A Word from the CEO
Jean-Luc Karnik

Our roots, our history
2019 is the 100th anniversary of the first oil training in France at the Pechelbronn field site, as well as the creation of the first oil laboratory, ancestors of the IFP and IFP School. A century later, IFP, now IFP Energies nouvelles, is recognized worldwide for its action and success in developing technologies and talents in the energy sector.

IFP Training, a subsidiary within the IFP group, was founded in 1975 to develop the skills of professionals in the Oil & Gas industry and now offers courses in fields as varied as exploration, production, refining, chemicals, the powertrain industry, energy transition, economics and management.

In addition to the “catalogue” training courses presented below, the core of the activity concerns tailor-made courses to customize the development of our clients’ teams, whether they are operators, engineers or managers.

In total, more than 15,000 professionals from 80 countries are trained each year through 1,400 training sessions.

Addressing our industry’s new challenges
Although the global demand for hydrocarbons increases, the high price volatility and geopolitical instability in some regions have a significant impact on the development of our industry, which can also be measured in the area of recruitment and training. In particular, there is a strong trend towards internalization and catalogue training courses are becoming commodities.

In addition, the new generations express high expectations often linked to the emergence of new training methods or new digital tools. They expect interactivity, practice and immediate impact of the training.

As a result, training is now seen as an investment in skills development, a guarantee of employability for employees and operational efficiency and enhanced safety for companies.

Our solutions
In this context, IFP Training develops a range of high value-added services and solutions and offers a skills management system, from evaluation to certification, guaranteeing a return on investment as well as a quality guarantee.

Close relations have been established with major players in the energy sector, particularly in Africa, Latin America, Europe, the Middle East and Russia. For example, we have partnered with TOTAL to offer training on real size industrial units to develop know-how and interpersonal skills.

I encourage you to read in the following pages about the resources and methods implemented, from our policy of pedagogical innovation and quality, our professionalization paths, our rich offer of training leading to certification, our competency assessment system to our global approach to accreditation.

Our teams and, in particular, our 100 permanent instructors and 600 industry experts are at your disposal to offer you high added value services and enable you to succeed in your projects.

Jean-Luc Karnik
Chief Executive Officer
# Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Index</td>
<td>4</td>
</tr>
<tr>
<td>Course Calendar</td>
<td>14</td>
</tr>
<tr>
<td>Career Paths</td>
<td>20</td>
</tr>
<tr>
<td>Technical Fields</td>
<td>31 to 401</td>
</tr>
<tr>
<td>E&amp;P Chain</td>
<td>31 to 72</td>
</tr>
<tr>
<td>Exploration</td>
<td>73 to 94</td>
</tr>
<tr>
<td>Reservoir &amp; Field Development</td>
<td>95 to 148</td>
</tr>
<tr>
<td>Drilling &amp; Completion Engineering</td>
<td>149 to 199</td>
</tr>
<tr>
<td>Production Engineering</td>
<td>200 to 221</td>
</tr>
<tr>
<td>Field Operations</td>
<td>222 to 257</td>
</tr>
<tr>
<td>Surface Facilities Engineering</td>
<td>258 to 299</td>
</tr>
<tr>
<td>Project Management</td>
<td>300 to 326</td>
</tr>
<tr>
<td>HSE</td>
<td>327 to 364</td>
</tr>
<tr>
<td>Gas</td>
<td>365 to 378</td>
</tr>
<tr>
<td>Unconventional</td>
<td>379 to 389</td>
</tr>
<tr>
<td>Offshore</td>
<td>390 to 401</td>
</tr>
<tr>
<td>Keywords List</td>
<td>402</td>
</tr>
<tr>
<td>Registration</td>
<td>409</td>
</tr>
<tr>
<td>General Terms of Sale</td>
<td>411</td>
</tr>
<tr>
<td>Course Title</td>
<td>Duration</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>General Introduction to Technical Topics</strong></td>
<td></td>
</tr>
<tr>
<td>Comprehensive Overview of E&amp;P Management Certification</td>
<td>60 days</td>
</tr>
<tr>
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<tr>
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<tr>
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<td>Liquefied Natural Gas Economics</td>
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</tr>
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<td>5 days</td>
</tr>
<tr>
<td>Natural Gas &amp; Electricity Trading</td>
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</tr>
<tr>
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<td>3 days</td>
</tr>
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<td>Production Sharing &amp; Joint Operating Agreements</td>
<td>3 days</td>
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<tr>
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<tr>
<td>Economics &amp; Risk Analysis of Upstream Projects</td>
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</tr>
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## Exploration

<table>
<thead>
<tr>
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<th>Dates</th>
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<th>Reference</th>
<th>Page</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>From Basin to Prospect Evaluation</td>
<td></td>
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<td></td>
<td></td>
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</tr>
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<td></td>
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<td></td>
<td></td>
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<td></td>
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</tr>
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<td><strong>From Prospect to Development: an Integrated Approach</strong></td>
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<td></td>
<td></td>
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</tr>
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<td><strong>Seismic &amp; Sequence Stratigraphy for Oil &amp; Gas Exploration</strong></td>
<td>10 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>EVAL/SEQUSTRATI 91</td>
</tr>
<tr>
<td><strong>Exploration Blocks Management</strong></td>
<td>15 days</td>
<td>In-house course</td>
<td></td>
<td></td>
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</tr>
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<td><strong>NEW E&amp;P Projects Value Management</strong></td>
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<td>In-house course</td>
<td></td>
<td></td>
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</tr>
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<td><strong>NEW E&amp;P Project Risk &amp; Decision Analysis Workshop</strong></td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>PIMP/PVDAWGB 94</td>
</tr>
</tbody>
</table>

## Reservoir & Field Development

<table>
<thead>
<tr>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition fee (H.T.)</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reservoir &amp; Field Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
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</tr>
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<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/PETROPHYSICS 97</td>
</tr>
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<td>5 days</td>
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<td><strong>Geological Modeling Workshop for Integrated Reservoir Studies</strong></td>
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<td></td>
<td></td>
<td>RCM/GEOMODEL 103</td>
</tr>
<tr>
<td><strong>Hydrocarbon Accumulations, Reserves Estimation, Risk Analysis &amp; Uncertainties</strong></td>
<td>5 days</td>
<td>In-house course</td>
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<tr>
<td><strong>Naturally-Fractured Reservoirs: Static &amp; Dynamic Modeling</strong></td>
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<td><strong>Petrophysical Properties: Core, Log &amp; Test Data Integration for Reservoir Modeling</strong></td>
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<td>3 days</td>
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<td><strong>Borehole Imaging Interpretation Workshop with WellCad™</strong></td>
<td>5 days</td>
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<td>In-house course</td>
<td></td>
<td></td>
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</tbody>
</table>
**Course Index**

### Reservoir Engineering

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Duration</th>
<th>Start Date</th>
<th>End Date</th>
<th>Location</th>
<th>Tuition Fee</th>
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*Tuition fees include instruction and documentation as well as meals and beverage breaks*
# Drilling & Completion Engineering

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<th>Duration</th>
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Tuition fees include instruction and documentation as well as meals and beverage breaks.

www.ifptraining.com
## Well Production Integrity
- 2 days In-house course
- COMP/WELINT 191

## Well Production Integrity Management
- 5 days In-house course
- COMP/WELINTMA 192

## Well Performance Engineering Certification
- 35 days In-house course
- COMP/WELLPERFENGE 193

## Well Integrity Engineering Certification
- 35 days In-house course
- COMP/WELINTENGE 194

## Well Control
- 5 days In-house course
- WEL/FPESME2 195

## Well Control - Level 2
- 5 days
  - 11-15 March Pau €2,490 WEL/FPESME2-4 196
  - 13-17 May Pau €2,490 WEL/FPESME2-4 196
  - 16-20 September Pau €2,490 WEL/FPESME2-4 196

## Well Control - Level 3 or 4
- 5 days
  - 11-15 March Pau €3,580 WEL/WELINE2 197
  - 13-17 May Pau €3,580 WEL/WELINE2 197
  - 16-20 September Pau €3,580 WEL/WELINE2 197

## Well Intervention & Pressure Control - Level 2
- 5 days In-house course
- WEL/WELINE3-4 198

## Well Intervention & Pressure Control - Level 3 or 4
- 5 days
  - 20-24 May Pau €3,580 WEL/WELINE3-4 198

## Stripping
- 3 days In-house course
- WEL/STRIPE 199

## Production Engineering

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## Surface Production

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## Field Operations

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</table>

Tuition fees include instruction and documentation as well as meals and beverage breaks.
## Course Index

### Surface Facilities Engineering

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fee (H.T.)</th>
<th>Reference</th>
<th>Page</th>
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### Static Equipment

<table>
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<th>Duration</th>
<th>Dates</th>
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<th>Reference</th>
<th>Page</th>
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### Rotating Machinery

<table>
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<th>Course Title</th>
<th>Duration</th>
<th>Dates</th>
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<th>Reference</th>
<th>Page</th>
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### Electricity & Instrumentation

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<th>Duration</th>
<th>Dates</th>
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<th>Reference</th>
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<td>Instrumentation, Process Control &amp; Safety Instrumented Systems</td>
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### Maintenance & Inspection

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
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<th>Page</th>
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<tbody>
<tr>
<td>NEW Asset Integrity Management</td>
<td>5 days</td>
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<td>Subsea Integrity Management (I) - Inspection, Monitoring &amp; Testing</td>
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Tuition fees include instruction and documentation as well as meals and beverage breaks.
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
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<td>Offshore Oil &amp; Gas Project Installation</td>
<td>5 days</td>
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<td>PCONS/CONSNGB</td>
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</table>

Tuition fees include instruction and documentation as well as meals and beverage breaks.
<table>
<thead>
<tr>
<th>Course Index</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition fee (H.T.)</th>
<th>Reference</th>
<th>Page</th>
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<td>11-15 March</td>
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<td>In-house course</td>
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<td>Pau</td>
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<td>28-30 October</td>
<td>Pau</td>
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<td>357</td>
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<td>In-house course</td>
<td>HMGT/HSECTORGB</td>
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<td>358</td>
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<td>HSE Management of Logistics</td>
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<td>HMGT/HSELOGGB</td>
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<td>359</td>
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<td>€2,150</td>
<td>PCONS/CONSTRGB</td>
<td>361</td>
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</tbody>
</table>
## Course index

### Gas

<table>
<thead>
<tr>
<th>Natural Gas Chain</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition fee (H.T.)</th>
<th>Reference</th>
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<td>Rueil-Malmaison</td>
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<td>Gas Cycling: an Integrated Approach</td>
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<tr>
<td>Natural Gas Storage</td>
<td>2 days</td>
<td>In-house course</td>
<td>NAT/GASTOR</td>
<td>NAT/GASTOR</td>
<td>368</td>
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<tr>
<td>Natural Gas Transport by Pipeline</td>
<td>2 days</td>
<td>In-house course</td>
<td>NAT/GASTRAN</td>
<td>NAT/GASTRAN</td>
<td>369</td>
<td></td>
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<tr>
<td>From Gas to Energy</td>
<td>5 days</td>
<td>In-house course</td>
<td>NAT/GASENERGY</td>
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<td>Gas Production &amp; Processing Engineer Certification</td>
<td>70 days</td>
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<td>PENG/GASENG</td>
<td>PENG/GASENG</td>
<td>371</td>
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<td>Gas Sweetening &amp; Sulfur Recovery</td>
<td>5 days</td>
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<td>PENG/GASD</td>
<td>PENG/GASD</td>
<td>372</td>
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<td>5 days</td>
<td>In-house course</td>
<td>PROP/GASHARD</td>
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<td>373</td>
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<td>Gas Flaring Reduction: Operational &amp; Environmental Stakes</td>
<td>3 days</td>
<td>In-house course</td>
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<td>SUST/GASMGT</td>
<td>374</td>
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<tr>
<td>Laboratory Analyses for Oil &amp; Gas Production</td>
<td>5 days</td>
<td>In-house course</td>
<td>PRIS/PLABOG</td>
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<th>Duration</th>
<th>Dates</th>
<th>Location</th>
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<th>Reference</th>
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<td>4-8 November</td>
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<td>60 days</td>
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<td>LNG/LNGENG</td>
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<td>LNG Process Simulation</td>
<td>5 days</td>
<td>In-house course</td>
<td>LNG/LNGSIM</td>
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<td>378</td>
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### Unconventional

<table>
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<th>Duration</th>
<th>Dates</th>
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<th>Reference</th>
<th>Page</th>
</tr>
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<tbody>
<tr>
<td>Tight Sand &amp; Shale Plays - In Unconventional Settings</td>
<td>5 days</td>
<td>In-house course</td>
<td>UNCO/TIGHTSHALE</td>
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<td>3 days</td>
<td>In-house course</td>
<td>UNCO/UNCON</td>
<td>UNCO/UNCON</td>
<td>381</td>
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<tr>
<td>Unconventional Resources - Shale Gas Fundamentals</td>
<td>5 days</td>
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<td>UNCO/UNCON</td>
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<td>10 days</td>
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<td>5 days</td>
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### Offshore

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*Tuition fees include instruction and documentation as well as meals and beverage breaks.*

[www.ifptraining.com](http://www.ifptraining.com)
## Course calendar

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Geosciences Reservoir Engineering
Career Path

DIGITALIZATION & DATA MANAGEMENT

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UNCONVENTIONAL

EXPLORATION: From Unconventional Play to Geological Sweet Spot

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UNCONVENTIONAL PRODUCTION

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METHODS & TOOLS

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FROM BASIN TO PROSPECT EVALUATION

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<td>Advanced Facies Analysis &amp; Rock-Typing Certification</td>
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<td>Seismic Reservoir Characterization: AVO &amp; Inversion Workshop Certification</td>
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<td>Geological Characterization &amp; Modeling - Integrated Workshop Certification</td>
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<td>Tools for Seismic Reservoir Characterization: Pre-Stack Seismic Inversion</td>
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<tr>
<td>Tools for Seismic Reservoir Characterization: Post-Stack Seismic Inversion</td>
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<td>SRC: Seismic Reservoir Characterization (Blended Learning)</td>
<td>24h/6 weeks</td>
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<td>Static Model Construction: Field Constraints &amp; Integration with Subsurface Data</td>
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<tr>
<td>Reservoir Fluid Properties - PVT</td>
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<td>Drilling &amp; Completion - Wellbore Interface &amp; Well Productivity</td>
<td>5 days</td>
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<tr>
<td>Well Testing &amp; Well Test Analysis</td>
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<td>Drive Mechanisms - EOR</td>
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<td>Dynamic Reservoir Simulation</td>
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<td>EOR Concepts &amp; Application</td>
<td>5 days</td>
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<td>Miscible Gas Injection EOR Certification</td>
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<td>RENG/DREMSIMIES</td>
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<td>RENG/RESSIMULS</td>
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<td>PVT Modeling</td>
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<td>Decline Curves Analysis</td>
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<td>Reserves Evaluation - Risk &amp; Uncertainties Certification</td>
<td>5 days</td>
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<td>Mature Fields - Subsurface Issues</td>
<td>5 days</td>
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<td>Integrated Reservoir Management Certification</td>
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<td><strong>FIELD DEVELOPMENT</strong></td>
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<tr>
<td>Field Development Project &amp; Uncertainties</td>
<td>5 days</td>
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</table>

www.lfptraining.com
# Drilling Supervisor Career Path

## Initial Training

**Drilling Fundamentals** 5 days  
**Well Completion & Servicing** 5 days

**Roughneck Floorman** Estimated: 2 months

**Derrickman** Estimated: 4 months

**Assistant Driller Course** 10 days

## Long Professionalizing Training Course (98 days)

Drilling & Completion

**Drilling & Completion Engineering Certification** (including HSE module & IWCF certification) 98 days

## Junior Supervisor (night)

**Drilling Supervisor**

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Duration</th>
<th>Reference</th>
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<tbody>
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<td><strong>INITIAL TRAINING</strong></td>
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<td>Drilling Fundamentals</td>
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<td>GEND/INFORE</td>
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<td>Well Completion &amp; Servicing</td>
<td>5 days</td>
<td>GEND/INPFE</td>
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<td><strong>ON AN ONSHORE RIG, AS A MEMBER OF A DRILLING CONTRACTOR TEAM</strong></td>
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<tr>
<td>Roughneck Floorman</td>
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<td>Derrickman Course</td>
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<td>Derrickman</td>
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<td>GEND/FOSIME</td>
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<td>5 days</td>
<td>FLU/CIM2E</td>
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<td>Stuck Pipe Prevention</td>
<td>5 days</td>
<td>DRIL/STUCKPIPE</td>
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<tr>
<td>Stripping</td>
<td>3 days</td>
<td>WEL/STRIPE</td>
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<tr>
<td>Well Test Operation</td>
<td>5 days</td>
<td>COMP/CEPE</td>
</tr>
<tr>
<td>Matrix Acidizing</td>
<td>5 days</td>
<td>COMP/ACIDIFE</td>
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<tr>
<td>Coiled Tubing &amp; Nitrogen Operations in Completion &amp; Workover</td>
<td>5 days</td>
<td>COMP/CTAE</td>
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<tr>
<td><strong>Well Intervention &amp; Pressure Control (IWCF certification)</strong></td>
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<td>5 days</td>
<td>WEL/WELINE2 &amp; WEL/WELINE3-4</td>
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<td>Well Production Integrity</td>
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<td>Introduction to Reservoir Engineering</td>
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<td>RENG/INFORES</td>
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<tr>
<td>Well Performance</td>
<td>5 days</td>
<td>COMP/WELPERFE</td>
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<td>Artificial Lift: Gas Lift</td>
<td>5 days</td>
<td>COMP/GLIFTE</td>
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<tr>
<td>Artificial Lift: Pumping</td>
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Well Intervention Supervisor  
Career Path

**Long Professionalizing Training Course**  
Well Operations & Completion Engineering

**Junior Supervisor**  
(night)

- **Initial Training**  
- **Drilling Supervisor**

---

### WELL INTERVENTION SUPERVISOR

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<td>GEND/INPFE</td>
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<td><strong>AT THE RIG SITE OR RIG SCHOOL</strong></td>
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<td>Safety Induction - Rig</td>
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<tr>
<td>Practical Training on Rig School</td>
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<tr>
<td>Sea Survival, Firefighting, First Aid</td>
<td>Variable</td>
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<td><strong>LONG PROFESSIONALIZING TRAINING COURSE DRILLING &amp; COMPLETION</strong></td>
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<td>GEND/FOSIME</td>
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<tr>
<td>Well Test Operation</td>
<td>5 days</td>
<td>COMP/CEPE</td>
</tr>
<tr>
<td>Matrix Acidizing</td>
<td>5 days</td>
<td>COMP/ACIDIFE</td>
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<tr>
<td>Coiled Tubing &amp; Nitrogen Operations in Completion &amp; Workover</td>
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<td>COMP/CTAE</td>
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<tr>
<td><strong>Well Intervention &amp; Pressure Control (IWCF certification)</strong></td>
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<td>HSE Management</td>
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<td>HMGT/HSEMGTGB</td>
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<td>Introduction to Reservoir Engineering</td>
<td>5 days</td>
<td>RENG/INFORES</td>
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<td>Advanced Well Performance</td>
<td>10 days</td>
<td>COMP/WELLPERF2E</td>
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<tr>
<td>Artificial Lift: Gas Lift</td>
<td>5 days</td>
<td>COMP/GLIFTE</td>
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<tr>
<td>Artificial Lift: Pumping</td>
<td>5 days</td>
<td>COMP/APOMPF</td>
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<tr>
<td>Well Production Integrity Management</td>
<td>5 days</td>
<td>COMP/WELINTMA</td>
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</table>
## Drilling Engineer Career Path

- **Initial Training**
  - **Drilling & Completion**
    - Drilling Fundamentals: 5 days (GEND/INFORE)
    - Well Completion & Servicing: 5 days (GEND/INPFE)
    - Safety Induction - Rig: Variable
    - Slips & Tongs (Rig school): 5 days
    - Sea Survival, Firefighting, First Aid: Variable

- **Long Professionalizing Training Course Drilling & Completion**
  - Drilling & Completion Engineering Certification (including HSE module & IWCF certification): 98 days (GEND/FOPPE)

- **Junior Supervisor (night)**
  - **Drilling Engineer**
    - ADVANCED COURSES
      - Supervisor Training on Drilling Simulator: 5 days (GEND/FOGME)
      - Underbalanced & Managed Pressure Drilling: Applications, Design & Operations: 5 days (DRIL/UBDE)
      - HPHT Drilling Design & Operations: 5 days (DRIL/HPHTE)
      - Stripping: 3 days (WEL/STRIPE)
      - Advanced Cementing Practices: 5 days (FLU/CIM2E)
      - Stuck Pipe Prevention: 5 days (DRIL/STUCKPIPE)
      - Well Test Operation: 5 days (COMP/CEPE)
      - Matrix Acidizing: 5 days (COMP/ACIDPE)
      - Coiled Tubing & Nitrogen Operations in Completion & Workover: 5 days (COMP/CTAG)
      - Well Intervention & Pressure Control (IWCF certification): 5 days (WEL/WELINEZ & WEL/WELINEZ-4)
      - HSE Management: 5 days (HMS/F/SGMT/GB)
      - Introduction to Reservoir Engineering: 5 days (RENG/INFORE)
      - Advanced Well Performance: 10 days (COMP/WELPERF2E)
      - Artificial Lift: Gas Lift: 5 days (COMP/GLIFTE)
      - Artificial Lift: Pumping: 5 days (COMP/PLPMP)
      - Well Production Integrity Management: 5 days (COMP/WELINTMA)

- **Management**
  - Integrated Reservoir Management (IRM): 45 days (RMGT/IFRM)
  - E&P Project Management Certification: 5 days (PMGT/PROJ/GB)
  - Negotiation of Exploration-Production Contracts: 4 days (EAM/PROCN)
  - Economics & Risk Analysis of Upstream Projects: 5 days (EAM/ECONAM)
  - Production Sharing & Joint Operating Agreements: 3 days (EAM/PSA)

---

**DRILLING ENGINEER**

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<tr>
<td>Safety Induction - Rig</td>
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<tr>
<td>Slips &amp; Tongs (Rig school)</td>
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<tr>
<td>Sea Survival, Firefighting, First Aid</td>
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<td>GEND/FOGME</td>
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<td>Underbalanced &amp; Managed Pressure Drilling: Applications, Design &amp; Operations</td>
<td>5 days</td>
<td>DRIL/UBDE</td>
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<tr>
<td>HPHT Drilling Design &amp; Operations</td>
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<td>WEL/STRIPE</td>
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<td>FLU/CIM2E</td>
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<td>Stuck Pipe Prevention</td>
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<td>DRIL/STUCKPIPE</td>
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<td>COMP/CEPE</td>
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<td>COMP/ACIDPE</td>
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<td>Introduction to Reservoir Engineering</td>
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<td>RENG/INFORE</td>
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<tr>
<td>Advanced Well Performance</td>
<td>10 days</td>
<td>COMP/WELPERF2E</td>
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<tr>
<td>Artificial Lift: Pumping</td>
<td>5 days</td>
<td>COMP/PLPMP</td>
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<tr>
<td>Well Production Integrity Management</td>
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<td>COMP/WELINTMA</td>
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## Production/Maintenance Technician Career Path

### Production Operator
- **Panel Operator**
- **Maintenance Technician**

### Production Supervisor
- **Panel Operator**
- **Maintenance Technician**

### Production Superintendent
- **Production Supervisor**
- **Maintenance Technician**

### PRODUCTION/MAINTENANCE TECHNICIAN

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<tr>
<td>HSE in Surface Production Operations</td>
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<td>Refresher Course for Production Operator</td>
<td>15 days</td>
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<td>Well Operation &amp; Testing</td>
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<td>Operation of Gas Lift Wells</td>
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<td>5 days</td>
<td>PROP/PUMPOPGB</td>
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<td>Compressors Operation</td>
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<td>PROP/COMP0PGB</td>
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<td>E&amp;I/INST1GB</td>
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<td>Instrumentation Maintenance</td>
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<tr>
<td>Fundamentals of Electrical Power Generation &amp; Distribution Equipment</td>
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<td>E&amp;I/ELECT1GB</td>
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<td>5 days</td>
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<td>Production Facilities Control Room Operation</td>
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<td><strong>SUPERINTENDENT</strong></td>
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<td>HSE Superintendent Certification</td>
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Throughout the career path, IFP Training can implement specific short courses on the following topics:

- Production Operations & Processing
- Health, Safety & Environment
- Equipment & Maintenance
Production/Operations/Maintenance/ HSE Engineer Career Path

**ENGINEERS PROGRAMS**

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<td><strong>ACCELERATED DEVELOPMENT PROGRAMS</strong></td>
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<tr>
<td>Oil &amp; Gas Process Engineering Certification</td>
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<td>Advanced Oil &amp; Gas Process Engineering Certification</td>
<td>35 days</td>
<td>PENG/ADVPROCESSINGGB</td>
</tr>
<tr>
<td>Pipeline Network Engineering &amp; Operation Certification</td>
<td>60 days</td>
<td>SPRO/TRANSPORTGB</td>
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<tr>
<td>Gas Production &amp; Processing Engineer Certification</td>
<td>70 days</td>
<td>PENG/GASENG</td>
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<tr>
<td>LNG Processing Engineer Certification</td>
<td>60 days</td>
<td>LNGLNGENG</td>
</tr>
<tr>
<td>Field Operations Engineer Certification</td>
<td>60 days</td>
<td>PROP/FIELDENG</td>
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<tr>
<td>Offshore Field Development Engineering Certification</td>
<td>65 days</td>
<td>ODEV/OFFSHDEVGB</td>
</tr>
<tr>
<td>Upstream Maintenance Engineer Certification</td>
<td>60 days</td>
<td>MAI/MAINTENG</td>
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<tr>
<td>HSE Engineer Certification</td>
<td>60 days</td>
<td>HMGT/HSEENG</td>
</tr>
<tr>
<td>Process Safety Engineer Certification</td>
<td>40 days</td>
<td>PHSE/PSENG</td>
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<td><strong>ADVANCED COURSES</strong></td>
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<tr>
<td>Advanced Oil &amp; Gas Field Processing Certification</td>
<td>15 days</td>
<td>PENG/ADVGB</td>
</tr>
<tr>
<td>Safety Engineering Certification</td>
<td>15 days</td>
<td>PHSE/SAFEENGGB</td>
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<tr>
<td>Advanced Instrumentation &amp; Instrumented Systems Certification</td>
<td>5 days</td>
<td>E&amp;I/INST2GB</td>
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<tr>
<td>Maintenance Management Certification</td>
<td>5 days</td>
<td>MAI/MANMTMG</td>
</tr>
<tr>
<td>Asset Integrity Management</td>
<td>5 days</td>
<td>PMGT/INTEGRITYGB</td>
</tr>
<tr>
<td>Turnaround Management</td>
<td>5 days</td>
<td>MAI/TURBARDOWNGB</td>
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<tr>
<td><strong>EXECUTIVE CERTIFICATE</strong></td>
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<tr>
<td>Comprehensive Overview of E&amp;P Management Certification</td>
<td>60 days</td>
<td>GENP/EMPMTMG</td>
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Oil Production Chain
Career Path

TRAINING COURSES SPANNING THROUGH THE ENTIRE OIL PRODUCTION CHAIN

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Petroleum Engineering Certification</td>
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<td>ACCELERATED DEVELOPMENT PROGRAMS</td>
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<tr>
<td>Production Engineering Certification</td>
<td>60 days</td>
<td>SPRD/PRODUCTIONGB</td>
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<tr>
<td>Oil &amp; Gas Process Engineering Certification</td>
<td>60 days</td>
<td>PENG/PROCESSENG</td>
</tr>
<tr>
<td>Advanced Oil &amp; Gas Process Engineering Certification</td>
<td>35 days</td>
<td>PENG/ADV/PROCESSGB</td>
</tr>
<tr>
<td>Field Operations Engineer Certification</td>
<td>60 days</td>
<td>PROP/FIELDENG</td>
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<tr>
<td>ADVANCED COURSES</td>
<td></td>
<td></td>
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<tr>
<td>Advanced Oil &amp; Gas Field Processing Certification</td>
<td>15 days</td>
<td>PENG/ADVGB</td>
</tr>
<tr>
<td>Integrated Production Modeling - Module 1</td>
<td>5 days</td>
<td>SPRG/PROD/MB1GB</td>
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<tr>
<td>Integrated Production Modeling - Module 2 (Project)</td>
<td>5 days</td>
<td>SPRG/PROD/MB2GB</td>
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<tr>
<td>Gathering Networks: Design &amp; Engineering</td>
<td>5 days</td>
<td>SPRG/NETWORKGB</td>
</tr>
<tr>
<td>Subsea Production Systems</td>
<td>5 days</td>
<td>SUB/SPSGB</td>
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<tr>
<td>Oil &amp; Gas Process Simulation</td>
<td>5 days</td>
<td>PENG/SIM/PROGSIM</td>
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<tr>
<td>Chemicals used in Production Activities</td>
<td>5 days</td>
<td>PROP/CHEMICAL</td>
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<tr>
<td>Oil &amp; Gas Field Processing Troubleshooting</td>
<td>5 days</td>
<td>PROP/TROUBLEGB</td>
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<tr>
<td>Mature Fields - Surface Production Issues</td>
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<td>SPRG/MATUREGB</td>
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<tr>
<td>Heavy Oil Production &amp; Processing</td>
<td>5 days</td>
<td>SPRG/HEAVYGB</td>
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<tr>
<td>Metering &amp; Allocation</td>
<td>5 days</td>
<td>SPRG/METER</td>
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<tr>
<td>Oil Terminals, FSO &amp; FPSO</td>
<td>5 days</td>
<td>PROP/TERMGB</td>
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<tr>
<td>Production Accounting &amp; Material Balance</td>
<td>3 days</td>
<td>PMGT/BALSH</td>
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<tr>
<td>Production Planning &amp; Monitoring</td>
<td>5 days</td>
<td>PMGT/PLANNING</td>
</tr>
<tr>
<td>Petrotechnical Data Management - Production Data</td>
<td>5 days</td>
<td>DATA/DATAMAOTS</td>
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Natural Gas Value Chain
Career Path

TRAINING COURSES SPANNING THROUGH THE ENTIRE NATURAL GAS VALUE CHAIN

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Duration</th>
<th>Reference</th>
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</thead>
<tbody>
<tr>
<td><strong>ACCELERATED DEVELOPMENT PROGRAMS</strong></td>
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</tr>
<tr>
<td>Gas Production &amp; Processing Engineer Certification</td>
<td>70 days</td>
<td>PENG/GASENG</td>
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<tr>
<td>Pipeline Network Engineering &amp; Operation Certification</td>
<td>60 days</td>
<td>SPRO/TRANSPORTGB</td>
</tr>
<tr>
<td>LNG Processing Engineer Certification</td>
<td>60 days</td>
<td>LNG/LNGENG</td>
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<tr>
<td><strong>ADVANCED COURSES</strong></td>
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</tr>
<tr>
<td>From Gas to Energy</td>
<td>5 days</td>
<td>NAT/ENERGYGB</td>
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<tr>
<td>Natural Gas</td>
<td>5 days</td>
<td>NATG/NATGAS</td>
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<tr>
<td>Gas Processing &amp; Conditioning</td>
<td>5 days</td>
<td>PENG/ADV3GB</td>
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<tr>
<td>Gas Sweetening &amp; Sulfur Recovery</td>
<td>5 days</td>
<td>PENG/ACIDGB</td>
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<tr>
<td>Gas Cycling: an Integrated Approach</td>
<td>5 days</td>
<td>NATG/GASCYCLGB</td>
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<tr>
<td>Gas Flaring Reduction: Operational &amp; Environmental Stakes</td>
<td>3 days</td>
<td>SUST/GASMDTGB</td>
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<tr>
<td>Natural Gas Transport by Pipeline</td>
<td>2 days</td>
<td>NATG/TRANSGB</td>
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<tr>
<td>Natural Gas Storage</td>
<td>2 days</td>
<td>NATG/STOCKGB</td>
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<tr>
<td>Liquefied Natural Gas (LNG)</td>
<td>5 days</td>
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<tr>
<td>LNG Process Simulation</td>
<td>5 days</td>
<td>LNG/LNGSIMGB</td>
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<tr>
<td>Compressors Operation</td>
<td>5 days</td>
<td>PROP/COMPOPGB</td>
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<tr>
<td>Compressors Maintenance</td>
<td>5 days</td>
<td>MAU/COMPMAINTGB</td>
</tr>
<tr>
<td>Gas Turbines</td>
<td>5 days</td>
<td>ROT/GT</td>
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### HSE COURSES SPANNING THROUGHOUT THE OIL & GAS PROJECTS LIFE CYCLE

<table>
<thead>
<tr>
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<tr>
<td><strong>ACCELERATED DEVELOPMENT PROGRAMS</strong></td>
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</tr>
<tr>
<td>HSE Engineer Certification</td>
<td>80 days</td>
<td>HMGT/HSEEENG</td>
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<tr>
<td>Process Safety Engineer Certification</td>
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<td>PHSE/PSENG</td>
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<tr>
<td><strong>ADVANCED COURSES</strong></td>
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<tr>
<td>Safety Engineering Certification</td>
<td>15 days</td>
<td>PHSE/SAFENGGB</td>
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<tr>
<td>NEBOSH International Certificate in Oil &amp; Gas Operational Safety</td>
<td>5 days</td>
<td>OHSE/NEBOSH</td>
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<td>HSE Management</td>
<td>5 days</td>
<td>HMGT/HSEMTGB</td>
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<tr>
<td>Process Safety Management</td>
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<td>PHSE/PSMNGB</td>
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<tr>
<td>Environmental Management</td>
<td>5 days</td>
<td>SUST/ENVMGMTGB</td>
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<tr>
<td>Environmental Management of Water in E&amp;P</td>
<td>5 days</td>
<td>SUST/WATERMGTGB</td>
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<td>Environmental Pollution &amp; Waste Management</td>
<td>5 days</td>
<td>SUST/POLLUTIONGB</td>
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<tr>
<td>Oil Spill Management</td>
<td>3 days</td>
<td>SUST/OILSPILLGB</td>
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<tr>
<td>Major Emergency Management - Initial Response Training</td>
<td>3 days</td>
<td>HMGT/MEMIRGB</td>
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<tr>
<td>Area Classification &amp; Control of Ignition Sources</td>
<td>3 days</td>
<td>PHSE/AREACLASSGB</td>
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<tr>
<td>HSE in Drilling Operations</td>
<td>5 days</td>
<td>OHSE/HSEE</td>
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<tr>
<td>Well Control - Level 2</td>
<td>5 days</td>
<td>WELL/PESME2</td>
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<td>Well Control - Level 3 or 4</td>
<td>5 days</td>
<td>WELL/PESME3-4</td>
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<tr>
<td>Well Intervention &amp; Pressure Control - Level 2</td>
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<td>WELL/WELINE2</td>
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<tr>
<td>Well Intervention &amp; Pressure Control - Level 3 or 4</td>
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<td>WELL/WELINE3-4</td>
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<tr>
<td>HSE in Surface Production Operations</td>
<td>5 days</td>
<td>OHSE/EXPSAFOP</td>
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<tr>
<td>HSE in Maintenance &amp; Construction Activities</td>
<td>5 days</td>
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<tr>
<td>Unconventional Resources: Environmental Management</td>
<td>5 days</td>
<td>SUST/SHALEEENGGB</td>
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<tr>
<td>Unconventional Resources: Safety issues</td>
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<td>OHSE/SHALESAFOPGB</td>
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<tr>
<td>Positive HSE Culture</td>
<td>2 days</td>
<td>OHSE/POSITCULTGB</td>
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<tr>
<td>HSE Management of Contractors</td>
<td>2 days</td>
<td>HMGT/HSECTRGB</td>
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<tr>
<td>HSE Management of Logistics</td>
<td>3 days</td>
<td>HMGT/HSELOGGB</td>
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**HSE Throughout Oil & Gas Projects Life Cycle**

- **Sustainability**
- **HSE Engineering**
- **HSE Management**
- **HSE in Operations**
- **IWCF Certifications**
- **HSE in Drilling & Completion**
- **HSE in Production Operations**
- **HSE in Processing facilities operations & maintenance**

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Project Management
Career Path

**Interfaces Manager (IM)**
- Coordination
- Engineering Disciplines
- Contractual Aspects
- Value Management
- Contracts/HSE/Quality
- HR/Negotiation/Conflicts

**Project Manager (PM)**
- Cost/Planning
- Risks
- Contracts/Claims

**Construction Manager (CM)**
- Planning/Safety/Logistics
- Procurement/Cost & Quality
- Commissioning

**Project Control Manager (PCM)**
- Cost/Planning
- Risks
- Contracts/Claims

**Project Engineering Manager (PEM)**
- Coordination/Reporting
- Contracts/Procedures
- Quality Management

---

### PROJECT MANAGEMENT

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Duration</th>
<th>Reference</th>
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<tr>
<td><strong>PROJECT IMPLEMENTATION</strong></td>
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<tr>
<td>E&amp;P Project Management Certification</td>
<td>5 days</td>
<td>PIMP/PROJGB</td>
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<tr>
<td>Upstream Project Management Certification</td>
<td>65 days</td>
<td>PIMP/UPMCGB</td>
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<tr>
<td>E&amp;P Value Chain &amp; Front-End Development</td>
<td>5 days</td>
<td>PIMP/PCJAFLB</td>
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<tr>
<td>E&amp;P Projects Value Management</td>
<td>5 days</td>
<td>PIMP/PJRMGB</td>
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<tr>
<td>E&amp;P Project Risk &amp; Decision Analysis Workshop</td>
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<tr>
<td>E&amp;P Project Quality &amp; Risk Management</td>
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<tr>
<td>Offshore E&amp;P Project Management</td>
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<tr>
<td>Building a Project Management Office (PMO)</td>
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<tr>
<td>E&amp;P Project Logistics Management</td>
<td>5 days</td>
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<td><strong>PROJECT CONTROL</strong></td>
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<tr>
<td>E&amp;P Project Control Tools</td>
<td>5 days</td>
<td>PCTR/PCGB</td>
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<tr>
<td>E&amp;P Technical Service Contracts</td>
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<td>PCTR/CPGB</td>
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<td>E&amp;P Technical Contract Negotiation</td>
<td>4 days</td>
<td>PCTR/ECNGB</td>
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<tr>
<td>E&amp;P Project Cost Estimation &amp; Control Certification</td>
<td>5 days</td>
<td>PCTR/PCSTGB</td>
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<tr>
<td>E&amp;P Project Operating Expenses Optimization</td>
<td>2 days</td>
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<tr>
<td>E&amp;P Project Planning &amp; Scheduling Workshop</td>
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<td>PCTR/PSPCGB</td>
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<tr>
<td><strong>PROJECT CONSTRUCTION</strong></td>
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<tr>
<td>Upstream Project Construction Techniques</td>
<td>5 days</td>
<td>PCONS/CONST1GB</td>
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<tr>
<td>Upstream Project Construction Site Administration</td>
<td>5 days</td>
<td>PCONS/CONST2GB</td>
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<tr>
<td>Upstream Project Construction HSE Management</td>
<td>5 days</td>
<td>PCONS/CONST3GB</td>
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<tr>
<td>Offshore Oil &amp; Gas Project Installation</td>
<td>5 days</td>
<td>PCONS/CONST4GB</td>
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<tr>
<td>Upstream Project Construction Works Supervision</td>
<td>5 days</td>
<td>PCONS/CONSUSBGB</td>
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<tr>
<td>Upstream Project Precommissioning, Commissioning &amp; Start-Up</td>
<td>5 days</td>
<td>PCONS/PRECOMGB</td>
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<td>Upstream Project Abandonment Operations</td>
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<td>Subsea Production Systems (SPS)</td>
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<tr>
<td>Subsea Pipelines</td>
<td>4 days</td>
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<tr>
<td>E&amp;P Project Construction Certification</td>
<td>60 days</td>
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<tr>
<td>E&amp;P Construction Superintendent Certification</td>
<td>60 days</td>
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</table>
E&P Chain

- **General Introduction to Technical Topics**
  - Comprehensive Overview of E&P Management Certification ........................................... p. 32
  - Exploration & Production Overview .............................................................................. p. 33
  - Introduction to Petroleum Engineering ........................................................................ p. 34
  - E&P Jobs ......................................................................................................................... p. 35
  - Fundamentals of Production ......................................................................................... p. 36
  - Drilling Fundamentals .................................................................................................. p. 37
  - Petroleum Engineering Certification ........................................................................... p. 38

- **Digitalization & Data Management**
  - Petrotechnical Data Management - G & G Data ......................................................... p. 39
  - Petrotechnical Data Management - Production Data ................................................ p. 40

- **Upstream Economics**
  - International Oil Summit ........................................................................................... p. 41
  - International Gas & Power Summit ........................................................................... p. 42
  - Overview of Petroleum Economics ........................................................................... p. 43
  - Overview of Natural Gas Economics ........................................................................ p. 44
  - Liquefied Natural Gas Economics ............................................................................. p. 45
  - Strategic Management in International Oil & Gas Business ...................................... p. 46
  - Natural Gas & Electricity Trading .............................................................................. p. 47
  - Oil Markets & Trading ................................................................................................ p. 48
  - Shipping: General Features, Chartering Contracts & Operations ................................ p. 49
  - Upstream Economics & Management ....................................................................... p. 50
  - Contractual Framework of Exploration-Production .................................................... p. 51
  - Production Sharing & Joint Operating Agreements .................................................... p. 52
  - Economic Framework of Exploration-Production ...................................................... p. 53
  - Negotiation of Exploration-Production Contracts ....................................................... p. 54
  - Economics & Risk Analysis of Upstream Projects ...................................................... p. 55
  - Practice of Exploration-Production Contracts Economic Modeling ......................... p. 56
  - Operating under “Local Content” ............................................................................... p. 57
  - Oil Fields Unitization .................................................................................................. p. 58
  - Upstream Auditing Certification ................................................................................ p. 59
  - Upstream Economics & Management Certification .................................................. p. 60
  - Investment Profitability Studies in the Oil & Gas Industry ......................................... p. 61
  - Upstream Contracts Audit .......................................................................................... p. 62
  - Governance of an E&P Company ............................................................................... p. 63

- **Competency Management & Training Engineering**
  - Competency Management in E&P ............................................................................ p. 64
  - Training Engineering in E&P ...................................................................................... p. 65
  - Field/Site Trainers Accreditation ................................................................................ p. 66
  - Classroom Lecturers Accreditation .......................................................................... p. 67
  - Subject Matter Experts Accreditation ....................................................................... p. 68
  - Communication & Behavioral Management ............................................................... p. 69
  - E&P Project Management Certification ..................................................................... p. 70
  - E&P Projects Value Management ............................................................................. p. 71
  - E&P Project Risk & Decision Analysis Workshop ...................................................... p. 72
Executive Certificate

Comprehensive Overview of E&P Management Certification

Level: ADVANCED

Purpose
This training aims to acquire practical know-how of Exploration & Production management, spanning from surface and subsurface engineering and operational issues to HSE economics and E&P value management.

Audience
Managers and high potentials of the Oil & Gas industry seeking to acquire a broad and comprehensive knowledge of the Exploration & Production business, from petroleum engineering and operations to contractual, environmental and societal issues, with an understanding of the tools needed to evaluate and manage E&P projects.

Learning Objectives
Upon completion of the course, the participants will be able to:
- explain petroleum engineering techniques and workflow from the exploration to the production phase,
- implement industry best practices of integrated production management,
- identify main steps and tools in E&P projects management and logistics,
- participate in front-end project studies,
- appraise environmental and societal matters throughout the life cycle of an upstream project.

Ways & Means
- Highly interactive training course delivered by industry experts and adapted to participants' experience.
- Numerous industrial case studies.

Learning Assessment
Continuous assessments all-along the program.

Prerequisites
Managers and high potentials of the Oil & Gas industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Executive Certificate delivered.
- An expertise confirmed in Comprehensive Overview of E&P Management.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

FROM DISCOVERY TO PRODUCTION 5 d

BASIN ANALYSIS TO PROSPECT EVALUATION - FROM PLAY TO PROSPECT 5 d
Petroleum systems and basin analysis. Geoscientific tools: seismic and well data. Risk analysis and prospect evaluation, reserves estimation.

FUNDAMENTALS OF RESERVOIR ENGINEERING 5 d

DRILLING, COMPLETION & WELL PERFORMANCE 5 d

SURFACE PRODUCTION 5 d

RESERVOIR MANAGEMENT 5 d

HSE MANAGEMENT 5 d

ENVIRONMENTAL & SOCIETAL ASPECT MANAGEMENT 5 d

E&P CHAIN VALUE MANAGEMENT 5 d
E&P risk dynamics. Critical decision points and value creation. Decision process from exploration block evaluation to development and production. Contracts and economic rent sharing. Field development studies and economic indicators.

