# Offshore Field Development - Pipelines & Flow Assurance

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## LEVEL
Foundation

## PURPOSE
This course provides a deep understanding of offshore technology and techniques, with a particular emphasis on issues of flow assurance.

## LEARNING OBJECTIVES
Upon completion of the course, participants will be able to:
- understand the technology and design of offshore production facilities,
- grasp the architecture of offshore field developments, from shallow water to deep offshore,
- understand pipelines technology, laying techniques and main operational problems,
- learn the techniques used to prevent main problems of flow assurance.

## WAYS AND MEANS
Highly interactive training by industry-specialist lecturers.
Numerous case studies from the offshore industry.

## LEARNING ASSESSMENT
Assessment by test at the end of the course.

## PREREQUISITES
No prerequisites for this course.

## Agenda

**OVERVIEW OF OFFSHORE DEVELOPMENTS**
Constraints specific to offshore production.
Present performances and future perspectives. Technological barriers.

**0.25 d**

**FIXED & FLOATING PRODUCTION STRUCTURES**
Offshore production structures: jacket, semi-submersible, SPAR, TLP, FPSO…
Selection criteria. Limitations.
Terminology: shallow water, deep offshore, ultra-deep offshore.

**0.25 d**

**CONSTRUCTION & INSTALLATION OF PLATFORMS**
Platform technology. Platform installation techniques.
Examples of shallow water developments.

**0.5 d**

**DEEP OFFSHORE DEVELOPMENTS**
Typical subsea architecture: subsea wellheads, well jumpers, production manifolds, production lines, production risers, preservation lines, umbilicals.
Role and technology of each piece of equipment.

**0.5 d**
Examples of deep offshore developments.

**FPSO/FSO TECHNOLOGY**
Technology of floating (production), storage and offloading vessels.
Ballast tanks. Atmosphere control.
Oil, methanol… Storage tanks. Blanketing system.
Storage tanks start-up procedures. Incidents.
Technology and operation of FSOFPSO offloading (tanker loading) buoy.

**OPERATION OF TERMINALS**
Technology of tankers and loading/offloading equipment.
Marine operations of reception and exports.
Terminal constraints: storage capacity, scheduling.

**NEW DEEP WATER TECHNOLOGIES**
Overview of new deep water technologies that are in R&D or pilot stages.

**FLOW ASSURANCE 1/2: PREVENTION OF DEPOSITS IN FLOWLINES**
Main flow assurance problems: hydrates, paraffins, sulfates, sand, salt, napthenates…
Main technical solutions and preservation operations. Intervention techniques.

**FLOW ASSURANCE 2/2: MONITORING OF MULTI-PHASE FLOW THROUGH FLOWLINES**
Multi-phase flow patterns. Application to Oil & Gas upstream activities.
Gas dominated systems: dry versus wet scheme, flowline and slug catcher design.
Oil dominated systems: hydrodynamic slug flow, examples.

**PIPESLINES: TECHNOLOGY, LAYING & OPERATION**
Technology of pipelines: standards, material grades, insulation techniques.
Pipeline laying techniques (offshore and shore approach). Illustrations.
Pipeline operation and maintenance:
Main flow assurance problems. Main available technical solutions.
Pipe corrosion monitoring and prevention. Cathodic protection.
Pipeline maintenance/maintenance management.