risers
 - Requirements and functions
 - Flexible dynamic risers
 - Design
 - Operation and use
 - Manufacture
 - Current developments
 - Hybrid riser towers
 - Steel catenary risers
 - Examples

SYLLABUS

MODULE 4

Module 4: Control Systems, Umbilicals and Equipment Costs

Learning Outcomes

- On completing this module you will have an understanding of:
- The functions and range of the subsea production control system
- The costs involved in the subsea production control system, both CAPEX and OPEX
- Life cycle cost analysis

Course Content

- Subsea production control systems
 - Types
 - Electro-hydraulic multiplex control systems
 - Equipment and suppliers
 - Operations
 - Installations
 - Examples
- Drilling control systems
- Umbilicals
 - Functions
 - Design and manufacture
 - Installation
 - Examples
- Costs of subsea equipment

SYLLABUS

MODULE 5

Module 5: Underwater Operations, Subsea Maintenance and New Technologies

Learning Outcomes

On completing this module you will have an understanding of:

- The importance of planning for inspection, maintenance and repair (IMR) in the design, construction, installation and operational phases of an offshore field development.
- The place of divers and ROVs in IMR and their limitations.
- The difference between a well intervention and a well workover, the reasons for each activity and the complexity of such activities.
- The need for artificial lift and the main ways that this can be accomplished.

Course Content

- Subsea equipment reliability, requirements and operability
- Inspection, maintenance and repair
 - Shallow water – diver operations
 - Deepwater diverless interventions
 - Remote Operated Vehicles (ROVs)
 - Autonomous Underwater Vehicles (AUVs)
 - Subsea well workover
- New technologies
 - Subsea pumping
 - Subsea processing
 - Requirements
 - Systems and examples

SYLLABUS

MODULE 6

Module 6: Subsea Reliability, Decommissioning Activities and Subsea Field Development Examples and Case Studies

Learning Outcomes

On completing this module you will have an understanding of:

- The definition and importance of reliability in subsea engineering.
- The definition and causes of failure.
- The concept and importance of reliability management.
- The importance and complexity of interface communication.
- The environmental and cost issues involved in decommissioning

Course Content

- Subsea completions - interfaces with other functions
 - Drilling and well completions
 - Production hosts
 - Government authorities
- Examples of fields developed with subsea completions
- Increased production to existing production host
 - North Sea fields
- Tie back to production host
 - Gulf of Mexico fields
 - Norwegian fields
- Subsea production to floating host
 - North Sea fields
 - Angolan fields
 - Australian fields
 - Brazilian fields
- Gas fields – deepwater production to shallow water host
 - MCE (Gulf of Mexico)
 - Malampaya field (Philippines)
- Gas fields – well to beach
 - Orman Lange field (Norway)
 - West Delta Deep (Egypt)