PROJECT MANAGEMENT 5 d

CONTRACTS & PROCUREMENT 5 d

LOGISTICS MANAGEMENT 5 d

Reference: GENP/EPMGTGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: GENP/EPMGTFR. Please contact us for more information.
Exploration & Production Overview

Level: DISCOVERY

Purpose
This course aims to introduce the fundamentals and vocabulary of Exploration & Production techniques: geosciences, reservoir engineering, drilling, completion, production, projects, decision-making processes, economic aspects and contracts...

Audience
All professionals in contact with the oil industry: directors, ministries, executives, technicians, support trades... wishing to acquire the basic knowledge of oil exploration & production techniques and the associated vocabulary in order to interact effectively with specialists in different disciplines.

Learning Objectives
Upon completion of the course, participants will be able to:
- explain the various phases of Oil & Gas development projects,
- identify the contribution of all experts and technologies involved through a field development project,
- understand the E&P value chain from prospect to market and associated contractual framework,
- describe techniques involved in field development in order to efficiently interact with technical teams.

Ways & Means
- Highly interactive course delivered by experts of the E&P industry.
- Numerous examples and feedbacks from the industry.

Prerequisites
No prerequisites for this course.

More info
Other training duration availability on request.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

INTRODUCTION TO THE OIL & GAS INDUSTRY
0.25 d
Introduction to the energy business: energy resources, energy demand and supply.
Scope of the Oil & Gas industry:
Brief history of the Oil & Gas industry.
Context: producer and consumer countries; national / independent / international oil companies; services companies; international organizations.
Risks related to the Oil & Gas industry.

GEOSCIENCES & RESERVOIR ENGINEERING
1.25 d
Introduction to petroleum geology:
Clastic and carbonate depositional environments and reservoirs.
Elements and processes of the petroleum system (source, reservoir, seal, traps).
Subsurface models, inputs data and concepts:
Seismic data gathering, processing and interpretation.
Well data acquisition and analysis.
Formation evaluation and sampling (logs and cores).
Reservoir characterization and modeling:
Data integration; introduction to reservoir modeling.
Management of subsurface uncertainties.
Volumetrics (in-place hydrocarbon estimation).
Subsurface Development Options: reservoir engineering:
Drainage mechanisms: introduction to EOR.
Different types of reservoir effluents and their behavior.

FIELD OPERATIONS & DEVELOPMENT
2.25 d
Drilling:
Main functions of drilling rigs: lifting, rotating, pumping, power and safety.
Well architecture.
Well construction.
Drilling equipment: bits, drilling string, drilling fluids...
Drilling techniques: casing, cementing, directional drilling, well testing, instrumentation.
Well control - BOPs (safety devices: wellheads in drilling).
Sampling: measurements during drilling (LWD), coring, mud-logging and wireline, fluid sampling.
Rigs onshore and offshore.
Specificities of offshore equipment.
Well completion:
Reservoir/wellbore interface; basics of well performance; stimulation; artificial lift techniques.
Well equipment and well intervention.
Field architecture:
Surface development options; study of various existing fields.
Case of offshore developments.
Surface facilities:
Well effluent gathering network.
Oil, gas and water processing.
Metering, storage and export.
Oil & Gas transport through pipelines and tankers.
Offshore installations: from shallow water to deep offshore technology.
HSE in field development:
Main hazards in hydrocarbon exploration & production operations.
Overview of safety engineering and environmental impact assessment studies throughout Oil & Gas project life cycle.
Introduction to unconventional developments:
Heavy oil fields.
Tight & shale Oil & Gas fields.

OIL & GAS FIELD DEVELOPMENT PROJECTS: DECISION MAKING PROCESS, ECONOMICS & LEGAL FRAMEWORK
1 d
Legal framework in E&P: oil contracts and principle of the oil rent sharing.
Project profitability evaluation:
Oil & Gas project economics and financial performance indicators.
Reserve evaluation.
Impact of subsurface uncertainty on project economics.
Field development process:
Technical service contracts.
Project control:
Scheduling and planning control.
Cost estimation and control.
Decommissioning.

SERIOUS GAME: OIL FIELD DEVELOPMENT CYCLE
0.25 d

Reference: GENP/DECOUVEP
Can be organized as an In-House course.
Contact: fp.paul@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
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<tbody>
<tr>
<td>Rueil</td>
<td>16 September</td>
<td>20 September</td>
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</table>

This course is also available in French: GENP/DECOUVERTE. Please contact us for more information.

www.ifptraining.com
Introduction to Petroleum Engineering

Level: DISCOVERY

Purpose
This course provides a complete overview of petroleum engineering covering primary issues of reservoir, drilling, completion and surface production.

Audience
Professionals in technical, commercial, legal, financial or human resources departments, within the petroleum industry or related sectors, who need a general knowledge in petroleum engineering.

Learning Objectives
Upon completion of the course, participants will:
- know about major issues in petroleum engineering,
- understand the various operations carried out during field development, from drilling to surface treatment,
- know the vocabulary needed to communicate with E&P professionals.

Ways & Means
- Interactive animation by E&P senior experienced lecturers.
- Visits to a drilling rig and a production site (in Pau training center).
- Numerous videos.
  * When the course is delivered in Rueil-Malmaison, practical illustration is provided by video.

Learning Assessment
Quiz on request.

Prerequisites
No prerequisites for this course.

More info
Refer to the following complementary courses, which might be of interest:
- “Introduction to Reservoir Engineering” (page 124);
- “Drilling Fundamentals” (page 152);
- “Well Completion & Servicing” (page 153);
- “Oil & Gas Field Processing” (page 224).

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

RESERVOIR ENGINEERING
Geologic traps and characteristics.
Rock and fluids properties, PVT studies.
Logging and well-test evaluation, oil in place estimation.
Drainage mechanisms, recovery factor.
Improved oil recovery notions.

WELL
Drilling:
Organization on site.
Well design.
Drilling rig: functions hoisting, rotations, pumping, power and safety.
Drilling rigs.
Drilling operations chronology.
Drilling operations: casing, cement job, directional drilling, fishing, D.S.T.
Drilling rig visit*.
Downhole production/completion:
Completion design.
Reservoir-wellbore interface.
Well stimulation.
Well equipment and maintenance.
Activation.
Offshore wells:
Selection of the drilling and production rigs - Platforms.
Design and specific equipment.

OIL & GAS PROCESSING FACILITIES
Produced fluid properties.
Gathering system, hydrate inhibition.
Crude oil treatment: separation, crude oil dehydration and desalting processes.
Gas processing: dehydration, sweetening, NGL recovery processes.
Metering and shipment.
Visit of a production site (if available)*.

Reference: GENP/INFPGF - Can be organized as an In-House course. Contact: fp.pau@ifptraining.com

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<td>Rueil</td>
<td>25 November</td>
<td>29 November</td>
<td>€3,580</td>
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This course is also available in French: GENP/INFPGF. Please contact us for more information.
E&P Jobs

Level: DISCOVERY

Purpose
This program aims at introducing E&P activities and providing a comprehensive overview of professions and skills involved throughout Oil & Gas field development projects.

Audience
Non-technical and technical personnel alike, seeking to acquire a global understanding of the E&P chain structure and the professions it involves.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify the various phases and activities of Oil & Gas field development projects,
- list professions and describe skills involved throughout Oil & Gas field development projects lifecycle,
- explain interactions between the various professions involved.

Ways & Means
- Highly interactive course delivered in none-technical language by experts of the E&P industry.
- Numerous examples and feedbacks from the industry.

Learning Assessment
The assessment takes place during the different periods of group work.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 2 days

INTRODUCTION TO THE OIL & GAS INDUSTRY - E&P ACTIVITIES
Scope of the Oil & Gas industry.
Stakeholders: producer and consumer countries; national/independent/international oil companies; service companies.
Oil & Gas field life cycle: introduction to E&P activities and workflow from exploration to abandonment.

GEOSCIENCES & RESERVOIR ENGINEERING
Activities:
- Exploration. Reservoir characterization and modeling. Reservoir engineering.
- Impact on drilling and production activities.
Professions:
- Exploration manager.
- Reservoir/development manager.
- PVT Technician/engineer. Data management technician/engineer.
- Service companies.

DRILLING, WELL COMPLETION & WELL INTERVENTIONS
Activities: drilling, completion, well intervention and workover.
Professions:
- Organization of operating and well servicing companies.
- Drilling: drilling manager, drilling engineer, mud logging engineer/technician, company man…
- Completion: well completion technician, well engineer, well performance engineer…
- Well intervention: well intervention engineer/technician, work-over engineer, stimulation engineer…

PRODUCTION
Activities:
- Offshore specificities.
Professions:
- Production engineering: operations manager, production engineer/operator, flow assurance engineer, well test technician/operator, well surveillance engineer…
- Field operations: OIM, field operations engineer, process engineer, production superintendent/ supervisor/panel operator/field operator, laboratory engineer/technician…
- Maintenance: mechanical engineer, method engineer, maintenance superintendent, mechanical/electrical/instrumentation technician…

HSE
HSE activities throughout Oil & Gas project lifecycle.
Professions: HSE manager, safety engineer; process safety engineer; environment engineer; prevention/intervention technician…

ENGINEERING & PROJECT MANAGEMENT
Activities:
- Project Management. Estimation and cost control.
Professions:
- Construction engineer. Commissioning engineer. Facilities engineer…

E&P SUPPORT FUNCTIONS
Economists. Finance and audits. Human resources.
Rig logistics. Production operations logistics.
Procurement. IT. Planning and methods.

Reference: GENP/EP/METIERGB
Only available as an In-House course.
Contact: exp.reuil@ifptraining.com

This course is also available in French: GENP/EP/METIERFR. Please contact us for more information.
fundamentals of production

level: discovery

purpose
this course provides an introduction to oil & gas production, along with a glossary of terms, covering fundamentals of technology, chain structure from well to export terminal, skills and job positions involved in operating production facilities.

audience
non-technical staff or technical professionals not directly involved in hydrocarbons production (managers, executives, technicians, staff of human resources, finance of projects departments…).

learning objectives
upon completion of the course, participants will be able to:

- understand the different phases of the oil & gas production process,
- grasp the specific issues of offshore oil & gas production,
- understand organizations, skills and job positions involved in operating production facilities,
- acquire a complete view of the oil & gas production chain, stretching over technical, business and economic issues.

ways & means

- course delivered by industry specialists.
- numerous illustrations and case studies.

learning assessment
continuous assessments all-along the program.

prerequisites
no prerequisites for this course.

expertise & coordination
ifp training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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course content

2 days

the oil & gas chain: production position

positioning of the production in the value e&p chain.
world primary production.
issues and technical constraints:
- conventional resources.
- unconventional resources.
job descriptions and skills for production activities.

0.5 d

onshore & offshore production

technical specifications, operating modes.
operating patterns and mapping fields.
technical architectures.
organization (remote site, extreme conditions, manning, shift…).

- case studies: fpso, wet gas field (onshore), oil fields operated with reinjection, remote control room, early production facilities…

0.5 d

from well to export point

from reservoir to wellhead: hydrocarbons and well effluent behavior.
well techniques, production techniques and well servicing.
surface facilities and treatment operations.

- metering and expedition.
- health safety and environment, sustainability.
- budgets (capex, opex) during the life cycle of a production field.

1 d

---

reference: genp/prodchain

only available as an in-house course.

contact: exp.rueil@ifptraining.com

this course is also available in french: genp/chainprod. please contact us for more information.
# Drilling Fundamentals

**Level:** DISCOVERY

**Purpose**

This intensive course provides a comprehensive overview of drilling and completion techniques and operations.

**Audience**

Engineers and technicians interested but not involved in drilling: geologists, geophysicists, reservoir engineers, completion, production and process staff, platform designers, economists, etc.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- recognize the vocabulary specific to drilling,
- identify and describe drilling operations and equipment used,
- identify the different professionals involved in drilling and learn about their roles and responsibilities.

**Ways & Means**

- Videos and animations.
- Exercises.
- Visit to a drilling site*.

* When the course is delivered in Rueil-Malmaison, practical illustration is provided by video.

**Learning Assessment**

Continuous evaluation: exercises and oral questions.

**Prerequisites**

No prerequisites for this course.

**More info**

Refer to the following complementary courses which might be of interest:
- "Introduction to Reservoir Engineering" (page 124), "Well Completion & Servicing" (page 153), "Oil & Gas Field Processing" (page 224).

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

<table>
<thead>
<tr>
<th>ORGANIZATION OF DRILLING OPERATIONS</th>
<th>0.5 d</th>
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</thead>
<tbody>
<tr>
<td>Drilling principles.</td>
<td></td>
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<tr>
<td>Cost, duration of a drilling job.</td>
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<tr>
<td>Different people involved, types of contracts.</td>
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<tr>
<td>Safety.</td>
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<table>
<thead>
<tr>
<th>DRILLING PRINCIPLES - EQUIPMENT</th>
<th>1.5 d</th>
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<tbody>
<tr>
<td>Different types of bits.</td>
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<tr>
<td>Drilling string.</td>
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<tr>
<td>Drilling rig:</td>
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<tr>
<td>Hoisting function and equipment.</td>
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<td>Pumping function and equipment.</td>
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<td>Rotating function and equipment.</td>
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<tr>
<td>Power function.</td>
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<tr>
<td>Safety function and equipment.</td>
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<tr>
<td>Mud and solid treatment.</td>
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<thead>
<tr>
<th>WELL ARCHITECTURE</th>
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<tbody>
<tr>
<td>Reservoir notions.</td>
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<td>Functions of different casings.</td>
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<tr>
<td>Parameters to be taken into account to determine well architecture.</td>
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<tr>
<td>Examples of architectures.</td>
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<thead>
<tr>
<th>SPECIAL OPERATIONS</th>
<th>1.25 d</th>
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<tbody>
<tr>
<td>Cementing operations.</td>
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<td>Wellhead.</td>
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<tr>
<td>Directional drilling.</td>
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<tr>
<td>Well control.</td>
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<tr>
<td>Fishing jobs.</td>
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<tr>
<td>Wireline logging, well test (DST).</td>
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<table>
<thead>
<tr>
<th>DRILLING ON A SIMULATOR (Pau)*</th>
<th>0.25 d</th>
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</thead>
<tbody>
<tr>
<td>Use of a well control simulator to show the drilling operations (tripping, drilling, running of casings).</td>
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<thead>
<tr>
<th>OFFSHORE DRILLING OPERATIONS</th>
<th>0.25 d</th>
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<tbody>
<tr>
<td>Different types of rigs.</td>
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<tr>
<td>Problems related to their use.</td>
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</table>

<table>
<thead>
<tr>
<th>WELL COMPLETION</th>
<th>0.25 d</th>
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<tbody>
<tr>
<td>Reservoir-wellbore interface.</td>
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<tr>
<td>Equipment for flowing wells.</td>
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<tr>
<td>Well intervention.</td>
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<tr>
<th>VISIT OF A DRILLING SITE*</th>
<th>0.5 d</th>
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Reference: SEND/INF/ORE — Can be organized as an In-House course.

Contact: fp.pau@ifptraining.com

This course is also available in French: DRIL/INFORF. Please contact us for more information.
## Purpose
This course provides in-depth technical knowledge of Oil & Gas production in order to hold rapidly, and very effectively, the position of field engineer, design engineer, or project engineer.

## Audience
Engineers (particularly recently graduated engineers or engineers in conversion) looking to acquire in-depth knowledge and best practices of Oil & Gas production.

## Learning Objectives
Upon completion of this course the participants will be able to:
- Grasp fundamentals of reservoir engineering and drilling.
- Explain well completion and servicing, well performance and artificial lift.
- Understand fundamental concepts underlying Oil & Gas processing.
- Understand in detail operating conditions and basic design of oil, water and gas treatment.
- Describe technology of static equipment and rotating machinery used in production facilities.
- Explain offshore development techniques and flow assurance issues.
- Identify main risks related to Oil & Gas production operations and review safety engineering best practices.
- Contribute to the dynamics of field development projects studies.
- Explain main contracts in E&P and assess project profitability.

## Ways & Means
- Highly interactive training with industry specialist lecturers.
- Multiple workshop sessions and industrial case studies.
- Numerous process simulation exercises using PRO/II™ software.
- Final 10-day group project on a real field development case study, result of which are presented to a jury.

## Prerequisites
Engineering degree or equivalent professional experience within the petroleum industry.

## Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Petroleum Engineering.
- Ready-to-use skills.

## Expertise & Coordination
IFP Training (permanent or contracted) expert in data management with a wide experience and whose competencies are kept up-to-date in industry projects.

### Course Content

<table>
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<tr>
<th>Level: FOUNDATION</th>
<th>100 days</th>
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<tr>
<td><strong>Course Content</strong></td>
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<tr>
<td><strong>INTRODUCTION TO PETROLEUM GEOSCIENCES</strong></td>
<td>5 d</td>
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<tr>
<td>Elements &amp; processes of petroleum systems. Exploration tools (seismic &amp; well data). Prospect evaluation.</td>
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<tr>
<td><strong>INTRODUCTION TO RESERVOIR CHARACTERIZATION</strong></td>
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<tr>
<td><strong>INTRODUCTION TO RESERVOIR ENGINEERING</strong></td>
<td>5 d</td>
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<tr>
<td><strong>DRILLING FUNDAMENTALS</strong></td>
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<tr>
<td>Drilling operations. Architecture of the well &amp; completion.</td>
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<tr>
<td><strong>WELL PRODUCTIVITY &amp; RESERVOIR - WELLBORE INTERFACE</strong></td>
<td>5 d</td>
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<tr>
<td>Well productivity. Reservoir wellbore interface implementation.</td>
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<tr>
<td><strong>ARTIFICIAL LIFT &amp; WELL INTERVENTION FUNDAMENTALS</strong></td>
<td>5 d</td>
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<tr>
<td>Artificial lift; gas lift, ESP. Types and means of intervention on producing wells. General procedure of a workover. Case study.</td>
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<tr>
<td><strong>WELL CONTROL</strong></td>
<td>5 d</td>
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<tr>
<td>Introduction to well control methods. Equipment: Wireline, coiled tubing, snubbing. IWCF Certification: Well Intervention &amp; Pressure Control.</td>
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<tr>
<td><strong>THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING</strong></td>
<td>5 d</td>
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<tr>
<td><strong>OIL &amp; WATER TREATMENT</strong></td>
<td>5 d</td>
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<tr>
<td><strong>GAS PROCESSING &amp; CONDITIONING</strong></td>
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<tr>
<td>Gas processing: dehydration, sweetening, NGL recovery. Fundamentals of Liquefied Natural Gas (LNG) chain.</td>
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<tr>
<td><strong>STATIC EQUIPMENT &amp; SCHEMATIZATION</strong></td>
<td>5 d</td>
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<tr>
<td><strong>ELECTRICITY &amp; INSTRUMENTATION</strong></td>
<td>5 d</td>
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<tr>
<td>Electrical power generation and distribution network. Instrumentation and process control. Safety Instrumented Systems.</td>
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<tr>
<td><strong>METERING - MATERIAL BALANCE - ALLOCATION</strong></td>
<td>5 d</td>
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<tr>
<td><strong>ROTATING MACHINERY</strong></td>
<td>5 d</td>
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<tr>
<td><strong>OFFSHORE FIELD DEVELOPMENT - FLOW ASSURANCE</strong></td>
<td>5 d</td>
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<tr>
<td><strong>SAFETY &amp; ENVIRONMENT IN SURFACE PROCESSING FACILITIES</strong></td>
<td>5 d</td>
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<tr>
<td>Hazards and risks in production operations. Safety in production operations and during construction or maintenance works. HSE management.</td>
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<tr>
<td><strong>SAFETY ENGINEERING</strong></td>
<td>5 d</td>
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<tr>
<td>IWCF certification: Well Interventions &amp; Pressure Control.</td>
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<tr>
<td><strong>PETROLEUM ECONOMICS &amp; PROJECT MANAGEMENT</strong></td>
<td>5 d</td>
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<tr>
<td><strong>FIELD DEVELOPMENT PROJECT - JURY</strong></td>
<td>10 d</td>
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Reference: GENP/PETROLENG. Only available as an In-House course. Contact: exp.rueil@ifptraining.com

This course is also available in French: GENP/INGPETROL. Please contact us for more information.
Course Content

INTRODUCTION TO DATA MANAGEMENT
0.5 d
Introduction to information management.
Data types: definitions.
Common Data Management issues.
Geo-referenced data: geodesy, topometry, cartography and Geographic Information System (GIS).

DATA MANAGEMENT METHODS
1 d
Data Management best practices, business impact.
Overview of Data Management: definitions.
Data life-cycle: from inception to destruction (planning, implementation and control activities).

THE VALUE OF DATA & DATA MANAGEMENT
0.5 d
Benefits of good Data Management.
Business case aspects and barriers.
Data governance: strategy, organization, policies and standards, projects and issues.
Data Management framework, governance, architecture, security.
Difference between reference and Master Data Management.
Data quality management: definition and dimensions of data quality (accuracy, currency, coverage, relevance, accessibility and comparability).
Data quality tools and capabilities.

GEOSCIENTIFIC DATA MANAGEMENT
1.5 d
Seismic data.
Borehole data (drilling report, logs and cores).
Well data (production data, well test, workovers).
Fluid data: PVT tests and reports.

PROJECT DATA MANAGEMENT
1 d
Project data base construction.
Sharing projects:
Geomodeling.
Material balance model.
Reservoir simulation model.

INTEGRATION MANAGEMENT SERVICE
0.5 d
How integration happens in the real world.
Data integration challenges.

Ways & Means
Interactive presentations and document analysis.

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training (permanent or contracted) expert in data management with a wide experience and whose competencies are kept up-to-date in industry projects.

Reference: DATA/DATAMNGT
Only available as an In-House course.

Contact: gre.rueil@ifptraining.com

This course is also available in French: DATA/DATAMNGTFR. Please contact us for more information.
Petrotechnical Data Management - Production Data

Course Content

OVERALL STRATEGY FOR DATA ANALYSIS & PRODUCTION OPTIMIZATION 1 d
Conduct an effective data analysis on a production site:
- Rapidly and efficiently describe production facilities: facilities, wells, pipeline networks...
- Determine production site optimization areas.
- Develop a global strategy to improve production.
- Deduce/predict breakdowns or malfunctions by analyzing available data.

PETROLEUM DATA: FROM RESERVOIR TO STORAGE TANK 1 d
Review of reservoir data required for production.
- Review of well, production, process and transactional data, flow assurance measurements, storage parameters, flowrate/volume calculations and measurement units.
- Review of measurement and supervision equipment: sensors/transmitter/network/servers/HMI...
- Other data: chemicals/operations/historical/maintenance...
- Measurement uncertainties: Where do they come from? How to detect them and prevent them (well tests, BSW, back-allocations per field/per well...)?

DATA MANAGEMENT SYSTEMS 0.75 d
Data usage process on a production site:
- Petrotechnical data system.
- Data management systems.
- Review of main existing systems and their functionalities.

EXISTING & UPCOMING TOOLS FOR PETROLEUM DATA ANALYSIS 0.75 d
Usage and limitations of conventional office and petroleum-specific software.
- Presentation of data mining and artificial intelligence concepts works in progress:
  - Production forecast.
  - Operating conditions optimization.
  - Predictive failure…

CASE STUDY: OIL FIELD PRODUCTION OPTIMIZATION 1.5 d
Study of an existing site, description of production facilities and data acquisition systems.
- Analysis of data provided to detect inconsistencies, anomalies, failures to produce and detect non-optimal conditions.
- Typical optimizations to be studied:
  - Which wells should be closed first with a bottleneck on the process?
  - Flowrate increase: impact on reserves and NPV.
- Establishing a global optimization plan for the oil field studied.

Reference: DATA/DATAMGTGB

Location  Start Date  End Date  Tuition Fees
Rueil  25 November  29 November  €3,570

This course is also available in French: DATA/DATAMGTFR. Please contact us for more information.
The International Oil Summit is an annual gathering of Energy and Oil Ministers, Heads of international organizations (IEA, OPEC, IEF...), CEOs and key industry leaders, from IOCs, NOCs and petroleum service sector, to discuss the most relevant issues of the oil sector.

**AGENDA**
Over the past years, the Summit has been the circle for policy makers and industry leaders to exchange views on ways and means to address a large spectrum of oil related issues; securing investment and meeting future oil demand, making successful arrangements leading to long lasting partnerships between NOCs and IOCs, addressing oil market volatility and its effects on investment, debating human resources related issues, improving dialogue among producing and consuming countries, and between oil and service companies on project management and risk sharing.

The Summit also look at avenues to successfully do business and implement sustainable energy policies in an increasingly carbon-constrained world, discuss the role of technology in meeting present and future energy security objectives.

**SPEAKERS**
The genuine debate in the Paris International Oil Summit has tremendously benefited from the participation of high caliber speakers. Past editions of the International Oil Summit welcomed Energy and/or Oil Ministers of Algeria, India, Iran, Iraq, Nigeria, Norway, Qatar, Saudi Arabia, United Arab Emirates, Venezuela... as well as CEOs and leaders from the petroleum industry such as Anadarko, BP, Chevron, CGG, Halliburton, Hellenic Petroleum, IFP Energies Nouvelles, Perenco, Petrobras, Repsol, Saudi Aramco, Schlumberger, Shell, Sonatrach, Statoil, Total, TechnipFMC, Vallourec, Saipem, etc.

**WHY ATTEND?**
The Summit is the only few gatherings bringing together Ministers, oil and service industry leaders to discuss the most important and relevant issues of the day. It allows policy makers and industry leaders to share concerns and objectives, thus narrowing gaps between energy policies and industry strategies. Participation in the Summit provides also an excellent opportunity for meetings, discussions and networking among attendees.

The Summit enjoys also excellent media coverage; some 50 journalists attend each year echoing oil industry concerns and views.

**SPONSORSHIP**
The International Oil Summit offers sponsors a unique opportunity in which they can increase their brand visibility amongst the key decision makers and main players of the petroleum sector, the press, influencers and other stakeholders. We have developed a range of packages designed for all budgets, with a range of benefits and avail ourselves to discuss details with our interested sponsors.
The International Gas and Power Summit is an annual high level event gathering key gas and power industry executives as well as policy makers, to discuss the most timely and relevant issues affecting the gas and power sectors.

AGENDA
Over the past years, the Summit has been the circle for policy makers and industry leaders to exchange views on ways and means to address a large spectrum of gas and power related issues and challenges; gas markets development, LNG trade and regional competition, regulatory framework shifts, players’ strategies, future gas and power demand and investment needs, ageing generation capacity, incorporation of growing share of renewables in the energy mix, adjusting to international and national-level climate and energy policies, and other exogenous impacting factors.

The Summit also look at avenues to successfully do business and implement sustainable energy policies in an increasingly carbon-constrained world, and discuss the role of technology in meeting present and future energy security objectives.

SPEAKERS
The genuine debate in the Paris International Gas and Power Summit has tremendously benefited from the participation of high caliber speakers. Past editions of the International Gas and Power Summit welcomed officials, including Ministers, from Algeria, Qatar, Norway, Egypt… as well as Cedigaz, Cheniere, Dunkirk LNG, Engie, EDF, GECF, Hoegh LNG, IEA, NIOC, Saipem, Statoil, TechnipFMC, Tellurian Investments, Total, Sonatrach, Qatar Petroleum, Uniper, and many others.

WHY ATTEND?
The Gas and Power Summit is the only few gatherings bringing together Ministers, gas and power industry leaders to discuss the most important and relevant issues of the day. It allows policy makers and industry leaders to share concerns and objectives, thus narrowing gaps between energy policies and industry strategies. Participation in the Summit provides also an excellent opportunity for meetings, discussions and networking among attendees. The Summit enjoys also excellent media coverage; some 50 journalists attend each year echoing oil industry concerns and views.

SPONSORSHIP
The International Gas and Power Summit offers sponsors a unique opportunity in which they can increase their brand visibility amongst the key decision makers and main players of the petroleum sector, the press, influencers and other stakeholders. We have developed a range of packages designed for all budgets, with a range of benefits and avail ourselves to discuss details with our interested sponsors.
Overview of Petroleum Economics

Level: FOUNDATION

Purpose
This course aims to provide an overview of the petroleum sector so that participants may understand the oil operations and business, from upstream to downstream, and identify economic challenges.

Audience
This course is geared towards people from the energy and petroleum sectors, industrial partners, business men and financiers, as well as public administration staff.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe the different types of energy resources (conventional, unconventional, renewable & fossil),
- interpret the evolution of the factors affecting the energy supply and demand (crude prices, technology, reserves, geopolitics, geography, environment, etc.),
- identify the actors of the energy scene and their strategic guidelines,
- describe the main steps of the upstream sector,
- distinguish the different types of oil contracts and explain the main economic criteria to evaluate a project,
- summarize the operation of the physical and financial oil markets,
- explain the evolution of the refining sector and of the petroleum product markets.

Ways & Means
- Quiz and serious game on the fundamentals of the energy sector,
- Case study on the economic evaluation of an E&P project,
- Exercises on cargo transportation costs, hedging, and refining margins,
- Team games on factors affecting crude prices, the upstream sector, and oil trading.

Learning Assessment
Participants will be evaluated during the training through quiz and exercises.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
In-house or contracted IFP Training trainers having expertise and experience in oil sector economics.

Reference: TRT/OPE
Can be organized as an In-House course.
Contact: em.contact@ifptraining.com

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<tr>
<td>Rueil</td>
<td>3 December</td>
<td>6 December</td>
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This course is also available in French: TRT/EPE. Please contact us for more information.
Overview of Natural Gas Economics

Course Content

GLOBAL GAS SCENE
Importance of natural gas in the world energy balance.
Outlets for natural gas.
Reserves, production, development zones.
International gas markets.
Impact of unconventional gas on the world demand/supply and on gas prices.

0.75 d

STRUCTURE & COSTS OF THE NATURAL GAS CHAIN
Description of the gas chain and associated costs.
Gas treatment and transportation.
Storage costs and distribution costs.
Liquefied Natural Gas (LNG), FLNG, FSRU, small scale LNG.

0.75 d

LONG-TERM NATURAL GAS & LNG CONTRACTS
Contractual framework of Exploration-Production.
Structure and principles of a long term contract.
Principles of take-or-pay, netback, indexation and gas price formulas.
Tolling agreements.

1 d

SPOT, FORWARD & FINANCIAL MARKETS
Spot and forward natural gas markets.
Why and how to access those markets?
Prices in the different markets.
Financial contracts, hedging strategies and examples.

0.5 d

GAS MARKETING IN A LIBERALIZED MARKET
Drivers and concepts of liberalization.
Principles of the EU gas directive, progress in various countries, take-or-pay issues.
Role of the regulator, network development, transport, tariffs, etc.
Contractual aspects between suppliers, transporters and distributors.

1 d

Ways & Means

Quizzes.
Exercises on the costs of gas infrastructures.
Examples of contracts & calculations on quantities.
Videos.

Learning Assessment

Participants will be evaluated during the training through quizzes and exercises.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

Permanent and contracted IFP Training trainers having expertise in technical and economic aspects of the gas chain.

Reference: GER/ONE

Can be organized as an In-House course.

Contact: em.contact@ifptraining.com

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<th>Location</th>
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<tr>
<td>Rueil</td>
<td>15 October</td>
<td>18 October</td>
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This course is also available in French: GER/EGN. Please contact us for more information.
Liquefied Natural Gas Economics

Level: FOUNDATION

Purpose
This training provides an overview of the economic and contractual aspects of the LNG (Liquefied Natural Gas) value chain.

Audience
This training is beneficial to professionals from the oil, gas or power industries or from the banking, insurance, and consulting sectors who need to understand LNG activities and their economic stakes.

Learning Objectives
Upon completion of the course, participants will be able to:

- evaluate the economics of each part of the LNG value chain,
- analyze the basic structure of LNG contracts,
- identify the main LNG markets and their evolution,
- evaluate the profitability of investments in the LNG industry.

Ways & Means
- Quizzes.
- Videos.
- Examples of contracts.
- Exercises on LNG contracts.

Learning Assessment
Participants will be evaluated during the training through quizzes and case studies.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
Permanent and contracted IFP Training trainers having expertise in technical and economic aspects of the liquefied natural gas (LNG) chain.

Course Content

GLOBAL GAS SCENE & LNG MARKETS
1 d
Natural gas uses, reserves, supply and demand.
New outlets for LNG (retail LNG).
International gas trades and importance of the LNG.
Evolution of the LNG trading and pricing.
Main LNG markets: America, Europe and Asia (mature markets: Japan and South Korea and emerging markets: China, India...).
Risks for the different LNG actors: liquefaction, shipping, portfolio players, buyers...
Unconventional gas and its impact on LNG markets.

TECHNICAL ASPECTS OF THE LNG CHAIN
1.5 d
LNG: properties and specifications.
Design of the different parts of the LNG chain.
Liquefaction plants, LNG tankers, regasification terminals.
Main projects of LNG terminals in the world and their exploitation.
Capital expenditures and operating costs.
Economic evaluation of a LNG project.
Business structures of LNG projects:
- Classical “Buy/Sell” model.
- Processing model.
New trends in the LNG industry:
- Floating concepts: FLNG, FSRU.
- Small scale LNG.
LNG as a retail product:
- Retail LNG.
LNG as a transportation fuel:
- Land transportation: road and rail.
- LNG bunkering: infrastructures, opportunities and challenges.

LNG CONTRACTS
1.5 d
Main features and important articles in LNG contracts.
LNG pricing: price formulae, indexation and net-back value.
Tolling agreements.
Impact of gas markets liberalization and third-party access to regasification terminals.
Coexistence between long-term contracts and short-term contracts.

Reference: GER/LGE
Can be organized as an In-House course.
Contact: em.contact@ifptraining.com

Location Start Date End Date Tuition Fees
Rueil 24 September 27 September €3,300

This course is also available in French: GER/EGL. Please contact us for more information.

www.ifptraining.com
Strategic Management in International Oil & Gas Business
Essential Business Management Skills for Oil & Gas Professionals

Level: FOUNDATION

Purpose
The participants will participate actively as well in the various lectures they will have to cover the economics of the Oil & Gas value chain as well as the management tools used in the industry; putting everything back in perspective with their company’s business.

Audience
The course is designed for high potential executives with minimum of two years experience. It is suitable to both technical and non-technical professionals who seek to develop good business awareness and understanding of the Oil & Gas industry.

Learning Objectives
Upon completion of the course, participants will have:
► seen the main economic, market, physical, environmental and political forces driving energy demand, supply, and prices.
► connected the key links and terms of the Oil & Gas industry, from the exploration well to the final products.
► understood the fundamental management tools and decision processes in an international Oil & Gas company.
► applied practical decisions and experienced the risk of doing business in the Oil & Gas industry on a worldwide scale through a computer “Strategic Management Game”.

Ways & Means
This course is built on interactive presentations, exercises and team games. Working in competing teams, participants have to:
► evaluate and anticipate the driving factors of oil prices through the “Oil price game”.
► rebuild the E&P chain of an offshore project.
► take a quiz on natural gas business.
► price a cargo of crude oil.
► calculate refining margins and the main economic indicators.
► evaluate the economic profitability of an oil field development, gas pipeline & LNG project.
► implement business decisions & evaluate its impact through the use of an Excel simulator “Strategic Management Game”.

Learning Assessment
Participants will be evaluated during the training through quizzes and case studies.

Prerequisites
Participants need to be comfortable with the use of Microsoft Excel.

Expertise & Coordination
IFP Training trainers having expertise and experience in Oil & Gas business.

Course Content

INTERNATIONAL OIL ENVIRONMENT
Energy demand and supply. Crude oil reserves and production. History of the petroleum industry. Role of main actors: OPEC, NOCs, IOCs, INOCs, IEA. Oil price evolution and long term scenarios. Present and future constraints of the Oil & Gas industry (alternative energies, investments, etc.).

UPSTREAM ECONOMICS
Fundamental steps of the upstream business. Economic aspects and costs, risks. Understanding the E&P value chain. Legal and fiscal framework for exploration-production (concessions, production sharing contracts, service contracts).

NATURAL GAS ECONOMICS
Natural gas reserves and production around the world. Main gas markets; their structures and constraints. Liquefied natural gas chain, economics and trade. Long-term sales and purchase gas contracts. Take-or-pay provisions and gas price formulas.

TRANSPORT & INTERNATIONAL OIL MARKETS
International trade and shipping of crude and products. Various types of markets and contracts: long-term contracts, forward and spot markets. Case study: how to price & hedge a cargo of crude oil?

REFINING ECONOMICS & PETROCHEMICALS

PROJECT ECONOMICS & DECISION ANALYSIS TOOLS
Economic criteria for investment project evaluations (NPV, IRR, POT, etc.). Global profitability analysis. Economic cost analysis. Introduction to risk analysis. Risk management, financial and cost management. Case studies: participants have to evaluate the economic profitability of a gas pipeline project and LNG project.

STRATEGIC BUSINESS GAME
Introduction to strategy and financial management. Introduction to the strategic game: participants are introduced to the use of strategic tools. Communication and workshop:
Participants analyze their respective situation (SWOT analysis) in each of the branches (upstream, refining, retail and petrochemical). Participants have to implement their decisions and evaluate its impact through the use of an Excel simulator.

Reference: GIP/SBA Only available as an In-House course. Contact: em.contact@ifptraining.com
Natural Gas & Electricity Trading
Market Risks & Their Operational Management

Course Content

<table>
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<tr>
<th>Course Content</th>
<th>Duration</th>
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<tbody>
<tr>
<td>MARKETS</td>
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<tr>
<td>Main features of gas and electricity markets.</td>
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<tr>
<td>RISK MANAGEMENT</td>
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<tr>
<td>Basic statistics.</td>
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<td>Risk typologies: Credit risk.</td>
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<td>Market risk.</td>
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<td>Operational risk.</td>
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<td>Value at risk.</td>
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<td>HEDGING &amp; MODELING</td>
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<tr>
<td>Nature.</td>
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<tr>
<td>Products: Futures, forwards, swaps, options.</td>
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<tr>
<td>CASE STUDIES</td>
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<tr>
<td>Compute sensitivities on a gas procurement contract.</td>
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<td>Compute the V@R of the contract using Monte Carlo and parametric methods.</td>
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Ways & Means
Case studies and examples.

Learning Assessment
Participants will be evaluated during the training through case studies.

Prerequisites
Basic notions of Microsoft Excel.

Expertise & Coordination
Contracted IFP Training trainers having expertise and experience in gas and electricity trading and their associated risks.
Oil Markets & Trading

Course Content

OIL SUPPLY & DEMAND FUNDAMENTALS  
Energy resources.  
Energy demand and supply.  
Oil producing countries, OPEC, consuming countries, international oil companies: constraints and strategies.  

SHIPPING  
General features.  
The Market and its players-Fixing of the freight rate (Worldscale).  
Chartering contracts.  
Risk control and environmental protection.  

CRUDE & PETROLEUM PRODUCTS PHYSICAL TRADING  
What is the value of a crude oil? The refiner’s point of view.  
Different types of contracts: long term, spot and forward.  
Main oil markets and their features.  
Key benchmark crudes.  
The role of the PRAs (price reporting agencies).  
Links between Trading and Shipping.  
Products trading.  
Main provisions of a sale/purchase contract.  

EXCHANGES & FUTURES TRADING  
The concept of volatility  
Definition of a contract: the cases of WTI and Brent.  
Exchanges and their organization: the cases of NYMEX and ICE.  
Main Futures Markets.  
Hedging principles.  
Hedging imperfections, basis risk.  
Market structure (contango, backwardation).  
Case studies.  

DERIVATIVES  
Options: principles, basics and characteristics.  
Interests and limits of options.  
Swaps: principles, basics and characteristics.  
Interests and limits of swaps.  

HEDGING STRATEGIES - VARIOUS CASE STUDIES ON HEDGING  
For a refiner.  
For a crude oil producer.  
For a marketer.  
For an industrial consumer.

Ways & Means  
 Syndicate works on case studies.  
 Case studies.  

Learning Assessment  
Participants will be evaluated during the training through exercises and case studies.  

Prerequisites  
Bachelor’s degree +3 and/or a minimum 3 years of working experience in Downstream.  

Expertise & Coordination  
In-house or contracted IFP Training trainers having expertise and experience in oil markets and trading.  

Level: PROFICIENCY

Purpose  
This training provides a better understanding of the structure of the markets, the uses and the impacts of physical and financial markets for crude oil and petroleum products.

Audience  
All personnel in the petroleum or associated industries needing to improve their knowledge and understanding of crude oil and petroleum products trading and pricing mechanisms.

Learning Objectives  
Upon completion of the course, participants will be able to:  
- analyze the parameters which influence prices of crude oil and prices of petroleum products,  
- review the different oil trading markets by type of transaction,  
- understand the importance of maritime transport costs in oil supply economics,  
- comprehend hedging techniques available for protection against fluctuations in prices.

Reference: TRT/OMT  
Can be organized as an In-House course.  
Contact: em.contact@ifptraining.com  

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<tr>
<td>Rueil</td>
<td>21 May</td>
<td>23 May</td>
<td>€2,360</td>
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This course is also available in French: TRT/MTP. Please contact us for more information.
Shipping: General Features, Chartering Contracts & Operations

Course Content

Level: PROFICIENCY

Purpose
This training provides participants a thorough knowledge of the technical, operational and commercial conditions concerning the transport of hydrocarbons by sea as well as an introduction to the legal and financial aspects of the shipping.

Audience
Professionals in the oil industry, involved in the supply, shipping, distribution activities and who need to improve their knowledge in operational and contractual aspects of shipping.

Learning Objectives
Upon completion of the course, participants will be able to:
- assess nautical capacity and technical criteria of a ship in particular for the transport of hydrocarbons,
- understand the risks associated with maritime activities (boating, environmental, policy...), as well as the regulations and related procedures,
- integrate into their reflection operational and strategic constraints that apply to the ship-owner or the carrier,
- negotiate in the best possible conditions contract litigations deriving from oil products marine operations,
- understand the tanker chartering market better.

Ways & Means
Illustration of actual cases.

Learning Assessment
Participants will be evaluated during the training through exercises.

Prerequisites
Minimum of 3 years of working experience in oil business and/or seagoing shipments of oil products.

Expertise & Coordination
Contracted IFP Training trainers having expertise and experience in shipping.

Course Content

VESSEL SPECIFICATIONS
Maritime vocabulary: position, distance, speed…
Ship measurements: tonnage, displacement, dimensions…
Anatomy of a ship: main features.
Nature of cargoes: dry, wet, specialties.
Ships offering: various types, age profile, specific focus on oil tankers and gas carriers.

SHIPPING FINANCIAL & LEGAL ASPECTS - BASICS OF INTERNATIONAL MARITIME LAWS
Elements of financing and profitability: type of fund raise, appreciation on current financial situation.
Current state of the shipbuilding industry.
The link between states and ship-owners: notions on the registration of ships, the world fleet by flag, by investing countries.
General notions of maritime legislation: territorial waters, EEZ, traffic separation, arctic waters…
Seaways: main maritime routes, Panama and Suez Canal, port network.
Piracy: legal, operational and financial consequences.

RISKS CONTROL & ENVIRONMENTAL PROTECTION
Impact on the environment: ITOPF statistics, Oil spills, GHG emissions…
International regulations: IMO conventions, MARPOL, SOLAS, STCW, ILO, ISPS…
Green regulations: air pollution, EEDI, ECA zone, BWM, ship recycling.
Impact on international shipping: SEEMP, engine technology, scrubbers, bunkering alternatives, financial impact.
Procedures for the transport of oil products: SIRE, TMSA, Vetting process.

THE SHIPPING CHAIN & THE PORT COMMUNITY
The Seaport: main features.
The maritime transportation occupations: agents, forwarders, stevedore’s, customs…
The handling of the ship in the port: port authority, pilot and tugs, peers main features…
Operating expenses of ships: fixed and variable costs, disbursement account.
The maritime transportation “contract”: Hague Visby, Rotterdam Rules, B/L…

SHIPPING EXPLOITATION & OPERATIONS
The bunkering market: products, players, contracts, market organization, PLATTS, BUNKERWIRE.
Risk management: basis of hedging, futures, swaps, options.
The marine lubricants market: products, players, contractual aspect.
Quantity measurements: industry commonly agreed procedures ROB, OBO, VEF, VAR, ISGOTT, specific focus on gas.
Cargo loading procedure: interface ship/shore, planning, sampling, pumping rates, topping off.
Ship To Ship (STS) operations: planning and notice, POAC role…
Claim handling: quantity, quality.

THE FREIGHT MARKET - PRICING MECHANISMS
Organization and operating evolutions in ship management.
Freight market organization: players and segmentation.
Freight rates structure: WORLDSCALE, BALTIC.
Risk management: FFA.
Market insights: appreciation of the market situation for various classes of oil tankers and gas carriers.

LNG & LPG SHIPPING MARKETS
Introduction.
LNG shipping market.
LNG liquefaction Regasification plants.
LNG market insights: appreciation of current situation.

CHARTERING AGREEMENT & CHARTER PARTY
Chartering agreement principles: different types, main terms, standard clauses, rider clauses.
Chartering agreement main definitions: Laycan, NOR, Laytime, example of calculation, demurrage, detention, retention…
Main litigation causes.
Role and responsibilities: split between charterer and ship-owner depending on charter type.
Coming to a chartering agreement: various steps and procedures, role of the broker.
Charter party specific clauses: force majeure, war risk, slow steaming, virtual arrival…
Some litigation cases: practical examples.

