**Offshore Field Development - Pipelines & Flow Assurance**

**Overview**

**LEVEL**
Knowledge

**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**

<table>
<thead>
<tr>
<th>Section</th>
<th>Duration</th>
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<tbody>
<tr>
<td><strong>OVERVIEW OF OFFSHORE DEVELOPMENTS</strong></td>
<td>0.25 d</td>
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<td>Constraints specific to offshore production.</td>
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<td>Present performances and future perspectives.</td>
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<td>Technological barriers.</td>
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<td><strong>FIXED &amp; FLOATING PRODUCTION STRUCTURES</strong></td>
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<td>Offshore production structures: jacket, semi-submersible, SPAR, TLP, FPSO…</td>
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<td>Selection criteria. Limitations.</td>
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<td>Terminology: shallow water, deep offshore, ultra-deep offshore.</td>
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<td><strong>CONSTRUCTION &amp; INSTALLATION OF PLATFORMS</strong></td>
<td>0.5 d</td>
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<td>Platform technology. Platform installation techniques.</td>
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<td>Examples of shallow water developments.</td>
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<td><strong>DEEP OFFSHORE DEVELOPMENTS</strong></td>
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<td>Typical subsea architecture: subsea wellheads, well jumpers, production manifolds, production lines, production risers, preservation lines, umbilicals.</td>
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<td>Role and technology of each piece of equipment.</td>
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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 FSO/FPSO 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.

**PIPELINES: 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.