Reference: TRT/CFS  Can be organized as an In-House course.
Contact: em.contact@ifptraining.com

Location Start Date End Date Tuition Fees
Rueil 10 December 13 December €3,030

This course is also available in French: TRT/CES. Please contact us for more information.
Upstream Economics & Management

Course Content

Module 1: Upstream Economic & Contractual Framework

Upstream Economic Environment
- 1 day
  - Economic development of the upstream sector.
  - Various actors in Exploration-Production and their strategies. Oil markets and prices.
  - Levels of investment.
  - Examples of finding, development and production costs.

Contractual & Fiscal Framework of Upstream Projects
- 4 days
  - Concession and production sharing contracts: principles, examples of tax regimes and case studies.
  - Risk-service contracts and technical assistance contracts.
  - General structure of Exploration-Production contracts.
  - Exploration phase: duration, commitments, surrender, data and information, etc.
  - Appraisal phase: work program, gas provisions, commerciality, etc.
  - Development phase: financing, State participation, budgets and development plans, unitization, etc.
  - Production phase: work conduct and supervision, audit and accounting, financing, taxation, transportation and marketing of production, hydrocarbon price determination, etc.
  - General terms & conditions: title transfer, force majeure, governing law and dispute resolution.
  - Main legal provisions in a Joint Operating Agreement, and Farm in/Farm out agreement.

Module 2: Upstream Project Economics

Economic Analysis of E&P Projects
- 4 days
  - Cost of capital and discount rate, value creation.
  - Global profitability analysis, the impact of taxation and inflation on economic indicators.
  - Specific method to Exploration & Production: shadow interest.
  - Equity profitability analysis.

Risk Analysis of E&P Projects
- 1 day
  - Introduction to risk analysis and risk discount rate: sensitivity analysis, Spider and Tornado diagrams.
  - Economic study of an exploration project using Min, Mode and Max scenarios.
  - Impact of “ringfencing” and the state participation in the decision-making process.

Module 3: Upstream Accounting & Finances

5 days

Statements of accounts for an Oil & Gas company, upstream specificities.
- Exploration: full cost, successful efforts, FAS 19.
- Reserves accounting: rules, FAS 69, control.
- Consolidation and Joint Venture accounting.
- Contract accounting, social accounting, group accounting.
- Accounting for concessions and PSCs: reserves, inventories, commitments, revenues.
- Reporting: purpose, obligations, financial communication.
- Analytical accounting, Cost management and control.
- Tax audit: recoverable costs, common costs, sole costs.

Reference: EAM/U/EEM Only available as an In-House course. Contact: em.contact@ifptraining.com
Contractual Framework of Exploration-Production

Level: FOUNDATION

Purpose
To provide participants with a good understanding of the shape and dynamics of Oil & Gas Exploration-Production contracts.

Audience
Professionals from the E&P sector and managers who need a practical understanding of all the concepts, principles and rules of Oil & Gas patrimonial contracts between host countries and international oil companies.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify the key issues and constraints in the contractual negotiations between host countries, NOCs and IOCs,
- categorize the different tax systems and contractual frameworks in existence,
- identify the main contractual and fiscal clauses of E&P contracts.

Ways & Means
- Comparative reading on a HC law and a E&P contract.
- Exercises on rent sharing.
- Examples of petroleum laws & fiscal regimes around the world.

Learning Assessment
Participants will be evaluated during the training through quizzes and case studies.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
Contracted IFP Training trainers having expertise and experience in the legal framework of exploration-production activities.

Course Content

LEGAL FRAMEWORK
Objectives of actors, role of national oil companies, stakes in E&P. Principles of rent sharing, property of hydrocarbons and State sovereignty. Procedure for contracts awarding, different regimes and petroleum laws in the world. Legal approach of petroleum law conception and implementation.

CONTRACTUAL & FISCAL FRAMEWORK

MAIN ARTICLES OF E&P CONTRACTS
General structure of patrimonial contracts. Exploration phase: duration, commitments, surrender, data and information, etc. Appraisal phase: work program, gas provisions, commerciality, etc. Development phase: financing, State participation, budgets and development plans, unitization, etc. Production phase: work conduct and supervision, audit and accounting, financing, taxation, transportation and marketing of production, hydrocarbon price determination, etc. General terms & conditions: title transfer, sole risk, force majeure, local content, environmental protection, governing law and dispute resolution. Conclusion: recent trends in oil taxation and patrimonial contracts.

JOINT OPERATING AGREEMENTS
Main legal provisions in a Joint Operating Agreements (JOA). Other agreements: JSBA (Joint Study & Bidding Agreement), unitization, farm-in/farm-out.

Reference: EAM/CCEP
Contact: em.contact@ifptraining.com

Can be organized as an In-House course.

Location | Start Date | End Date | Tuition Fees
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Rueil | 14 May | 16 May | €2,550

This course is also available in French: EAM/CCEP. Please contact us for more information.
Production Sharing & Joint Operating Agreements

Course Content

3 days

PRODUCTION SHARING AGREEMENTS (PSA) 1 d

Introduction:
- Origins, concept and scope of the PSA.
- Comparison of PSA to other contracts.
- Contents and structure of a typical PSA.

PSA mechanisms:
- Cost oil, profit oil split, “Government Take”.
- Bonuses, first tranche petroleum, tax holiday, cost recovery ceilings, uplifts, investment credits, government “back-in”.

Typical PSA cash flow forecast chart.

Case study: comparative reading of a mining law and a PSC.

MAIN ARTICLES OF AN E&P CONTRACT 1 d

General structure of patrimonial contracts.
- Exploration phase: duration, commitments, surrender, data and information, etc.
- Appraisal phase: work program, gas provisions, commerciality, etc.
- Development phase: financing, State participation, budgets and development plans, unitization, etc.
- Production phase: work conduct and supervision, audit and accounting, financing, taxation, transportation and marketing of production, hydrocarbon price determination, etc.

General terms & conditions: title transfer, sole risk, force majeure, local content, environmental protection, governing law and dispute resolution.

Conclusion: Recent trends in oil taxation and patrimonial contracts.

Real-life examples from the news.

JOINT OPERATING AGREEMENTS (JOA) 1 d

Introduction:
- The purpose of the joint ventures and use of a JOA.
- The relationship of the JOA to other oil industry contracts.
- Structure of a JOA, definitions and terminologies.

The operator: appointment, rights and duties, liabilities, responsibilities, resignation, removal.

The partners:
- Rights and duties, liabilities, responsibilities.
- The operating committee and sub committees.
- Establishment, powers and duties, notices, voting procedures, impact of voting, pass-mark.

Case study: discussing the main articles of a selected Joint Operating Agreement (JOA).

Reference: EAM/PSA

Only available as an In-House course.

Contact: em.contact@ifptraining.com

This course is also available in French: EAM/CPA. Please contact us for more information.
Economic Framework of Exploration-Production

Level: FOUNDATION

Purpose
To allow the participants to get familiar with the use of decision-making tools in the field of E&P projects economics and financial analysis.

Audience
Engineers and commercial staff who need to extend their understanding of the economic and financial aspects of the upstream sector.

Learning Objectives
Upon completion of the course, participants will be able to:
- explain the economic, technical and fiscal aspects of E&P activities,
- evaluate the economic profitability of a simplified E&P project and assess its key sensitivity parameters,
- analyze the main corporate financial statements (profit/loss and balance sheet) issued by oil companies.

Ways & Means
- Case studies simulated on computers.
- Development of an oil field (under concession and production sharing agreements).
- Acceleration of production project with or without EOR (Enhanced Oil Recovery).
- Valuation of a decision to acquire information (seismic or drilling).
- Pricing of an exploration block.
- Analysis and construction of balance sheets, income statements and key financial statements of an Oil & Gas company.

Learning Assessment
Participants will be evaluated during the training through quizzes and case studies.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
Permanent IFP Training trainers having expertise in upstream project economic evaluation.

Course Content

UPSTREAM ECONOMIC ENVIRONMENT

0.5 d

CONTRACTUAL & FISCAL ENVIRONMENT

0.5 d

ECONOMIC EVALUATION OF E&P PROJECTS
Cost of capital and discount rate, value creation. Economic criteria for project evaluation: net present value (NPV), internal rate of return (IRR), payback period, etc. Global profitability analysis, the impact of taxation and inflation on economic indicators. Case studies: development of an oil field (under concession and production sharing agreements). Introduction to risk analysis and risk discount rate: sensitivity analysis, Spider and Tornado diagrams. Probability of success, economic risk analysis in oil exploration. Economic study of an exploration project using Min, Mode and Max scenarios. Case studies: valuation of a decision to acquire information (seismic or drilling) and pricing of an exploration block.

2 d

UPSTREAM ACCOUNTING & FINANCE

2 d
Negotiation of Exploration-Production Contracts

Level: PROFICIENCY

Purpose
To have an overview of the EP patrimonial contract negotiation and to develop or deepen a skill in negotiating, using rigorous methodology and innovative approach.

Audience
People who could participate in one or more stages of an EP contract negotiation: negotiators, project managers, explorers, engineers, lawyers, economists, advisors, managers from the public sector related to the energy sector and representatives of national companies.

Learning Objectives
Upon completion of the course, participants will be able to:
► describe the different ways to access acreage,
► use a rigorous methodology and innovative approach for upstream contracts negotiation,
► make an objective and comprehensive report to their management and anticipate objections.

Ways & Means
Simulation of a negotiation (role play where each stakeholder is played by a different team) allowing real-life negotiation case.

Learning Assessment
Participants will be evaluated during the training through quizzes and case studies.

Prerequisites
Basic knowledge of the contractual environment of E&P.

Expertise & Coordination
Contracted IFP Training trainers having expertise and experience in the negotiation of exploration-production contracts.

Course Content

REMINDER OF CONTRACTUAL & FISCAL FRAMEWORK OF EXPLORATION-PRODUCTION 0.5 d
Concession, Production Sharing Agreement, Service Contracts.
Analysis of the contract contents’ analysis.
Distribution of the different items into homogeneous “bundles”: clauses related to the exploration stage, clauses conducting operations, clauses related to economic and tax calculations, to pure legal issues, to financial terms, etc.
Important clauses of a contract to prepare a negotiation.

REMINDER OF ECONOMIC EVALUATION OF E&P PROJECTS 0.5 d
Cost of capital and discount rate, value creation.
Economic criteria for project evaluation: net present value (NPV), internal rate of return (IRR), payback period, etc.
Global profitability analysis, the impact of taxation and inflation on economic indicators.

NEGOTIATION SKILLS 0.5 d
Negotiation principles: methodology and techniques.
Preparation for negotiating: principles, economic reminders, technical reminders (reserves, etc.).

ROLE PLAY 2.5 d
Case study preparation per team (Joint Venture: JV, State).
Preparation for the first round of negotiation (contact and consultation).
First simulation and debriefing, updating the negotiation plan.
Preparation for the second round of negotiation (confrontation and early conciliation).
Second simulation and debriefing, updating the negotiation plan.
Preparation for the third round of negotiation (construction of the agreement and conclusion).
Third simulation and debriefing.
Preparation of the report to the management and presentation.

Reference: EAM/EPCN
Can be organized as an In-House course.
Contact: em.contact@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>21 May</td>
<td>24 May</td>
<td>€4,100</td>
</tr>
</tbody>
</table>

This course is also available in French: EAM/CNEP. Please contact us for more information.
Economics & Risk Analysis of Upstream Projects

Course Content

5 days

ECONOMIC & CONTRACTUAL FRAMEWORK OF E&P 0.5 d
Various phases of Exploration-Production.
Technical cost, evolution of the economic environment.
Petroleum Exploration and Production contracts.
Concessions, production sharing contracts, service contracts.
Sharing of the economic rent, economic flexibility in petroleum contracts.
Economic clauses.

INVESTMENT PROFITABILITY STUDIES 2 d
Cost of capital and discount rate, value creation.
Economic criteria for project evaluation: net present value (NPV), internal rate of return (IRR), payback period, etc.
Global profitability analysis, the impact of taxation and inflation on economic indicators.
Specific method to Exploration and Production: shadow interest.
Case studies: development of an oil field (under concession and production sharing agreements).
Introduction to risk analysis and risk discount rate: sensitivity analysis, Spider and Tornado diagrams.
Impact of “ringfencing” and the state participation in the decision-making process.

RISK ANALYSIS OF E&P PROJECTS 1.5 d
Probability of success, analysis of economic risk in oil exploration.
Evaluation of exploration projects and decision trees.
Farm in/Farm out.
Risked and unrisked economics.
Case study: economic study of an oil project including Min, Mode and Max scenarios.
Evaluation of development projects.
Economic risk associated with a marginal development.
Decision trees and subjective probabilities, decision theory.

PORTFOLIO MANAGEMENT 1 d
Components and determinants of asset valuation at various stages of maturity: exploration and appraisal, development, production.
Review of methodologies and processes, probabilistic analysis.
Asset aggregation and portfolio optimization, tools of choice for comparing expected results and budget efficiencies.
Conclusions, what works and what doesn’t.
Contribution of risk analysis and management to successful exploration.

Ways & Means

Case studies simulated on computers:
Development of an oil field (under concession and production sharing agreements).
Impact of “ringfencing” and the state participation in the decision-making process.
Valuation of a decision to acquire information (seismic or drilling).
Pricing of an exploration bloc.

Learning Assessment

Participants will be evaluated during the training through quizzes and case studies.

Prerequisites

Participants need to be comfortable with the use of Microsoft Excel.

Expertise & Coordination

Contracted IFP Training trainers having expertise and experience in upstream project economics.

Reference: EAM/ERA Can be organized as an In-House course.
Contact: em.contact@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
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<tbody>
<tr>
<td>Rueil</td>
<td>14 October</td>
<td>18 October</td>
<td>€3,800</td>
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</table>

This course is also available in French: EAM/EAR. Please contact us for more information.
Practice of Exploration-Production Contracts Economic Modeling

**Level:** PROFICIENCY

**Purpose**

To provide a practical understanding of the economic modeling of Oil & Gas field development project as well as exploration projects. A number of computer case studies will be treated along the course to apply the principles that are presented succinctly, which makes this course a very practical one.

**Audience**

Managers and executives involved in Exploration-Production activities who need to acquire a deep understanding of fiscal modeling for project evaluation.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- explain the critical aspects of taxation and upstream contracts,
- build advanced economic models for the economic evaluation of Exploration-Production projects,
- analyze the economic results and carry out sensitivity analysis,
- incorporate the geological risk and uncertainty in the economic evaluation of E&P projects.

**Ways & Means**

Case studies simulated on computers.

**Learning Assessment**

Participants will be evaluated during the training through quizzes and case studies.

**Prerequisites**

Participants need to be comfortable with the use of Microsoft Excel.

**Expertise & Coordination**

Contracted IFP Training trainers having expertise and experience in upstream project economic modeling.

**Course Content**

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTRACTUAL &amp; FISCAL FRAMEWORK OF EXPLORATION-PRODUCTION</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Overview of E&amp;P activities, exploration, development and production costs. General principles of oil taxation. Concession contracts, production sharing contracts and service contracts. Principles of rent sharing between States and oil companies. Case studies: examples of contracts.</td>
<td></td>
</tr>
<tr>
<td>OIL CONTRACT MODELING</td>
<td>2 d</td>
</tr>
<tr>
<td>Cost of capital and discount rate, value creation. Economic criteria for project evaluation: net present value (NPV), internal rate of return (IRR), payback period, etc. Global profitability analysis, the impact of taxation and inflation on economic indicators. Specific method to Exploration and Production: shadow interest. Case studies: development of an oil field (under concession and production sharing agreements). Equity profitability analysis. Case studies: LNG project and gas pipeline project with specific financing.</td>
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</tr>
<tr>
<td>RISK ANALYSIS OF EXPLORATION-PRODUCTION PROJECTS</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

**CASE STUDIES**

- Development of an oil field (under concession and production sharing agreements).
- LNG plant project with specific financing.
- Impact of “ringfencing” and the state participation in the decision-making process.
- Valuation of a decision to acquire information (seismic or drilling).
- Pricing of an exploration bloc.

Reference: EAM/PCM  Only available as an In-House course. Contact: em.contact@ifptraining.com

This course is also available in French: EAM/PMC. Please contact us for more information.
Operating under “Local Content”

**Level:** PROFICIENCY

**Purpose**
To master the implications of Local Content provisions over the execution of an oil field development project, mainly in terms of procurement and personnel management.

**Audience**
Managers from the Oil & Gas public sector (NOCs, regulation authorities, ministries) or from IOCs having to deal or operate under a “Local Content” environment and contractual provisions.

**Learning Objectives**
Upon completing the course, participants will be able to:
- identify the key-factors in the Local Content provisions applicable to a given contractual context, and assess their impact over the execution of an oil field development project,
- participate in the elaboration of a Local Content Management Plan,
- take part in a procurement contract tendering, negotiation and follow-up,
- take into account the impacts of LC provisions on workforce management.

**Ways & Means**
- Course delivered by experts in the field of Local Content management in the Oil & Gas business.
- Practical case study on a procurement contract.

**Learning Assessment**
Participants will be evaluated during the training through quizzes and case studies.

**Prerequisites**
Bachelor degree with a 5-year experience minimum at a management level in the fields of engineering, law, finance or economics in the upstream Oil & Gas industry; a good knowledge of the various project phases of an oil field development would be a plus.

**Expertise & Coordination**
Contracted IFP Training trainers having expertise and experience in upstream project execution.

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**Course Content**

**WHAT IS “LOCAL CONTENT”?**
0.5 d
Context and current overview.
Typology of Local Content provisions applicable in the Oil & Gas business: goods and services, workforce, know-how and technology transfer.
Challenges and opportunities.

**THE LOCAL CONTENT MANAGEMENT PLAN (LCMP)**
1 d
Contractual strategy.
Key-factor and associated risks.
Setting up and management of a LCMP.

**CONSEQUENCES OF LC PROVISIONS ON THE EXECUTION OF A PROCUREMENT CONTRACT**
1 d
Contractual strategy including impact on Oil & Gas contracts.
Tendering process.
Recommendation and awarding.
Execution - Control.
Links with maintenance and exploitation.

**IMPACT OF LC PROVISIONS ON WORKFORCE MANAGEMENT**
0.5 d
Employment.
Training and education.

**Reference:** EAM/OLC

Only available as an In-House course.

This course is also available in French: EAM/CLC. Please contact us for more information.
## Purpose

To provide the participants with a comprehensive overview of the various parameters at stake in an oil field unitization project using real-case examples, in order for them to be able to take part in negotiations for oil field unitization contracts.

## Audience

Managers from the public and the private sector with a minimum 5-year experience in technical or functional positions in the upstream Oil & Gas sector, having to deal with unitization cases or projects.

## Learning Objectives

Upon completing the course, participants will be able to:

- explain the various factors at stake in the case of an unitization project, both on a national perspective (cross permit) and a transnational perspective (cross country),
- have a critical approach to the main provisions at stake in a unitization contract,
- choose the best suitable type of contract,
- take part in a negotiation team for unitization.

## Ways & Means

- Real-case studies.
- Feedbacks from experts in the field of unitization.

## Learning Assessment

Participants will be evaluated during the training through quizzes and case studies.

## Prerequisites

Basic knowledge of the contractual framework of E&P and its main provisions.

## Expertise & Coordination

Contracted IFP Training trainers having expertise and experience in oil field unitization.

## Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
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<tbody>
<tr>
<td><strong>INTRODUCTION</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Context - Stakes.</td>
<td></td>
</tr>
<tr>
<td>Overview of current unitized oil developments.</td>
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</tr>
<tr>
<td><strong>RESERVES DEVELOPMENT UNDER AN UNITIZATION PROJECT</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Principles.</td>
<td></td>
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<tr>
<td>Stakes and key factors.</td>
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<tr>
<td>Consequences in terms of development schemes.</td>
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<tr>
<td><strong>UNITIZATION IMPLICATIONS</strong></td>
<td>0.5 d</td>
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<tr>
<td>Political aspects.</td>
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<tr>
<td>Contractual aspects.</td>
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<tr>
<td>Economic aspects.</td>
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<tr>
<td>Fiscal aspects.</td>
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<tr>
<td><strong>STRUCTURE OF AN UNITIZATION CONTRACT</strong></td>
<td>1 d</td>
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<tr>
<td>Main provisions.</td>
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<tr>
<td>Cross country case:</td>
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<tr>
<td>The boundary question.</td>
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<tr>
<td>Various types of contracts: unitization, commercial agreement, joint development area.</td>
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<tr>
<td>Study case based on real-case examples.</td>
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<tr>
<td><strong>CASE STUDIES BASED ON RECENT UNITIZED DEVELOPMENT CASES</strong></td>
<td>1 d</td>
</tr>
</tbody>
</table>

This course is also available in French: EAM/UNITZ. Please contact us for more information.

Reference: EAM/UNITZ  Only available as an In-House course.

Contact: em.contact@ifptraining.com

This course is also available in French: EAM/UNITZ. Please contact us for more information.
Advanced Certificate
Upstream Auditing Certification

Level: PROFICIENCY

Purpose
This course is designed to master the framework, principles, objectives, methodology, roll-out and follow-up of various upstream audits: petroleum contract auditing, JOA auditing as well as petroleum aspects of internal auditing.

Audience
This course is intended for managers from the Oil & Gas public (NOCs, ministries, regulation authorities…) and private sectors who deal with different types of petroleum auditing missions (petroleum contract auditing, JOA auditing, petroleum aspects of internal auditing) from the preparation phase to the roll-out and follow-up phases.

Learning Objectives
Upon completion of the Upstream Auditing Certification, participants will be able to:
- identify the risk-zones and key factors to audit,
- take part in an audit, following specifications and schedules,
- write recommendations and exceptions,
- propose recommendations for strategic and/or organizational choices.

Ways & Means
Modules are delivered by upstream auditing professionals. The evaluation process includes a mock case preparation, roll-out and follow-up of an audit.

Learning Assessment
Participants will be evaluated during the training through quizzes and case studies.

Prerequisites
Participants with a Bachelor’s degree in Engineering or Business with 5 years of management experience in the Oil & Gas industry are ideal candidates. In addition, fundamental knowledge of financial (general accounting, financial statements, financial accounting) and upstream petroleum contracts is required and will be assessed through a preliminary test.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Upstream Auditing.
- Ready-to-use skills.

More info
* Duration includes one day of assessment.

Expertise & Coordination
Contracted IFP Training trainers having expertise and experience in auditing of exploration-production activities.

Reference: GIP/ADVUA

Only available as an In-House course.

Contact: em.contact@ifptraining.com
This course is also available in French: GIP/ADVAM. Please contact us for more information.

www.ifptraining.com
Graduate Certificate
Upstream Economics & Management Certification

Level: FOUNDATION

Purpose
This certifying training is part of a professional career development to managerial positions in exploration & production business, requiring specific skills in economics, contracts, taxation, finance, auditing and project management.

Learning Objectives
Upon completion of the course, participants will be able to:
- develop negotiation skills in petroleum contracts,
- build advanced economic models for evaluating Exploration-Production projects,
- interpret the different financial statements published by Oil & Gas companies,
- effectively manage the project: engineering studies, procurement, construction and commissioning.

Ways & Means
- Case studies simulated on computers,
- Analyze the main corporate financial statements issued by Oil & Gas companies.
- Cost estimation of Exploration & Production projects.

Learning Assessment
The assessment system is made up of two (02) elements:
- an entry assessment, covering all topics treated during the training in order to measure the progress of the candidates and does not validate any modules,
- In order to sanction the certification, at the end of each module from 1 to 12, participants must pass written/oral exams, lasting one hour and a half.

Prerequisites
Are allowed to take part to this certified training only applicants having:
- a Master’s degree or equivalent in engineering, economics, finance or legal with minimum 2 years working experience,
- a Bachelor’s degree with minimum of 5 years working experience.
Applicants must provide proof validating these prerequisites, e.g. (copy of engineering degree, Master, Bachelor Degree or equivalent).

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Upstream Economics & Management.
- Ready-to-use skills.

Expertise & Coordination
Contracted IFP Training trainers having expertise and industrial experience in economics, finance and auditing of exploration-production activities.

Course Content 60 days

UPSTREAM ECONOMICS

Module 1: Overview of Oil & Gas chain
International energy scene. Upstream economics. Oil trading. Downstream economics.

Module 2: Introduction to petroleum engineering
Reservoir engineering. Well intervention. Surface facilities.

Module 3: Natural gas chain economics

Module 4: Trading of crude oil & petroleum products

Module 5: Contractual & fiscal framework of Exploration-Production
Legal framework. Contractual and fiscal framework. Main clauses of petroleum contracts.

Module 6: JOA & negotiation of E&P patrimonial contracts
Association agreements. Methodology of negotiation. Simulation: negotiating a PSC.

MANAGEMENT OF UPSTREAM ASSETS

Module 7: Estimation & cost control

Module 8: Economic evaluation of Exploration & Production projects
Economic criteria. Economic costs analysis. Equity profitability analysis and project funding. Risk analysis of Exploration-Production projects.

Module 9: Project management
Introduction to preliminary studies. Feed or basic engineering studies. Project control and administration. HSE and quality management. Detail studies and procurement. Construction.

Module 10: Upstream accounting & financial management

Module 11: Upstream contracts audits

Module 12: Hunting for oil: simulation game of E&P chain
The Hunting For Oil™ (HFO™) course presents a practical overview of the mostly used techniques in of the Upstream Oil & Gas industry, from prospect exploration to field development and production. Participants will learn to select and acquire license blocks, use seismic data, plan drilling activities, develop their field by analyzing technical aspects, and manage the time line, the budget and other critical factors related to field development.

Reference: EAM/EEMC
Contact: em.contact@ifptraining.com

This course is also available in French: EAM/EAMC. Please contact us for more information.
Investment Profitability Studies in the Oil & Gas Industry

Level: FOUNDATION

Purpose

This course provides a better understanding of the concepts behind the theory of capital budgeting, thus helps improving the analysis in investment profitability studies. A number of computer case studies will be treated all along the course to apply the principles that are presented succinctly, which makes this course a very practical one.

Audience

Managers and staff concerned with decisions affecting medium and long term cash flows, such as investment, disinvestment, acquisitions or leasing, who need to improve their understanding of the theory and practice of investment analysis.

Learning Objectives

Upon completion of the course, participants will be able to:

- develop advanced computer models for the economic evaluation of Oil & Gas projects,
- incorporate specific financing plan through equity profitability analysis,
- analyze the economic results and carry out sensitivity analysis,
- incorporate the risk and uncertainty in the economic evaluation of Oil & Gas projects.

Ways & Means

Case studies simulated on computers.

Learning Assessment

Participants will be evaluated during the training through quizzes and case studies.

Prerequisites

Participants need to be comfortable with the use of Microsoft Excel.

Expertise & Coordination

IFP Training trainers having expertise and experience in Oil & Gas project economics.

Course Content

<table>
<thead>
<tr>
<th>3 days</th>
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<tbody>
<tr>
<td>ECONOMIC EVALUATION CRITERIA 0.5 d</td>
</tr>
<tr>
<td>Corporate finance, capital costs and discount rate of the company.</td>
</tr>
<tr>
<td>Construction of project cash flows schedule.</td>
</tr>
<tr>
<td>Economic criteria for project evaluation: net present value (NPV), internal rate of return (IRR), payback period, etc.</td>
</tr>
<tr>
<td>Case studies: development of an oil field under concession.</td>
</tr>
<tr>
<td>GLOBAL PROFITABILITY ANALYSIS 1 d</td>
</tr>
<tr>
<td>Methodology for assessing the global profitability of capital invested.</td>
</tr>
<tr>
<td>Impact of taxation and inflation in profitability investment studies.</td>
</tr>
<tr>
<td>Choosing an investment program with a limited budget, scarcity cost of capital.</td>
</tr>
<tr>
<td>Case studies: accelerating production project (EOR) project of upgrading a refinery (Hydrocracking unit).</td>
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<tr>
<td>ECONOMIC COST ANALYSIS 0.5 d</td>
</tr>
<tr>
<td>Accounting cost vs. economic cost, after-tax cash outflows.</td>
</tr>
<tr>
<td>Total discounted cost, annual economic cost.</td>
</tr>
<tr>
<td>Economic depreciation, unit economic cost, optimal economic lifetime.</td>
</tr>
<tr>
<td>Cases studies: issues related to purchasing of equipment and definition of an optimal economic lifetime.</td>
</tr>
<tr>
<td>EQUITY PROFITABILITY ANALYSIS 0.5 d</td>
</tr>
<tr>
<td>Financing Oil &amp; Gas projects, project finance and B.O.T. structures.</td>
</tr>
<tr>
<td>Various financing plans and debt repayment.</td>
</tr>
<tr>
<td>Analysis of equity cash flows, return on equity capital, financial leverage.</td>
</tr>
<tr>
<td>Case studies: construction of LNG plant and gas pipeline projects with specific financing.</td>
</tr>
<tr>
<td>RISK ANALYSIS 0.5 d</td>
</tr>
<tr>
<td>Introduction to risk analysis and risk discount rate: sensitivity analysis, Spider and Tornado diagrams.</td>
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<td>Probability of success, economic risk analysis in oil exploration.</td>
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<td>Economic study of an exploration project using Min, Mode and Max scenarios.</td>
</tr>
<tr>
<td>Case studies: valuation of a decision to acquire information (seismic or drilling) and pricing of an exploration bloc.</td>
</tr>
</tbody>
</table>

CASE STUDIES

- Oil field development project.
- Acceleration of production project with or without EOR (Enhanced Oil Recovery).
- Isomerization vs. alkylation project.
- FCC project (Fluid Catalytic Cracking).
- Project of upgrading a refinery.
- Hydrocracking unit project.
- Polypropylene Plant Project.
- LNG plant project with specific financing.
- Gas pipeline project with specific financing.
- Service station modernization project.
- Gas-fired power plant project.
- Valuation of a decision to acquire information (seismic or drilling).
- Pricing of an exploration bloc.

Reference: GIP/IPS

Can be organized as an In-House course.

Contact: em.contact@ifptraining.com

Location Start Date End Date Tuition Fees

Rueil 23 April 25 April €2,150

This course is also available in French: GIP/ERP. Please contact us for more information.
Upstream Contracts Audit

Level: PROFICIENCY

Purpose
This course provides participants a detailed understanding of principles and methods of upstream contracts audit.

Audience
For upstream personnel who will conduct joint-venture audits, or will be audited by partners in a joint venture, for State auditors in charge of auditing Oil & Gas contracts, for executives who look for a comprehensive understanding of issues linked to contractual audit.

Learning Objectives
Upon completion of the course, participants will be able to:
- prepare and lead a contractual audit,
- identify the risks related to accounting in Oil & Gas industry,
- set up an audit structure.

Ways & Means
Case studies and exercises based on recent industrial cases.

Learning Assessment
Participants will be evaluated during the training through quizzes and case studies.

Prerequisites
Basic knowledge of the contractual and financial framework of E&P and/or a minimum 5 to 10 years’ experience in financial functions in the E&P sector.

Expertise & Coordination
Contracted IFP Training trainers having expertise and experience in auditing of exploration-production activities.

Course Content

**CONTRACTUAL ACCOUNTING**
1 d
Joint Operating Agreements and accounting appendix.
Upstream tax issues.
Production Sharing Contracts (PSC) and accounting procedures.
Joint costs and recoverable costs.
At cost principle and implementation.
Bases of operator’s cost accounting.

**SPECIFICITIES OF JOINT VENTURE AUDIT**
1.5 d
Audit rights.
Organization of the audit: partners, operator.
Auditing respect of at cost principle.
Exercises.

**SPECIFICITIES OF STATE AUDIT**
1.5 d
Audit rights.
Organization of the State audit, auditors qualification.
Articulation between joint-venture audit and State audit.
Key elements of contract and accounting procedure.
Case study.

**CONDUCTING A CONTRACT AUDIT**
1 d
Audit preparation.
During the audit.
Conclusion of the audit.
Audit supervisor role.
Audit report and follow-up.

Reference: GIP/UCA
Contact: em.contact@ifptraining.com

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This course is also available in French: GIP/ACEP. Please contact us for more information.
Governance of an E&P Company

Level: PROFICIENCY

Purpose
This course provides the most recent elements and reflections on companies governance and key issues specific to the Oil & Gas upstream companies, except for contracts audit which is treated in a separate course (upstream contracts audit).

Audience
Professionals in charge of implementing internal control and procedures, managers and independent board members wanting to know the best practices, to technical staff called to move to the internal audit of their company.

Learning Objectives
Upon completion of the course, participants will be able to:
- obtain a global understanding of the problems attached to company’s governance,
- know the most recent solutions developed and implemented in internal control of companies,
- analyze the human and financial resources needed to ensure the financial safety of the company,
- lead or supervise the creation of an internal audit.

Ways & Means
Discussions on key issues and examples from the news.

Learning Assessment
Participants will be evaluated during the training through quizzes and case studies.

Prerequisites
5 to 10 years of experience in the international Oil & Gas industry environment.

Expertise & Coordination
Contracted IFP Training trainers having expertise and experience in auditing of exploration-production activities.

GOVERNANCE OF COMPANIES
Internal control: where and when.
Principles of financial security.
Definition of audit, norms and standards.
Internal control: definition, modalities.
Internal audit, external audit.
Audit committee, Certified Public Accountants (CPAs) and external auditors.

AUDIT & INTERNAL CONTROL
Definition.
Code of conduct and internal audit.
International standards of internal audit.
Internal control and the COSO referential.
Risk definition and management.
Fraud definition, types and prevention.
Introduction to internal audit methods.

OIL & GAS SPECIFIC ISSUES
FCPA compliance.
New reporting requirements for listed companies.
Reserves, payments to States, emission certificates.

BEST PRACTICES STUDY
Institutional answers in the USA and in the European Union.
Company’s organization.
Developing an internal culture of financial safety.

Reference: GIP/GEPC  Can be organized as an In-House course.
Contact: em.contact@ifptraining.com

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This course is also available in French: GIP/GCEP. Please contact us for more information.
Competency Management in E&P

Course Content

DEFINITION OF COMPETENCE MANAGEMENT SYSTEM
- Definition of the concept of competence.
- Governance and company’s strategy.
- Definition and principles of the competence and career planning methodology and the competence management.
- Benefits of competence management systems.
- Oral presentation: each project team discovers its practical case, substantiates it and then presents it to the rest of the group.

ASSESS & FORMALIZE ONE’S COMPANY’S REQUIREMENTS
- Review of existing situation and findings.
- Definition of the framework, targeted aims, challenges, stakeholders and resources.
- Creation of a project team and development of an action plan, together with processes and methods used.
- Group work: BASED on the review of the existing situation, the “project team” must produce their action plan, factoring in the stated constraints. Each project team will then present their action plan to the group.

CREATE THE NECESSARY SKILLS REFERENCE FRAMEWORKS & TOOLS
- Identify the technical support people.
- Win the support of the technical support people for the initiative.
- Methods for collecting information.
- Produce job descriptions.
- Draft the skills reference framework, corresponding to E&P activities.
- Graduate the skills levels.
- Review of reference documents and internal validation.
- Group work:
  - Identify information sources and stakeholders who can feed the reference frameworks.
  - Produce an extract of the skills list from the detailed job description.
  - Each project team details the difficulties encountered and the key success factors.

ORGANIZE A COMPETENCE ASSESSMENT CAMPAIGN
- Key principles.
- Competence assessment methodologies.
- Scheduling and logistics.
- The assessor’s profile, a key party in the process.
- Analyzing and making use of the results.
- Simulation: using IFP Training’s simplified competence assessment tool, each project team will simulate a competence assessment campaign and will issue recommendations based on a typical mapping for E&P activities (Geosciences, Reservoir, Production, Field operations, Drilling…).

IMPLEMENT A COMPLETE COMPETENCE MANAGEMENT SYSTEM
- The complete competence management cycle.
- The communication plan.
- Continuous improvement.
- Group work: each individual in the group will have to simulate arguments for having this initiative implemented in front of the other members of their group.

Reference: CMGT/CMSGB
- Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

This course is also available in French: CMGT/CMSFR. Please contact us for more information.
Training Engineering in E&P

Purpose
This course provides a comprehensive understanding of training engineering applied to E&P, along with methodology and tools.

Audience
Human resources professionals within the E&P industry, in charge of identifying the training needs, building the training plan and implementing it for an International or a National Oil Company.

Learning Objectives
Upon completion of the course, the participants will be able to:
- understand the training engineering phases and objectives,
- build the tools needed for each phase,
- have a systemic approach in training engineering applied to E&P,
- be proactive during the process, in order to better support the technical departments.

Ways & Means
Customized training to the E&P jobs, based on group works, practical exercises and real examples.

Learning Assessment
The assessment takes place during the different periods of group work. This includes 4 presentations/exercises during the week, the details of which are detailed below.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

**TRAINING ENGINEERING DEFINITION**
1 d
Final objectives of the methodology within E&P activities.
Engineering of the HR general strategy: company values, policies, strategies, regulations.
Training engineering components.
Pedagogical engineering.
Protagonists, roles and expectations.

**NEEDS ASSESSMENT**
1 d
Performing training diagnosis:
- Synthesis of the past training assessments.
- Competency and career planning.
- Competency assessment campaigns (example: drilling team, 4 jobs).
- Identify and compile the training needs.
- Vision of the Company’s executive management.
- Operational needs (example: gathering the training needs from the production sites).
- Training manager and HR team.
- External inputs: consulting agencies, training providers.
- Final beneficiaries, Company’s employees.
- Exercise: create a tool for mapping training needs, useful for the training plan design.

**TRAINING SYSTEM DESIGN**
0.75 d
The tools for the training system design:
- Job descriptions (examples: reservoir engineer, driller, panel operator).
- Skill reference data, segmented per functional areas within E&P activities: integration paths, career paths (example: production engineer career path, production operator career path).
- Competence mapping.
- Training reference documents.
- Exercise: build competence checklists from job descriptions and daily activities report.

**BUILD & IMPLEMENT THE TRAINING PLAN**
1.5 d
Definition of the objectives, the needs in competence and the duration of the plan.
Prioritize the training activities.
Build the training paths.
Identification of the budget.
Training design and pedagogical engineering:
- The different learning modes.
- Trainees’ availability and operational needs.
- Constitution of the pedagogical team.
Approval of the training plan and internal communication.
Organization of the training actions.
Follow-up actions and tools.
- Exercises:
  - Prioritize training actions from competence mapping.
  - Construction of a training plan from the needs identification mapping, the competence mapping and the operational constraints.
  - Organize a consultation to define the budget and select the training providers (internal or external).

**TRAINING ASSESSMENT**
0.75 d
Trainees’ assessment before, during and after the course completion.
Feedback from the trainer and the pedagogical team.
Feedback from the trainees and their management regarding the organization, the quality and content.
Ensuring that the knowledge/know-how acquired is enforced by the employees in their daily activities:
- Managers’ involvement.
- “Cold feedback”: after 6 months.
- Results analysis and continuous quality-enhancement cycle.
- Exercise: build a satisfaction questionnaire for the trainees to obtain useful information for further actions.

Reference: CMGT/TRAINENGGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: CMGT/TRAINENGFR. Please contact us for more information.

www.ifptraining.com
Field/Site Trainers Accreditation

Level: FOUNDATION

Purpose
The purpose of this accreditation is to develop and validate the competence of site instructors tasked with developing, implementing and assessing practical training activities on site (on-job training), so as to ensure compliance with international standards.

Audience
Experienced operations personnel who have been promoted to a site training position, or at experienced site trainers looking to develop their pedagogical know-how.

Learning Objectives
Obtaining accreditation will validate the instructor’s competences in implementing practical training on-site:
- prepare an on-site activity schedule and coordinate on-site training activities with operations personnel,
- facilitate participants’ learning and memorizing through personal work,
- assess participants in their study of their assignment area and their practice of Operator/Technician job duties.

Ways & Means
- Training sequences simulations, which places candidates in training situations.
- Case studies for studying the trainees’ different learning phases.

Learning Assessment
An assessment is done at the end of the session which content is described in the agenda below.

Prerequisites
- Personnel with experience in the technical area in which they will serve as instructor.
- Prior experience in training or in passing on knowledge.
- Intermediary managerial role (supervisor type).

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

PEDAGOGICAL METHODS PRESENTATION FOR TRAINING OPERATORS & TECHNICIANS 0.5 d
Operators’ and technicians’ training philosophies and objectives.
Typical program and implementation. Assessment systems and certification criteria.
The various types of pedagogical activities which can be conducted on site:
- Theoretical courses and operations tutorials.
- Practical exercises at the operational site and presentation in front of the group.
- Technical training on site through mentoring (On-the-Job Orientation).
- Practice of job duties through mentoring (On-the-Job Training).

TECHNICAL TRAINING TOOLS & METHODS 2 d
Active pedagogy for adults.
Pedagogical techniques and principles.
Techniques for setting up group activities, exercises, hands-on tasks.
Role play in front of the group.

ORGANIZE TRAINING ACTIVITIES ON SITE 1.5 d
Organization, supervision, coordination and reporting of on-site practical training: On-Job-Orientation (OJO) and On-Job Training (OJT).
Pedagogical know-how:
- Techniques for communication, questioning, listening, observing, reformulating, praising.
- Assessment techniques: evaluating trainees’ practical know-how, assessing their competence.
On-Job Training implementation: technical knowledge and know-how:
- How to develop a training sequence based on an actual situation on-site?
- Learning on-site during operations, detecting and using interesting learning opportunities.
- Encouraging information investigation methods.
- Identifying difficulties that the trainee experiences.
Coordinating.

ACCREDITATION ASSESSMENT 1 d
Each candidate presents a training sequence to the group, putting into practice the methods they have learned during the week. They will also prepare the objectives off and instructions to a training activity to be delivered on site.
The group and the IFP Training expert will discuss the candidate’s strengths and weaknesses.

Reference: CMGT/TRAINERACC1GB
Only available as an In-House course.
Contact: exp.rueil@ifptraining.com
This course is also available in French: CMGT/TRAINERACC1FR. Please contact us for more information.
Classroom Lecturers Accreditation

Course Content

Part 1 - PEDAGOGICAL ENGINEERING
Candidates follow a 1-week training on the principles and tools needed for delivering professional training programs to adults. The purpose of this week is to enable candidates to acquire pedagogical methods, best practices and get into the right habits so they can apply them in the three following phases. This phase also serves as an opportunity for candidates to take a step back and take a look at the role of trainer.
Accreditation assessment: role-play.

Part 2 - ATTENDING A TRAINING WEEK DELIVERED BY AN IFP TRAINING EXPERT
This section provides candidates with the opportunity to analyze the way in which teaching is delivered and the techniques that the IFP Training expert uses, building on what they will have learnt from a theoretical perspective during the first week.
The theme of this week should correspond to the candidate’s area of expertise so that they can fully integrate the learning techniques and tools used.
Accreditation assessment: the candidate is asked to analyze the methods and dynamics they have seen during the training course.

Part 3 - DEVELOPING PEDAGOGICAL MATERIAL
This third section aims at developing the pedagogical material required for delivering a training course in the area of expertise of the candidate instructor. Training material development uses the pedagogical methods acquired during the first week and is inspired by the course delivery attended. The IFP Training expert will provide continuous coaching so that complete, viable pedagogical documents are created by the end of part 3, reusing various pedagogical training activities suitable for adult learning (lessons, exercises, teamwork exercises, case studies…).
Accreditation assessment: candidates will be assessed on their ability to adapt and on the quality of the pedagogical material that they produce.

Part 4 - RUNNING A TRAINING PROGRAM
This section is made up of two phases:
An initial co-delivery phase with an IFP Training expert in real-life conditions. During this phase, candidates will have the opportunity to draw on the instructor’s management techniques and continually correct their own methods, through continuous coaching by the IFP training expert.
The second phase involves autonomously delivering part of the training course, in real-life conditions.
The theme of the module must correspond to the candidate’s area of expertise so that they can focus on the pedagogical methods.
Accreditation assessment: assessment of the training performance.

Level: FOUNDATION
Purpose
The purpose of this accreditation is to develop and validate the pedagogical know-how of classroom trainers tasked with creating, delivering and assessing technical training courses in the various disciplines associated with E&P, so as to ensure compliance with international standards.

Audience
This accreditation is aimed at professionals working in Exploration & Production who deliver, or who may be required to deliver, classroom training courses for basic or advanced technical training programs.

Learning Objectives
Obtaining the accreditation will validate the classroom trainer’s know-how in:
- coordinating classroom-based training courses,
- adapting and implementing pedagogical activities,
- catalyzing the group’s enthusiasm and developing its positive attitude by implementing active pedagogical methods,
- developing and maintaining participants’ interest,
- facilitating understanding and knowledge acquisition,
- assessing the knowledge acquired and adapting the course delivery accordingly.

Ways & Means
Personalized coaching, role-play, active learning.

Learning Assessment
The program contains one evaluation for each part of the program, for a total of four, described in the agenda below.

Prerequisites
- Oil & Gas professional with 10 years’ experience in the technical area in which they will serve as instructor.
- Prior experience in training or in passing on knowledge in the classroom.
- Qualified in a technical discipline.

More info
Minimum duration: 20 days.
- * The content, the duration of each phase and the way in which the activities are run for this accreditation will be adapted to the client and to the initial profiles of the trainers to be accredited.

Reference: CMGT/TRAINERACC2GB
This course is also available in French: CMGT/TRAINERACC2FR. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com 67
Subject Matter Experts Accreditation

Course Content

<table>
<thead>
<tr>
<th>Part 1 - PEDAGOGICAL ENGINEERING</th>
<th>25 days</th>
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<tr>
<td>The purpose of this accreditation is to develop the pedagogical know-how of a SME, as well as her/his capacity to transfer her/his knowledge, in order to make her/his trainees benefit from the SME’s advanced technical skills. This accreditation program covers creating, delivering and assessing a technical training program in the SME area of expertise.</td>
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<td>Part 2 - ATTENDING A TRAINING WEEK DELIVERED BY AN IFP TRAINING EXPERT</td>
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<td>Candidates follow a 1-week training on the principles and tools needed for delivering professional training programs to adults.</td>
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<td>The purpose of this week is to enable candidates to acquire pedagogical methods, best practices and get into the right habits so they can apply them in the three following phases. This phase also serves as an opportunity for candidates to take a step back and take a look at the role of trainer.</td>
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<tr>
<td>Part 3 - DEVELOPING PEDAGOGICAL MATERIAL &amp; KNOWLEDGE TRANSFER</td>
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<td>For this phase, the IFP Training’s expert identifies, together with the SME and her/his company, the topics, related to the SME’s area of expertise, for which pedagogical material is missing or is incomplete. Candidates will have to create pedagogical material necessary to the delivery of a complete training module. Training material development uses the pedagogical methods acquired during the first week and is inspired from the course delivery attended. The SME will be coached by the IFP Training expert throughout this phase so that complete, viable pedagogical documents are created by the end of part 3, reusing various pedagogical training activities suitable for adult learning (lessons, exercises, teamwork exercises, case studies...).</td>
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<td>Part 4 - COMPETENCE MANAGEMENT FUNDAMENTALS</td>
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<td>Within a company, the subject matter expert has to use her/his skills to build the skill data references corresponding to her/his area of expertise. Therefore, she/he will need to understand the objectives and methods of an effective competence management system, and be able to diagnose the need for her/his company.</td>
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<td>To create effective tools, it is important that candidates have knowledge of the complete cycle of competence management and can link it to the methodology used in their structure.</td>
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<td>This phase is not subject to an accreditation assessment, but it is essential to link the technical careers with the trainings to be implemented.</td>
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<td>Part 5 - RUNNING A TRAINING PROGRAM</td>
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<td>This section provides candidates with the opportunity to analyze the way in which teaching is delivered and the techniques that the IFP Training expert uses, building on what they will have looked at from a theoretical perspective during the first week.</td>
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<td>The theme of this week should correspond to the candidate’s area of expertise so that they can fully integrate the learning techniques and tools used.</td>
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Ways & Means

Personalized coaching, role-play, active learning.

Learning Assessment

The program contains one evaluation for part 1, 2, 3 and 5 of the program, for a total of four, described in the agenda.

Prerequisites

- Degree owner in a technical field, related to her/his current area of expertise.
- Professional renowned in her/his company, occupying her/his current job for 5 years at least.
- Is associated to her/his company training services.

More info

Minimum duration: 25 days.
- The content, the duration of each phase and the way in which the activities are run for this accreditation will be adapted to the client and to the initial profiles of the trainers to be accredited.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: CMGT/TRAINERACC3GB Only available as an In-House course. Contact: exp.rueil@ifptraining.com

This course is also available in French: CMGT/TRAINERACC3FR. Please contact us for more information.
Communication & Behavioral Management

Level: FOUNDATION

Purpose
This training gives an in-depth understanding of the different aspects of presenting: physical space, body language, audience interaction.

Audience
Personnel that regularly deliver presentations and speak at public events.

Learning Objectives
During this module, the participants will learn fundamentals of oral communication techniques. Upon completion of this module, participants will be able to:
- hear and understand and hold the audience’s attention,
- develop fluency in expression and overcome stage fright.

Ways & Means
They will learn these techniques actively through role-play situations with group debrief and practical case studies. With their agreement, trainees can be videotaped during exercises.

Learning Assessment
The assessment takes place during the different periods of group work.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OVERCOMING ONE’S FEAR & EXPRESSING ONESELF

1 d

Overcoming one’s fear.
Managing stage fright and using appropriate stress management strategies:
- Feeling comfortable in oral presentation.
- Develop assertiveness.

Oral communication situations:
- What are you scared about in oral communication situations?
- Minute speech introducing stress management technique in 3 points.

Expressing oneself:
- Grabbing attention.
- Organizing one’s speech and build a structured presentation.
- Using a visual aid.
- Making an effective and lively speech, using metaphors, examples…
- Expressing emotions, tuning voice and managing body gesture.
- Convincing the audience and being remembered.

Self-analysis questionnaire: are you assertive?

Oral communication situations:
- Express emotions.
- Audience feedback.

ENGAGING IN DISCUSSION & DEBATES

1 d

Engaging in discussion & debates:
- Meeting the audience’s needs.
- Engage in discussion and Q&A session with the audience.
- Identifying key words.

Oral communication situations:
- BE the trainer: held a 15-minute presentation about oral presentation + 5 minute Q&A session.

Reference: CMGT/COMGB

Only available as an In-House course.

This course is also available in French: CMGT/COMFR. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
Advanced Certificate
E&P Project Management Certification

Level: PROFICIENCY

Purpose
This course explains how large E&P projects are managed from initial stage to completion.

Audience
Professionals who require a comprehensive understanding of project management practices for E&P projects.

Learning Objectives
Upon completion of this course, participants will be able to:
- conduct the preliminary stages of the project: conceptual and feasibility studies, economic evaluation, FEED,
- enforce project control processes to meet scope, cost and schedule objectives,
- strengthen HSE in project design and construction,
- select the right type of technical contract,
- manage pre construction phases: mainly basic engineering and call for tenders,
- manage construction phases: engineering, procurement, construction and commissioning.

Ways & Means
- The course is illustrated with several examples taken from E&P projects.
- A project case study is used throughout the course to illustrate each chapter.

Learning Assessment
Quiz at the end of the module.

Prerequisites
Basic knowledge of petroleum industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in E&P Project Management.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

E&P CHAIN VALUE MANAGEMENT
Project evaluation and choices throughout the exploration and production value chain.

INTEGRATION & SCOPE MANAGEMENT
Preliminary, conceptual and pre-project studies and their deliverables.
EPC phase objectives and project execution plan.
Local content and sustainable development.

TECHNICAL SERVICE CONTRACTS
Contracting strategy (project breakdown into contracts).
Types and comparison of technical contracts.
Endorsements and assignments.
Tendering process.

PROJECT ORGANIZATION
Interface management.
Management of human resources, organization charts, project manager's role.
Stakeholder management.
Communication management.

HSE, QUALITY & RISK MANAGEMENT
HSE: tools and techniques for safety and environment design, project reviews, safety concept and safety dossier.
HSE during construction phase, HSE indicators.
Quality: assurance, control and surveillance management.
Risks: identification, ranking, action plans.

PROJECT CONTROL: COSTS & SCHEDULE
Planning and scheduling: schedule elaboration, progress control, recovery plan.
Costs: estimation of facilities expenditures, budget elaboration, cost control, reporting.

OIL & GAS PROJECT PHASES
Detailed engineering: work packages, main deliverables, project reviews, documentation control, changes.
Procurement: activities (purchasing, expediting, inspection, shipping), long lead items, company supplied items, material control systems.
Construction/fabrication challenges: contractors and resources, (sub) contract types.
Construction at site: execution plan, construction methods (temporary construction facilities, prefabrication, modularization, delivery, erection), interface with commissioning.
Fabrication at yards: load-out, transport and installation.
Completion activities: methodology, sequence, completion dossiers, commissioning systems, hand-over and acceptance of the facilities.
Project close out and management of collective knowledge.

Reference: PIMP/PROJGB
Can be organized as an In-House course.

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<td>22 November</td>
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Contact: pl.rueil@ifptraining.com


E&P Projects Value Management

Course Content

**STRUCTURE & DYNAMICS OF UPSTREAM PROJECTS**

Strategic issues in Oil & Gas: structure of the Oil & Gas industries, picture of worldwide Oil & Gas supply and demand, primary objectives of an oil company, economic analysis and long-term planning, E&P portfolio components and risk dynamics, focus on geological risk and economic risk, important value drivers, life cycle of upstream assets, critical decision points and value creation, E&P assets valuation, stakeholders, business and operational processes.

Exploration phase: exploration rounds and blocks, fundamental questions for a manager, speculation and decision process, petroleum system, and prospect evaluation, techniques and expertise involved (geology, geophysics, geological modeling, exploration drilling), exploration risk and reward analysis, probability of success and decision tree analysis, expected monetary value, exploration block valuation and basis for decision in exploration, impact of state participation, exploration risk mitigation through farm-out agreements.

Development/production phase: from discovery to development and production, appraisal phase, uncertainties and reserves evaluation, reserves probability distribution and classification, techniques and expertise involved (reservoir modeling, drilling and well completion, recovery mechanisms, production profiles, Oil & Gas processing, production facilities), field development schemes, capital expenditures, operating expenses, abandonment issues and costs, concept of value of a discovery for an oil company, decision tree analysis for choosing optimal strategy, cost and value of information.

E&P contractual framework: strategic objectives of States and IOCs, state participation and role of NOCs, economic rent sharing, risk mitigation through joint-ventures, different types and structure of patrimonial contracts, important obligations, fundamental concepts in joint-operating agreements, decision committees, financing of operations, utilization agreements, cost recovery, sharing value through mechanisms of production-sharing contracts and risk-service contracts, government take, state control and supervision.

**OIL & GAS PROJECT STUDIES & MANAGEMENT**

Front-end development studies: front-end loading as a foundation for smarter project execution, phases and deliverables (prefeasibility stage, feasibility stage, basic engineering), project scope definition and execution plan. Fundamentals of financial management: corporate finance, project finance, cost of debt capital, cost of equity capital, balance sheet, return on capital employed, return on equity, weighted average cost of capital and fundamental condition for project value creation, cost accounting and budgeting.

Field development project economic evaluation: methodology for assessing the economic value of an Oil & Gas field development project, global project cash flows (Revenues, Capex, Opex and Gvt Take), discounting, risks and discount rate, economic indicators (net present value, internal rate of return, pay-out-time), quantitative risk analysis.

*Case study: oil field development project with State participation within the framework of a PSC.*

Principles of project management: large capital Oil & Gas projects challenges and performance, final investment decision, project risks, organizational risks and external risks, FEED and EPC contracts, project organization, control and management (schedule, cost, quality, HSE, and risk issues), keys to successful project delivery.

Reference: PIMP/PVMGB

Only available as an In-House course.

Contact: pl.rueil@ifptraining.com

www.ifptraining.com
E&P Project Risk & Decision Analysis Workshop

Purpose
This course aims to comprehend the methods and gain a practical knowledge of the probabilistic models applied in Oil & Gas project decision analysis through a workshop dedicated to problem solving with spreadsheet applications.

Audience
Oil & Gas professionals from various disciplines who need to acquire the skills needed to analyze risk of Oil & Gas projects and build probabilistic models to provide the decision analysis required for analyzing investment opportunities.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand the concepts of risks, uncertainties and probability distributions and tables,
- practice the use of the various tools of expected values, decision trees and Monte Carlo simulation,
- develop and solve different types of probabilistic models used in prospect evaluation and field development projects.

Ways & Means
- Spreadsheet applications for numerous problems of decision analysis in the upstream sector.
- Illustration with software @Risk and PrecisionTree.

Learning Assessment
Quiz at the end of the module.

Prerequisites
Good practical knowledge of Microsoft Excel.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OVERVIEW OF THE DECISION PROCESS 0.5 d
Strategic issues in Oil & Gas: E&P portfolio components and risk dynamics, important value drivers, life cycle of upstream assets, critical decision points and value creation, economic rent sharing through Oil & Gas contracts. Exploration phase: exploration rounds and blocks, fundamental questions for a manager, speculation and decision process, exploration risk and prospect reserves evaluation, techniques and expertise involved, exploration risk and reward analysis, impact of state participation, risk mitigation. Development/production phase: appraisal, uncertainties and discovery reserves evaluation, techniques and expertise involved, field development schemes, capital expenditures, operating expenses, abandonment issues and costs, economic modeling, value of a discovery, fundamental condition for value creation.
Fundamental issues in decision analysis: uncertainty in capital investments, decision analysis process, terminology used in decision analysis, various applications in the Oil & Gas industry.

MAIN STATISTICS & PROBABILITY CONCEPTS 1.5 d
Descriptive statistics: measures of central tendency, measures of dispersion, grouping of large data sets, frequency distribution, cumulative and decumulative relative frequency.
Probability concepts: simple, conditional, joint, and marginal probability, probability rules, discrete probability distributions, continuous probability distributions.
Spreadsheet applications: drilling data, exploration drilling, reservoir data, workover...

RISK & DECISION ANALYSIS 3 d
Expected value concepts: expected value and standard deviation of random variables, structural elements of decision problems, payoff tables, expected monetary value, expected profitability index, performance index, expected opportunity loss, sensitivity analysis, fundamental decision criteria, mean-variance analysis.
Decision tree analysis: designing and solving decision trees, risk profiles, expected value of information (perfect or imperfect), expected net gain, prior, conditional and posterior probabilities, Baye's rule.
Attitudes towards risk: expected preference value or expected utility, utility function, risk tolerance, certainty equivalent and risk premium, assessing the utility function, mathematical representation of utility functions, gambler's ruin, risk-adjusted value and working interest.
Simulation in decision analysis: applications of simulation, steps in simulation modeling, probabilistic dependence of input variables.
Spreadsheet applications: decision tree analysis with the software PrecisionTree, Monte Carlo simulation with the software @Risk, reserves probability distribution, reserves uncertainties in the valuation of a simple prospect, Bayesian tree analysis for prospect evaluation, drilling prospect with farm-out option, cost and value of information from a delineation, seismic option, investment decision with a risk tolerance…

Reference: PIMP/PRDAWGB  Only available as an In-House course.

Contact: pl.rueil@ifptraining.com
Exploration

▶ General

Introduction to Basin Exploration ................................................................. p. 74
Hunting for Oil: Exploration & Upstream Overview ....................................... p. 75

▶ Methods & Tools

Petroleum Geophysics .................................................................................... p. 76
Seismic Reflection Fundamentals ................................................................... p. 77
Petroleum Systems: Hydrocarbons from Source Rock to Reservoirs .............. p. 78
Structural Geology, Basin Development & Associated Traps ....................... p. 79
Well Logging & Basic Log Interpretation (BL) ................................................. p. 80
Well Logging & Qualitative Log Interpretation .............................................. p. 81
3D Seismic Interpretation Workshop .............................................................. p. 82
Sedimentology & Sequence Stratigraphy ..................................................... p. 83
Stratigraphic Modeling: Basin Architecture & Sediment Distribution .......... p. 84
Basin Modeling: Thermicity, Maturation & Migration .................................. p. 85
Wellsite Geology .......................................................................................... p. 86

▶ From Basin to Prospect Evaluation

Geosciences: from Basin Exploration to Discovery Certification ...................... p. 87
Basin Assessment & Modeling Certification ................................................ p. 88
Play Assessment & Prospect Generation ..................................................... p. 89
From Prospect to Development: an Integrated Approach .............................. p. 90
Seismic & Sequence Stratigraphy for Oil & Gas Exploration ....................... p. 91
Exploration Blocks Management ................................................................. p. 92
E&P Projects Value Management ................................................................. p. 93
E&P Project Risk & Decision Analysis Workshop ......................................... p. 94
Introduction to Basin Exploration

**Level:** FOUNDATION

**Purpose**
This course provides a practical knowledge of petroleum exploration. It aims to develop required competencies for an effective participation in multidisciplinary project teams.

**Audience**
Non-geoscientific technicians interested in petroleum exploration techniques, young professionals in geosciences with limited experience in the E&P industry.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- understand exploration strategy and follow the standard exploration workflow,
- get familiar with most common exploration techniques, via a multidisciplinary approach and data integration,
- acquire requested competences for basin analysis in order to assess the hydrocarbon potential and identify potential plays and related prospects.

**Ways & Means**
- Short daily lectures followed by exercises and hands-on sessions.
- Both individual work (exercises) and team work (short case study).

**Learning Assessment**
Knowledge assessment with multiple choice questions and open explanatory questions.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

<table>
<thead>
<tr>
<th>5 days</th>
<th>1 d</th>
<th>3 d</th>
<th>1 d</th>
</tr>
</thead>
</table>

**Location Start Date End Date Tuition Fees**

| Rueil | 2 September | 6 September | €3,030 |

Can be organized as an In-House course.
Contact: gre.rueil@ifptraining.com

Reference: GENG/INF0BAS. This course is also available in French: GENG/INF0BASFR. Please contact us for more information.
Hunting for Oil: Exploration & Upstream Overview

Serious game simulation workshop

Course Content

The Hunting For Oil™ (HFO™) course presents a practical overview of the mostly used techniques in the Upstream Oil & Gas industry, from prospect exploration to field development and production, and provides a comprehensive evaluation of specific risks and uncertainties at each step of the decision-making process in E&P. Participants will learn to select and acquire license blocks, use seismic data, plan drilling activities, develop their field, and manage the time line as well as the budget.

INTRODUCTION - EXPLORATION GEOLOGY

Introduction: specific roles and objectives of exploration, development & production in the petroleum industry.
Lecture: geological context of hydrocarbon prospecting; reservoir characterization tools & techniques in E&P.
Workshop: introduction to geoscientific exploration methods. Data-room/Call for tenders.

EXPLORATION GEOPHYSICS

Lecture: seismic reflection (fundamentals, data acquisition, processing & interpretation).
Workshop: seismic interpretation, survey planning, commitment and permitting.

HYDROCARBON TRAPS - OPERATIONS GEOLOGY

Lecture: hydrocarbon genesis, migration, entrapment and timing; play assessment (concept and preservation).
Workshop: wellsite geology (mud logging, wireline logging) and well monitoring; well data interpretation.

WELL COMPLETION - RESERVOIR ENGINEERING - PRODUCTION MONITORING

Lecture: well design and completion; enhanced recovery.
Workshop: field appraisal strategy and development planning.

RESERVE EVALUATION - INTRODUCTION TO RESERVOIR MODELING

Lecture: understand the reservoir (sedimentological and structural modeling).
Workshop: accumulation evaluation (mapping and volumetric calculation - OOIP); production monitoring.
Conclusion: presentation of teams’ results; feedback discussion; wrap-up session.

The teams define and implement their strategy in order to deploy the best scenario and to win, through mutual complementary interaction. Both cash flow and production are taken into account for the final evaluation. A series of hands-on activities and exercises (maps, seismic sections, logs, fluid contacts, volumetrics, etc.) is proposed through sequential workshops to highlight key phases and illustrate lectures.

Level: PROFICIENCY

Purpose

The success of an oil company depends on appropriate strategy, effective data interpretation and collaborative teamwork: this course has been designed to stimulate the participants’ desire for learning, and to capture their attention with an adequate blend of challenges, competition and collaboration, making the learning experience both enjoyable and educational, whatever their professional origin and background.

Audience

Geologists, geophysicists and reservoir engineers, with short experience, who need to acquire a full view of the exploration, development and production workflow, in particular those who will join in multidisciplinary or asset teams - but also petroleum engineers, support staff, and non-technical staff, high potentials in the Oil & Gas upstream industry whose activity (either commercial, legal, financial or marketing) is calling for interaction with NOCs or International Operators, including executive managers and government officials.

Learning Objectives

Upon completion of the course, participants will be able to:
► acquire a global vision of the upstream petroleum industry.
► evaluate reservoir characteristics and potential using adequate geophysical and geological information.
► understand how uncertainties inherent to data influence the capability to interpret them,
► draw field development plans by balancing development costs versus production rates, in order to maximize NPV.

Ways & Means

► The HFO course is based on a serious game and a simulation workshop.
► Trainees are ideally grouped in teams of 3. Each team acts as a virtual oil company that competes with the others; explore for economically viable volumes of hydrocarbons in a new area.
► The course is supported by the DALLAS™ software package, a dynamic training tool based on an innovative learning platform.

Learning Assessment

Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainers (permanent or contracted) have a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.
Petroleum Geophysics

Level: FOUNDATION

Purpose

This course provides a comprehensive, practical understanding of most techniques used in petroleum geophysics. It aims to focus on seismic techniques applied to investigate both reservoir structure and petrophysical characteristics.

Audience

E&P professionals with no or limited experience in petroleum geophysics.

Learning Objectives

Upon completion of the course, participants will be able to:

- select the appropriate geophysical method to be used during various phases of petroleum Exploration & Production,
- gain an insight into seismic reflection and methodology: acquisition, processing and interpretation,
- acquire the fundamental principles of borehole seismic and reservoir geophysics.

Ways & Means

- Interactive presentations, exercises, document analysis and videos.
- 2 workshops on PC, using seismic processing and interpretation software tools.
- Software used during workshops: with courtesy of Schlumberger.

Learning Assessment

Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>10 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION TO PETROLEUM GEOPHYSICS</td>
</tr>
<tr>
<td>SEISMIC WAVE PROPAGATION &amp; SIGNAL PROCESSING</td>
</tr>
<tr>
<td>SEISMIC ACQUISITION</td>
</tr>
<tr>
<td>Geodesy. Projections. Topographic surveying. 2D and 3D seismic, land, marine, sea bottom seismic. Seismic sources (explosive, vibroseis, airguns...). Seismic receivers (geophones, MEMS, hydrophones...). Streamers, OBC, nodes, shallow water, transition zone...</td>
</tr>
<tr>
<td>SEISMIC PROCESSING &amp; IMAGING</td>
</tr>
<tr>
<td>BOREHOLE SEISMIC</td>
</tr>
<tr>
<td>Theory and principles, synthetic seismogram and well-to-seismic tying. Vertical Seismic Profile (VSP), Offset Seismic Profile (OSP), walkaway. Seismic While Drilling (SWD). Examples and applications.</td>
</tr>
<tr>
<td>SEISMIC INTERPRETATION: THEORY &amp; PRACTICE</td>
</tr>
<tr>
<td>Principles and methodology, seismic interpretation pitfalls. 2D seismic interpretation practice (on paper). Workshop: 3D Seismic Interpretation.</td>
</tr>
<tr>
<td>SEISMIC FOR RESERVOIR ANALYSIS</td>
</tr>
<tr>
<td>Seismic amplitude analysis, Direct Hydrocarbon Indicators (DHI), seismic attribute analysis. HR - HQ - HD - Broadband seismic, 4D Seismic Multi-component seismic, P waves versus S waves. AVO-AVA processing and analysis, seismic inversion.</td>
</tr>
<tr>
<td>GRAVIMETRY, MAGNETOMETRY &amp; ELECTRO-MAGNETOMETRY</td>
</tr>
</tbody>
</table>

Reference: METH/GPHYSICS Can be organized as an In-House course. Contact: gre.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>2 December</td>
<td>13 December</td>
<td>€6,000</td>
</tr>
</tbody>
</table>

This course is also available in French: METH/GPHYSICSFR. Please contact us for more information.
Seismic Reflection Fundamentals

Level: FOUNDATION

Purpose
This course provides a thorough understanding of seismic reflection and usual applications. It aims at acquiring fundamental concepts in subsurface imaging for geological interpretation purposes.

Audience
E&P professionals with no or limited experience in seismic.

Learning Objectives
Upon completion of the course, participants will be able to:
- assess the seismic reflection workflow main steps, from acquisition to interpretation,
- understand fundamentals of seismic wave propagation with relation to petrophysical properties of subsurface,
- grasp methodology of surface and borehole seismic acquisition, processing and interpretation.

Ways & Means
Interactive presentations, exercises, hands-on, document analysis and videos.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content
5 days

SEISMIC WAVES PROPAGATION & SIGNAL PROCESSING 1 d

SEISMIC ACQUISITION 0.5 d
2D and 3D seismic, land, marine, sea bottom seismic. Seismic sources (explosive, vibroseis, air guns…). Seismic receivers (geophones, MEMS, hydrophones…). Streamer, OBC, nodes, shallow water, transition zone…

SEISMIC PROCESSING & IMAGING 0.5 d

BOREHOLE SEISMIC 0.5 d
Theory and principles, synthetic seismogram and well-to-seismic tying. Vertical Seismic Profile (VSP), Offset Seismic Profile (OSP), walkaway. Seismic While Drilling (SWD).
Examples and applications.

SEISMIC INTERPRETATION 2 d
Principles and methodology, seismic interpretation pitfalls. Hands-on: 2D seismic interpretation (on paper).

SEISMIC FOR RESERVOIR ANALYSIS 0.5 d
Seismic amplitudes analysis, Direct Hydrocarbon Indicators (DHI), seismic attributes analysis. HR - HQ - HD - Broadband seismic, 4D seismic. Multi-component seismic, P waves vs S waves. AVO-AVA processing and analysis, seismic inversion.

SUMMARY, SYNTHESIS & WRAP-UP

Reference: METH/SEISREF  Only available as an In-House course.
Contact: gre.rueil@ifptraining.com

www.ifptraining.com
# Petroleum Systems:
## Hydrocarbons from Source Rock to Reservoirs

**Level:** FOUNDATION

**Purpose**

To gain a greater understanding of important geological processes in a petroleum basin, this course provides an understanding of various geochemical techniques, leading to sedimentary basins’ hydrocarbon potential evaluation and to the identification of hydrocarbon migration pathways.

**Audience**

Geologists, geophysicists or geochemists involved in petroleum potential evaluation or in reservoir management.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- review the petroleum system concept and associated processes,
- get practical insights of basic analysis of geochemical data and reports,
- assess and analyze geochemical data in order to evaluate source rock potential and maturity.

**Ways & Means**

Lectures and hands-on activities: several exercises and case studies.

**Learning Assessment**

Knowledge assessment with multiple choice questions and open explanatory questions.

**Prerequisites**

No prerequisites for this course.

**Expertise & Coordination**

IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

| 5 days |  
|---|---|
| **INTRODUCTION TO PETROLEUM SYSTEMS** | 1 d |
| **SOURCE ROCKS: FORMATION & DISTRIBUTION** | 1 d |
| Formation of source rocks:  
Type of organic matter.  
Distribution of source rocks in space & time. |  |
| **FROM SOURCE ROCK TO ACCUMULATION** | 1 d |
| Formation of Oil & Gas:  
Methods for evaluation of the source rocks.  
Modeling of hydrocarbon formation.  
Migration. |  |
| **MOLECULAR FOSSILS, BIOMARKERS** | 1 d |
| Concept of “biomarker“:  
Analytical methods.  
Markers of origin and environments.  
Oil/source rock correlation.  
Maturity parameters.  
Oil spill survey. |  |
| **ALTERATION IN RESERVOIRS** | 0.5 d |
| **WORKSHOP ON A PETROLEUM SYSTEM** | 0.5 d |
| **SUMMARY, SYNTHESIS & WRAP-UP** |  |
| The petroleum system of South Atlantic Ocean. |  |

Reference: METH/GEOCHIM. Only available as an In-House course.

Contact: gre.rueil@ifptraining.com
Structural Geology, Basin Development & Associated Traps

Level: FOUNDATION

Purpose
This course provides an in-depth knowledge of key elements which characterize the structural style of a sedimentary basin.

Audience
Petroleum exploration geoscientists, multidisciplinary team managers.

Learning Objectives
Upon completion of the course, participants will be able to:
- get familiar with both brittle and ductile deformations identification and analysis, in various types of sedimentary basins, at different scales and under different stress regimes: at lithosphere scale: plate tectonics and basin formation (rifts, passive margins, active margins and thrust belts); at basin scale: subsidence and inversion, structural traps (tilted blocks, horsts, shale and salt domes, folds), at field and reservoir scales: behavior of faults (seal or drain), fracturing, cap rock integrity, etc.,
- be able to identify the specific structural style of a petroleum area, on outcrop pictures and on seismic profiles,
- be able to grasp issues linked to tectonic evolution versus petroleum system evolution (in different structural contexts).

Ways & Means
Interactive course: lectures illustrated by practical exercises and personal work.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: METH/STRUCT
Only available as an In-House course.
Contact: gre.rueil@ifptraining.com

Course Content

PLATE TECTONICS & STRUCTURAL STYLES
Earth structure, global dynamics and time scales.
Structure of continental and oceanic lithospheres: thermicity, rheology, stress and strain.
Fundamentals of structural analysis:
- Extensional regimes: geodynamics and architecture of related basins (rift basins, passive margins).
- Compressional regimes: geodynamics and architecture of related basins (foreland basins, active margins, thrust belts).
- Intra-plate basins and tectonic inversion.

EXTENSIONAL & COMPRESSIONAL DEFORMATIONS - STRUCTURAL TRAPS
Structural traps in extensional context.
Structural traps in compressional context.
Wrench faulting and related traps.
Salt tectonics and related traps.
Relationship between tectonic and sedimentary processes.
Case study: the Arabian plate and margins, relations with petroleum systems.

EXPLORATION & DEVELOPMENT PROBLEMS ASSOCIATED WITH STRUCTURAL STYLES
Folding mechanisms and styles, impact on fractures distribution.
Conductive and sealing faults.
Migration pathways and petroleum systems timing.
Seal efficiency and time of residence of hydrocarbons in structural traps.

SUMMARY, SYNTHESIS & WRAP-UP

5 days
1.5 d
1.5 d
0.5 d
Well Logging & Basic Log Interpretation (BL)
E-learning with remote personal coaching

**Level:** FOUNDATION

**Purpose**
This course provides a practical understanding of basic concepts and methodology of well log acquisition and interpretation for subsurface and reservoir studies.

**Audience**
Geologists, geophysicists, reservoir engineers interested in well log interpretation.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- understand wireline and mud log acquisition techniques,
- grasp fundamental physics of log measurements and to perform log quality control,
- perform basic log interpretation in order to identify and characterize reservoirs.

**Ways & Means**
The first 2 hours are dedicated to introducing agenda, methods and tools. Specific needs and expectations of each participant are also assessed and discussed (MCQ and phone interview with the tutor).

**Learning Assessment**
Knowledge assessment with multiple choice questions and open explanatory questions.

**Prerequisites**
No prerequisites for this course.

**More info**
Total training duration is 32 hours, spread over an 8-week period.

**Expertise & Coordination**
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

<table>
<thead>
<tr>
<th><strong>BASIC INTERPRETATION CONCEPTS</strong></th>
<th>8 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seals and reservoirs.</td>
<td></td>
</tr>
<tr>
<td>Definition of main reservoir petrophysical and fluid properties (lithology, porosity, resistivity, saturation).</td>
<td></td>
</tr>
<tr>
<td>Fundamental equations for log interpretation in clean formations.</td>
<td></td>
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<tr>
<td>Measurement environment (drilling, borehole, invasion process).</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MEASUREMENTS &amp; APPLICATIONS</strong></th>
<th>12 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mud logging and coring operations.</td>
<td></td>
</tr>
<tr>
<td>Wireline logging operations.</td>
<td></td>
</tr>
<tr>
<td>Well log: header, calibrations, parameters, repeat section, main log.</td>
<td></td>
</tr>
<tr>
<td>Logging tool principle, limitation, application, quality control.</td>
<td></td>
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<tr>
<td>Caliper, Gamma Ray and GR spectrometry, spontaneous potential.</td>
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<tr>
<td>Resistivity (induction, Laterolog) and microresistivity measurements.</td>
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<tr>
<td>Porosity and lithology measurements: nuclear (litho-density, neutron) and acoustic logging.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>BASIC LOG INTERPRETATION</strong></th>
<th>12 h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireline log interpretation in clean formations:</td>
<td></td>
</tr>
<tr>
<td>Identification of shales, common geological formations and reservoirs.</td>
<td></td>
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<tr>
<td>Cross-plot technique with density and neutron.</td>
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<tr>
<td>Identification of fluid contacts.</td>
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<tr>
<td>Hydrocarbon effects on logs.</td>
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<tr>
<td>Determination of lithology and porosity.</td>
<td></td>
</tr>
<tr>
<td>Determination of Rw (SP, Ratio, Rwa).</td>
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<tr>
<td>Determination of water and hydrocarbon saturations.</td>
<td></td>
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<tr>
<td>Case of oil-based mud.</td>
<td></td>
</tr>
<tr>
<td>Estimation of h.Phi.So.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: METH/BWLWJ. Only available as an In-House course. Contact: gre.rueil@ifptraining.com
Well Logging & Qualitative Log Interpretation

Level: FOUNDATION

Purpose

This course provides an overview of main logging tools and proposes an insight into fundamental well log interpretation for reservoir identification and characterization.

Audience

Geoscientists and other E&P professionals interested in wireline log acquisition and well-log interpretation.

Learning Objectives

Upon completion of the course, participants will be able to:

- acquire the concepts of log interpretation (Archie formula, invasion),
- review mud logging, coring and wireline logging techniques,
- perform a quick-look interpretation to characterize reservoirs: fluid contacts, lithology, porosity, saturation.

Ways & Means

Interactive presentations and exercises to build a lithology and fluid column.

Learning Assessment

Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BASIC INTERPRETATION CONCEPTS &amp; WIREFLINE LOG RECORDING</strong></td>
</tr>
<tr>
<td>Foundational concepts. Reservoir petrophysics (lithology, porosity, resistivity, saturation) and fluid properties. Environment of measurement (borehole, invasion profile) and related parameters. Fundamental equations (Archie formula) for log interpretation in clean formations. Mud logging, measurements during drilling, coring and wireline logging techniques. Applications. Well logs examples.</td>
</tr>
</tbody>
</table>

| 1.25 d |
| **REVIEW OF LOG MEASUREMENTS & APPLICATIONS** |

| 2 d |
| **“QUICK-LOOK” INTERPRETATION** |
| Qualitative well-log interpretation: Log responses in most common geological formations. Identification of reservoirs and fluid contacts (overlay technique: water- and oil-based mud cases). Hydrocarbon effect on density & neutron logs. Determination of water resistivity Rw (SP, Ratio, Rwa), formation resistivity (Rt, Rxo) and flushed zone diameter. Determination of lithology, porosity, water and hydrocarbon types and saturations. Cross-plot techniques with density, neutron, sonic and other logs (Pe, K, Th, etc.). Shale effects on logs: introduction to shaly and complex lithology formations. Application on case studies. |

| 0.5 d |
| **PRESSURE MEASUREMENTS & FLUID SAMPLING** |
| Pressure measurements and fluid sampling: operation and applications. Pressure analysis: determination of fluid contacts, fluid gradient and fluid density. |

| 0.25 d |
| **NMR, DIPMETER & BOREHOLE IMAGING TECHNIQUES** |
| NMR log (Nuclear Magnetic Resonance): principle and applications. Dipmeter and borehole imaging tools: principle and applications. |

Reference: METH/LOGBASIC. Can be organized as an In-House course. Contact: gre.rueil@ifptraining.com

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<th>Tuition Fees</th>
</tr>
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<tr>
<td>Rueil</td>
<td>16 September</td>
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This course is also available in French: METH/LOGBASICFR. Please contact us for more information.
3D Seismic Interpretation Workshop
Structural model construction & trap analysis

Level: PROFICIENCY

Purpose
This course provides a practical understanding of 3-D seismic structural interpretation in order to identify prospect locations.

Audience
E&P professionals with previous experience in seismic interpretation.

Learning Objectives
Upon completion of the course, participants will be able to:
- get familiar with a 3D seismic structural interpretation workflow,
- perform a seismic structural interpretation: seismic data QC, well-to-seismic tying, horizons and faults picking, structural model construction and trap identification,
- use a velocity field to perform a time-to-depth conversion,
- identify structural prospects.

Ways & Means
- Interactive presentations, exercises and document analysis.
- 80% of training duration is dedicated to workshop on PC, using a seismic interpretation software tool from the industry.
- Software used during workshops: with courtesy of Schlumberger.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
Highly recommended: fundamental knowledge in seismic wave propagation, acquisition and processing, as well as in structural geology.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

WEEK 1
Team work on 3D case studies (extensional context).

Structural interpretation - Prospect geometry identification
Workshop presentation and objectives (0.5 day)
Survey introduction - Geophysical context.
Geology and petroleum system overview.
Prospect objectives.

Seismic data analysis and QC (0.5 day)
Parameters for seismic displays: vertical sections, time slices, composite sections, 3D view.
Seismic data analysis: noises, multiples, footprints, frequency content, smoothing.
Seismic data preparation: smoothing/filtering for structural interpretation vs reservoir interpretation.

Well-to-seismic tying and horizons identification (1 day)
Well data calibration to identify main geological markers and main reservoir layers.
Synthetic seismogram calculation.

Seismic data picking and mapping - Potential traps definition (2.5 days)
Structural interpretation (in time) of mains horizons key, horizons and faults picking (time picking: manual, guided, automatic, grid, and 3D picking), and correlation.
Picking results QC and estimation of uncertainties.
Volume and surface attributes calculation and analysis.
Surfaces generation to produce a time model.
Mapping.

Velocity model construction and time-to-depth conversion (0.5 day)
Interfaces selection for modeling.
Seismic velocities of intervals: editing and smoothing, control and correction with reference wells.
Velocity model construction via layer stripping.
Time-to-depth conversion.

WEEK 2
Introduction to seismic reservoir analysis
Potential reservoirs analysis (3.5 days)
Reservoir picking and modeling.
Surface attributes calculation and analysis.
Interval attributes calculation and analysis.

Structural prospects identification and evaluation (1.5 days)
Entrapment, reservoir extension.
Time vs. depth structures comparison.
Uncertainties assessment.
Recommendations.

Summary, synthesis & wrap-up

Reference: METH/SEISINTERP
Can be organized as an In-House course.
Contact: gre.rueil@ifptraining.com

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This course is also available in French: METH/SEISINTERPFR. Please contact us for more information.
Sedimentology & Sequence Stratigraphy

Purpose
This course provides a practical, comprehensive understanding of new concepts and methods applied in stratigraphy, sedimentology and sequence stratigraphy analysis.

Audience
Geologists, geophysicists working in multidisciplinary-team dedicated to exploration.

Learning Objectives
Upon completion of the course, participants will be able to:
- review fundamentals of main depositional environments,
- understand and apply sequence stratigraphy concepts and methods,
- identify sequences on seismic lines, and interpret core and log data with regard to stratigraphy.

Ways & Means
Lectures, exercises, hands-on sessions on real case studies.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
The course requires a good grasp of fundamentals in stratigraphy and sedimentology, with a first experience in seismic interpretation.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

STRATIGRAPHY - SEDIMENTOLOGY - DEPOSITIONAL ENVIRONMENTS 1 d
Review of basic concepts in stratigraphy and sedimentology. Alluvial, fluvial, deltaic, shallow and deep marine facies models. Facies classification and related petrophysical characteristics.

SEISMIC SEQUENCE STRATIGRAPHY AT BASIN SCALE 2.5 d
Historical concept of depositional sequences and system tracts. Interpretation methodology both for clastics and carbonate facies. Prediction of potential source rocks & reservoirs location. Application to seismic interpretation. State-of-art overview of sequence stratigraphy.

HIGH-RESOLUTION SEQUENCE STRATIGRAPHY AT RESERVOIR SCALE 1 d

OVERVIEW OF STRATIGRAPHIC MODELING 0.5 d
Interactive demo on Dionisos™ modeling software.

Reference: METH/SEQSTRATI  
Can be organized as an In-House course.  
Contact: gre.rueil@ifptraining.com

Location | Start Date | End Date | Tuition Fees
---|---|---|---
Rueil | 17 June | 21 June | €3,160

This course is also available in French: METH/SEQSTRATIFR. Please contact us for more information.
Stratigraphic Modeling:
Basin Architecture & Sediment Distribution

Level: PROFICIENCY

Purpose
This course provides an in-depth and practical understanding of stratigraphic modeling following a comprehensive workflow.

Audience
Junior exploration geoscientists, multidisciplinary-team managers.

Learning Objectives
Upon completion of the course, participants will be able to:
- grasp methodology of sequence stratigraphy and concepts of stratigraphic evolution,
- model stratigraphic evolution of a basin using the software program DionisosFlow™,
- predict reservoir distribution and geometry, and assess efficiently the stratigraphic architecture of a sedimentary basin.

Ways & Means
- Hands-on training sessions on workstation.
- Use of the software program DionisosFlow™ (maximum 2 participants per workstation).
- Exercises and reports to launch questions and discussions at the end of the course.
- Software used during workshops: with courtesy of Beicip-Franlab.

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training (permanent or contracted) expert in fractured reservoirs with a wide experience and whose competencies are kept up-to-date in industry projects.

Course Content

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<tr>
<td><strong>SEQUENCE STRATIGRAPHY ANALYSIS</strong></td>
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| **STRATIGRAPHIC PARAMETERS** | 1 d |
| Presentation of allogenic parameters through the use of DionisosFlow™ software. Sensitivity analysis exercises with DionisosFlow™. |

| **ACCOMMODATION & SHORELINE SHIFTS** | 1 d |

| **SEISMIC & WELLS ANALYSIS** | 1 d |

| **MODELING LOOP** | 1 d |
| Links between stratigraphic modeling and basin modeling. Questions and discussion. Exercises with DionisosFlow™. |

Reference: METH/DIONISOS. Only available as an In-House course. Contact: gre.rueil@ifptraining.com
Basin Modeling: Thermicity, Maturation & Migration

Course Content

SEDIMENTARY BASIN MODELING THROUGHOUT TIME  
1 d
AM: lectures.
Basin types (rift, margin, foreland, etc.).
Subsidence versus time.
Compaction, backstripping.
PM: exercises, introduction to TemisFlow™ 1D module, subsidence curve calculation.

THERMAL HISTORY  
1 d
AM: lectures.
Modes of heat propagation: conduction, convection and advection.
Transient thermal regimes and blanketing effects of sedimentary covers.
Calibration of heat flow for present and past thermal state.
PM: exercises with TemisFlow™ 1D module, influence of heat flow, surface temperature, conductivity.

MATURATION & EXPULSION  
1 d
AM: lectures.
Source rock (kerogen type, Rock-Eval data...).
Kerogen cracking, kinetic parameters determination.
Secondary cracking.
Paleo-thermometers (organic matter, fission tracks, fluid inclusions...).
PM: exercises with TemisFlow™ 1D module, influence of kinetic parameters.

HYDROCARBONS MIGRATION - WORKSHOP  
2 d
Session 1:
AM: lectures.
Migration principles.
Definition of lithologies in basin modeling.
Archimedes force, capillary pressure.
PM: introduction to TemisFlow™ 2D module, exercises in TemisFlow™ 2D module, influence of parameters.
Session 2:
AM: lectures.
Oil & Gas generation.
PVT and chemical composition.
Velocity of hydrocarbon migration.
PM: exercises with TemisFlow™ 2D module, influence of parameters.

Reference: METH/TEMIS  
Only available as an In-House course.

Contact: gre.rueil@ifptraining.com

www.ifptraining.com
Wellsite Geology
Operations Geology & Geological Logging

Level: FOUNDATION

Purpose
This course provides a comprehensive understanding of how to monitor and use geological data acquired while drilling in order to characterize geological formations and reservoirs.

Audience
Geologists, technicians involved with geological wellsite control and/or supervision. Geoscientists using well geological reports.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand well-site geologist’s role, tasks and responsibilities,
- grasp various techniques applied in well-site geology and during coring operations,
- learn about the various aspects of operations geology and geological logging.

Ways & Means
Interactive presentations, applications on case studies, team work.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 5 days

DRILLING PARAMETERS 0.5 d
Quick review of mechanical parameters (WOH, WOB, RPM, ROP) & hydraulic parameters (SPP, MFR, MPL, MWin & out, etc.) monitored during drilling.

GEOLOGICAL PARAMETERS 1 d
Cuttings: sampling, cleaning, analysis, description, calcimetry, lag time, XRD, fluorescence.
Quality and representativeness of cuttings.
Hints on how to fill in the cutting description sheet: main minerals and accessory minerals.
Paleontological observations.

HYDROCARBON GASES 1 d
Physics and chemistry of gases.
Detection and evaluation of gas shows while drilling. Chromatography. Type of dissolved gases in the mud.
Importance of gas control on quality of measurements. Gas while drilling.

GEOLOGICAL LOGGING 1 d
Role of well site geologist: analysis and decision.
Depth control: depth, deviation surveys, (MD, TVD, TVDSS) and stratigraphic column.
Gathering geological and drilling information.
Geological log: header and track presentation; main software programs.
Drilling parameters for a geological log.
Calcimetry, gas, gain and losses.
Composite log: interpretation of geological observations and descriptions for the lithology.
Integration of other data: well tests results and logging information.
Supervision and quality control of logging operations.
Coring operations: core recovery, cleaning, splicing, description, fracture identification, sampling, photos.
Final report.
Case studies.

WORKSHOP SESSION: CASE STUDY 1.5 d
Quality control: quality control of mud logs in clastic and carbonate environments.
Hands-on: composite mud log construction from analyses and cuttings description.

Reference: METHWSGEOL  Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Graduate Certificate
Geosciences: from Basin Exploration to Discovery Certification

Level: PROFICIENCY

Purpose
This course provides a comprehensive, practical knowledge of basin exploration, analysis & modeling workflow, and to develop competencies and know-how via hands-on activities, case studies for play assessment and prospect definition.

Audience
Newly-hired geoscientists or reservoir engineers with no or limited experience in geology, geophysics and involved in exploration projects, from basin analysis to prospect generation.

Learning Objectives
Upon completion of the course, participants will be able to:
- have a clear comprehension of analysis methods and techniques applied to basin exploration,
- analyze and interpret a dataset, and integrate it to build a coherent model for basin assessment,
- integrate data and process leading to play assessment and prospects definition.

Ways & Means
- Hands-on activities and simulations on real cases.
- Emphasis on practical work to develop participants’ autonomy and appropriate decisions.
- Both personal and group work, team-building, group discussion in results and workflows.
- Software tools used in the petroleum industry.
- Software used during workshops: with courtesy of Beicip-Franlab and Schlumberger.

Learning Assessment
- Weekly knowledge assessment.
- Initial and final evaluation at the beginning and end of the program to assess participants’ learning curve.
- Final project at the end to simulate operational situation to be presented to a jury.

Prerequisites
- Engineering degree, master degree in geosciences or equivalent diploma, technicians involved in an upgrade process or to validate their know-how in covered disciplines.
- No previous experience.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Geosciences: from Basin Exploration to Discovery.
- Ready-to-use skills.

Expertise & Coordination
IFP Training experts in Exploration with a wide technical experience.

Course Content

EXPLORATION GEOLOGY DISCIPLINES
Lectures, hands-on activities and case studies are distributed in several modules of 1-2 weeks long.
Training content presents a clear operational orientation in order for participants to get familiar with specific exploration techniques via an extensive exposure to real cases allowing them to anticipate the problems they will have to cope with later in their own projects.
The course covers the following topics: petroleum exploration tools and techniques; seismic and well data analysis and interpretation; basin analysis (infilling and architecture) and assessment (trap geometry prediction); prospect generation; basin modeling; exploration project workshop (case study).

Part 1: Exploration Tools and Techniques (40 days)
Fundamental petroleum geosciences:
- Play assessment: from basin analysis to exploration opportunities.
- Structural geology, basin development and associated traps.
- Petroleum systems (hydrocarbons from source rock to reservoirs).
- 3D seismic interpretation workshop (structural model construction and trap analysis - 2 weeks).
Well log analysis:
- Well logging and qualitative log interpretation.
- Quantitative well log analysis.
Assimilation workshop:
- Review and synthesis of exploration tools (Assimilation workshop) - Presentations.

Part 2: Basin Analysis and Assessment (40 days)
Sedimentology, stratigraphy and seismic:
- Fundamentals of sedimentology (clastics and carbonates).
- Applied sedimentology in the field (geological objects vs. exploration tools).
- Core description and facies analysis.
- Sedimentological well log interpretation.
- Sedimentology & sequence stratigraphy (workshop).
- Seismic interpretation and attributes analysis workshop: qualitative and quantitative methods.
Prospect evaluation:
- Play assessment and prospect generation.
Paper review workshop:
- Synthesis of regional exploration (paper review workshop) - Presentations.

Part 3: Basin Modeling Workshop (30 days)
Basin modeling:
- Stratigraphic modeling (basin architecture and sediment distribution).
- Basin modeling (thermicity, maturation and migration).
Final project - Hands-on workshop:
- Team workshop on case study.
- Reporting and final presentations.

PROJECT REPORT DEFENSE & JURY
The training program ends with a project on a real case. Participants are involved in a simulated situation and their mission is to summarize, integrate and apply acquired knowledge. Each team will present the final results of a project to a jury.

Reference: EVAL/BAMLONG
Only available as an In-House course.
Contact: gre.ruei@ifptraining.com

www.ifptraining.com

Offshore
Unconventional
E&P Chain
Reservoir & Field Development
Production Engineering
Field Operations
Project Management
HSE
Gas
Graduate Certificate
Basin Assessment & Modeling Certification

Level: PROFICIENCY

Purpose
This course provides a comprehensive, practical knowledge and know-how of basin exploration, analysis & modeling workflow, via hands-on activities, case studies for play assessment and prospect definition.

Audience
Geologists, geophysicists and reservoir engineers, with 1 to 3 years of experience involved in basin analysis and prospect generation.

Learning Objectives
Upon completion of the course, participants will be able to:
- have a clear comprehension of analysis methods and techniques applied to basin exploration,
- Interpret and integrate a dataset to build a coherent model for prospect definition,
- contribute to the reduction of uncertainty and risks, and optimize investments.

Ways & Means
- Hands-on activities and simulations on real cases.
- Emphasis on practical work to develop participants’ autonomy and appropriate decisions.
- Both personal and group work, team-building, group discussion in results and workflows.
- Software tools used in the petroleum industry.
- Software used during workshops: with courtesy of Beicip-Franlab and Schlumberger.

Learning Assessment
- Weekly knowledge assessment.
- Initial and final evaluation at the beginning and end of the program.
- Final project at the end to simulate operational situation to be presented to a jury.

Prerequisites
- Engineering degree, master degree in geosciences or equivalent diploma.
- Limited experience (1 to 3 years in Exploration).

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Basin Assessment & Modeling.
- Ready-to-use skills.

Expedition & Coordination
IFP Training experts in Exploration with a wide technical experience.

Course Content

EXPLORATION GEOLOGY DISCIPLINES
Lectures, hands-on activities and case studies are distributed all along the program. Training content presents a clear operational orientation in order for participants to get familiar with specific techniques via an extensive exposure to simulations on real cases allowing them to anticipate the problems they will have to cope with later in their own projects.

Part 1: Exploration block management (15 days) (page 92)
- Play assessment: From basin analysis to exploration opportunities.
- Prospect generation and evaluation: from single to multi-prospect portfolio (page 89).
- Exploration & Production project economics and decision analysis.

Part 2: Exploration techniques & basin modeling (30 days)
- Structural geology: impact on petroleum system development and maturity.
- Well logging and qualitative log interpretation (page 81).
- 3D seismic interpretation workshop (structural & stratigraphic).
- Sedimentology and sequence stratigraphy workshop (page 83).
- Stratigraphic modeling (basin architecture and sediment distribution) (page 84).
- Basin modeling (thermicity, maturation and migration) (page 85).

Part 3: Reservoir studies: accumulation and modeling (10 days)
- Hydrocarbons in place estimation: OOIP - Uncertainties & risks.
- Geological modeling workshop for integrated reservoir studies (page 103).

Part 4: Final project workshop (10 days)
- Exploration for prospect generation workshop.

PROJECT REPORT DEFENSE & JURY
The training program ends with a project on a real case. Participants are involved in a simulated situation and their mission is to summarize, integrate and apply acquired knowledge. Each team will present final results of a project to a jury.

Reference: EVAL/BAM
Only available as an In-House course.

Contact: gre.rueil@ifptraining.com

This course is also available in French: EVAL/BAMFR. Please contact us for more information.
Play Assessment & Prospect Generation

Level: PROFICIENCY

Purpose
This course provides a practical, comprehensive understanding of that part of the E&P value chain that deals with the technical evaluation of an exploration asset.

Audience
Geoscientists, technical or non-technical managers interested in prospect assessment.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand prospect definition workflow and to estimate OHIP (Original Hydrocarbon In Place) estimation parameters,
- understand risks and uncertainties related to OHIP calculation methods and to use related results accordingly,
- review fundamental concepts of portfolio management and to learn how to define adapted exploration strategies.

Ways & Means
- Lectures and exercises.
- Hands-on sessions on real case studies.
- Discussion, teamwork experience feedback.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

FROM PROSPECT LEAD TO POTENTIAL FIELD
Presentation of exploration methods and strategies.
Basin petroleum potential assessment process. Key points of the exploration workflow.

PLAY ASSESSMENT
Data collection and QC.
Basin potential assessment.
Regional context. The petroleum trilogy.
Migration and entrapment processes.
Relative timing of events.

PROSPECT ANALYSIS & GENERATION
Source rock potential estimation.
Seismic and well data integration and interpretation.
Basin structural history.
Timing of hydrocarbon expulsion and migration,
OHIP calculation parameters. Determinist and stochastic assessment.
Estimation of risks and related uncertainties. Assessment consistency.
“Prospect review card”.
Case study on prospect generation.

RISK ANALYSIS
Identification and assessment of risks and uncertainties related to:
Geology (source rock, reservoir, seal, preservation).
Fluids (generation, maturation, migration, entrapment, timing).
Probability Of Success (POS). Transition to dynamics. Consequences for economics.
Case study.

WRAP UP & CONCLUSION

Reference: EVAL/PLAY - Can be organized as an In-House course.
Contact: gre.rueil@ifptraining.com

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<td>28 June</td>
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This course is also available in French: EVAL/PLAYFR. Please contact us for more information.
Course Content

WEEK 1: BASIN ANALYSIS & PROSPECT GENERATION - FROM PLAY TO LEAD
The participants carry out a mini-project on a real case study:
- Short basin analysis using a seismic line and well-log data.
- Potential “play” identification in the basin.
- Prospect analysis and ranking.

Introduction to petroleum system & basin analysis
Basin potential assessment.
Regional context. Petroleum trilogy.
Play definition.

Risk analysis
Geological risk (reservoir, trap, HC conservation), fluid content risk (source rock, maturation, migration, timings).
Probability of success. Consequences for economics.

Basin assessment & prospect definition
Basin potential assessment:
- The petroleum trilogy.
- Traps.
Migration versus entrapment timing:
- Seismic interpretation.
- Well data interpretation.
Cross correlation & integration with seismic data.
Prospect definition:
- OHIP calculation.
- Uncertainties.

WEEK 2: OIL FIELD DEVELOPMENT - FROM DISCOVERY TO PRODUCTION START

Introduction to E&P workflow
General presentation of the different steps of an oil field development project.
Reminder of concepts, tools, methods, necessary data to work with and how to reduce inherent subsurface uncertainties.
Illustration through a case history (onshore field, light oil).

Discovery
Geological and tectonic context of the field.
Seismic interpretation issues.

Appraisal phase
Evolution of subsurface uncertainties (structural maps, OHIP estimations, etc.) with new data from appraisal wells.
Updating of the issues after each appraisal well.
Definition of data acquisition programs for each well.
Data synthesis at the end of the appraisal phase and OHIP estimations.

Engineering studies
Estimations of reserves, production profiles through simplified methods and a full field simulation.
Estimations of CAPEX, OPEX, technical costs of different development scenarios.
Comparison of production forecasts with actual field production history.

Reference: EVAL/PROSPECT

Only available as an In-House course.

Contact: gre.rueil@ifptraining.com
Seismic & Sequence Stratigraphy for Oil & Gas Exploration

Level: ADVANCED

Purpose
This course provides, through daily practical exercises and an integrated project, a thorough and very practical understanding of seismic and sequence stratigraphy for Oil & Gas exploration.

Audience
Geologists, geophysicists, production managers and engineers involved in exploration or reservoir characterization.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand the use of sequence stratigraphy as a tool in basin exploration, and describe related workflow structure,
- ensure accurate stratigraphic breakdown of well data,
- manipulate and use a full dataset in an integrated project: well logs, biostrat information, and 2D lines.

Ways & Means
- The most important elements in this process are accurate stratigraphic breakdown of well database and stratigraphic data loading both into the well and the seismic databases.
- Software used during workshops: with courtesy of Schlumberger.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

WEEK 1

Sequence stratigraphy concepts & method
Shelfal accommodation space. Tectonic, eustasy and sediment control on the stratal and facies stacking pattern of depositional sequences.
Practical paleontology:
- Establishment of a chronostratigraphic framework to support well and seismic correlation.
- Precise definitions of paleo-environments and water depths in order to predict reservoir facies.

Well log & seismic responses of lowstand systems tracts
LST sequence boundaries, slope fans, basin floor fans and prograding complexes.
TST & HST basin starvation, source rock and reservoir seal.
Biostratigraphic signature of lowstand versus transgressive/highstand systems tracts.
Hierarchy of stratigraphic cycles.

Well log/seismic responses of neritic systems tracts
LST sequence boundaries, incised valley and lowstand prograding complex.
TST & HST stratal and facies stacking pattern.
HST alluvial, deltaic, shoreline complexes and shelf sands.
Biostratigraphic signature of transgressive and highstand systems tracts.
Relationship of stratigraphic patterns to changes in subsidence rates as driven by regional and earth scale tectonic processes.

WEEK 2

Log/seismic responses of neritic systems tracts
(alluvial plain to delta front)
LST sequence boundaries, incised valleys, major unconformities and prograding complexes.
TST incised valley fill, shelfal aggradation.
HST alluvial, deltaic, shoreline complexes.
Stratal and facies stacking pattern in the alluvial plain.
Forestepping sequences and major unconformities as driven by regional and earth scale tectonic processes.

Log/seismic responses of neritic systems tracts (siliciclastic shelf)
LST sequence boundaries, incised valleys, major unconformities and prograding complexes.
TST in shelfal environment (log-to-core scale).
HST in shelfal environment (log-to-core scale).
Stratal and facies stacking pattern in a siliciclastic shelfal system.
Biostratigraphic signature.
Hierarchy of stratigraphic cycles.
Exploration & Production consequences and related strategies.

Data integration
Interpretation of a set of wireline logs covering the Mesozoic-Cenozoic succession to tie.
Transgressive/regressive facies cycles and unconformity surfaces. A quantitative paleontological datasets is used to aid in determining maximum flooding surfaces, peak transgression and unconformities.
Interpretation of a regional basin-scale seismic line tied to the wells. Mapping of various potential reservoir intervals.
Data integration: Exploration & Production consequences and related strategies.

Reference: EVAL/STRATADV

Only available as an In-House course.

Contact: gre.rueil@ifptraining.com
From Basin to Prospect Evaluation

Exploration Blocks Management

**Course Content**

15 days

**WEEK 1**

**Opening workshop: setting up exploration block strategy**

By studying a “theoretical basin”, this opening workshop will work participants through a 2-day brainstorming session on the pros and cons of various strategies and methodologies that could be considered for setting up, delineating and promoting exploration blocks in the most efficient manner, given the state of maturity of the areas under consideration, the economic terms of the contractual framework, and the State’s strategic goals at some point in time.

The participants will work in teams and face different technical and economic situations. With the guidance of an expert moderator, they will have to walk through the decision-making process, analyze risks, discuss options, present and defend opinions.

This workshop is intended as an eye-opener on all the fundamental technical and economic issues that will be touched upon or studied and analyzed in details throughout the rest of the training program; the final objective being to build up the skills required for managing and promoting the exploration for a development of the State’s Oil & Gas resources.

**Play assessment: from basin analysis to exploration opportunities**

Petroleum play (0.25 day)

- What is a petroleum play? Play concept definition, need for defining a concept.

Petroleum system and basin analysis (1 day)


Proven and unproven plays: basis of an exploration strategy (1.5 days)


Workshop on real case studies.

**WEEK 2**

**Prospect generation & evaluation: from single to multi-prospect portfolios**

Prospect analysis and evaluation (2.5 days)


Identification and assessment of risks and uncertainties (1.5 days)


“Prospect Identification Card”. Maps, parameters estimation, reserves values (Min/Mode/Max). Calculation of recoverable reserves. Prospect’s risked reserves. Preparation of virtual FDP and production profiles.

**WEEK 3**

**Prospect/block valuation: exploration project economics & decision analysis**

E&P value chain and decision process (0.5 day)


Exploration prospect valuation (1.5 days)


Exploration block valuation (1.5 days)


Overview of risk behavior in petroleum exploration (1.5 days)


Reference: EVAL/BLOCK. Only available as an In-House course.

Contact: gre.rueil@ifptraining.com
E&P Projects Value Management

Course Content

**STRUCTURE & DYNAMICS OF UPSTREAM PROJECTS**

Strategic issues in Oil & Gas: structure of the Oil & Gas industries, picture of worldwide Oil & Gas supply and demand, primary objectives of an oil company, economic analysis and long-term planning, E&P portfolio components and risk dynamics, focus on geological risk and economic risk, important value drivers, life cycle of upstream assets, critical decision points and value creation, E&P assets valuation, stakeholders, business and operational processes.

Exploration phase: exploration rounds and blocks, fundamental questions for a managers, speculation and decision process, petroleum system, and prospect evaluation, techniques and expertise involved (geology, geophysics, geological modeling, exploration drilling), exploration risk and reward analysis, probability of success and decision tree analysis, expected monetary value, exploration block valuation and basis for decision in exploration, impact of state participation, exploration risk mitigation through farm-out agreements.

Development/production phase: from discovery to development and production, appraisal phase, uncertainties and reserves evaluation, reserves probability distribution and classification, techniques and expertise involved (reservoir modeling, drilling and well completion, recovery mechanisms, production profiles, Oil & Gas processing, production facilities), field development schemes, capital expenditures, operating expenses, abandonment costs and risks, concept of value of a discovery for an oil company, decision tree analysis for choosing optimal strategy, cost and value of information.

E&P contractual framework: strategic objectives of States and IOCs, state participation and role of NOCs, economic rent sharing, risk mitigation through joint-ventures, different types and structure of patrimonial contracts, important obligations, fundamental concepts in joint-operating agreements, decision committees, financing of operations, utilization agreements, cost recovery, sharing value through mechanisms of production-sharing contracts and risk-service contracts, government take, state control and supervision.

**OIL & GAS PROJECT STUDIES & MANAGEMENT**

Front-end development studies: front-end loading as a foundation for smarter project execution, phases and deliverables (preferability stage, feasibility stage, basic engineering), project scope definition and execution plan. Fundamentals of financial management: corporate finance, project finance, cost of debt capital, cost of equity capital, balance sheet, return on capital employed, return on equity, weighted average cost of capital and fundamental condition for project value creation, cost accounting and budgeting.

Field development project economic evaluation: methodology for assessing the economic value of an Oil & Gas field development project, global project cash flows (Revenues, Capex, Opex and Gvt Take), discounting, risks and discount rate, economic indicators (net present value, internal rate of return, pay-out-time), quantitative risk analysis.

**Case study: oil field development project with State participation within the framework of a PSC.** Principles of project management: large capital Oil & Gas projects challenges and performance, final investment decision, project risks, organizational risks and external risks, FEED and EPC contracts, project organization, control and management (schedule, cost, quality, HSE, and risk issues), keys to successful project delivery.
NEW E&P Project Risk & Decision Analysis Workshop

Level: PROFICIENCY

Purpose
This course aims to comprehend the methods and gain a practical knowledge of the probabilistic models applied in Oil & Gas project decision analysis through a workshop dedicated to problem solving with spreadsheet applications.

Audience
Oil & Gas professionals from various disciplines who need to acquire the skills needed to analyze risk of Oil & Gas projects and build probabilistic models to provide the decision analysis required for analyzing investment opportunities.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand the concepts of risks, uncertainties and probability distributions and tables,
- practice the use of the various tools of expected values, decision trees and Monte Carlo simulation,
- develop and solve different types of probabilistic models used in prospect evaluation and field development projects.

Ways & Means
- Spreadsheet applications for numerous problems of decision analysis in the upstream sector.
- Illustration with software @Risk and PrecisionTree.

Learning Assessment
Quiz at the end of the module.

Prerequisites
Good practical knowledge of Microsoft Excel.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OVERVIEW OF THE DECISION PROCESS
0.5 d
Strategic issues in Oil & Gas: E&P portfolio components and risk dynamics, important value drivers, life cycle of upstream assets, critical decision points and value creation, economic rent sharing through Oil & Gas contracts. Exploration phase: exploration rounds and blocks, fundamental questions for a manager, speculation and decision process, exploration risk and prospect reserves evaluation, techniques and expertise involved, exploration risk and reward analysis, impact of state participation, risk mitigation. Development/production phase: appraisal, uncertainties and discovery reserves evaluation, techniques and expertise involved, field development schemes, capital expenditures, operating expenses, abandonment issues and costs, economic modeling, value of a discovery, fundamental condition for value creation. Fundamental issues in decision analysis: uncertainty in capital investments, decision analysis process, terminology used in decision analysis, various applications in the Oil & Gas industry.

MAIN STATISTICS & PROBABILITY CONCEPTS
1.5 d
Descriptive statistics: measures of central tendency, measures of dispersion, grouping of large data sets, frequency distribution, cumulative and decumulative relative frequency. Probability concepts: simple, conditional, joint, and marginal probability, probability rules, discrete probability distributions, continuous probability distributions. Spreadsheet applications: drilling data, exploration drilling, reservoir data, workover...

RISK & DECISION ANALYSIS
3 d
Expected value concepts: expected value and standard deviation of random variables, structural elements of decision problems, payoff tables, expected monetary value, expected profitability index, performance index, expected opportunity loss, sensitivity analysis, fundamental decision criteria, mean-variance analysis. Decision tree analysis: designing and solving decision trees, risk profiles, expected value of information (perfect or imperfect), expected net gain, prior, conditional and posterior probabilities, Baye’s rule. Attitudes towards risk: expected preference value or expected utility, utility function, risk tolerance, certainty equivalent and risk premium, assessing the utility function, mathematical representation of utility functions, gambler’s ruin, risk-adjusted value and working interest. Simulation in decision analysis: applications of simulation, steps in simulation modeling, probabilistic dependence of input variables. Spreadsheet applications: decision tree analysis with the software PrecisionTree, Monte Carlo simulation with the software @Risk, reserves probability distribution, reserves uncertainties in the valuation of a simple prospect, Bayesian tree analysis for prospect evaluation, drilling prospect with farm-out option, cost and value of information from a delineation, seismic option, investment decision with a risk tolerance...

Reference: PIMP/PRDAWGB - Only available as an In-House course. Contact: pl.rueil@ifptraining.com
Reservoir & Field Development

▶ Reservoir Characterization & Modeling

Introduction to Reservoir Characterization .................................................. p. 96
Integrated Petrophysics for Reservoir Characterization & Modeling ............... p. 97
Reservoir Characterization & Modeling Certification ...................................... p. 98
Quantitative Well Log Analysis ..................................................................... p. 99
Fundamentals of Fracture Analysis & Rock-typing ........................................ p. 100
Seismic Interpretation & Attributes Analysis Workshop: Qualitative & Quantitative Methods ................................................................. p. 101
Petroleum Geostatistics ............................................................................. p. 102
Geological Modeling Workshop for Integrated Reservoir Studies ....................... p. 103
Hydrocarbons Accumulations, Reserves Estimation, Risk Analysis & Uncertainties ................................................................. p. 104
Naturally-Fractured Reservoirs: Static & Dynamic Modeling ................................ p. 105
Petrophysical Properties: Core, Log & Test Data Integration for Reservoir Modeling ................................................................. p. 106
Upscaling: from Static to Dynamic Model ...................................................... p. 107
Borehole Imaging Interpretation Workshop with FracaFlow™ ................................ p. 108
Fracture & Fault Modeling Workshop with FracaFlow™ ..................................... p. 109
Tight Reservoir Petrophysics ...................................................................... p. 110
Tight Reservoir Characterization & Modeling ................................................. p. 111
Advanced Multivariate Geostatistics Certification ........................................... p. 112
Advanced Facies Analysis & Rock-Typing Certification ..................................... p. 113
Seismic Reservoir Characterization: AVO & Inversion Workshop Certification ................................................................. p. 114
Geological Characterization & Modeling - Integrated Workshop Certification ................................................................. p. 115
Tools for Seismic Reservoir Characterization: Pre-Stack Seismic Inversion ................ p. 116
Tools for Seismic Reservoir Characterization: Post-Stack Seismic Inversion ................ p. 117
SRC: Seismic Reservoir Characterization ..................................................... p. 118
Static Model Construction: Field Constraints & Integration with Subsurface Data ................................................................. p. 119
Fundamentals of Reservoir Geology ............................................................ p. 120
Core Analysis for Reservoir Characterization ................................................. p. 121
Special Core Analysis ............................................................................. p. 122
Geomechanics for Geoscientists ................................................................... p. 123

▶ Reservoir Engineering

Introduction to Reservoir Engineering ......................................................... p. 124
Reservoir Fluid Properties - PVT .................................................................. p. 125
Drilling & Completion - Wellbore Interface & Well Productivity ......................... p. 126
Well Testing & Well Test Analysis .................................................................. p. 127
Drive Mechanisms - Enhanced Oil Recovery .................................................... p. 128
Dynamic Reservoir Simulation .................................................................... p. 129
EOR Concepts & Applications .................................................................... p. 130
Miscible Gas EOR Certification ................................................................... p. 131
Chemical EOR Certification ...................................................................... p. 132
Advanced Dynamic Reservoir Simulation ....................................................... p. 133
Reservoir Simulation Workshop Certification ................................................ p. 134
Advanced Well Test Analysis Certification ...................................................... p. 135
PVT Modeling ......................................................................................... p. 136
Decline Curves Analysis ............................................................................ p. 137
Decline Curves Analysis ............................................................................ p. 137
Reservoir Engineering Certification ............................................................. p. 138
Reservoir Management Workshop ............................................................. p. 139
Reserves Evaluation - Risks & Uncertainties Certification .................................. p. 140
Mature Fields - Subsurface Issues .................................................................. p. 141
IRM - Integrated Reservoir Management ....................................................... p. 142

▶ Field Development

Reservoir Management Workshop ............................................................. p. 139
Reserves Evaluation - Risks & Uncertainties Certification .................................. p. 140
E&P Project Risk & Decision Analysis Workshop ........................................... p. 147
E&P Project Cost Estimation & Control Certification ........................................ p. 148
Field Development Project & Uncertainties .................................................... p. 143
Field Operations Engineer Certification ......................................................... p. 144
Field Development Project ........................................................................ p. 145
E&P Value Chain & Front-End Development ................................................... p. 146
# Introduction to Reservoir Characterization

## Level: FOUNDATION

### Purpose

This course provides participants with an understanding of all types of data needed to build a reservoir model (seismic, geological, petrophysical and dynamic) and a clear understanding of the techniques related to reservoir modeling.

### Audience

Geologists, geophysicists, petrophysicists, reservoir engineers or petroleum engineers involved in integrated reservoir studies.

### Learning Objectives

Upon completion of the course, participants will be able to:

- recognize the techniques and challenges related to reservoir modeling (focus on reservoir properties),
- build required competencies for reservoir geoscientists to analyze a specific dataset and construct a reliable static model.

### Ways & Means

Interactive presentations, practical exercises and hands-on activities.

### Learning Assessment

Knowledge assessment with multiple choice questions.

### Prerequisites

No prerequisites for this course.

### Expertise & Coordination

IFP Training (permanent or contracted) expert in geomodeling with a wide experience and whose competencies are kept up-to-date in industry projects.

### Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO RESERVOIR CHARACTERIZATION</strong></td>
<td>1 d</td>
</tr>
<tr>
<td><strong>RESERVOIR ARCHITECTURE</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td><strong>FACIES ANALYSIS - ROCK-TYPING</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td><strong>PETROPHYSICS &amp; ROCK PROPERTIES - RESERVOIR HETEROGENEITIES</strong></td>
<td>1 d</td>
</tr>
</tbody>
</table>

Reference: RCM/INFOGEOL [Only available as an In-House course.](mailto:gre.ruell@ifptraining.com)
Purpose
This course provides a comprehensive, practical knowledge of rock properties used for reservoir characterization and modeling workflow, via hands-on activities and case studies using dedicated software for data analysis, data interpretation and reservoir modeling.

Audience
Geoscientists involved in multidisciplinary teams, willing to acquire practical know-how in petrophysical data interpretation for reservoir studies.

Learning Objectives
Upon completion of the course, participants will be able to:
1. Understand concepts, techniques and methods of rock properties applied to reservoir modeling.
2. Characterize a fractured network on a field.
3. Develop the skills to check the validity of structural interpretation on seismic through time using balancing and structural restoration.
4. Apply the current borehole imaging tools and modern interpretation techniques.
5. Apply the workflow to characterize and model the fracture networks in a reservoir model (real case).

Ways & Means
Hands-on activities and simulations on real cases. Emphasis on practical work to develop participants’ autonomy and appropriate decisions. Both personal and group work, team-building, group discussion in results and workflows. Software tools used in the petroleum industry.

Learning Assessment
- Knowledge assessment with multiple choice questions and open explanatory questions.
- Initial and final evaluations (at the beginning and end of the program) to assess participants’ learning curve.
- Final project at the end to simulate operational situation to be presented to a jury.

Prerequisites
Previous experience is required in petroleum geology and seismic interpretation.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Integrated Petrophysics for Reservoir Characterization & Modeling.
- Ready-to-use skills.

Expertise & Coordination
IFP Training experts in reservoir characterization and modeling, and fractured reservoirs with a wide technical experience.

Reference: RCM/PETRORES | Only available as an In-House course.
Purpose
This course provides a comprehensive, practical knowledge of reservoir characterization and modeling workflow, via hands-on activities and case studies with the aim of bridging the gap between static geological characterization and dynamic reservoir behavior.

Audience
Geoscientists, engineers newly hired or 2-3 years experienced, experienced technicians involved in multidisciplinary teams, willing to widen their knowledge and acquire practical know-how in geological modeling.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand the analysis methods and techniques applied to reservoir modeling with related challenges,
- analyze and interpret a dataset and integrate it in order to elaborate a reliable static model,
- build a consistent geological static model with heterogeneities affecting fluid flow and production,
- assess the uncertainty and risks in order to reduce them and thus optimize investments.

Ways & Means
- Hands-on activities and simulations on real cases.
- Emphasis on practical work to develop participants’ autonomy and appropriate decisions.
- Both personal and group work, team-building, group discussion in results and workflows.
- Software tools used in the petroleum industry.
- Software used during workshops: with courtesy of Beicip-Franlab, Geovariance, Schlumberger and Senergy.

Learning Assessment
- Knowledge assessment with multiple choice questions and open explanatory questions.
- Initial and final evaluation at the beginning and end of the program to assess participants’ learning curve.
- Final project at the end to simulate operational situation to be presented to a jury.

Part 1: Reservoir characterization tools
Introduction to reservoir characterization.
Well logging & qualitative log interpretation.
Stratigraphy and sedimentology of siliciclastic reservoirs.
Fundamentals of facies analysis & rock-typing.
Seismic interpretation and attributes analysis workshop: qualitative and quantitative methods.

Part 2: Reservoir modeling and volumetrics
Petroleum geostatistics.
Geological modeling workshop for integrated reservoir studies.
Hydrocarbons accumulations, reserves estimation, risk analysis and uncertainties.
Naturally-fractured reservoirs: static and dynamic modeling.
Petrophysical properties: core, log and test data integration for reservoir modeling.

Part 3: Final project workshop
Final project. Hands-on workshop (team work).
Presentation and jury.

Reference: RCM/RCM
Can be organized as an In-House course. Contact: gre.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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<tbody>
<tr>
<td>Rueil</td>
<td>9 September</td>
<td>29 November</td>
<td>€31,900</td>
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</tbody>
</table>

This course is also available in French: RCM/RCMFR. Please contact us for more information.
Quantitative Well Log Analysis

Level: PROFICIENCY

Purpose
This course provides participants with some experience in qualitative log interpretation.

Audience
Geoscientists and technicians having an experience in qualitative log interpretation and willing to perform quantitative reservoir evaluation.

Learning Objectives
Upon completion of the course, participants will be able to:
- perform sound quality-control and environmental correction of logs, determine Rt, Rxo, Di,
- evaluate shale content of reservoirs, apply shale and hydrocarbon corrections,
- perform quantitative log interpretation in case of water and oil based mud, determine porosity, permeability, net sand, net reservoir and net pay characteristics.

Ways & Means
- Hand computations followed by petrophysical software sessions.
- Software used during workshops: with courtesy of Senergy.

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
Participants should know the principles and applications of common wireline logging tools and must be used to perform a quick-look (lithology, porosity, Rw, Sw).

Expertise & Coordination
IFP Training (permanent or contracted) expert in petrophysics and quantitative log analysis with a wide experience and whose competencies are kept up-to-date in industry projects.

Course Content

PREPARATION FOR QUANTITATIVE LOG ANALYSIS
1 d
Petrophysical concepts and relationships.
Quality control of the data.
Determination of geological formations and reservoirs - Zonations.
Environmental corrections of logs. Determination of Rt, Rxo, Di.
Case studies (water and oil based muds).

INTERPRETATION OF CLEAN FORMATIONS
1 d
Determination of fluid contacts (WOC, GOC).
Determination of matrix and fluid parameters, Rw (SP, Ratio, Rwa).
Determination of lithology, porosity, fluid type, water and hydrocarbon saturations.
Cross plots techniques: N-D-S, Pe-RHOB, K-Th, etc.
Case studies.

QUANTITATIVE LOG INTERPRETATION OF SHALY FORMATIONS
(deterministic approach) 2.5 d
Influence of shale on logging tool response. Introduction to complex lithology - D-N cross-plot.
Determination of shale parameters, shale content Vsh and effective porosity.
Hydrocarbon effects on logs and hydrocarbon correction.
Determination of water and hydrocarbon saturations (various equations).
Comparison of porosity and permeability results to core data (PHI-K relationship and SCAL).
Determination of net sand, net reservoir and net pay thicknesses and associated characteristics (Vsh, H, Phie, So).
Case studies: integration & interpretation of pressure tests and NMR data, if available.
Cross-section between wells and comparison of interpretation results.

OTHER INTERPRETATION METHODS
0.5 d
Introduction to the multi-mineral model and general optimization method.
Case study.

Reference: RCM/LOGADV
Can be organized as an In-House course.
Contact: gre.rueil@ifptraining.com

Location | Start Date | End Date | Tuition Fees
--- | --- | --- | -----
Rueil | 23 September | 27 September | €3,150

This course is also available in French: RCM/LOGADVFR. Please contact us for more information.
Fundamentals of Facies Analysis & Rock-typing

Level: FOUNDATION

Purpose
This course provides participants with an integrated approach to facies analysis and rock-typing combining logs, core description, and laboratory petrophysical data.

Audience
Geologists, geophysicists and reservoir engineers involved in integrated reservoir studies.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify electrofacies from logs,
- identify log signatures and facies association,
- define rock-types with petrophysical data (logs and laboratory data),
- define Petrofacies from various relationships like Reservoir Quality Index, Winland R35 for net pay determination and other poro-perm transforms.

Ways & Means
Interactive presentations, practical exercises and hands-on activities.

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training (permanent or contracted) expert in facies analysis and geostatistics with a wide technical experience and whose competencies are kept up-to-date in industry projects.

Course Content 5 days

OVERVIEW ON ELECTROFACIES ANALYSIS & ROCK-TYPING 1 d
Non-supervised approach and supervised approach for electrofacies analysis. Preliminary quality control of logs with hands-on. Integration of core description. From electrofacies to rock-types with hands-on.

NON-SUPERVISED ANALYSIS 1 d

SUPERVISED ANALYSIS 1 d

ROCK-TYPES DETERMINATION 2 d
Porosity and permeability modeling (hands-on). Rock quality index (RQI, FZI, etc.). Rock-typing with petrophysical data and capillary pressure curves: hands-on. Workflow for electrofacies to rock-type assignments.

This course is also available in French: RCM/ROCKTYPFR. Please contact us for more information.

Reference: RCM/ROCKTYP. Only available as an In-House course. Contact: gre.ruell@ifptraining.com
Seismic Interpretation & Attributes Analysis Workshop: Qualitative & Quantitative Methods

Level: PROFICIENCY

Purpose
This course aims to grasp the basics of seismic interpretation, both qualitative and quantitative methods. To be able to understand and follow every step of seismic interpretation projects.

Audience
Junior geoscientists.

Learning Objectives
Upon completion of the course, participants will be able to:
- work effectively in a seismic interpretation study project,
- understand how to perform a feasibility study and to select the most appropriate workflow,
- gather and prepare data for seismic interpretation studies.

Ways & Means
- Interactive presentations, practical exercises, document analysis.
- Workshop on case study using dedicated software.
- Software used during workshops: with courtesy of Schlumberger.

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training (permanent or contracted) expert in seismic reservoir characterization with a wide technical experience and whose competencies are kept up-to-date in industry projects.

Course Content

QUALITATIVE INTERPRETATION
Geological frame for interpretation: tectonic environment and sedimentary basins.
Petroleum geophysics:
- Wave propagation.
- Acquisition.
- Processing.
Seismic interpretation workflows:
- Structural interpretation.
- Stratigraphic interpretation.
- Well-to-seismic tying.

Exercises: examples in various environments and basins.

QUANTITATIVE INTERPRETATION
Fundamentals of rock physics.
Post-stack attributes, acoustic impedance and seismic inversion.
Pre-stack and AVO.
Well data and seismic data preconditioning for seismic characterization.
Quantitative reservoir property prediction: lithologies and fluids.

WORKSHOP - NORTH SEA CASE STUDY
Case study presentation.
Conclusions.

Reference: RCM/SEISATTRIB
Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Petroleum Geostatistics

**Level:** FOUNDATION

**Purpose**
This course provides a comprehensive and practical knowledge of reservoir characterization and modeling, focusing on geostatistical methods and tools.

**Audience**
Geologists, geophysicists, reservoir engineers and professionals involved in data interpretation and management.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- use basic geostatistical tools and methods (variograms, kriging, cokriging, external drift),
- use vertical proportion curves (e.g. layering, well gridding, statistics, vertical proportion curves building),
- constrain geostatistical distribution using additional information (e.g. geology, seismic and dynamic data).

**Ways & Means**
- Interactive lectures, practical examples and laboratory exercises will be performed using dedicated software: Isatis™.
- Software used during workshops: with courtesy of Geovariance.

**Learning Assessment**
Knowledge assessment with multiple choice questions.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training (permanent or contracted) expert in geostatistics with a wide technical experience and whose competencies are kept up-to-date in industry projects.

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**Course Content**

<table>
<thead>
<tr>
<th><strong>FUNDAMENTALS OF GEOSTATISTICS</strong></th>
<th>1.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic statistics for data analysis.</td>
<td></td>
</tr>
<tr>
<td>Introduction to geostatistics.</td>
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<tr>
<td>Quantification of spatial variability: variogram.</td>
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</tbody>
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<thead>
<tr>
<th><strong>KRIGING &amp; VARIATIONS</strong></th>
<th>1 d</th>
</tr>
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<tbody>
<tr>
<td>Introduction to kriging.</td>
<td></td>
</tr>
<tr>
<td>Data integration: cokriging, collocated cokriging, external drift kriging.</td>
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<tr>
<td>Exercises.</td>
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<table>
<thead>
<tr>
<th><strong>MAPPING</strong></th>
<th>0.5 d</th>
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<tbody>
<tr>
<td>Applications to time-to-depth conversion.</td>
<td></td>
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<tr>
<td>Property mapping.</td>
<td></td>
</tr>
<tr>
<td>Dealing with non-stationary cases (trends).</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>GEOSTATISTICAL SIMULATIONS</strong></th>
<th>2 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why simulations; limitations of kriging.</td>
<td></td>
</tr>
<tr>
<td>Simulation methods for continuous parameters (as Phi and K).</td>
<td></td>
</tr>
<tr>
<td>Simulation methods for categorical variables (lithology).</td>
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</tr>
<tr>
<td>Applications.</td>
<td></td>
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<tr>
<td>Risk assessment optimization.</td>
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<td>Applications.</td>
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**Reference:** RCM/GEOSTAT
*Can be organized as an In-House course.*

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<thead>
<tr>
<th><strong>Location</strong></th>
<th><strong>Start Date</strong></th>
<th><strong>End Date</strong></th>
<th><strong>Tuition Fees</strong></th>
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<tr>
<td>Rueil</td>
<td>14 October</td>
<td>18 October</td>
<td>€3,150</td>
</tr>
</tbody>
</table>

Contact: gre.rueil@ifptraining.com
Geological Modeling Workshop for Integrated Reservoir Studies
The objective is the field - The software is a tool

Level: FOUNDATION

Purpose
This course provides participants with an understanding of all data types needed to build a reservoir model (seismic, geological, petrophysical and dynamic) and a clear understanding of the techniques related to reservoir modeling.

Audience
Geologists, geophysicists, petrophysicists, reservoir engineers or petroleum engineers involved in integrated reservoir studies.

Learning Objectives
Upon completion of the course, participants will be able to:
- recognize the techniques and challenges related to reservoir modeling (focus on reservoir properties),
- build required competencies for reservoir geoscientists to analyze a specific dataset and construct a reliable static model,
- apply the workflow for building a reservoir model using dedicated software,
- identify the uncertainties and assess them in order to reduce the risk and optimize the investments.

Ways & Means
- Interactive presentations and hands-on activities using software dedicated for reservoir modeling (EasyTrace™ and Petrel™),
- Software used during workshops: with courtesy of Beicip-Franlab and Schlumberger.

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training (permanent or contracted) expert in reservoir characterization and geological modeling with a wide experience and whose competencies are kept up-to-date in industry projects.

Course Content

<table>
<thead>
<tr>
<th>Basic Principles - Reservoir Characterization Workflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction and objectives. Case study: field presentation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Organization</th>
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<table>
<thead>
<tr>
<th>Structural Modeling</th>
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<table>
<thead>
<tr>
<th>Rock-Typing &amp; Property Modeling</th>
</tr>
</thead>
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<table>
<thead>
<tr>
<th>Volume Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volumetrics: quantification of accumulation for selected parameters. Sensitivity study on parameters. Key parameters determination for risk assessment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summary, Synthesis &amp; Wrap-Up</th>
</tr>
</thead>
</table>

Reference: RCM/GEOMODEL - Only available as an In-House course. Contact: gre.rueil@ifptraining.com

www.ifptraining.com
Hydrocarbons Accumulations, Reserves Estimation, Risk Analysis & Uncertainties

**Course Content**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROCARBONS ACCUMULATIONS</td>
<td>0.75 d</td>
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<tr>
<td>RESERVES ESTIMATION</td>
<td>0.25 d</td>
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<tr>
<td>RISKS &amp; UNCERTAINTIES</td>
<td>0.5 d</td>
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<tr>
<td>REAL CASE STUDY</td>
<td>3.5 d</td>
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<tr>
<td>SYNTHESIS &amp; WRAP-UP</td>
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**Purpose**

This course provides participants a practical understanding of hydrocarbon accumulation calculation and the methods to estimate reserves and assess uncertainties.

**Audience**

Geoscientists and reservoir engineers interested or involved in prospection, reserves estimation and reporting.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- estimate the hydrocarbon accumulation using the volumetric method,
- understand the difference between hydrocarbon accumulation in place and reserves,
- apply the methods for estimating reserves, both deterministic and probabilistic and gain a thorough understanding of various reserves levels,
- define the main concepts of risk and uncertainties assessment,
- integrate risks and uncertainties into reserves evaluation.

**Ways & Means**

- Interactive presentations, practical exercises and real case study using a complete data set and dedicated software for uncertainties assessment.
- Software used during workshops: with courtesy of Oracle.

**Learning Assessment**

Knowledge assessment with multiple choice questions.

**Prerequisites**

No prerequisites for this course.

**Expertise & Coordination**

IFP Training (permanent or contracted) geologist or reservoir engineer expert in hydrocarbon accumulations with a wide experience and whose competencies are kept up-to-date.

Reference: RCM/001P  
*Only available as an In-House course.*

Contact: gre.rueil@ifptraining.com
Naturally-Fractured Reservoirs: Static & Dynamic Modeling
in collaboration with GoGeo Engineering

Level: PROFICIENCY

Purpose
This course provides a clear and relevant workflow integrating geophysical, geological and engineering data to develop reservoir models for Naturally-Fractured Reservoirs (NFR). The course covers the geological aspects of natural fractures and their impact on the reservoir performance.

Audience
Geophysicists, geologists and reservoir engineers involved in integrated reservoir studies, geomodelers involved in fractured reservoirs looking for a full integration of all available data. Clastics, carbonates or shale play, the natural fractures will play a major role.

Learning Objectives
Upon completion of the course, participants will be able to:
- build a predictive 3D fracture model, constraining the model with the dynamic data,
- use neural network in order to recognize what controls the fractures density,
- identify sweet spots,
- generate porosity and permeability models for dynamic reservoir simulation,
- practice reservoir simulation and apply history matching techniques.

Ways & Means
- Short lectures alternating with hands-on practice on a real case study dataset, using a dedicated software tool for fractured reservoir modeling: FRACPREDICTOR™.
- Software used during workshops: with courtesy of GoGeo Engineering.

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training contracted expert in fractured reservoirs with a wide experience and whose competencies are kept up-to-date in industry projects. This course is proposed in collaboration with Go Geo Engineering.

Course Content

INTRODUCTION TO FRACTURED RESERVOIR
Introduction.
Types of fracture and their effects.
Fractured anticlines and fractures on cores.
Fractures effect on reservoir quality.

MODELING FRACTURED RESERVOIRS TECHNIQUES
Discrete Fracture Network (DFN).
Continuous Fracture Model (CFM).
Fracture model calibration.

INTEGRATED WORKFLOW FOR MODELING NFR
Seismic attributes for fracture modeling.
3D application on the Tensleep data.

NATURALLY FRACTURED RESERVOIR ENGINEERING
Production problems.
Well testing in fractured reservoirs.
Reservoir simulation in fractured reservoirs.

Reference: RCM/FRACMOD®
Can be organized as an In-House course.
Contact: gre.rueil@ifptraining.com

Location | Start Date | End Date | Tuition Fees |
--- | --- | --- | --- |
Rueil | 4 November | 8 November | €3,325

This course is also available in French: RCM/FRACMODFR. Please contact us for more information.

www.ifptraining.com
Petrophysical Properties: Core, Log & Test Data Integration for Reservoir Modeling

**Level:** PROFICIENCY

**Purpose**
This course provides a deep understanding of the methods used to measure reservoir petrophysical properties from cores, logs and well tests data and, ultimately, correlate and integrate results for reservoir characterization and modeling.

**Audience**
Petrophysicists, geologists, geophysicists and reservoir engineers.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- deduce reservoir properties from log interpretation and compare results to core measurements,
- define rock-types, determine electrofacies and derive K-Phi relationship,
- integrate cores, logs and well tests data for reservoir modeling.

**Ways & Means**
Real case study with cores, logs and well tests data.

**Learning Assessment**
Knowledge assessment with multiple choice questions.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training (permanent or contracted) expert in petrophysics with a wide experience and whose competencies are kept up-to-date in industry projects.

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**Course Content** 4 days

**RESERVOIR PROPERTIES FROM CONVENTIONAL & SPECIAL CORE ANALYSIS** 1 d
Core studies.
Structure and properties of porous materials: porosity, permeability, grain density.
Saturation, wettability, relative permeability and capillary pressure.
Electrical properties (m and n exponents).
Real case study: petrophysical synthesis.

**RESERVOIR PROPERTIES FROM LOG EVALUATION** 2 d
Seals, reservoirs and fluid characteristics.
Wireline logging operations and logs.
Open hole log interpretation methodology.
Determination of reservoir properties from log interpretation: lithology, porosity and water saturation (case study).
Quantitative log analysis.
Core - Log correlation and comparison of petrophysical results to core data.
Permeability estimation from logs and core data.
Real case study.

**ROCK-TYPING** 0.75 d
Introduction to rock-typing and bases of electro-facies analysis.
Electrofacies identification techniques: non-supervised and supervised approach.
Connection with both geological and reservoir models building process.
Real case study: correlate, combine and integrate consistent information from logs, core description and petrophysics.

**WELL TESTING** 0.75 d
Well test introduction and generalities.
Well test interpretation methods.
Examples and type curves.
Real case study: well test interpretation and integration with petrophysics.

**DATA INTEGRATION FOR RESERVOIR MODELING** 0.5 d
Introduction to integration for reservoir modeling.
Geological model review: structural model, stratigraphic model and petrophysical model.
Reservoir, geological and petrophysical synthesis.
Gridding and upscaling.

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Reference: RCM/PETRODATA. Can be organized as an In-House course. Contact: gre.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>12 November</td>
<td>15 November</td>
<td>€3,150</td>
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</tbody>
</table>

Alternate French: RCM/PETRODATAFR. Please contact us for more information.
# Upscaling: from Static to Dynamic Model

## Course Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO UPSCALING</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td><strong>UPSCALING METHODS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>VALIDATION</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Static validation: volumes, histograms. Dynamic validation: volumes, simulation results on fine and coarse grids, well transmissivity.</td>
<td></td>
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<tr>
<td><strong>UPSCALING WORKSHOP: REAL CASE STUDY</strong></td>
<td>2 d</td>
</tr>
</tbody>
</table>

## Level: PROFICIENCY

### Purpose
This course provides participants with a clear understanding of the techniques related to upscaling.

### Audience
Geologists and reservoir engineers involved in integrated reservoir modelling.

### Learning Objectives
Upon completion of the course, participants will be able to:

- recognize the techniques and challenges related to upscaling (properties, methods, validation).
- build required competencies to analyze reservoir heterogeneities in order to define the aggregation rate,
- apply the workflow for generating an upscaled grid using dedicated software Petrel™ and Eclipse™,
- validate the upscaled grid (static and dynamic models).

### Ways & Means
- Interactive presentations, hands-on real case study using software dedicated for reservoir modelling: Petrel™ and Eclipse™.
- Software used during workshops: with courtesy of Schlumberger.

### Prerequisites
No prerequisites for this course.

### Expertise & Coordination
IFP Training (permanent or contracted) expert in reservoir simulation with a wide experience and whose competencies are kept up-to-date in industry projects.

Reference: RCM/UPSCALE. Only available as an In-House course.

Contact: gre.rueil@ifptraining.com

This course is also available in French: RCM/UPSCALEFR. Please contact us for more information.
Borehole Imaging Interpretation Workshop with WellCad™

Purpose
This course provides participants with an understanding of current borehole imaging tools and modern interpretation techniques.

Audience
Geoscientists and reservoir engineers involved in development of naturally fractured reservoirs.

Learning Objectives
Upon completion of the course, participants will be able to:
- acquire the fundamental principles of Borehole Image Interpretation,
- apply the methodology to approach the Borehole Image Interpretation,
- perform BHI data quality control,
- identify the fractures present in the images, by differentiating them from sedimentary and artificial features,
- characterize the interpreted fractures in terms of their position, morphology, type, kinematics, orientation and dip angle, using WellCAD™.

Ways & Means
Interactive presentations, practical exercises and hands-on activities using software dedicated for BHI interpretation (WellCAD™).

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training (permanent or contracted) expert in BHI interpretation and fractured reservoirs with a wide experience and whose competencies are kept up-to-date in industry projects.

Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
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<tbody>
<tr>
<td>INTRODUCTION TO BOREHOLE IMAGING LOG</td>
<td>0.5 d</td>
</tr>
<tr>
<td>BOREHOLE IMAGE TOOLS &amp; QUALITY CONTROL</td>
<td>1 d</td>
</tr>
<tr>
<td>BOREHOLE IMAGE INTERPRETATION SOFTWARE</td>
<td>1 d</td>
</tr>
<tr>
<td>BOREHOLE IMAGE INTERPRETATION: CASE STUDY</td>
<td>2.5 d</td>
</tr>
<tr>
<td>SUMMARY, SYNTHESIS &amp; WRAP-UP</td>
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</tbody>
</table>

Reference: RCM/BHI  Only available as an In-House course.
Contact: gre.rueil@ifptraining.com

This course is also available in French: RCM/BHIFR. Please contact us for more information.
# Fracture & Fault Modeling Workshop with FracaFlow™

**Level:** PROFICIENCY

**Purpose**

This course provides participants with proficient skills for the modeling using a software dedicated to fractured reservoir characterization and modeling.

**Audience**

Geoscientists and reservoir engineers involved in development of naturally fractured reservoirs.

**Learning Objectives**

Upon completion of the course, participants will be able to apply the workflow to characterize and model the fracture network in a reservoir model.

**Ways & Means**

- Interactive presentations, practical exercises and hands-on activities using FracaFlow™.
- Software used during workshops: with courtesy of Beicip-Franlab.

**Learning Assessment**

Knowledge assessment with multiple choice questions.

**Prerequisites**

No prerequisites for this course.

**Expertise & Coordination**

IFP Training (permanent or contracted) expert in fractured reservoirs with a wide experience and whose competencies are kept up-to-date in industry projects.

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**Course Content**

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
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<tbody>
<tr>
<td><strong>INTRODUCTION &amp; DATA IMPORT (&quot;NF&quot; case study)</strong></td>
<td>0.5 d</td>
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<tr>
<td>Theoretical notions about fractured reservoirs.</td>
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<tr>
<td>Overview of OpenFlow™ platform.</td>
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<tr>
<td>Study creation, settings, 1D-2D-3D views.</td>
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<tr>
<td>Data import: reservoir grid, horizons, faults, wells and related data.</td>
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<tr>
<td><strong>FRACTURED &amp; FAULT CHARACTERIZATION (&quot;NF&quot; case study)</strong></td>
<td>0.5 d</td>
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<tr>
<td>Fracture analysis at wells: orientation, dispersion, sets creation.</td>
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<tr>
<td>Fracture density computation.</td>
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<tr>
<td>Fault analysis: length, spatial distribution, sets creation, attribute maps.</td>
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<tr>
<td><strong>MODELING, CALIBRATION, EQUIVALENT PARAMETERS COMPUTATION (&quot;NF&quot; case study)</strong></td>
<td>1 d</td>
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<tr>
<td>Fracture and fault modeling/DFN generation:</td>
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<tr>
<td>Diffuse fractures and faults.</td>
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<tr>
<td>Quality control.</td>
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<tr>
<td>Equivalent parameters computation: full field analytical upscaling.</td>
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<tr>
<td>Calibration with KH data.</td>
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<tr>
<td>Dynamic simulations: flowmeter, well test simulation.</td>
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<tr>
<td><strong>DATA IMPORT, DYNAMIC &amp; GEOLOGICAL ANALYSES (&quot;MEMBER&quot; case study)</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Data import.</td>
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<tr>
<td>Dynamic analyses.</td>
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<tr>
<td>Mud loss, flowmeter, well test, production data.</td>
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<tr>
<td>Fracture analysis, fault analysis.</td>
<td></td>
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<tr>
<td><strong>MODELING, EQUIVALENT PARAMETERS COMPUTATION ANALYSES (&quot;MEMBER&quot; case study)</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Fracture and fault modeling/DFN generation.</td>
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<tr>
<td>Diffuse fractures and sub-seismic faults.</td>
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<tr>
<td>Quality control.</td>
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<tr>
<td>Equivalent parameters computation for fracture network (Phi Block size, Kx, Ky, Kz).</td>
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<tr>
<td>Local analytical upscaling.</td>
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<tr>
<td>Full field analytical upscaling.</td>
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</tbody>
</table>

Reference: RCM/FRACA  - Only available as an In-House course.  
Contact: gre.ruell@ifptraining.com  
This course is also available in French: RCM/FRACAFR. Please contact us for more information.
Tight Reservoir Petrophysics

Level: PROFICIENCY

Purpose
This course provides knowledge and understanding of the petrophysical aspects of tight reservoirs.

Learning Objectives
Upon completion of the course, participants will be able to:
- characterize tight reservoir lithology and mineralogy, porosity, water saturation, permeability, capillary and relative permeability, quantify the Total Organic Content (TOC) and calculate Hydrocarbons In Place (HIP),
- understand and use the log core data in tight reservoirs,
- understand and characterize tight reservoir mineralogy and lithology,
- apply the principles of tight reservoir petrophysics,
- understand the use of petrophysical properties tight reservoir in the characterization and modeling workflow.

Ways & Means
- Interactive courses and exercises.
- Videos and examples with the most known unconventional reservoirs in the world.
- Hands-on practice using a real case studies data set (Oil & Gas).

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training (permanent or contracted) expert in petrophysics with a wide experience and whose competencies are kept up-to-date in industry projects.

Course Content

PETROPHYSICS IN TIGHT RESERVOIRS  1 d
Basic of tight reservoir.
Tight reservoirs in the world.
Overview of petrophysical properties in tight reservoir.
Log and core data.
Petrophysical model in tight reservoirs.
Petrophysical properties in static and dynamic models.

MINERALOGY & LITHOLOGY  1 d
Mineralogy of tight reservoirs.
Mineralogy from logging measurements and core data.
Lithology corrections.
Shale volume in tight reservoirs.
Examples from several tight plays in the word.
Lithofacies determination from log data and mineralogy.

PETROPHYSICAL PROPERTIES CALCULATION IN TIGHT RESERVOIRS  2 d
Porosity calculation in tight reservoirs.
Total Organic Content (TOC) in tight reservoirs.
Water saturation evaluation.
Hydrocarbons in place.
Sweet spots determination.
Permeability and relative permeability.
Capillary pressure.

TIGHT RESERVOIR PETROPHYSICS WORKSHOP  1 d
Examples from several tight plays in the word.
Hands-on application: 3 different datasets of tight reservoirs (Oil & Gas).

Reference: RCM/TIGHTPETRO
Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Tight Reservoir Characterization & Modeling

**Level:** PROFICIENCY

**Purpose**
This course provides information and knowledge about determining the major data requirements and modeling issues associated with tight reservoirs in general as well as how to set up rational exploitation programs for these reservoirs.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- discuss the tight reservoir characteristics at the basin scale,
- discuss the characteristics of tight reservoirs,
- discuss all geological and seismic aspects related to modeling tight reservoirs,
- integrate geology, geophysics and well data in application to a sound reservoir model,
- identify natural fractures and model their density, and orientation,
- create fracture porosity and permeability models for reservoir simulation,
- recognize the sweet spots and productive zones,
- estimate the reservoir production and the optimum development plan.

**Ways & Means**
- Interactive courses and exercises with a real case studies data set.
- Videos and examples with the most known tight reservoirs in the world.
- Hands-on practice using dedicated software to practice and generate actual reservoir models from a real data set.
- Software used during workshops: with courtesy of Beicip-Franlab and Schlumberger.

**Learning Assessment**
Knowledge assessment with multiple choice questions.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training (permanent or contracted) expert in tight reservoirs and fractured reservoir modeling with a wide experience and whose competencies are kept up-to-date in industry projects.

**Course Content**

**INTRODUCTION TO UNCONVENTIONAL RESOURCES**
1 d
Introduction to tight reservoirs.
Tight reservoirs vs. shale reservoirs.
Production from tight reservoirs in the world.
Core and well data in tight reservoirs.

**TIGHT RESERVOIRS AT THE BASIN SCALE**
2 d
Deposition and its impact on mineralogy of the tight reservoirs.
Burial history and its impact on TOC.
Tectonics and its impact on stresses and pore pressure.
Tectonics and its effect on natural fractures.
Derisking tight plays with regional sweet spots.
Tight plays potential estimation.

**TIGHT RESERVOIR CHARACTERIZATION**
2.5 d
Importance of seismic characterization of unconventional reservoirs.
Methodologies to characterize tight reservoirs.
Pre/post stack data loading and quality control of seismic, horizons, faults and wells.
Seismic attributes for tight reservoirs.
Post stack seismic attributes calculation.
Pre stack seismic attributes calculation.
Azimuthal anisotropy.
Extended Elastic Inversion.
Seismic attributes for geological and natural fractures modeling in tight reservoirs.
Seismic attributes for geomechanical modeling of tight reservoirs.
*Hands on application: 3 real data sets of tight reservoirs using dedicated software.*
Examples of the added value of seismic attributes on tight reservoir studies.

**GEOLOGIC MODELING FOR TIGHT RESERVOIRS**
2.5 d
The geology of tight reservoirs.
The use of petrophysical and drilling data in tight reservoir modeling.
The use of seismic to improve the tight reservoir model.
Geological and petrophysical properties modeling.
TOC estimation.
Natural fractures in tight reservoirs.
Natural fractures modeling in tight reservoirs.
Geological sweet spots estimation.
*Hands on application: 2 real data sets of tight reservoirs using dedicated software.*

**WORKSHOP: INTEGRATED WORKFLOW FOR MODELING TIGHT RESERVOIRS**
2 d
Integrated workflow applied to tight reservoirs: from the raw data to the engineering study.
*Hands on application: 2 real data sets from tight reservoirs using dedicated software.*
Unconventional reservoirs case studies around the world.

Reference: RCM/TIGHTMOD
*Only available as an In-House course.*

Contact: gre.rueil@ifptraining.com

www.ifptraining.com
Advanced Certificate
Advanced Multivariate Geostatistics Certification

Course Content

**MULTIVARIATE DATA ANALYSIS**
1 d
Statistics: distributions, mean, variance, correlation coefficient, linear regression.
Multivariate statistical analysis: PCA, Min-Max autocorrelation factor.
Variograms and cross-variogram: the linear model of coregionalization.

**COKRIGING & ITS VARIATIONS**
1 d
Kriging theory: building the kriging system of equations, kriging weights behavior, cross-validation.
Generalization of kriging to the multivariate case: cokriging.
Particular case of collocated cokriging.

**KRIGING WITH AUXILIARY VARIABLES**
0.5 d
Kriging with trend: universal kriging formalism.
Kriging with external drift.
Comparison between collocated cokriging and kriging with external drift.
Kriging with Bayesian drift.
Kriging with fuzzy data.

**GEOSTATISTICS & CLASSIFICATION**
0.5 d
Clustering methods for ElectroFacies calculation.
Enhancing clustering by integrating spatial constraints.
Pitfalls in ElectroFacies calculation and characterization.

**FACTORIAL KRIGING & FACTORIAL COKRIGING**
1 d
Multi-components variograms (univariate and multivariate cases).
Factorial kriging theory.
Application to data filtering.
Seismic filtering with multiple acquisitions.

**GEOSTATISTICAL SIMULATIONS IN THE MULTIVARIATE CASE**
0.5 d
Reminder about geostatistical simulations, comparison with kriging.
Theoretical overview of co-simulations of continuous variables.
A multivariate facies simulation method: truncated Pluri-Gaussian Simulations (PGS).
Complex sedimentary patterns modeling with PGS.

**SUMMARY & TEST**
0.5 d
Summary of the studied methods and their applications: Q&A session.
Final examination.

Reference: RCM/MGEOSTAT  Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Advanced Certificate
Advanced Facies Analysis & Rock-Typing Certification

Level: ADVANCED

Purpose
This course develops an integrated approach to rock-type determination combining raw logs, interpreted logs from petrophysical evaluation, core description, and laboratory petrophysical data (routine core analysis and special core analysis). It details the quality control and processing which are necessary before the integration of such data. Interpretation techniques allowing a consistent integration of these different sources of data are developed based on probabilistic classification schemes. Various means to ensure the consistency between lithofacies and petrophysical rock-types incorporating SCAL data are discussed. Various means to ensure the consistency between lithofacies and petrophysical rock-types incorporating SCAL data are discussed. Eventually it is shown how the full rock-typing scheme is validated through the modeling of initial water saturation.

Audience
Experienced geoscientists and reservoir engineers involved in multidisciplinary teams, willing to widen their knowledge in reservoir characterization.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand the meaning of rock-types and their contribution to reservoir modeling,
- recognize log signatures (electrofacies) and tie them to core facies,
- learn various porosity-permeability models and their use in rock-typing,
- define rock-types with petrophysical data (logs and laboratory data),
- perform initial water saturation modeling as a QC of rock-types.

Ways & Means
- The course content will be developed on real case studies.
- Hands-on activities are planned on all major topics.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
A basic geological knowledge makes this course more enjoyable.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Advanced Facies Analysis & Rock-Typing.
- Ready-to-use skills.

Expertise & Coordination
IFP Training (permanent or contracted) expert in facies analysis and geostatistics with a wide technical experience and whose competencies are kept up-to-date in industry projects.

Course Content

GENERAL WORKFLOW FOR ROCK-TYPING
0.5 d
The contribution of rock-types to reservoir modeling.
Electrofacies analysis with supervised and non-supervised approaches.
Preliminary quality control of logs with hands-on.
Integration of core description.
From electrofacies to rock-types.

ELECTROFACIES ANALYSIS
1.5 d
Probabilistic and neural network approaches.
Hands-on supervised analysis with probabilistic approach.
Key points and pitfalls in supervised analysis.
Hands-on non-supervised electrofacies analysis.
Key points in non-supervised analysis.
Workflows for electrofacies analysis.

POROSITY-PERMEABILITY MODELING
1 d
Porosity and permeability modeling in connection with electrofacies.
Permeability models (Carman Kozeny, Lucia, etc.) and their use in rock-typing.

SCAL DATA INTEGRATION
1 d
Introduction to SCAL data.
Capillary pressure curves transformation and integration in rock-typing.
Automatic processing of capillary pressure curves (with hands on).

WATER SATURATION MODELING
1 d
Water saturation modeling based on rock-types with hands-on.
Advanced Certificate
Seismic Reservoir Characterization: AVO & Inversion Workshop Certification

Level: ADVANCED

Purpose
This course provides deep knowledge of seismic reservoir characterization focusing on amplitudes, using both qualitative and quantitative methods and leads attendees to understand and follow every step of seismic reservoir characterization projects.

Audience
Experienced geoscientists and reservoir engineers involved in multidisciplinary teams, willing to widen their knowledge in seismic reservoir characterization.

Learning Objectives
Upon completion of the course, participants will be able to:
» understand a seismic reservoir characterization study project,
» work in a seismic reservoir characterization study project at basic level,
» perform a feasibility study and select the most appropriate workflow,
» gather and prepare data for seismic interpretation studies.

Ways & Means
» Interactive presentations, practical exercises, documents analysis.
» Workshop on case study using dedicated software.
» Software used during workshops: courtesy of Beicip-Franlab and Schlumberger.

Learning Assessment
» Assessment of the technical work during the workshop.
» Oral presentation of the case studies developed during the workshop.

Prerequisites
Basics of structural interpretation are required.

Why an IFP Training Certification?
» An international recognition of your competencies.
» An Advanced Certificate delivered.
» An expertise confirmed in Seismic Reservoir Characterization: AVO & Inversion Workshop.
» Ready-to-use skills.

Expertise & Coordination
IFP Training (permanent or contracted) expert in seismic reservoir characterization with a wide technical experience and whose competencies are kept up-to-date in industry projects.

Course Content

WEEK 1

Qualitative interpretation: seismic stratigraphy & attributes 2 d
Stratigraphic hydrocarbon traps.
Well-to-seismic calibration.
Seismic amplitude interpretation.
Seismic resolution.
Seismic attributes for stratigraphic interpretation.
DHI analysis: Bright or Dim spot.
From basin estimation to reservoir characterization.
Weekly test.
Correction and conclusions.

Workshop
Case study presentation. Hands-on objectives.
Interpretation of sedimentary bodies.
Unconformity and angularity, sequence identification and picking:
» Top and base picking of sedimentary sequence in the tertiary group.
» Interpretation of prograding sub-sequences using seismic facies analysis (amplitude, energy, phase, etc.).
Other structures’ evidence through structural attributes analysis:
» Channels delineation and interpretation using structural attributes.
» Other structural elements.
Seismic evidence of a reservoir. Detection and analysis:
Amplitude and seismic attributes anomalies analysis at sequence top (DHI, gas shadows, etc.).
Analysis of seismic character modification in the vicinity of the reservoir (reflectivity, phase or frequency changes, multiples enhancement, structural anomalies, etc.).
Seismic attributes analysis and characterization:
Analysis of seismic inversion and porosity attributes in potential traps.
Attribute comparison in potential trap areas, seismic facies analysis and characterization.
Participants’ results presentation.
Feedback and wrap-up.

WEEK 2

Quantitative interpretation: inversion & AVO 2 d
Fundamentals of rock physics.
Wavetlet.
Log time-to-depth conversion and resampling. Aliasing.
Acoustic impedances and seismic inversion.
AVO principles and interpretation.
Well data and seismic data preconditioning for seismic characterization.
Quantitative reservoir property prediction: lithologies and fluids.
Weekly test.
Correction and conclusions.

Workshop
Case study presentation. Hands-on objectives.
Log time-to-depth conversion and resampling.
Wavelet generation.
Acoustic impedances and synthetic trace generation.
Synthetic AVO case (amplitude vs. offset):
» AVO modeling: 4 classes.
» AVO interpretation.
DHI interpretation (bright spot). Fluid content determination.
Participants’ results presentation.
Feedback and wrap-up.

Reference: RCM/SEISMIC

Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Advanced Certificate
Geological Characterization & Modeling - Integrated Workshop Certification

Level: ADVANCED

Purpose
This course provides a comprehensive, practical knowledge of reservoir characterization & modeling workflow, via hands-on activities and case studies with the aim of bridging the gap between static geological characterization and reservoir dynamic behavior.

Audience
Experienced geoscientists and reservoir engineers involved in multidisciplinary teams, willing to widen their knowledge in reservoir characterization and modeling.

Learning Objectives
Upon completion of the course, participants will be able to:
- provide a clear understanding of techniques and challenges related to reservoir modeling (focus on reservoir properties),
- build required competencies for analyzing datasets and constructing reliable static model,
- emphasize reservoir modeling main goal: reduce subsurface uncertainties (reduce risk and optimize investments).

Ways & Means
- Interactive lectures, videos, practical exercises and hands-on activities with the aim of producing a reservoir model using dedicated software for rock-typing (EasyTrace™) and geomodeling (Petrel™).

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- Ready-to-use skills.

Expertise & Coordination
IFP Training (permanent or contracted) expert in geomodeling with a wide experience and whose competencies are kept up-to-date in industry projects.

Course Content

10 days

WEEK 1: RESERVOIR CHARACTERIZATION

Introduction to reservoir characterization 1 d

Reservoir architecture 1.5 d

Facies analysis - Rock-typing 1.5 d

Petrophysics & rock properties - Reservoir heterogeneities 1 d

WEEK 2: RESERVOIR MODELING (workshop on case study)

Basic principles - Reservoir characterization workflow 0.5 d
Introduction and objectives. Case study: field presentation.

Project organization 0.5 d

Structural modeling 1.5 d

Rock-typing & property modeling 1.5 d

Volume calculation 1 d

Reference: RCM/ROM Only available as an In-House course. Contact: gre.rueil@ifptraining.com

www.ifptraining.com
Tools for Seismic Reservoir Characterization: Pre-Stack Seismic Inversion

Level: ADVANCED

Purpose

This course makes participants able to perform a pre-stack seismic inversion, feasibility, QC and some clues to interpret the results. This training can be followed by the Post-Stack Seismic (page 117) inversion session to complete inversion technique skills.

Audience

Geophysicists, and senior/junior geoscientists with a solid seismic background knowledge.

Learning Objectives

Upon completion of the course, participants will be able to:

- run a feasibility study for seismic pre-stack inversion,
- prepare and load data for seismic pre-stack inversion,
- run and supervise a seismic pre-stack inversion,
- perform quality control and interpret the results.

Ways & Means

The training will be performed in workshop mode, using a standard case study*. Interactive presentations, exercises, document analysis will help to understand the key steps.

Dedicated industry software will be used for this training.

Software used during workshops: with courtesy of Schlumberger.

Learning Assessment

Knowledge assessment with multiple choice questions.

Prerequisites

The training session called “Seismic Reservoir Characterization: AVO & inversion workshop certification” (page 114) is highly recommended before this one.

More info

* F3 North-sea block data. However data can eventually be provided by the client with prior agreement.

Expertise & Coordination

IFP Training (permanent or contracted) expert in seismic reservoir characterization with a wide technical experience and whose competencies are kept up-to-date in industry projects.

Reference: RCM/PRESTACK  Only available as an In-House course. Contact: gre.rueil@ifptraining.com

Course Content

5 days

INTRODUCTION & REMINDERS

Model-based pre-stack inversion: What for? How does it work? Examples. 0.25 d

DATA LOADING & FEASIBILITY

Loading well, seismic, horizon data. Initial feasibility: what is the purpose of this inversion? Analysis of the data. Gather analysis and preconditioning. 0.75 d

WELL-TO-SEISMIC CALIBRATION & WAVELETS

Sonic log correction. Seismic wavelet extraction and analysis. Well-to-seismic calibration. Choosing final wavelets. 1 d

INITIAL MODELING

Role of initial or low frequency model. Choosing wells and horizons. Initial model building: IP, IS, Rho. 1 d

INVERSION TESTING & RUNNING

Inversion parameter sensitivity testing. Running final inversion. QC of inversion results. 1 d

INTERPRETING THE RESULTS

Tools for Seismic Reservoir Characterization: Post-Stack Seismic Inversion

Course Content

INTRODUCTION & REMINDERS

DATA LOADING & FEASIBILITY
Loading well, seismic, horizon data.
Initial feasibility: what is the purpose of this inversion? Analysis of the data.

WELL-TO-SEISMIC CALIBRATION
Sonic log correction.
Seismic wavelet extraction and analysis.
Calibrating wells to seismic.

INITIAL MODELING
Role of initial or low frequency model.
Choosing wells and horizons.
Initial model building.

INVERSION TESTING & RUNNING
Inversion parameter sensitivity testing.
Running final inversion.
QC of inversion results.

INTERPRETING THE RESULTS
Interpretation of inversion.
Refining seismic interpretation.
Quantitative reservoir property prediction: lithologies and fluids.
Uncertainty analysis.

Reference: RCM/POSTSTACK
Only available as an In-House course.
Contact: gre.rueil@ifptraining.com

Level: ADVANCED

Purpose
This course makes participants able to perform a post-stack seismic inversion, QC and interpret the results, in order to finally detect and quantify lithologies, porosities and fluid content using seismic amplitudes and well information. This training can be followed by the "Tools for seismic reservoir characterization: Pre-Stack Seismic inversion" session (page 116) to complete inversion technique skills.

Audience
Geophysicists, and senior/junior geoscientists with a solid seismic background knowledge.

Learning Objectives
Upon completion of the course, participants will be able to:
- run a feasibility study for seismic post-stack inversion,
- prepare and load data for seismic post-stack inversion,
- run and supervise a seismic post-stack inversion,
- perform quality control and interpret the results.

Ways & Means
- The training will be performed in workshop mode, using a standard case study. Interactive presentations, exercises, document analysis will help to understand the key steps.
- Dedicated industry software will be used for this training.
- Software used during workshops: with courtesy of Schlumberger.

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
The training session called “Seismic Reservoir Characterization: AVO & Inversion Workshop Certification” (page 114) is highly recommended before this one.

Expertise & Coordination
IFP Training (permanent or contracted) expert in seismic reservoir characterization with a wide technical experience and whose competencies are kept up-to-date in industry projects.
SRC: Seismic Reservoir Characterization
E-learning with remote personal coaching

Course Content

SEISMIC RESERVOIR CHARACTERIZATION
What is seismic reservoir characterization, how is it integrated? Methods used and scale issues.

ROCK PHYSICS

PHYSICS AND AVO PRINCIPLES

CALIBRATION

AVO IN PRACTICE
Introduction to AVO interpretation. AVO class. AVO facies volume.

INVERSION

RESERVOIR PROPERTIES PREDICTION

Level: FOUNDATION

Purpose
This course provides a comprehensive, practical understanding of how seismic data is used to characterize, model and rank reservoirs.

Audience
Geologists, geophysicists and reservoir engineers with basic knowledge in geophysics.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand the relationship between physical properties of rocks and geophysics.
- master the main steps of seismic reservoir characterization workflow, to perform QC and to assess data to be interpreted and related uncertainties.
- interpret major results of petro-elastic analysis and modeling, AVO-AVA and inversion studies and to understand methodological issues in seismic inversion, attributes classification and reservoir properties prediction.

Ways & Means
- The first 2 hours are dedicated to introducing agenda, methods and tools.
- Specific needs and expectations of each participant are also assessed and discussed (MCQ and phone interview with the tutor).

Prerequisites
No prerequisites for this course.

More info
Total training duration is 24 hours, spread over a 6-week period.

Expertise & Coordination
IFP Training (permanent or contracted) expert in seismic reservoir characterization a wide experience and whose competencies are kept up-to-date in industry projects, as well as support from IFP Training blended learning specialist.

Reference: RCM/BLSRC
Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Static Model Construction: Field Constraints & Integration with Subsurface Data
Organized in collaboration with Cambridge Carbonate Ltd

Level: ADVANCED
Purpose
The Jurassic outcrops of Eastern Paris Basin are exceptional quality analogues for several producing oil fields, especially regarding sequence stratigraphy features and typical carbonate platforms architecture. Recent diagenetic and petrophysical investigation performed on selected outcrops and in equivalent subsurface provide a unique opportunity of proposing an updated, complete and integrated overview of shallow marine carbonates.

Audience
Geologists, geophysicists, petrophysicists and reservoir engineers. Fundamentals of carbonate sedimentology may be a useful prerequisite, but a quick reminder can be organized in the field.

Learning Objectives
Upon completion of the course, participants will be able to:
> review the constraints to the static model in the field,
> integrate outcrop observation with subsurface data: sedimentary architectures,
> show the distribution and evolution of petrophysical properties through diagenesis.

A geological and petrophysical static model was performed over a large area centered on the main zone of interest, along an extended stratigraphic interval (Bajocian to Kimmeridgian).

Ways & Means
Outcrop sections (quarries), cores, well logs, thin section photographs, RCA data, NMR logs.

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
No prerequisites for this course.

More info
Fees include accommodation and transportation on field trip location.

Expertise & Coordination
IFP Training contracted expert in carbonates with a wide experience and whose competencies are kept up-to-date in industry projects. This course is proposed in collaboration with Cambridge Carbonate Ltd.

Reference: RCM/CARBFT

Course Content

DAY 1
AM: Meeting point on field trip location.
PM: Presentation of the stratigraphic succession and of the aims of the trip.
Early Bajocian platform: 1 quarry (out of 2 possible) with illustration of coral bioconstructions and inter-bioherms sedimentation. Integration with 3D seismic observations. Quick reminder on basics of carbonate sedimentology on site if required.

DAY 2
AM: Late Bajocian flooding (flooding of the Early Bajocian carbonate platform) and subsequent establishment of Bathonian platform; discussion about forcing parameters on carbonate platform growths and demise. One type section in a quarry.
PM: Bathonian platform outcrops (3) in distal (offshore), shoal (Ooid shoal) and proximal environments; introduction to the local petrophysics (porosity, permeability, NMR, MICP…) and reservoir problematic. First integration and discussion of the 3D geological and reservoir model (input, controls on facies and poro-perm distribution in the Middle Jurassic carbonates).

DAY 3
Visit of the Andra Underground Research Laboratory (to be confirmed) + core store with examples of subsurface equivalent of what has been and will be observed on outcrops AND/OR outcrops illustrating the return of carbonate sedimentation after the Callovian-Oxfordian marls, and the establishment of the Oxfordian platform; discussion about forcing parameters on carbonate platform growths and demise.

DAY 4
Visit of quarries (2 or 3) to illustrate the evolution of the Oxfordian/Kimmeridgian platform evolution; discussion about the evolution of the architecture of the platform, and regarding the distribution of depositional environments distribution.
Introduction to the local petrophysics (porosity, permeability, NMR, MICP…) and reservoir problematic. Second integration and discussion of the 3D geological and reservoir model (input, controls on facies and poro-perm distribution in the Upper Jurassic carbonates).

DAY 5
AM: Optional quarry AND/OR local gastronomy specialties.
PM: Travel back to Paris.

www.ifptraining.com

Contact: gre.rueil@ifptraining.com
Fundamentals of Reservoir Geology

Level: PROFICIENCY

Purpose

This course provides an in-depth understanding of reservoir geology, covering concepts as well as data reviewing and modeling.

Audience

Newly-hired and 2- to 3-year experienced reservoir engineers willing to deepen their knowledge in reservoir fluid properties and PVT modeling. Is also is intended for geoscientists, petroleum engineers and production engineers moving towards reservoir engineering.

Learning Objectives

Upon completion of the course, participants will be able to:

- Discuss main concepts of Reservoir Geology, especially petrophysical concepts, used in the description of reservoirs and the way the corresponding rock properties are measured from cores.
- Access to rock properties from log interpretation and compare to core measurements.
- Define petro-facies, electro-facies and rock-types.
- Integrate cores, logs and well tests data for reservoir modeling.
- Apply the workflow for building a reservoir static model using dedicated software.
- Identify and assess the uncertainties within the geomodeling workflow.

Ways & Means

- Interactive lectures, exercises.
- Hands-on practice using software dedicated to reservoir modeling (PETREL™ and EasyTrace™).
- Software used during workshops: with courtesy of Beicip-Franlab and Schlumberger.

Learning Assessment

Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: RCM/RESGEOL  
Only available as an In-House course.  
Contact: gre.rueil@ifptraining.com

Course Content

INTRODUCTION TO RESERVOIR CHARACTERIZATION (E-200)  
5 d

- Reservoir characterization and modeling objectives.
- Reservoir characterization and modeling workflows.
- Data and related uncertainty.
- Data integration.
- Reservoir architecture:
  - Seismic interpretation and pitfalls.
  - Well log analysis.
- Facies analysis.
- Rock-typing.
- Petrophysics and rock properties.
- Reservoir heterogeneities.

PETROPHYSICS - RESERVOIR PROPERTIES FROM CORES & LOGS EVALUATION  
5 d

- Reservoir properties from conventional and special core analysis:
  - Coring.
  - Porosity: definition and measurements (effective and total porosity); pore size distribution by NMR and mercury Injection.
  - Single-phase permeability: definition and measurements; liquid and gas permeability, Klinkenberg correction; permeability composition.
  - Capillary pressure: definition and measurements (porous plates and centrifuge/interpretation, local saturation); from lab to reservoir: Pc to determine reservoir initial saturations and transition zones.
  - Wettability: definition and measurements (Amott index, USBM index); influence of wettability on Pc.
  - Electric measurements. Formation factor and Resistivity Index (RI).
  - Multi-phase permeability: Darcy’s law for two-phase flows core analysis; relative permeabilities: steady-state, unsteady-state, interpretations, synthesis.
  - Influence of wettability on the relative permeabilities.
  - Petrophysical rock-typing. Leverett J functions.
- Reservoir properties from log evaluation:
  - Wireline logging operations and logs.
  - Open-hole log quick-look interpretation methodology.
  - Determination of reservoir properties from log interpretation (non-reservoir and reservoir zones, porosity, contacts, Archie’s law and saturations).

RESERVOIR MODELING WORKSHOP  
5 d

- Basic principles: introduction and objectives.
- Case study: field presentation and data discussion.
- Project definition:
  - Data QC and summary table.
  - Interpolation and basic reservoir modeling.
- Structural framework:
  - Structural context.
  - Time depth conversion.
  - Surfaces modeling and quality control.
  - Fault modeling and regions.
  - Well correlation and stratigraphic data analysis.
- Grid building; grid zones and layering; geo-cellular grid validation.
- Rock-type and facies modeling:
  - Basic of geostatistics.
  - Rock-typing.
- Data analysis and facies modeling.
- Property modeling:
  - Petrophysical modeling.
  - Seismic drivers in reservoir modeling.
  - Geological model analysis: N-t-G, porosity, permeability and water saturation.
  - Volumetric, upscaling and uncertainty:
    - Hydrocarbon volume calculation.
    - Structure and properties upscaling.
    - Quantification of uncertainty. Sensitivity analysis and ranking of models.
  - Inputs for reservoir simulators.
  - Summary, synthesis and wrap-up.
Core Analysis for Reservoir Characterization

Level: PROFICIENCY

Purpose
This course provides a comprehensive and practical understanding of methods, procedures and issues related to laboratory conventional and special core analysis for describing and evaluating reservoir rock properties, and all considerations that should be taken into account for reservoir characterization.

Audience
Geoscientists, petrophysicists, reservoir engineers, petroleum engineers and other E&P professionals willing to deepen their knowledge in conventional and special core analysis.

Learning Objectives
Upon completion of the course, participants will be able to:
- discuss rock properties used in reservoir modeling and reservoir simulation models,
- discuss, interpret and validate a CCAL and a SCAL report and review a quality control process,
- design a SCAL program with regard to given objectives.

Ways & Means
- Highly interactive course alternating theory, exercises and field cases.
- Use of the SCAL (Special Core Analysis) license free simulator SCORES.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and experience of Core Analysis, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

Coring & Core Analysis 0.5 d

Generalities on Two-Phase Flow Properties 0.5 d

Conventional Core Analysis 1 d
Porosity definition and measurement. Permeability (absolute) definition and measurements. Formation factor and Resistivity Index definition and measurement. Mercury injection (MICP) for reservoir saturation height function and pore size distribution. Recent developments in MICP showing important problems in MICP for low permeability rock when assessing transition zones.

Special Core Analysis (SCAL), Measurements of SCAL Properties 1 d

Quality Control of Available Data 1 d
Sample selection using X-ray CT for homogeneity assessment. Representative wettability, special considerations for transition zones. Recognizing unusual features.

Averaging Petrophysical Properties 0.5 d

Design of SCAL Program 0.5 d
Demonstration step-by-step approach. Establish SCAL program objective. Understanding of strength and weaknesses of each SCAL method. Need for imbibition capillary pressure to interpret relative permeability data.

Reference: RCM/CONSCAL Only available as an In-House course.

Contact: gre.rue@ifptraining.com

www.ifptraining.com
**Special Core Analysis**

**Level:** PROFICIENCY

**Purpose**

This course provides a comprehensive and practical understanding of methods, procedures and issues related to evaluation of special rock properties such as relative permeability and capillary pressure at laboratory and all considerations before their application in reservoir simulation.

**Audience**

Geoscientists, petrophysicists, reservoir engineers, petroleum engineers and other E&P professionals willing to deepen their knowledge in special core analysis.

**Learning Objectives**

Upon completion of the course, participants will be able to:
- discuss the business impact of Special Core Analysis (SCAL) measurements using state-of-the-art laboratory and data interpretation techniques,
- design a SCAL measurement program,
- assess the quality of SCAL reports,
- implement SCAL data into reservoir simulation studies.

**Ways & Means**

- Highly interactive course alternating theory, exercises and field cases.
- Use of the SCAL (Special Core Analysis) license free simulator SCORES.

**Learning Assessment**

Knowledge assessment with multiple choice questions and open explanatory questions.

**Prerequisites**

No prerequisites for this course.

**Expertise & Coordination**

IFP Training trainers (permanent or contracted) having a good expertise and experience of Core Analysis, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

**INTRODUCTION**

- Business value of SCAL, remaining vs. residual oil saturation, wettability.
- Best practice: need for interpretation-by-simulation.
- General overview of laboratory measurement techniques.

**STEADY-STATE TECHNIQUE**

- Basics: experimental set-up in the lab, physics of the experiment, horizontal vs. vertical, automation of data gathering.
- Analytical interpretation: data consistency, design of experiments, choices for fractional flow.
- Residual oil vs. remaining oil saturation, impact of imbibition capillary pressure, oil end-effect.
- Impact of drainage capillary pressure, water end-effect.

**CORE PLUG PREPARATION & UNSTEADY-STATE TECHNIQUE**

1 d

Core plug preparation:
- Use of the SCAL (Special Core Analysis) license free simulator SCORES.
- Establish initial water saturation:
  - Mercury injection (MICP) for reservoir saturation height functions and pore size distribution.
  - Recent developments in MICP showing important problems in MICP for low permeability rock when assessing transition zones.
- Ageing.
- Unsteady-State (Welge) technique:
  - Basics: experimental set-up in the lab, physics of the experiment, horizontal vs. vertical, automation of data gathering; analytical interpretation with exercises in Excel™.
  - Analytical calculation of shock front saturation, JBN method.
  - Impact of drainage capillary pressure, water end-effect.
  - Impact of capillary forces, capillary number and desaturation.

**CENTRIFUGE TECHNIQUE & SCAL DATA QUALITY ASSESSMENT**

1 d

Centrifuge technique:
- Basics: experimental set-up in the lab, physics of the experiment, drainage vs. imbibition hardware, automation of data gathering.
- Analytical interpretation: data consistency, design of experiments, choices for fractional flow.
- Best practice: interpretation-by-simulation, hands-on exercises with the SCORES/DuMux simulator:
  - Effect of oil viscosity, characteristic time.
  - Impact of water mobility in imbibition experiments.
  - Impact of capillary forces.
  - History matching multi- and single-speed experiments.
- SCAL quality assessment:
  - How to recognize bad data?
  - Best practice: verifying data consistency.
- Implement SCAL data into reservoir simulation studies:
  - Rock-typing.
  - Gridding for reservoir simulation.

**POROUS PLATE TECHNIQUE, SCAL FOR GAS FLOODING EXPERIMENTS, STRENGTHS & WEAKNESSES OF EACH SCAL TECHNIQUE**

1 d

Porous plate technique - Basics:
- Experimental set-up in the lab, physics of the experiment, capillary continuity, multiple plugs vs. single plug equipment, automation of data gathering.
- Analytical interpretation with exercises in Excel™, recognizing equilibrium, characteristic time.
- Impact of drainage capillary pressure, water end-effect.
- Impact of water mobility in imbibition experiments.
- Effect of oil viscosity, characteristic time.
- Hagoort analysis for single-speed experiments.
- Hagoort criterion for viscous fingering.
- Hagoort analysis for single-speed experiments.

**SCAL FOR EOR & SCAL MASTER MEASUREMENT PROGRAM**

1 d

SCAL for EOR:
- Introduction into EOR techniques in the field.
- Understanding scope for EOR.
- Issues and design of SCAL experiments for low salinity flooding, Microbial EOR, CO₂ EOR, Thermal EOR, Chemical EOR, EOR in fractured reservoirs.
- Plenary discussion on the design of a best practice master measurement program:
  - At the end of this discussion, a comprehensive handout will be distributed that serves as a Master SCAL measurement program for future use in the office.

**Reference:** RCM/SCAL

**Only available as an In-House course.**

**Contact:** gre.rueil@ifptraining.com
**NEW** Geomechanics for Geoscientists

**Level:** PROFICIENCY

**Purpose**
This training course aims to ensure the understanding of geomechanics-related phenomena that affect reservoir exploitation management and safety such as compaction/subsidence, reservoir cover layer fracturing, fault activation, and to be aware of the techniques used in the petroleum industry to mitigate these phenomena.

**Audience**
Geoscientists (reservoir engineers, geologists, geophysicists).

**Learning Objectives**
Upon completion of the course, participants will be able to:
- acquire the basic geomechanical knowledge useful for reservoir applications,
- understand the connection between stress, pressure and temperature both in the reservoir and in the cover layers at the origin of compaction, fracturing and fault activation,
- know the workflow and the data needed to build a geomechanical model first at the well scale and then at the reservoir scale,
- interpret model results to assess compaction/subsidence, the maximum injection pressure, fault integrity.

**Ways & Means**
Application exercises adapted to reservoir exploitation situations.

**Learning Assessment**
Acquired knowledge will be assessed through studies based on real cases. In each study, participants will have to analyze the situation to provide a diagnosis and possible solutions.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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**Course Content**

**INTRODUCTION TO GEOMECHANICS IN THE PETROLEUM INDUSTRY**
0.25 d
Review of all the applications of geomechanics in the reservoir and drilling fields illustrated with real cases.

**THEORETICAL BASES USEFUL FOR RESERVOIR APPLICATIONS**
2 d
Stresses, deformations, yield.
Connection between stress, pressure and temperature.
Rock tensile failure.
Rock shearing failure.
Fault activation criterion.
Laboratory measurements of tensile and rupture properties.
Measurements of pore compressibility.
Geomechanical model of wells (formation pressure, stress and mechanical properties) and calibration from laboratory measurements and logs and well tests, particularly the leak-off test, induced fractures and oval shapes.

**IMPACT OF GEOMECHANICS ON RESERVOIR SAFETY & MANAGEMENT**
2 d
Workflow of the building of a coupled reservoir and geomechanical model.
Arching effect.
Compaction and subsidence calculations and assessment of the related risks.
Determination of the maximum injection pressure and the storage capacity in a reservoir.
Methods of monitoring of reservoir cover layer integrity.

**APPLICATION**
0.75 d
Exercise based on one or several real cases gathering the major issues of reservoir geomechanics. Knowledge assessment.

Reference: RCM/GEOM  Only available as an In-House course.
Introduction to Reservoir Engineering

Course Content

RESERVOIR ENGINEERING WORKFLOW
Introduction to E&P and reservoir engineering workflow through interactive teamwork.

FUNDAMENTALS OF RESERVOIR CHARACTERIZATION
1.25 d
Petroleum geology:
- Type of rocks.
- Hydrocarbon genesis.
- Petroleum systems.
Rock properties and petrophysics:
- Cores and coring operations
- Porosity, permeability, saturations.
- Capillary pressure, wettability, relative permeability.
Well log interpretation:
- Logging operations and log environment (borehole, invasion profile).
- Fundamental equations for log interpretation in clean formations.
- Main open-hole logs. Quick-look qualitative interpretation technique.
Reservoir fluids properties (oil, gas, water):
- Fluids composition (hydrocarbons).
- Thermodynamics equilibrium. Phase envelope.
- Main PVT parameters: FVF, Rs,GOR, etc.

FUNDAMENTALS OF RESERVOIR ENGINEERING
2 d
Well testing and well test analysis:
- Well and reservoir performance and the need for testing.
- Practical well test operations: types of tests, well testing equipment.
- Darcy’s law, diffusivity equation and typical flow regimes.
- Productivity index, radius of investigation.
Well test interpretation: pressure curves analysis, pressure derivative.
Drive mechanisms:
- Primary recovery: oil reservoirs (natural depletion, natural water drive) and gas reservoirs.
- Secondary recovery: water flooding, gas injection.
- EOR: miscible gas injection, chemical flooding, thermal flooding.

CASE STUDY: FIELD DEVELOPMENT
0.5 d
Application to an oil field evaluation and development:
- Identification of drive mechanisms.
- Reserves estimation and field development set-up.

FUNDAMENTALS OF RESERVOIR SIMULATION
0.5 d
Principles and objective of reservoir simulation:
- Reservoir simulation models - Building the models.
- Reservoir simulators - Black-oil, compositional, thermal, chemical, etc.
Reservoir simulation workflow.
- Data review. History match. Production forecast.
Introduction to a reservoir simulator - ECLIPSE™:
- Data set review. Grid. Petrophysical data. PVT data. Wells and production constraints.
Analyzing some simulation results on various reservoir models.

RESERVES DEFINITION & CLASSIFICATION
0.5 d
Reserves and resources:
- Economics criteria.
- Risks and uncertainties.
- Reserves and resources definition & classification.
Oil & Gas reserves. Some figures.

Reference: RENG/INFORES
Can be organized as an In-House course.
Contact: gre.rueil@ifptraining.com

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<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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<td>20 September</td>
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This course is also available in French: RENG/INFORESFR. Please contact us for more information.
Reservoir Fluid Properties - PVT
Reservoir fluids properties - Oil - Gas

Level: PROFICIENCY

Purpose
This course provides a comprehensive and practical understanding of Oil & Gas reservoir fluids properties and related behavior as well as corresponding data and laboratory PVT experiments.

Audience
Newly-hired and 2- to 3-year experienced reservoir engineers willing to deepen their knowledge in reservoir fluid properties and PVT models. It is also intended for geoscientists, petroleum engineers and production engineers moving towards reservoir engineering.

Learning Objectives
Upon completion of the course, participants will be able to:

- discuss main principles of thermodynamics applied to reservoir engineering studies,
- describe reservoir fluids and discuss corresponding fundamental PVT properties,
- describe the PVT studies performed in order to get PVT data,
- describe and apply the process to build PVT models from experimental data, especially for reservoir simulation.

Ways & Means
- Interactive lectures and exercises.
- Analyzing a real PVT report.
- Hands-on practices using state-of-the-art EOS package for PVT matching.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

FUNDAMENTALS OF THERMODYNAMICS
1.5 d
Petroleum fluids genesis.
Chemical composition of petroleum fluids:
- Hydrocarbon families.
- Compositional presentation of reservoir fluids.
Thermodynamics of petroleum fluids:
- Pure component, binary mixture, multi-component systems. Phase behavior.
- Hydrocarbon fluids: under saturated oil, saturated oil, dry gas, wet gas, retrograde gas. Phase envelope.
Measurements:
- Sampling:
  - Bottom hole and surface sampling.
  - Representativity and validity of sampling.
  - Analysis.
- PVT studies: oil - gas condensate.

PROPERTIES OF HYDROCARBON FLUIDS
2.5 d
Thermodynamics: mixture equilibrium, fluids classification.
Liquid-vapor equilibrium:
- Real equilibrium, thermodynamics potential, fugacity.
- Saturation pressure, formation volume factor, density, compressibility, viscosity.
Equation of state:
- Peng-Robinson, Soave-Redlich-Kwong.
- Liquid-vapor calculation.
Analytical representation: properties of light and heavy cuts.
Fluid modeling: PVT matching.
Fluid synthesis: gravity segregation, field cases, miscibility.
Downstream data: data for reservoir simulator and process.

PVT MODELING
1 d
Matching a PVT model to experimental data using a PVT EOS package.

Reference: RENG/PVT
This course is also available in French: RENG/PVTFR. Please contact us for more information.

Contact: gre.rueil@ifptraining.com
Location Start Date End Date Tuition Fees
Rueil 7 October 11 October €3,150

Can be organized as an In-House course.
Drilling & Completion -
Wellbore Interface & Well Productivity

Course Content

FUNDAMENTALS OF DRILLING
Well design. Casing program.
Drilling equipment and techniques.
Directional drilling.
Drilling fluids (mud).
Different types of rigs. Specific offshore problems.

FUNDAMENTALS OF COMPLETION
Completion: operations involved, main phases.
Main factors influencing completion design.
Completion configurations: fundamental requirements, main configurations.

WELL PRODUCTIVITY (Part 1)
Fundamentals: overall approach of the well flow capacity.
Inflow (study of the bottomhole pressure from the upstream side):
  - Main parameters, Productivity Index (PI), global skin and flow efficiency.
Outflow (study of the bottomhole pressure from the downstream side):
  - Case of oil wells and case of gas wells.
Analysis of inflow and outflow performance curves, need for artificial lift.

RESERVOIR-WELLBORE INTERFACE IMPLEMENTATION (excluding “wellbore treatments”) Specific aspects linked to drilling and cementing the pay zone.
Perforating: main techniques, key parameters for productivity.
Specific case of horizontal drains.

WELL PRODUCTIVITY (Part 2)
Additional information about Productivity Index (PI):
  - Productivity Index and flow regime.
Inflow performance below bubble point pressure (IPR).
Additional information about skin:
  - Components of completion skin.
  - Damage skin estimation.

Ways & Means
Interactive lectures and exercises.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: RENG/WELLPROD
Can be organized as an In-House course.

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<th>Start Date</th>
<th>End Date</th>
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<td>14 October</td>
<td>18 October</td>
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This course is also available in French: RENG/WELLPRODFR. Please contact us for more information.
Well Testing & Well Test Analysis

**Level:** PROFICIENCY

**Purpose**
This course provides a comprehensive and practical understanding about performing set-up, design and analysis of well tests.

**Audience**
Newly-hired and 2- to 3-year experienced reservoir engineers willing to deepen their knowledge in reservoir fluid properties and PVT modeling. It is also intended for geoscientists, petroleum engineers and production engineers moving towards reservoir engineering.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- discuss the theory of well test analysis,
- identify main flow regimes and models,
- carry out simple well test analysis,
- define or recommend a well test design.

**Ways & Means**
- Interactive lectures and exercises.
- Hands-on practice based on synthetic and real data using hand and spreadsheet calculations and SAPHIR™ dedicated industrial software.
- Software used during workshops: with courtesy of Kappa Engineering.

**Learning Assessment**
Knowledge assessment with multiple choice questions and open explanatory questions.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content 5 days**

**INTRODUCTION TO WELL TESTING, BASIC EQUATIONS & METHODS** 1 d
Objective of well testing.
Practical well test operations: types of tests, equipment, safety and environmental issues.
Definitions and typical flow regimes: radial flow, fractured reservoirs, limited reservoirs and closed reservoirs.
Productivity Index (PI), radius of investigation.
Darcy’s law and the diffusivity equation.
Time superposition, multirate testing.
Space superposition, boundary effect.
Pressure curves analysis.
Pressure derivative curves analysis.

**WELLBORE CONDITIONS** 0.5 d
Wellbore storage and skin effects.
Infinite and finite conductivity vertical fracture.
Well in partial penetration.
Horizontal well.
Skin factors, geometrical skin and well deliverability.

**RESERVOIR HETEROGENEITIES** 1 d
Double porosity models: pseudo-steady state and transient state models.
Double permeability models.
Composite reservoir models.

**BOUNDARY MODELS** 1 d
One sealing fault model.
Two parallel sealing faults model/two intersecting sealing faults model.
Closed system model and reservoir limits testing.
Constant pressure boundary model.

**TEST DESIGN - HANDS-ON SESSION** 1 d
Rate history definition.
Time and pressure error.
Changing wellbore storage.
Phase segregation.
Interpretation procedure.
From the initial diagnosis to the final consistency check of the results.
Reporting and presentation of results.
Examples of test response.

**GAS WELLS: REVIEW & APPLICATIONS** 0.5 d
Hypothesis for gas wells testing. Darcy and non-Darcy flow.
Pseudo-pressure and inertial effects.
Gas wells deliverability:
Absolute open flow potential.
Houpert method.
Back pressure tests. Isochronal tests. Modified isochronal tests.

Reference: RENG/WELLTEST  Can be organized as an In-House course.
Contact: gre.rueil@ifptraining.com

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<th>Start Date</th>
<th>End Date</th>
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<td>25 October</td>
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This course is also available in French: RENG/WELLTESTFR. Please contact us for more information.
Drive Mechanisms - Enhanced Oil Recovery

Material balance

Level: PROFICIENCY

Purpose

This course provides an in-depth understanding of reservoir drive mechanisms and Enhanced Oil Recovery (EOR) methods and corresponding recovery performances.

Audience

Newly-hired and 2- to 3-year experienced reservoir engineers willing to deepen their knowledge in drive mechanisms and Enhanced Oil Recovery methods. It is also intended for geoscientists, petroleum and production engineers moving towards reservoir engineering.

Learning Objectives

Upon completion of the course, participants will be able to:

- discuss the natural mechanisms of production of Oil & Gas reservoirs and their corresponding expected performance,
- discuss the mechanisms of secondary recovery through water injection and non-miscible gas injection and their related expected performance,
- list the main Enhanced Oil Recovery methods and discuss their mechanisms and corresponding expected performance,
- describe typical EOR projects workflow and related screening criteria and economics,
- carry out simple material balance calculations for matching reservoir parameters/forecast recovery.

Ways & Means

- Interactive lectures and exercises.
- Real field case studies.
- Hands-on practices using MBAL™ dedicated industrial software for PVT matching, history matching and production forecast through material balance.

Learning Assessment

Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>DRIVE MECHANISMS - PRIMARY RECOVERY</th>
<th>2 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil reservoirs:</td>
<td></td>
</tr>
<tr>
<td>Undersaturated oil expansion.</td>
<td></td>
</tr>
<tr>
<td>Solution gas drive.</td>
<td></td>
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<tr>
<td>Gas gap drive.</td>
<td></td>
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<tr>
<td>Natural water drive.</td>
<td></td>
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<tr>
<td>Analytical aquifer models.</td>
<td></td>
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<tr>
<td>Hurst &amp; Van Everdingen model.</td>
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<tr>
<td>Carter-Tracy model.</td>
<td></td>
</tr>
<tr>
<td>Gas reservoirs with and without aquifer.</td>
<td></td>
</tr>
<tr>
<td>Material balance:</td>
<td></td>
</tr>
<tr>
<td>Principles and equations.</td>
<td></td>
</tr>
<tr>
<td>Generalized material balance.</td>
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<tr>
<td>Drive index.</td>
<td></td>
</tr>
<tr>
<td>Campbell and cole plots.</td>
<td></td>
</tr>
<tr>
<td>Application: estimating recovery factors from material balance, checking aquifer and gas cap size, checking accumulation estimate...</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRIVE MECHANISMS - SECONDARY RECOVERY</th>
<th>2 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reminders about multiphase flow in the reservoir: wettability, capillarity, relative permeability.</td>
<td></td>
</tr>
<tr>
<td>Water and non-miscible gas injection:</td>
<td></td>
</tr>
<tr>
<td>Principles.</td>
<td></td>
</tr>
<tr>
<td>Sources of fluid, well injectivity, injectors pattern</td>
<td></td>
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<tr>
<td>Expected performance of water and gas injection.</td>
<td></td>
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<tr>
<td>Multiphase flow stability and influence of mobility ratio.</td>
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<tr>
<td>Diffusive flow:</td>
<td></td>
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<tr>
<td>Buckley-Leverett frontal displacement theory.</td>
<td></td>
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<tr>
<td>Welge method.</td>
<td></td>
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<tr>
<td>Sweep efficiency:</td>
<td></td>
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<tr>
<td>Displacement or microscopic efficiency.</td>
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<tr>
<td>Areal efficiency.</td>
<td></td>
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<tr>
<td>Vertical efficiency.</td>
<td></td>
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<tr>
<td>Cycling.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRACTICAL MATERIAL BALANCE</th>
<th>2 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practical exercises on synthetic and real field case data using MBAL™ software:</td>
<td></td>
</tr>
<tr>
<td>PVT and reservoir parameters history match.</td>
<td></td>
</tr>
<tr>
<td>Production forecast.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENHANCED OIL RECOVERY</th>
<th>2 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles and mechanisms of main EOR methods:</td>
<td></td>
</tr>
<tr>
<td>Chemical flooding.</td>
<td></td>
</tr>
<tr>
<td>Miscible gas injection.</td>
<td></td>
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<tr>
<td>Thermal flooding.</td>
<td></td>
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<tr>
<td>EOR projects:</td>
<td></td>
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<tr>
<td>Screening criteria.</td>
<td></td>
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<tr>
<td>Economics.</td>
<td></td>
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<tr>
<td>Application - Field cases.</td>
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Reference: RENG/DRIVEOR

Can be organized as an In-House course.

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<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
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<td>Rueil</td>
<td>28 October</td>
<td>8 November</td>
<td>€5,040</td>
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This course is also available in French: RENG/DRIVEORFR. Please contact us for more information.

Contact: gre.rueil@ifptraining.com
Dynamic Reservoir Simulation

Level: PROFICIENCY

Purpose
This course provides a comprehensive and practical understanding of dynamic reservoir simulation, covering principles and concepts as well as data reviewing and formatting.

Audience
Newly-hired and 2- to 3-year experienced reservoir engineers willing to deepen their knowledge in reservoir fluid properties and PVT modeling. It is also intended for geoscientists, petroleum engineers and production engineers moving towards reservoir engineering.

Learning Objectives
Upon completion of the course, participants will be able to:
- discuss the fundamental concepts of dynamic reservoir simulation,
- build a simple reservoir simulation model (including data gathering and data QC),
- carry out a simple reservoir simulation study (including taking into account technical and economical constraints, basic history matching and production forecast) using a black-oil model.

Ways & Means
- Interactive lectures and exercises.
- Hands-on practice using state-of-the-art software packages: ECLIPSE™, PETREL-RE™ or PumaFlow™ reservoir simulator.
- Black oil reservoir simulation including the manipulation of all kind of reservoir data (geological, petrophysical, PVT, well data, production history).
- Software used during workshops: with courtesy of Schlumberger.

Learning Assessment
- Knowledge assessment with multiple choice questions and open explanatory questions.
- Assessment from results obtained on hands-on exercises using the simulator.

Prerequisites
Reservoir engineering degree or equivalent experience within the petroleum industry.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 10 days

INTRODUCTION TO DYNAMIC RESERVOIR SIMULATION 0.5 d
Physical aspects and fundamental laws.
Mathematical and numerical aspects (diffusivity equation, transport equation, equations of state…).
Types of reservoir simulation models: black oil, compositional, thermal, chemical and double porosity model.

INTRODUCTION TO THE SIMULATOR 0.5 d
Simulation software presentation.
Practical exercise (building a model from A to Z).

SPACE & TIME DISCRETIZATION 1 d
Grid properties (Cartesian grid, radial grid, corner point grid, etc.) and key elements to take into account.
Time step management and main events to take into account.
Practical exercise using the simulator.

PETROPHYSICS 1 d
Data review and petrophysical upscaling.
Practical exercise using the simulator.

FLUIDS 1 d
Data review and formalisms used by the simulator.
Use of black oil data set and integration of lab experiments results (constant composition expansion, constant volume depletion).
Practical exercise using the simulator.

INITIAL STATE 0.5 d
Data review and formalisms used by the simulator (equilibration regions).
Identification of fluids in place per region.
Practical exercise using the simulator.

AQUIFERS REPRESENTATION 0.5 d
Formalisms used by the simulator (gridded or analytical aquifers).
Review of different possibilities (bottom, edge, transient, steady state, semi steady state) and Hurst & Van Everdingen tables.
Practical exercise using the simulator.

FLOW REPRESENTATION 1 d
Formalisms used by the simulator (transmissivity multipliers, end point scaling of capillary pressures and relative permeability).
Identification of production mechanisms and material balance analysis.
Practical exercise using the simulator.

WELLS REPRESENTATION 1 d
Formalisms used by the simulator (inflow Performance and numerical PI, outflow performance and VFP tables).
Practical exercise using the simulation software.

HISTORY MATCHING 2 d
Objectives and methodology.
Production data and identification of data to match.
Production mechanisms and identification of matching parameters.
History matching strategies (pressure, saturation, early and late times) and uncertainty reduction.
Practical exercise using the simulator.

PRODUCTION FORECAST 1 d
Objectives and methodology.
Integration of well representation and production constraints.
Estimation of future productions linked to different scenarios and identification of remaining uncertainties.
Practical exercise using the simulator.

Reference: RENG/SIMULRES
Can be organized as an In-House course.
Contact: gre.rueil@ifptraining.com

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<td>18 November</td>
<td>29 November</td>
<td>€6,650</td>
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This course is also available in French: RENG/SIMULRESFR. Please contact us for more information.

www.ifptraining.com
EOR Concepts & Applications

Level: ADVANCED

Purpose
This course provides a detailed understanding of Enhanced Oil Recovery (EOR) methods and mechanisms together with information about EOR projects workflow and decision making, especially screening criteria.

Audience
Reservoir engineers, petroleum engineers and assets managers involved in EOR projects.

Learning Objectives
Upon completion of the course, participants will be able to:
- discuss recovery expectations from reservoirs under primary, secondary and EOR methods,
- discuss main Enhanced Oil Recovery (EOR) methods and corresponding mechanisms for improving recovery factor,
- apply screening criteria used for decision making on EOR projects,
- plan and apply main EOR methods using empirical, analytical and simulation tools.

Ways & Means
- Interactive lectures and exercises.
- Field case studies.
- Chemical and Miscible Gas EOR simulation using dedicated software.
- Software used during workshops: with courtesy of Schlumberger.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
Basic knowledge in reservoir engineering, oil reservoirs drive mechanisms and reservoir simulation.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 5 days

FUNDAMENTALS OF OIL RESERVOIRS DRIVE MECHANISMS 1 d
Review of primary and secondary recovery drive mechanisms:
- Natural depletion of undersaturated oil reservoir.
- Solution gas drive.
- Natural water drive.
- Water and gas injection.
Principle and mechanisms of main EOR methods:
- Chemical flooding.
- Miscible gas injection.
- Thermal flooding.

EOR - CHEMICAL METHODS (surfactant, polymer, alkaline) 1.5 d
Principles and mechanisms of chemical EOR.
Selection criteria.
Recovery targets and why they are seldom met.
Chemicals. Characteristics and properties.
Preformed Particle Gel (PPG).
Colloidal Dispersion Gels (CDG).
Design considerations.
Simulation of chemical flooding. Application to ASP flooding.
Case studies.

EOR - MISCIBLE GAS INJECTION METHODS (CO₂, N₂, HC) 1.5 d
Principles and mechanisms of miscible gas EOR.
Minimum Miscibility Pressure (MMP).
Hydrocarbon miscible displacement:
- First contact miscible process.
- Condensing gas drive.
- Vaporizing gas drive.
Selection criteria.
Labatory experiments.
Simulation of miscible gas injection. Application to CO₂ injection.
Case studies.

EOR - THERMAL METHODS (SAGD, H&P, in-situ combustion) 0.5 d
Principles and mechanisms of thermal EOR.
Selection criteria.
Steam flooding production prediction.
Case studies.

EOR IMPLEMENTATION 0.5 d
EOR project planning workflow.
Pilot design.
EOR monitoring.
Case studies.

Reference: RENG/EOR
Can be organized as an In-House course.
Contact: gre.rueil@ifptraining.com

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<tr>
<td>Pau</td>
<td>30 September</td>
<td>4 October</td>
<td>€3,240</td>
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Advanced Certificate
Miscible Gas EOR Certification

Level: PROFICIENCY

Purpose

This course provides an in-depth understanding of Miscible Gas Enhanced Oil Recovery (EOR) methods, the corresponding displacement mechanisms and expected performance. It also provides information about miscible gas EOR projects workflow based on the presentation of screening criteria and field cases.

Audience

Reservoir engineers and petroleum engineers involved in miscible gas EOR projects.

Learning Objectives

Upon completion of the course, participants will be able to:

- discuss the recovery expectations from reservoirs under primary, secondary and EOR methods,
- discuss the mechanisms of various miscible gas EOR methods and related screening criteria,
- list gas used in miscible gas EOR and compare the way they affect oil recovery,
- design and apply miscible gas EOR methods by using empirical, analytical and simulation tools and evaluate their performance.

Ways & Means

- Interactive lectures and exercises.
- Field case studies.
- Miscible gas EOR simulation using dedicated software.
- Software used during workshops: with courtesy of Schlumberger.

Learning Assessment

Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites

Basic knowledge in reservoir engineering, oil reservoirs drive mechanisms and reservoir simulation.

Why an IFP Training Certification?

- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Miscible Gas EOR.
- Ready-to-use skills.

Expertise & Coordination

IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: RENG/EOR-G  
Contact: gre.rueil@ifptraining.com

Course Content

REMINDERS OF OIL RESERVOIR DRIVE MECHANISMS  
Review of primary and secondary recovery drive mechanisms:
- Natural depletion of undersaturated oil reservoir.
- Solution gas drive.
- Natural water drive.
- Water and gas injection.

Principle and mechanisms of main EOR methods:
- Chemical flooding.
- Miscible gas flooding.
- Thermal flooding.

DISPLACEMENT THEORY & FRACTIONAL FLOW  
Factors affecting oil recovery.
- Mobility ratio and sweep efficiency.
- Fractional flow theory.
- Oil recovery calculation in homogeneous and stratified reservoirs.

PHASE BEHAVIOR & FLUID PROPERTIES  
Fundamentals of fluids properties. Phase envelope.
- Fluid properties affected by miscible gas injection.
- Ternary diagrams.

MISCIBLE GAS INJECTION METHODS (CO₂, N₂, hydrocarbons)  
Principles and mechanisms of miscible gas EOR.
- Minimum Miscibility Pressure (MMP).
- Displacement mechanism.
- First contact miscibility.
- Condensing drive.
- Vaporizing drive.
- Screening criteria.
- Laboratory experiments.
- Miscible gas EOR design & workflow.
- Miscible CO₂ flooding.
- Miscible hydrocarbon flooding.
- Simulation and performance evaluation of miscible gas flooding.
- Case studies.

REMINDERS OF OIL RESERVOIR DRIVE MECHANISMS  
0.5 d

DISPLACEMENT THEORY & FRACTIONAL FLOW  
0.5 d

PHASE BEHAVIOR & FLUID PROPERTIES  
1 d

MISCIBLE GAS INJECTION METHODS (CO₂, N₂, hydrocarbons)  
3 d
Advanced Certificate
Chemical EOR Certification

Level: PROFICIENCY

Purpose
This course provides an in-depth understanding of Chemical Enhanced Oil Recovery (EOR) methods, the corresponding displacement mechanisms and expected performance. It also provides information about Chemical EOR projects workflow based on the presentation of screening criteria and field cases.

Audience
Reservoir engineers and petroleum engineers involved in Chemical EOR projects.

Learning Objectives
Upon completion of the course, participants will be able to:

- discuss the recovery expectations from reservoirs under primary, secondary and EOR methods,
- discuss the mechanisms of various Chemical EOR methods and related screening criteria,
- list the types of chemicals used in Chemical EOR and compare the way they affect oil recovery,
- design and apply Chemical EOR methods by using empirical, analytical and simulation tools and evaluate their performance.

Ways & Means
Interactive lectures and exercises.
Field case studies.
Chemical EOR simulation using dedicated software.
Software used during workshops: with courtesy of Schlumberger.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
Basic knowledge in reservoir engineering, oil reservoirs drive mechanisms and reservoir simulation.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Chemical EOR.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: RENG/EOR-C Only available as an In-House course. Contact: gre.rueil@ifptraining.com

Course Content

**REMINDEARS OF OIL RESERVOIR DRIVE MECHANISMS**
0.5 d
Review of primary and secondary recovery drive mechanisms:
- Natural depletion of undersaturated oil reservoir.
- Solution gas drive.
- Natural water drive.
- Water and gas injection.

Principal and mechanisms of main EOR methods:
- Chemical flooding.
- Miscible gas flooding.
- Thermal flooding.

**DISPLACEMENT THEORY & FRACTIONAL FLOW**
0.5 d
Factors affecting oil recovery.
Mobility ratio and sweep efficiency.
Fractional flow theory.
Oil recovery calculation in homogeneous and stratified reservoirs.

**POLYMER FLOODING**
1 d
Polymer flooding and classical types of polymers.
Polymer properties and behavior: rheology, viscosity, non-Newtonian effects...
Adsorption and retention mechanisms.
Selection criteria.
Design of polymer flooding.
Preformed Particle Gel (PPG).
Colloidal Dispersion Gels (CDG).
Simulation of polymer flooding.
Case studies.

**SURFACTANT FLOODING**
1 d
Surfactant flooding and classical types of surfactants.
Surfactant characteristics: molecular structure, critical micelle concentration (CMC)...
Surfactant, water and oil behavior.
Selection criteria and tests.
Simulation of surfactant flooding.
Case studies.

**ALKALINE FLOODING**
0.5 d
Alkaline flooding and classical types of alkaline.
Displacement mechanisms in alkaline flooding.
Alkaline consumption.
Selection criteria and tests.
Simulation of alkaline flooding.
Case studies.

**ALKALINE-SURFACTANT-POLYMER FLOODING (ASP)**
1 d
Displacement mechanisms in ASP flooding.
Experimental design and calculation of appropriate injection pore volumes.

**SMART WATER INJECTION**
0.5 d
Definition and principles of smart water method.
Smart water injection design and workflow.
Case studies.
Advanced Dynamic Reservoir Simulation

Level: ADVANCED

Purpose
This course provides deep insight into some advanced dynamic reservoir simulation features including gridding, aquifers and wells representation, compositional simulation and assisted history matching.

Audience
Reservoir engineers and petroleum engineers willing to deepen their knowledge in dynamic reservoir simulation.

Learning Objectives
Upon completion of the course, participants will be able to:
- apply the fundamental concepts of dynamic reservoir simulation,
- carry out gridding refinement and upscaling,
- model dual porosity dual permeability reservoirs,
- model complex wells,
- perform compositional simulation,
- discuss and carrying out assisted history matching,
- analyze simulation results,
- optimize reservoir performance.

Ways & Means
- Interactive lectures and exercises.
- Hands-on practice using state-of-the-art software packages: ECLIPSE™, PETREL-RE™ or PumaFlow™ reservoir simulator.
- Software used during workshops: with courtesy of Beicip-Franlab and Schlumberger.

Learning Assessment
- Knowledge assessment with multiple choice questions and open explanatory questions.
- Assessment from results obtained on hands-on exercises using the simulator.

Prerequisites
Basic dynamic reservoir simulation knowledge is compulsory.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 5 days

FUNDAMENTALS OF DYNAMIC RESERVOIR SIMULATION 0.5 d
Physical aspects and basic laws.
Mathematical and numerical aspects (diffusivity, transport and general equations).
Review of basic rock and fluid properties for input into dynamic reservoir simulation models.

TIME & SPACE DISCRETIZATION - GRIDDING & UPSCALING 1 d
Time step management and main events to take into account.
Grid properties (Cartesian grid, radial grid, corner point grid, etc.) and key elements to take into account.
Gridding and local grid refinement - Principles and application.
Upscaling - Principles and application.
Practical exercise using the simulator.

FRActured RESERVOIR MODELING 0.75 d
Introduction to fractured reservoirs:
- Definition of fractured reservoirs and their difference with classic reservoirs.
- Classification of fractured reservoirs (Nelson concept).
- Data required for fractured reservoirs characterization and modeling.
- Formalisms used by the simulator - Dual porosity models.
Practical exercise using the simulator.

WELLS REPRESENTATION 0.75 d
Formalisms used by the simulator:
- Inflow Performance and numerical PI.
- Outflow performance and VFP tables.
Practical exercise using the simulation software.

COMPOSITIONAL SIMULATION 1 d
Components and composition - Black Oil vs. compositional models:
- Lumping and de-lumping.
- Compositional EOS - Ternary diagram.
- Gas modeling in compositional models.
Practical exercise using the simulator.

ASSISTED HISTORY MATCHING 1 d
Principles of assisted history matching:
- Objective function and optimization.
- Experimental design.
- Response surface.
Practical exercise using the simulator.

Reference: RENG/ADVSIMULRES  Only available as an In-House course.
Reservoir Engineering

Advanced Certificate

Reservoir Simulation Workshop Certification

**Course Content 10 days**

**Part 1: RESERVOIR SIMULATION COURSE**

*5 d*

**Introduction to reservoir simulation:**
- Physical aspects & basic laws.
- Mathematical & numerical aspects (diffusivity, transport & general equations).
- Types of reservoir simulation models: black oil, compositional, thermal, chemical and double porosity model.

**Introduction to the simulator (ECLIPSE™):**
- Simulation software presentation.
- Practical exercise (building a model from A to Z).

**Space & time discretization:**
- Grid properties (Cartesian grid, radial grid, corner point grid, etc.) & key elements to take into account.
- Time step management & main events to take into account.

**Petrophysics:**
- Data review & petrophysical upscaling.
- Fluids:
  - Data review & formalisms used by the simulator.
  - Use of black oil data set & integration of lab experiments (constant composition expansion, constant volume depletion).
- Initial state:
  - Data review & formalisms used by the simulator (equilibration regions).
  - Identification of fluids in place per region.
- Aquifers representation and modeling:
  - Formalisms used by the simulator (gridded or analytical aquifers).
- Review of different possibilities (bottom, edge, transient, steady state, semi steady state) & Hurst & Van Everdingen tables.

**Flow representation:**
- Formalisms used by the simulator (transmissivity multipliers, end point scaling of capillary pressures & relative permeability).
- Identification of production mechanisms & material balance analysis.

**Wells representation:**
- Formalisms used by the simulator (Inflow Performance & numerical PI, outflow performance & VFP tables).
- Practical exercise using the simulation software.

**History match:**
- Objectives & methodology.
- Production data & identification of data to match.
- Production mechanisms & identification of matching parameters.
- History matching strategies (pressure, saturation, early & late times) & uncertainty reduction.
- Production forecast:
  - Objectives & methodology.
  - Integration of well representation & production constraints.
- Estimation of future productions linked to different scenarios and identification of remaining uncertainties.
- Identification of recommended scenario and conclusions.

**Part 2: FIELD DEVELOPMENT PROJECT WORKSHOP**

*5 d*

**Field case presentation and critical analysis of the dataset:**
- PVT data.
- Kr-Pc data.
- Accumulation.

**Analysis of various production schemes:**
- Natural depletion down to bubble point, below bubble point, down to maintained optimum pressure.
- Water injection.
- History matching:
  - Matching field pressure, wells pressure, water-cut andGOR.
  - Select the matching parameters and related range.
- Decide on the level of acceptability of the history match.

**Production forecast:**
- Using the selected previously matched dataset, perform a development study.
- Investigate natural depletion and water injection (and possibly WAG): optimize recovery adding producers, injectors, finding out their optimal location.
- Recommend an FDP based on relevant economic calculations (NPV, IRR, Profitability Index, etc.).

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**Reference:** RENG/RESSMU  - Only available as an In-House course.

**Contact:** gre.rueil@ifptraining.com
Advanced Certificate
Advanced Well Test Analysis Certification

Level: ADVANCED

Purpose
This course provides an extensive and practical knowledge in well test design and analysis aimed at evaluating well productivity and reservoir parameters in the best technical and economical way. It will deal with data acquired from various well completions, homogeneous and heterogeneous reservoirs, gas shale reservoir, as well as testing various production fluids, oil, gas, heavy Oil & Gas condensate.

Audience
Reservoir engineers and petroleum engineers willing to deepen their knowledge in Well Test Analysis.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe practical and advanced Well Test Analysis methods and their applications,
- discuss application of results derived from Well Test Analysis in Geosciences and Reservoir Engineering, especially integration of Well Test Analysis results within geological and geophysical models,
- perform design and analysis of pressure data acquired in wells completed in heterogeneous reservoirs,
- perform design and analysis of pressure data acquired in water, polymers or steam injector wells,
- discuss benefits and limitations of Well Test Analysis applied to non conventional reservoirs.

Ways & Means
- Interactive courses and exercises.
- Hands-on practice using state-of-the-art software (SAPHIR™).
- Workshop using real field case data.
- Software used during workshops: with courtesy of Kappa Engineering.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
Basic Well Test Analysis knowledge is recommended.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Advanced Well Test Analysis.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a high expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OVERVIEW OF WELL TEST ANALYSIS
1 d
Well testing definition and applications, DST and rig less testing.
Well Test Analysis. Overview of learning methodology.
Diffusivity equation. Homogeneous reservoirs. Analytical and numerical methods.
Types of flow regimes. Radial, pseudo radial, pseudo-steady state and steady state flow.
Pressure derivative.
Wellbore storage and skin effect.
Drawdown and buildup pressure analysis. Superposition principle.
Average reservoir pressure determination. Interference testing.
Deconvolution method.

HETEROGENEOUS RESERVOIRS TESTING
0.5 d
Two-porosity reservoirs. Pseudo steady state and transient interporosity flow.
Multilayered reservoirs, with and without cross flow.
Radial and linear composite systems.
Reservoir discontinuities. Sealing and conductive fault, intersecting and parallel faults.
Field case examples.

GAS WELLS TESTING
0.5 d
Solution to the diffusivity equation for gas.
Gas pseudo pressure and rate dependent skin.
Gas well deliverability. AOPF.
Back pressure tests: flow after flow, isochronal and modified isochronal test.
Testing of dry gas, wet gas and gas condensate reservoirs.
Field case examples.

STIMULATED WELL TESTING
0.5 d
Infinite and finite conductivity fracture models.
Linear and bilinear flow.
Time to reach radial and pseudo steady state flow regimes.
Wellbore storage effect and fracture skin.
Determination of half-fracture length and fracture conductivity.
Horizontal and fractured horzontal well.
Field cases examples.

INJECTION WELL TESTING
0.5 d
Secondary recovery and EOR processes.
Oil and water banks. Mobility.
Injection and fall off testing. Interpretation models.
Water and steam front determination.
Average Injection Pressure determination.
Field cases examples.

GAS SHALE RESERVOIRS TESTING
0.5 d
Modeling fluid flow behavior in unconventional reservoirs.
Gas Shale and Coal Bed Methane (CBM) reservoirs.
Mini frac (DFIT) interpretation.
Pressure Transient Analysis applicable to horizontally multi fractured wells.
Stimulated Reservoir Volume (SRV) determination.
Time to reach fractures interference.
Well interference due to frac operations.
Effect of pressure-dependent rock properties on permeability.
Field case examples.

WELL TEST DESIGN
0.5 d
Test design methodology according to reservoir evaluation objectives.
Common test string configurations. DST and rig less testing.
Elaboration of testing program and contingencies:
- Real time vs. memory data acquisition.
- Pressure gauges: resolution, specifications and acquired pressure data quality control.
- Offshore well testing.
- Reservoir and well candidates for test design.
Field case examples.

WORKSHOP
1 d
Interpretation of real data acquired in fields of interest by using state of the art software:
- Both analytical and numerical methods will be applied.
- Test design scenarios for both homogeneous and heterogeneous reservoirs including the expected boundary conditions according to the geological model.

Reference: RENG/ADWELLTEST & Only available as an In-House course.
Contact: gre.rueil@ifptraining.com

www.ifptraining.com

Drilling
Surface Facilities Engineering
Reservoir & Field Development
Reservoir Engineering
HSE
Gas
Unconventional
Production Engineering
Project Management
E&P Chain
Exploration

Course Content

FLUID PROPERTIES & THERMODYNAMIC MODELING
2 d
Fluid properties:
- PVT properties of pure components and mixtures.
- Functions and variables.
- Properties of reservoir fluids.
Introduction to PVT modeling software.
Thermodynamic models and equilibrium:
- Functions and variables.
- EOS and algorithms.
- Component properties and lumping.
- Liquid-vapor thermodynamic equilibrium.

RESERVOIR, FIELD CASES & PROJECT
3 d
Measurements:
- Sampling.
- Analysis.
- Standardization of data.
- PVT experiments.
- Gas injection specific data.
Fluid modeling:
- PVT compositional modeling.
- Matching of experimental data.
- Physical consistency.
- Gravitational segregation.
- Miscibility.
Field cases:
- Compartmentalization.
- Non-classical GOR profile.
- Reservoir stripping.
Data for reservoir simulation:
- Compositional.
- Black oil (standard, extended).
Project and exercises:
- From the PVT Report do the PVT model.
- Quality check of the data.
- Oil fitting.
- Gas fitting.
- Discussions and conclusions.

Reference: RENG/PVTMOD
Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Decline Curves Analysis

Level: PROFICIENCY

Purpose
This course provides an extensive and practical knowledge for analyzing production data using decline curve analysis techniques, both classical and modern in order to make production forecast and reserve estimation.

Audience
Reservoir engineers and petroleum engineers who are responsible for making production forecasts using decline curves analysis.

Learning Objectives
Upon completion of the course, participants will be able to:
- apply the fundamental concepts of decline curve analysis and Arps decline curves analysis for reserves evaluation during boundary dominated flow regime,
- apply Fetkovich decline curves analysis and related type curves and assess the effects of transient regime,
- discuss principles of Blasingame decline curves analysis and related advantages by respect to Arps & Fekovitch decline curves analysis.

Ways & Means
Interactive lectures and exercises.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
Basic reservoir engineering knowledge is recommended (especially reservoir drive mechanisms).

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>3 days</th>
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<tbody>
<tr>
<td><strong>INTRODUCTION TO PRODUCTION ANALYSIS</strong></td>
</tr>
<tr>
<td>0.25 d</td>
</tr>
<tr>
<td>Principles of production analysis - Reminders about flow regimes.</td>
</tr>
</tbody>
</table>

| 1.5 d |
| **TRADITIONAL DECLINE CURVE ANALYSIS - ARPS DECLINE CURVE ANALYSIS** |
| Exponential decline. |
| Hyperbolic decline. |
| Harmonic decline. |
| Arps type curves. |
| Power function analysis for b>1. |

| 0.75 d |
| **FETKOVICH DECLINE CURVES ANALYSIS** |
| Principle and equations - Fetkovich dimensionless variables. |
| Fetkovitch type curves and decline curve analysis. |

| 0.5 d |
| **INTRODUCTION TO BLASINGAME DECLINE CURVE ANALYSIS** |
| Principle and equations - Blasingame dimensionless variables. |
| Blasingame type curves and decline curve analysis. |

Reference: RENG/DCA
Only available as an In-House course.

Contact: gre.rueil@ifptraining.com
Graduate Certificate
Reservoir Engineering Certification

Level: PROFICIENCY

Purpose
This course provides a comprehensive practical knowledge of fundamental concepts of Reservoir Engineering, through hands-on activities, case studies and projects.

Audience
This course is intended for newly hired or 2-3 years experienced reservoir engineers, for geoscientists, petroleum engineers and production engineers.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe reservoirs characterization and modeling workflow,
- discuss fluids properties and describe the PVT modeling process,
- discuss principles of well testing and well test interpretation,
- discuss the mechanisms of primary recovery and secondary recovery and their performance,
- list main Enhanced Oil Recovery methods and discuss mechanisms and performance,
- discuss fundamentals of Reservoir Management and describe reservoir monitoring techniques,
- define the concepts of resources, reserves and corresponding classification, integrating risks and uncertainties,
- discuss fundamentals of dynamic reservoir simulation, and build a simple black-oil reservoir simulation study.

Ways & Means
- Numerous hands-on and workshop on real data sets.
- Individual and teamwork to develop autonomy and ability of decisions.
- Final teamwork workshop on optimizing an oil field development project integrating real data, field data.
- Software used during workshops: with courtesy of Beicip-Franlab, Kappa Engineering and Schlumberger.

Learning Assessment
- Weekly evaluation.
- Initial and final assessment at the beginning and end of program.
- A final project at the end of the program with defend of results in front of a jury.

Prerequisites
Engineering degree or equivalent experience in the E&P industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Reservoir Engineering.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainers having a good expertise and experience.

Course Content

<table>
<thead>
<tr>
<th>PART 1: FUNDAMENTALS OF RESERVOIR GEOLOGY (page 120)</th>
<th>15 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART 2: FLUIDS, WELLBORE INTERFACE &amp; WELL PRODUCTIVITY, WELL TESTING</td>
<td>15 d</td>
</tr>
<tr>
<td>PART 3: RESERVOIR DRIVE MECHANISMS &amp; RESERVOIR MANAGEMENT</td>
<td>14 d</td>
</tr>
<tr>
<td>PART 4: RESERVOIR SIMULATION &amp; FINAL DEVELOPMENT PROJECT WORKSHOP</td>
<td>20 d</td>
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</tbody>
</table>

Dynamic Reservoir Simulation (page 129).
Final teamwork workshop - 2 weeks of hands-on workshop focused on optimizing an oil field development project integrating real laboratory data, field data and simulation model.

Reference: RMGT/RESENGIN
Can be organized as an In-House course.
Contact: gre.rueil@ifptraining.com

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<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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<tbody>
<tr>
<td>Rueil</td>
<td>16 September</td>
<td>13 December</td>
<td>€34,960</td>
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</table>

This course is also available in French: RMGT/RESENGINFRA. Please contact us for more information.
Reservoir Management Workshop

**Course Content**

<table>
<thead>
<tr>
<th>Component</th>
<th>Duration</th>
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<tbody>
<tr>
<td><strong>INTRODUCTION TO RESERVOIR MANAGEMENT</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Objective of reservoir management.</td>
<td></td>
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<tr>
<td>Field development projects: an integrated effort.</td>
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<tr>
<td><strong>DECISION PROCESS &amp; BUSINESS ASPECTS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Decision making process of field development projects.</td>
<td></td>
</tr>
<tr>
<td>Fundamentals of petroleum economics and criteria (NPV, IRR...).</td>
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<tr>
<td><strong>FUNDAMENTALS OF RESERVOIR CHARACTERIZATION</strong></td>
<td>0.5 d</td>
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<tr>
<td>Data gathering, data base, quality control.</td>
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<tr>
<td>Reservoir characterization workflow.</td>
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<tr>
<td>Reservoir geo-modeling workflow.</td>
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<tr>
<td><strong>RESERVES EVALUATION &amp; CLASSIFICATION</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Review of Oil &amp; Gas reservoirs drive mechanisms and related expected recovery factors.</td>
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<tr>
<td>Analogs.</td>
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<tr>
<td>Performance analysis:</td>
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<tr>
<td>Material balance.</td>
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<tr>
<td>Decline curves analysis.</td>
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<td>Dynamic simulation models.</td>
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<tr>
<td>Resources and reserves classification:</td>
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<tr>
<td>SPE definitions and principles (PRMS).</td>
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<tr>
<td>SEC definitions and guidelines.</td>
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<tr>
<td><strong>RISKS &amp; UNCERTAINTIES</strong></td>
<td>0.5 d</td>
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<tr>
<td>Introduction to risks and uncertainties:</td>
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<tr>
<td>Definitions.</td>
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<tr>
<td>Notions of probability and decision trees.</td>
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<tr>
<td>Statistical description of data.</td>
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<tr>
<td>Various sources of uncertainties:</td>
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<tr>
<td>Structural uncertainties.</td>
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<tr>
<td>Geological uncertainties.</td>
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<tr>
<td>Reservoir uncertainties.</td>
<td></td>
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<tr>
<td>Uncertainty assessment techniques.</td>
<td></td>
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<tr>
<td><strong>DATA ACQUISITION &amp; RESERVOIR MONITORING FOR IOR/EOR</strong></td>
<td>0.75 d</td>
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<tr>
<td>IOR/EOR definitions, facilities, planning and costs.</td>
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<tr>
<td>Open hole logging (pressure profile, saturation, porosity…).</td>
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<tr>
<td>Cased hole logging (saturation logging, production logging…).</td>
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<tr>
<td>4D seismic.</td>
<td></td>
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<tr>
<td><strong>WORKSHOP - CASE STUDY</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Reservoir exploration through drilling and seismic profiles.</td>
<td></td>
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<tr>
<td>Reservoir characterization through PVT data and logs.</td>
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<tr>
<td>Reservoir development (number of wells, location…) and profile prediction.</td>
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<tr>
<td>Final investment decision based on economical criteria.</td>
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</tbody>
</table>

**Prerequisites**

No prerequisites for this course.

**Ways & Means**

- Interactive lectures and exercises.
- Field case study workshop.

**Learning Assessment**

Knowledge assessment with multiple choice questions and open explanatory questions.

**Reference:** RMGT/RMNGT  -  Can be organized as an In-House course.  
**Contact:** gre.rueil@ifptraining.com

<table>
<thead>
<tr>
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<th>End Date</th>
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</tr>
</thead>
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<tr>
<td>Rueil</td>
<td>12 November</td>
<td>15 November</td>
<td>€3,030</td>
</tr>
</tbody>
</table>

This course is also available in French: RENG/RMNGTFR. Please contact us for more information.
Advanced Certificate
Reserves Evaluation - Risks & Uncertainties Certification

Level: PROFICIENCY

Purpose
This course provides a comprehensive and practical understanding of methods of evaluation and classification of hydrocarbons resources and reserves (PRMS, SEC) and related issues, especially risks and uncertainties and how to assess/mitigate these risks & uncertainties.

Audience
Geoscientists, reservoir engineers, asset managers, economists, government representatives interested or involved in resources and reserves estimation and reporting, as well as related risks & uncertainties assessment.

Learning Objectives
Upon completion of the course, participants will be able to:
- Discuss principles of reservoir characterization and engineering and resources and reserves evaluation,
- Define concepts of resources and reserves and describe the Petroleum Resources Management System (PRMS) and Securities and Exchange Commission (SEC) system,
- Discuss and apply main petroleum economical criteria affecting reserves evaluation,
- Discuss concepts of risks and uncertainties,
- Identify main sources of risks and uncertainties and discuss methods about integrating risks and uncertainties into resources and reserves evaluation: structural uncertainties, geological uncertainties, dynamic uncertainties, geostochastic modeling, etc.

Ways & Means
Interactive courses and exercises.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
Basic knowledge in reservoir characterization and reservoir engineering.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Reserves Evaluation - Risks & Uncertainties.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of Reserves Evaluation and Risk & Uncertainties assessment, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
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<tr>
<th>5 days</th>
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</thead>
</table>

**INTRODUCTION TO FIELD DEVELOPMENT PROJECTS**
E&P field development projects workflow.  
0.25 d

**BASICS OF RESERVOIR CHARACTERIZATION AND MODELING**
Rock and fluid properties.  
Geomodeling.  
Volumetric evaluation of Oil & Gas accumulation.  
0.75 d

**RECOVERY, ECONOMICS & RESERVES EVALUATION**
Oil & Gas reservoirs drive mechanisms and recovery factors.  
Analogs.  
Performance analysis:  
Material balance.  
Decline curves analysis.  
Simulation models.  
Fundamentals of petroleum economics:  
Actualization.  
Economical criteria (NPV, IRR, PI...).  
Field development project and reserves evaluation.  
1.5 d

**RESERVES DEFINITIONS**
Oil & Gas resources & reserves definitions.  
SPE definitions and guidelines. Petroleum Resources Management System (PRMS).  
SEC definitions and guidelines.  
Other definitions.  
0.5 d

**RISKS & UNCERTAINTIES**
Concepts of risks and uncertainties.  
Risks:  
Notions of probability and decision trees.  
Uncertainties:  
Statistical description of data.  
Common statistical distributions.  
Monte-Carlo and parametric methods.  
Uncertainties within E&P development projects:  
Structural, geological and dynamic uncertainties.  
Notions of geostatistics and stochastic modeling.  
Uncertainties assessment. Experimental design and response surface methodology.  
2 d

Reference: RMGT/RISKUN  
Can be organized as an In-House course.  
Contact: gre.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>7 October</td>
<td>11 October</td>
<td>€3,450</td>
</tr>
</tbody>
</table>
Mature Fields - Subsurface Issues

Course Content

| Level: FOUNDATION |
| Purpose |
This course provides a comprehensive and practical understanding of methods and issues related to the reevaluation of mature hydrocarbons fields (brown fields) in order to optimize the production and increase the reserves.

| Audience |
Geoscientists, reservoir engineers, petroleum engineers and asset managers involved in managing and optimizing mature fields.

| Learning Objectives |
Upon completion of the course, participants will be able to:
- Discuss and apply principles of mature reservoir characterization and reserves re-evaluation and upside opportunities,
- Describe the workflow for optimizing the production decline of a mature field,
- Evaluate the feasibility of optimizing a given mature field and discuss the main concepts of risks and uncertainties management,
- Discuss and apply the economical criteria for reviving mature fields.

| Ways & Means |
Interactive courses and exercises.

| Learning Assessment |
Knowledge assessment with multiple choice questions and open explanatory questions.

| Prerequisites |
No prerequisites for this course.

| Expertise & Coordination |
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

| 5 days |
| BASICS OF RESERVOIR CHARACTERIZATION OF MATURE FIELDS 0.5 d |
Introduction to field redevelopment study.
Reminder on rock and fluid properties.
Volumetric evaluation of Oil & Gas accumulation for mature reservoirs.

| RESERVOIR MONITORING & DATA ACQUISITION FOR IOR/EOR ACTIVITIES 1 d |
Definitions, facilities, planning and costs.
Behind pipe oil and bypassed reserves determination:
Open hole logging (pressure profile, saturation…).
Cased hole logging (CBL, RST…).
Production logging.
4D seismic.
Exercises.

| RESERVES ESTIMATIONS & PRODUCTION PROFILES IN BROWN FIELDS 1 d |
Performance analysis:
Analog.
Material balance.
Decline curves analysis (estimation of ultimate recovery).
Dynamic reservoir simulation and history matching (saturation maps, bubble maps…).
Criteria for performance analysis methods.
Field case.

| PROBLEM IDENTIFICATION & REMEDIATION TECHNIQUES 2 d |
Implementing state of the art reservoir management system.
Identifying shut-in or low PI’s wells.
Analyzing the surface gathering network and identifying the main bottlenecks.
Defining a monitoring plan.
Improved Oil Recovery (IOR) techniques:
Artificial lift.
Infill drilling.
Deviated and horizontal wells.
Sidetracks and smart completions.
Produced water management.
Wax and asphaltene treatments.
Enhanced Oil Recovery (EOR) techniques:
Chemical (P, SP, ASP, FWAG…).
Miscible (solvent).
Thermal.

| PETROLEUM ECONOMICS & RISK ASPECTS 0.5 d |
Fundamentals of petroleum economics.
Economic selecting criteria (NPV, IRR, PI…).
Well potential based on reserves to be drained, surface facility, well condition…
Review of well history and operational cost.

Reference: RMGT/MATFIELD
Contact: gre.rueil@ifptraining.com

This course is also available in French: RMGT/MATFIELDFR. Please contact us for more information.
Advanced Certificate
IRM - Integrated Reservoir Management

Course Content

RESERVOIR ENGINEERING & FIELD DEVELOPMENT FUNDAMENTALS
(IFP Training) 17 d

Production geology.
Petrophysics: rock properties (porosity, saturation, permeability) and their interactions with fluids.
Well logging and well log interpretation.
Fluid properties: PVT oil, gas and water.
Wellbore interface and wellbore treatment. Well performance.
Well testing and well test analysis.

Drive mechanisms:
Primary recovery: natural depletion of Oil & Gas fields related performance.
Secondary recovery: immiscible water and gas injection in oil fields and related performance.
Enhanced Oil Recovery: miscible gas injection, chemical flooding or thermal process.

Reserves evaluation and classification.
Risks and uncertainties assessment.
Development project & planning. Decision making process.
E&P economics & contracts. Economical criteria.

FIELD CASE STUDY (Imperial College) 13 d

Development and application of a reservoir simulation model for reservoir management, including up scaling,
history matching, and reservoir performance prediction, field development planning and simple economic analysis.
UK field development project.

Field trip to the Wessex basin.
Group-based computer-aided exercise covering the development and monitoring of a large oil field.

Data analysis, development of a reservoir simulation model, including upscaling and history matching.
Application of model to identify an optimum field development plan with simple economic evaluation.

RESERVOIR MANAGEMENT FUNDAMENTALS & FIELD CASE STUDIES
(IFP Training) 15 d

Production logging.
Time-lapse seismic.
Decline curve analysis.

Special case of unconventional reservoirs.
Condensate gas reservoir development:
Reminders about gas reservoirs.
Reservoir performance modeling and optimization.
Well performance.
Integrated production modeling and optimization using IPM™ suite industrial software.
Offshore oil reservoir development:
Data QC.
Estimate of accumulation.
Drive mechanisms identification and assessment.
Optimization of wells location while taking into account technical and economic constraints (production flowrates, workover, platform/subsea wells, surface fluids treatment/management etc.).
Optimization of injection flowrates and cycling periods (option).
Uncertainties assessment.
Conclusions and FDP recommendation.

Reference: RMGT/IRM  Only available as an In-House course.
Contact: gre.rueil@ifptraining.com

Accommodation and transportation costs are not included in the fee. Logistics can be organized by IFP training.
A specific brochure for this program is available on request.

Expertise & Coordination

IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.
Field Development Project & Uncertainties

Level: PROFICIENCY

Purpose

This course provides an in-depth understanding of fundamentals of field development projects, from geology to hydrocarbons recovery, with a special attention to risks induced by the project’s uncertainties.

Audience

Geoscientists, reservoir engineers, petroleum engineers, asset managers and economists willing to deepen their knowledge in field development project and uncertainties management.

Learning Objectives

Upon completion of the course, participants will be able to:

- discuss and apply best practices of Oil & Gas fields development projects,
- discuss and apply methods and criteria for economic evaluation of development projects,
- discuss main concepts and tools of risks and uncertainties assessment, included experimental design & response surface methodology.

Ways & Means

- Interactive lectures and exercises.
- Field case study with real data set.

Learning Assessment

Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites

Basic knowledge in Geosciences and Reservoir Engineering.

Expertise & Coordination

IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

ECONOMIC EVALUATION OF FIELD DEVELOPMENT PROJECTS 1 d

Field development projects decision making process.
Projects economics: methods and criteria.
Oil tax legislation.
Types of petroleum contracts: concession, production sharing.

FIELD DEVELOPMENT PROJECT - CASE STUDY 4 d

From discovery to development of an oil field: methodology from a real field case.
Geological context and discovery.
Appraisal phase (field evaluation after each appraisal well):
- Evaluation of reservoir properties.
- Wells correlation.
- Estimation of accumulation.
Development phase:
- Setting up various scenarios from identified drive mechanisms.
- Estimation of reserves, plateau and production profile.
- Surface/subsurface integration.
- Economical evaluation of scenarios: CAPEX, OPEX, NPV, IRR, etc.
Field development and uncertainties:
- Why quantifying uncertainties in reservoir studies?
- Overview of the response surface methodology and experimental design approach.
- Identification of the most influential uncertain parameters. Consequences on field evaluation and production forecasts.

Reference: FDV/FDP

Only available as an In-House course.

This course is also available in French: FDV/FDPFR. Please contact us for more information.

Contact: gre.rueil@ifptraining.com

www.ifptraining.com
Field Development

Graduate Certificate
Field Operations Engineer Certification

Level: FOUNDATION

Purpose
This course aims to provide the in-depth technical knowledge of Oil & Gas production facilities design and operation necessary to hold rapidly, and very effectively, the position of field operations engineer or project engineer.

Audience
Engineers (particularly recently graduated field, design or project engineers) interested in a specialization in Oil & Gas surface production operations.

Learning Objectives
Upon completion of the course, participants will be able to:
- grasp fundamentals of reservoir engineering, drilling, well completion and servicing,
- evaluate well performance and identify needs for artificial lift,
- explain fundamental concepts underlying Oil & Gas processing,
- analyze operating conditions and basic design of oil, water and gas treatment,
- describe the technology of static equipment and rotating machinery used in production facilities,
- identify offshore development techniques and flow assurance issues,
- identify main risks related to Oil & Gas production operations and contribute to process safety management,
- contribute to the dynamics of field development projects studies.

Ways & Means
- Highly interactive training with industry specialists lecturers.
- Numerical applications and illustrations.
- Multiple teamwork sessions. Use of dynamic simulations and industrial case studies.
- Numerous simulations performed using the PRO/II™ or HYSYS™ software.
- Several tutorials with equipment in a workshop. Site/field visits.

Learning Assessment
- Continuous assessments all-along the program.
- Final assessment including a presentation in front of a jury.

Prerequisites
No prerequisites for this course.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Field Operations Engineer.
- Ready-to-use skills.

More info
This training includes 1 week in Pau (south of France) for mechanical workshop and site visits.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content
60 days

FUNDAMENTALS OF GEOSCIENCES & RESERVOIR ENGINEERING
5 d

FUNDAMENTALS OF DRILLING, WELL COMPLETION & WELL PERFORMANCE
5 d

ADVANCED OIL & GAS FIELD PROCESSING
15 d
Module I: Thermodynamics applied to well effluent processing
- Well effluent. Ideal gas and real fluid behavior.
- Gas compression and expansion.
- Liquid-vapor equilibrium of pure components and mixtures. Mixture separation.
- Heat transfer, heat balance and thermal equipment.

Module II: Oil & water treatment
- Crude oil treatment: stabilization, dehydration, sweetening.
- Storage equipment.
- Reject and injection water treatment.

Module III: Gas processing & conditioning
- Gas processing: dehydration, sweetening, NGL recovery.
- Fundamentals of Liquefied Natural Gas (LNG) chain.

PIPING & INSTRUMENTED SYSTEMS
5 d


ROTTING MACHINERY - TECHNOLOGY, SELECTION & OPERATION
5 d

OFFSHORE FIELD DEVELOPMENT - PIPELINES & FLOW ASSURANCE
5 d


PRODUCTION ACCOUNTING & MATERIAL BALANCE
3 d
Measures and metering systems along the chain. Liquid and gas balances. Performance monitoring and production reporting.

Case study and production balances reconstruction: back allocation, satellite fields…

PETROLEUM ECONOMICS & PROJECT MANAGEMENT
2 d

PROCESS SAFETY MANAGEMENT
5 d

FIELD DEVELOPMENT PROJECT - JURY
10 d
During this final project, participants will select field development scenario and architecture, design wells, evaluate well performances, design and simulate process, realize heat and mass balance and evaluate profitability of their project.

This 10-day teamwork project is a real case study based on actual data. Participants are coached throughout the project to produce the required deliverables, which are to be presented on the last day (jury):

Reference: PROP/FIELDENG
Only available as an In-House course.

Contact: exp.reuil@ifptraining.com

This course is also available in French: PROP/INGPROD. Please contact us for more information.
Field Development Project
Scheme selection - Design - Schedule - Project profitability

Level: FOUNDATION

Purpose
This course provides the knowledge, methodology and tools to orchestrate work and integrate contributions of engineers from all disciplines working in a project team with the purpose of devising field development schemes.

Audience
Engineers from all upstream Oil & Gas disciplines: reservoir, drilling and well completion, treatment facilities, cost estimation, design…

Learning Objectives
Upon completion of the course, participants will be able to:
- consolidate the fundamentals to lead a field development study,
- acquire world class methodology in Oil & Gas field development,
- assess and assemble contributions of all technical disciplines involved in mapping out a field development scheme,
- outline the design of flow-lines, processing facilities and export facilities,
- make an efficient contribution to field development multidisciplinary project teams.

Ways & Means
- Intensive 10-day work on a full field development project, with deliverables presented to a jury in a plenary session.
- Coaching throughout the training by industry experts for a highly interactive learning experience.
- Several teamwork sessions with practical exercises.
- Use of several professional software programs for designing facilities and sizing equipment.

Learning Assessment
Oral presentation in front of a jury at the end of the program.

Prerequisites
No prerequisites for this course.

Reference: FDV/FDEVGB

Course Content

FUNDAMENTALS OF RESERVOIR, DRILLING & COMPLETION 0.5 d
WELL EFFLUENTS BEHAVIOR - NEED FOR EFFLUENT FIELD PROCESSING 0.5 d
CRUDE OIL TREATMENT 0.5 d
PRODUCTION & INJECTION WATER TREATMENT 0.5 d
GAS PROCESSING & CONDITIONING 0.5 d
SIMULATION OF OIL & GAS FIELD TREATMENT 1 d
CASE OF OFFSHORE DEVELOPMENTS - FLOW ASSURANCE 0.25 d
SAFETY & ENVIRONMENT 0.25 d
PROJECT MANAGEMENT 0.5 d
PETROLEUM ECONOMICS 0.5 d
FIELD DEVELOPMENT PROJECT (teamwork project with experienced coach) 10 d

Deliverables:
- Data collection and analysis. Identification of the technically feasible scenarios. Selection of the optimum scenario.
- Design of flow-lines and study of flow assurance issues.
- Design of surface processing facilities: Process Flow Diagram (PFD), operating conditions, main control loops…
- Design of export pipelines and estimation of floating storage capacities.
- Estimation of power requirements and consequently the fuel gas balance.
- Topside layout, minimizing hazards.
- Tentative schedule for the project. Cost estimation and project profitability analysis.
- Contracting policy. Local content policy.

Jury: presentation of the results and comments with members of the Jury.

PEDAGOGICAL METHODOLOGY
Team work exercise, in order to promote an efficient collaborative work.
Continuous coaching by industry experts, for a highly interactive learning.
Use of several industrial-proven software for the design of the installations and the sizing of the equipment.

www.ifptraining.com

This course is also available in French: FDV/FDEVFR. Please contact us for more information.
Level: ADVANCED

Purpose

This course provides a thorough understanding of Front-End Engineering issues and the interaction between all experts involved along the decision path in formulating Project Development Plans (PDP) and submitting them for Final Investment Decisions (FID).

Audience

Professionals involved in E&P projects requiring a comprehensive view of the methodology and tools needed for successful front-end development.

Learning Objectives

Upon completion of the course, participants will be able to:
- Conduct field development feasibility studies,
- Build and develop project options scenarios,
- Define scope for project (front-end) estimates,
- Identify costly projects,
- Produce project development plans.

Ways & Means

Several case studies are used to illustrate the E&P decision process and the various issues of front-end development studies.

Learning Assessment

Quiz at the end of the module.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 5 days

DECISION PATH ALONG THE E&P VALUE CHAIN 1.5 d

Strategic issues in exploration-production:
- Requirements for decision in the Oil & Gas industry. Primary objectives of an Oil & Gas company. Strategies to feed the E&P portfolio asset funnel. E&P risk dynamics and objectives of economic analysis. Life cycle of upstream assets.
- Critical decision points and value creation at experts meeting points.

Decision process from block evaluation to exploration drilling:

Decision process from discovery to development and production:
- Discovery appraisal, reserves evaluation and recovery mechanisms. Reserves probability distribution and classification. Oil & Gas fields. Development scenarios. Decision tree analysis for choosing optimal strategy (case study).

VALUE ASSESSMENT OF DEVELOPMENT PROJECTS 2 d

Fundamental contractual and economic aspects:

A field development project economic evaluation:
- Investment decision based on cash-flow modeling and analysis. Corporate finance and remuneration of capital employed. Importance of weighted average cost of capital. Fundamental condition for value creation. Project’s cash flow modeling and discounting. Project’s economic indicators and sensitivity analysis. A field development project economic model and valuation report (case study). Choosing the most economically viable option, with or without capital constraints (case studies).

Methodology of quantitative risk analysis:

CONCEPTS FOR SUCCESSFUL FRONT-END DEVELOPMENT 0.5 d

Closer look at why projects fail:
- Discussion of issues and constraints facing Oil & Gas projects. Large capital Oil & Gas projects challenges and performance. Aggressive pursuit and conservative response. Project risks, organizational risks, external risks and the influence curve. Asset front-end loading index. Keys to successful project delivery.

FEL (Front-End Loading) purpose and methodology:
- Foundation for smarter project execution. Important effort in the FED (Front-End Development). FEL phases and deliverables: visualization, conception, definition. Goals for FED and benefits of FEL. Risk exposure and amount of control.

Oil & Gas field development project definition:
- Activities and stages leading to the FID. Studies to be performed to reach that goal. Stage-gated project management process. Interaction between various disciplines involved in the project.

DYNAMICS OF FEL 1 & FEL 0.5 d

FEL 1: Prefeasibility stage:
- Objective of preliminary studies and appraisal requirements. Preliminary scheme and technical feasibility. Preliminary schedule and cost estimates. Economic, safety, environment and stakeholders issues.

FEL 2: Feasibility stage:
- Objective of conceptual studies. Screening of alternatives and confirmation of feasibility. Key parameters definition and various technical options. Concept study content and concept selection criteria. Pre-project or pre-FEED study content and output. Field development plan, project economics and execution principles. Pre-requisites for launching the FEED or Basic Engineering. Case study.

DYNAMICS OF FEL 3 & FID 0.5 d

FEL 3: basic engineering and development stage:
- Project scope definition and integration management. Work breakdown structure for an Oil & Gas field. Scope of the basic engineering package. Reference documents needed and validation process. FEED activities, deliverables and organizations. Company and contractor execution plans.

Final Investment Decision:
- Project sanction. Typical project organization. FEED contract types. Managing changes to the scope baseline. SOR (Statement Of Requirements) modifications.

Key field development planning and FEL issues to keep in mind.

Reference: PMMP/PROJAFLAGB • Only available as an In-House course. Contact: pl.rueil@ifptraining.com
Level: PROFICIENCY

Course Content 5 days

OVERVIEW OF THE DECISION PROCESS 0.5 d
Strategic issues in Oil & Gas: E&P portfolio components and risk dynamics, important value drivers, life cycle of upstream assets, critical decision points and value creation, economic rent sharing through Oil & Gas contracts. Exploration phase: exploration rounds and blocks, fundamental questions for a manager, speculation and decision process, exploration risk and prospect reserves evaluation, techniques and expertise involved, exploration risk and reward analysis, impact of state participation, risk mitigation. Development/production phase: appraisal, uncertainties and discovery reserves evaluation, techniques and expertise involved, field development schemes, capital expenditures, operating expenses, abandonment issues and costs, economic modeling, value of a discovery, fundamental condition for value creation. Fundamental issues in decision analysis: uncertainty in capital investments, decision analysis process, terminology used in decision analysis, various applications in the Oil & Gas industry.

MAIN STATISTICS & PROBABILITY CONCEPTS 1.5 d
Descriptive statistics: measures of central tendency, measures of dispersion, grouping of large data sets, frequency distribution, cumulative and decumulative relative frequency. Probability concepts: simple, conditional, joint, and marginal probability, probability rules, discrete probability distributions, continuous probability distributions. Spreadsheet applications: drilling data, exploration drilling, reservoir data, workover...

RISK & DECISION ANALYSIS 3 d
Expected value concepts: expected value and standard deviation of random variables, structural elements of decision problems, payoff tables, expected monetary value, expected profitability index, performance index, expected opportunity loss, sensitivity analysis, mean-variance analysis. Decision tree analysis: designing and solving decision trees, risk profiles, expected value of information (perfect or imperfect), expected net gain, prior, conditional and posterior probabilities, Baye’s rule. Attitudes towards risk: expected preference value or expected utility, utility function, risk tolerance, certainty equivalent and risk premium, assessing the utility function, mathematical representation of utility functions, gambler’s ruin, risk-adjusted value and working interest. Simulation in decision analysis: applications of simulation, steps in simulation modeling, probabilistic dependence of input variables. Spreadsheet applications: decision tree analysis with the software PrecisionTree, Monte Carlo simulation with the software @Risk, reserves probability distribution, reserves uncertainties in the valuation of a simple prospect, Bayesian tree analysis for prospect evaluation, drilling prospect with farm-out option, cost and value of information from a delineation, seismic option, investment decision with a risk tolerance...

Reference: PIMP/PRDAWGB Only available as an In-House course. Contact: pl.rueil@ifptraining.com

www.ifptraining.com
Purpose
This course provides a structured and comprehensive approach towards cost estimation and control of upstream Oil & Gas projects.

Audience
Project engineers and managers, petroleum architects, engineers in charge of the modification/extension of existing facilities and R&D engineers.

Learning Objectives
Upon completion of the course, participants will be able to:
- technically define a project to provide a comprehensive cost estimate,
- perform estimates using a variety of methods and tools,
- apply the main cost control techniques used throughout the project execution.

Ways & Means
Case studies from upstream projects. Spreadsheets will be used to perform project cost estimates from basic design parameters.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in E&P Project Cost Estimation & Control.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OVERVIEW OF E&P PROJECTS
Introduction to exploration and production projects:
- Decision process from discovery to production.

Technical fundamentals:
- Production facilities.
- Structures and pipelines.

0.5 d

PROJECT COST ESTIMATION
Estimation framework:
- Cost evaluation during project evaluation phases:
  - Order of magnitude estimate. Factored/modular estimate.
  - Cost evaluation during basic engineering and contracting phases:
    - Semi detailed estimate. Detailed estimate.
- From historical data to present time cost evaluation:
  - Cost escalation, cost indexes, inflation. Location factors.
- Additional cost elements:

1.5 d

CASE STUDIES ON COST ESTIMATION
CAPEX of an onshore project:
- Cost estimate of well clusters, CPF, flow lines, trunk lines and infrastructures using diverse documents (historical data, curves, etc.).
CAPEX of an offshore project:
- Cost estimate of a satellite field development.
CAPEX of a deep offshore project:
- Cost estimate of the three main packages (FPSO, UFR and SPS).
OPEX of an onshore field:
- Production, transformation and transport costs. Routine and non-routine costs.

1.5 d

COST CONTROL
Overview of cost control process.
Impact of contracting strategy.
Breakdown structures and budget.
Commitment process.
Change management.
Forecasts and reporting.

1.5 d

Reference: PCTR/COSTGB
Can be organized as an In-House course.
Contact: pl.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>25 November</td>
<td>29 November</td>
<td>€3,570</td>
</tr>
</tbody>
</table>

This course is also available in French: PCTR/COSTFR. Please contact us for more information.
Drilling & Completion Engineering

- General Drilling & Completion
  - Well Operations & Completion Engineering Certification ................................................................. p. 150
  - Supervisor Training on Drilling Simulator .................................................................................................... p. 151
  - Drilling Fundamentals ................................................................................................................................. p. 152
  - Well Completion & Servicing ........................................................................................................................ p. 153

- Drilling
  - Practical Aspects of Well Construction & Planning .................................................................................. p. 157
  - Geological Field Trip for Drillers ................................................................................................................ p. 158
  - Fundamentals of Drilling & Completion ...................................................................................................... p. 159
  - Well Architecture & Equipment ................................................................................................................. p. 160
  - Bit & Drill String & Fishing while Drilling .................................................................................................. p. 161
  - Rig, BOP’s & Well Control Equipment ..................................................................................................... p. 162
  - Data Acquisition during Drilling Operations ............................................................................................... p. 163
  - HSE in Drilling Operations ......................................................................................................................... p. 164

- Fluids
  - Drilling Fluids ................................................................................................................................................ p. 172
  - Cementing Practices ...................................................................................................................................... p. 173

- Completion & Well Operations
  - Wellhead Selection & Maintenance ........................................................................................................... p. 175
  - Well Productivity & Reservoir - Wellbore Interface .................................................................................. p. 176
  - Well Test Operation ..................................................................................................................................... p. 177
  - Well-Completion Equipment & Procedures for Flowing Wells ................................................................ p. 178
  - Tubing Movement & Forces .......................................................................................................................... p. 179
  - Wellbore Treatments ..................................................................................................................................... p. 180
  - Matrix Acidizing ........................................................................................................................................... p. 181
  - Basic Hydraulic Fracturing ........................................................................................................................... p. 182
  - Artificial Lift & Well Intervention Fundamentals ...................................................................................... p. 183
  - Artificial Lift: Gas lift ......................................................................................................................................... p. 184
  - Artificial Lift: Pumping ...................................................................................................................................... p. 185
  - Coiled Tubing & Nitrogen Operations in Completion & Workover ................................................................ p. 186

  - Drilling & Completion Engineering Certification ............................................................... p. 154
  - Drilling Engineering ....................................................................................................................................... p. 155
  - Completion Engineering ................................................................................................................................. p. 156

- Directional & Horizontal Drilling Certification ......................................................................................... p. 165
- Geomechanics for Drillers .............................................................................................................................. p. 166
- Underbalanced & Managed Pressure Drilling: Applications, Design & Operations .................................. p. 167
- Deepwater Drilling & Development Certification ..................................................................................... p. 168
- Wellhead & Blowout Preventers ..................................................................................................................... p. 169
- Stuck Pipe Prevention ...................................................................................................................................... p. 170
- HPHT Drilling Design & Operations ............................................................................................................. p. 171

- Advanced Cementing Practices .................................................................................................................... p. 174
- Well Servicing & Workover .............................................................................................................................. p. 187
- Well Performance ............................................................................................................................................. p. 188
- Advanced Well Performance ............................................................................................................................. p. 189
- Well Inflow & Outflow Performance ............................................................................................................... p. 190
- Well Production Integrity Management ........................................................................................................... p. 191
- Well Production Integrity Management ........................................................................................................... p. 191
- Well Performance Engineering Certification .................................................................................................. p. 193
- Well Integrity Engineering Certification ......................................................................................................... p. 194
- Well Control - Level 2 ..................................................................................................................................... p. 195
- Well Control - Level 3 or 4 ................................................................................................................................. p. 195
- Well Intervention & Pressure Control - Level 2 ............................................................................................ p. 197
- Well Intervention & Pressure Control - Level 3 or 4 ..................................................................................... p. 198
- Stripping ........................................................................................................................................................ p. 199
Graduate Certificate

Well Operations & Completion Engineering Certification

Level: FOUNDATION

Purpose
This course provides an in-depth, practical understanding of completion techniques, operations, equipment and procedures.

Audience
Young engineers involved in drilling and completion, supervisors, tool pushers.

Learning Objectives
Upon completion of the course, participants will be able to:
- assist in completion operations on site;
- and, with some experience, manage those operations,
- define a completion program, and, with some on-site experience, design and implement such a program,
- pass the IWCF “Well Intervention and Pressure Control” certification.

Ways & Means
- Equipment and cutaway tools display.
- Exercises, role-playing sessions and case studies.
- Summary notes prepared and presented by the participants.
- 5-day completion project, ending with a presentation to a jury.
- Knowledge assessment on a weekly basis.

Learning Assessment
Quiz and presentation of the project to a jury.

Prerequisites
Engineering degree or equivalent experience within the petroleum industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Well Operations & Completion Engineering.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1 - FUNDAMENTALS OF DRILLING &amp; COMPLETION</td>
<td>5 d</td>
<td>152</td>
</tr>
<tr>
<td>Module 2 - WELL PRODUCTIVITY &amp; RESERVOIR - WELLBORE INTERFACE</td>
<td>5 d</td>
<td>176</td>
</tr>
<tr>
<td>Module 3 - WELL COMPLETION EQUIPMENT &amp; PROCEDURES FOR FLOWING WELLS</td>
<td>5 d</td>
<td>178</td>
</tr>
<tr>
<td>Module 4 - WELLBORE TREATMENTS</td>
<td>5 d</td>
<td>180</td>
</tr>
<tr>
<td>Module 5 - ARTIFICIAL LIFT &amp; WELL INTERVENTION FUNDAMENTALS</td>
<td>5 d</td>
<td>183</td>
</tr>
<tr>
<td>Module 6 - COILED TUBING &amp; NITROGEN OPERATIONS IN COMPLETION &amp; WORKOVER</td>
<td>5 d</td>
<td>186</td>
</tr>
<tr>
<td>Module 7 - WELL INTERVENTION &amp; PRESSURE CONTROL</td>
<td>5 d</td>
<td>198</td>
</tr>
<tr>
<td>Module 8 - PROJECT ON COMPLETION PROGRAM</td>
<td>5 d</td>
<td></td>
</tr>
</tbody>
</table>

Completion design.
Tubing calculations.
Fluids design.
Chronology of operations.
Presentation to a jury.

This course is also available in French: GEND/IP. Please contact us for more information.

Reference: GEND/CE

Only available as an In-House course.

Contact: fp.pau@ifptraining.com
Supervisor Training on Drilling Simulator

Course Content

Level: PROFICIENCY

Purpose

This course aims to help trainees to understand, prepare and manage various situations, to analyze and react properly.

Audience

Assistant drillers, drillers, tool pushers, drilling engineers and supervisors.

Learning Objectives

Upon completion of the course, participants will be able to:

- remind the good practices for the main operations on the rig with the references to the company rules,
- prepare the instructions for a given situation using checklists if needed,
- manage a prejob safety meeting prior to commence an operation,
- follow the operations and control the important parameters,
- detect potential problems and react properly using a decision tree if necessary,
- manage the problems and adapt the program to the situation (Management Of Change).

Ways & Means

- Short reminder in a classroom and application in real-life working conditions on Drilling Simulators.
- Systematic debriefing with trainees at the end of each day.
- Scenarios can be tailor made according to the needs of the client and the level of the trainees.

Learning Assessment

Practice on simulator, debriefing.

Prerequisites

Well Control knowledges are advised.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

COMMON OBJECTIVES FOR ALL EXERCISES

Reminders of the good practice and the company rules (if any).

Work on the simulators with various situations.

Analyze the situations.

Prepare the instructions.

Manage the prejob/safety meetings.

Follow the ongoing operations.

Detect potential problems.

React properly.

Adapt the program if needed.

TRIPPING

Work on the simulators with various situations, prepare the program for the trip or wiper trip in a vertical and deviated well, follow the ongoing operations, drags, torque, swabbing, back reaming, pump out of hole, detect potential problems.

CASING OPERATION

Work with various situations, prepare the program to run the casing in the hole, follow the ongoing operations, filling up the casing, drags, surging, detect potential problems, and react properly.

CEMENTING OPERATION

Prepare the program for the cementing job in various situations, follow the ongoing operations, regular cement job, kick while cementing, losses and detect potential problems if any, react properly and adapt the program if needed.

LOT & ELOT

Prepare the program for the integrity test of the formation, follow the ongoing operations, FIT, LOT, ELOT, detect potential problems, react properly and adapt the program if needed.

CIRCULATION, HOLE CLEANING

Work on the simulators with various hole cleaning issues, prepare the program, follow the ongoing operations, PUW, SOW, FRW, ECD, SPP, detect potential problems of hole cleaning, react properly and adapt the program if needed by changing or adjusting hydraulic parameters.

LOSSES

Analyze the situation, follow the ongoing operations, drilling, RIH, circulation, detect potential problems of losses (partial or total losses), react properly, adapt the program if needed.

STUCK PIPE

Prepare the program for the trip or wiper trip in a vertical and deviated well, work on the simulators with various stuck pipe situations, follow the ongoing operation, drilling, POOH, jarring, detect potential problems (key seat, differential pressure sticking, packoff), react properly and free the string.

WELL CONTROL IN HORIZONTAL WELL

Manage the operations to kill a well with a kick in an horizontal profile.

SHALLOW GAS

Work on the simulators with various situations leading to a shallow gas kick, prepare the program to anticipate the problem, follow the ongoing operation, drilling of the top hole, pilot hole, detect potential problems, kick while drilling, kick during pipe connection, kick while POOH, react properly with dynamic killing procedure and diverter use.

WELL CONTROL WITH CP>MAASP

Kick exceeding kick tolerance, manage the killing operation, follow the ongoing operation, kick circulation, detect potential problems when CP close to MAASP, react properly avoiding fracture of the formation if possible and managing the BHP.

Remark: this list is not complete and various other scenarios are available and can be created at the request of the client.

Reference: GEND/FOSIME. Only available as an In-House course.

This course is also available in French: GEND/FOSIMF. Please contact us for more information.

www.ifptraining.com
Drilling Fundamentals

Level: DISCOVERY

Purpose
This intensive course provides a comprehensive overview of drilling and completion techniques and operations.

Audience
Engineers and technicians interested but not involved in drilling: geologists, geophysicists, reservoir engineers, completion, production and process staff, platform designers, economists, etc.

Learning Objectives
Upon completion of the course, participants will be able to:
> recognize the vocabulary specific to drilling,
> identify and describe drilling operations and equipment used,
> identify the different professionals involved in drilling and learn about their roles and responsibilities.

Ways & Means
> Videos and animations.
> Exercises.
> Visit to a drilling site*.  
* When the course is delivered in Rueil-Malmaison, practical illustration is provided by video.

Learning Assessment
Continuous evaluation: exercises and oral questions.

Prerequisites
No prerequisites for this course.

More info
Refer to the following complementary courses which might be of interest: “Introduction to Reservoir Engineering” (page 124), “Well Completion & Servicing” (page 153), “Oil & Gas Field Processing” (page 224).

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

ORGANIZATION OF DRILLING OPERATIONS
Drilling principles.
Cost, duration of a drilling job.
Different people involved, types of contracts.
Safety.

0.5 d

DRILLING PRINCIPLES - EQUIPMENT
Different types of bits.
Drilling string.
Drilling rig:
Hoisting function and equipment.
Pumping function and equipment.
Rotating function and equipment.
Power function.
Safety function and equipment.
Mud and solid treatment.

1.5 d

WELL ARCHITECTURE
Reservoir notions.
Functions of different casings.
Parameters to be taken into account to determine well architecture.
Examples of architectures.

0.5 d

SPECIAL OPERATIONS
Cementing operations.
Wellhead.
Directional drilling.
Well control.
Fishing jobs.
Wireline logging, well test (DST).

1.25 d

DRILLING ON A SIMULATOR (Pau)*
Use of a well control simulator to show the drilling operations (tripping, drilling, running of casings).

0.25 d

OFFSHORE DRILLING OPERATIONS
Different types of rigs.
Problems related to their use.

0.25 d

WELL COMPLETION
Reservoir-wellbore interface.
Equipment for flowing wells.
Well intervention.

0.25 d

VISIT OF A DRILLING SITE*

0.5 d

Reference: GEND/INFORE
Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

<table>
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<th>Location</th>
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<tr>
<td>Pau</td>
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<td>Rueil</td>
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<td>25 October</td>
<td>€3,580</td>
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* This course is also available in French: DRIL/INFORF. Please contact us for more information.
Well Completion & Servicing

Level: DISCOVERY

Purpose
This course provides a comprehensive overview of completion and well intervention operations.

Audience
Engineers and technicians, from operating or service companies, interested but not involved in well completion or servicing: geologists, geophysicists, reservoir engineers, drillers, production and process staff, platform designers, economists, etc.

Learning Objectives
Upon completion of the course, participants will be able to:
- recognize the connection between reservoir and completion,
- distinguish between the main configurations and techniques of completion,
- review advantages and issues of various techniques,
- communicate efficiently with Oil & Gas service companies and equipment suppliers.

Ways & Means
- Well control on a simulator.
- Equipment and cutaway tools display.
- Exercises, role-playing sessions, project and case studies.
- Summary notes prepared and presented by the participants.

Learning Assessment
Discussion of the summary notes prepared and presented by the participants.

Prerequisites
No prerequisites for this course.

More info
Kindly refer to the following complementary courses which might be of interest: “Introduction to Reservoir Engineering” (page 124), “Drilling Fundamentals” (page 152), and “Oil & Gas Field Processing” (page 224).

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

**NECESSARY FUNDAMENTALS OF RESERVOIR ENGINEERING FOR COMPLETION**

0.75 d
- Introduction: area concerned by completion, main steps.
- Geological trap, rock properties.
- Fluid behavior.
- Reservoir characterization, well testing.
- Recovery mechanisms.

**NECESSARY FUNDAMENTALS OF DRILLING FOR COMPLETION**

0.25 d
- Drilling and casing program, casing cementing.
- Wellhead and safety equipment (BOP).

**INTRODUCTION TO COMPLETION**

0.5 d
- Concerned area, main steps (for memory).
- Main factors influencing completion design.
- Completion configurations: requirement, main configurations.

**WELL PRODUCTIVITY & RESERVOIR-WELLBORE INTERFACE (Part 1)**

0.75 d
- Overall approach of the well flow capacity:
  - Inflow and outflow performance.
  - Need for artificial lift.
  - Drilling (and casing) of the pay zone: specific aspects.
  - Problems linked to restoring the cement job.
  - Perforating: principle, main methods.

**EQUIPMENT OF NATURALLY FLOWING WELLS**

1 d
- Functions to be carried out and corresponding pieces of equipment, main configurations of production string(s).
- Technology and handling of main pieces of equipment: production well head, tubing, packer, downhole devices, subsurface safety valve.
- Running in hole procedure.
- Present trends: fullbore... intelligent completion.

**RESERVOIR-WELLBORE INTERFACE (Part 2)**

0.5 d
- Stimulation: acidizing, hydraulic fracturing.
- Sand control.
- Horizontal drain specificity: interest, reservoir-wellbore interface.

**ARTIFICIAL LIFT**

0.5 d
- Sucker rod pumping and electrical submersible pumping: principle, main components, factor to consider for design, operating problems.
- Continuous gas lift: principle, factors to consider for design, unloading, operating problems.
- Field of application.

**WELL SERVICING & WORKOVER**

0.5 d
- Main jobs: measurement, maintenance, workover.
- Operations on live wells: wireline, coiled tubing, snubbing.
- Operations on killed wells: workover.

**KNOWLEDGE ASSESSMENT**

0.25 d

Reference: GEND/INPFE. Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

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<td>Rueil</td>
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*This course is also available in French: GEND/INPFF. Please contact us for more information.*
Graduate Certificate
Drilling & Completion Engineering Certification

**Level:** FOUNDATION

**Purpose**
This course provides an in-depth, practical understanding of drilling and completion techniques, operations, equipment and procedures.

**Audience**
Young engineers involved in drilling and completion, supervisors, tool pushers.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- assist in drilling/completions operations on site and, with some experience, manage those operations.
- define a drilling/completion program and, with some on-site experience, design and implement such a program.
- pass the IWCF “Combined Surface/Subsurface BOP Stack” test.

**Ways & Means**
- Drilling simulator.
- Well control on a simulator.
- Equipment and cutaway tools display.
- Exercises, role-playing sessions and case studies.
- Summary notes prepared and presented by the participants.
- 10-day drilling/completion project, ending with a presentation to a jury.
- Site visits.
- Knowledge assessment on a weekly basis.

**Learning Assessment**
Quiz at the end of each week, final project presentation to a jury.

**Prerequisites**
Engineering degree or equivalent experience within the petroleum industry.

**Why an IFP Training Certification?**
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Drilling & Completion Engineering.
- Ready-to-use skills.

**More info**
This training program is made up of two complementary training programs: “Drilling Engineering” (page 155) and “Completion Engineering” (page 156). The training includes several modules; each one can be attended independently.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

<table>
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<th>Module</th>
<th>Title</th>
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<tbody>
<tr>
<td>1</td>
<td>GEOLOGICAL FIELD TRIP FOR DRILLERS</td>
<td>5 d</td>
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<tr>
<td>2</td>
<td>FUNDAMENTALS OF DRILLING &amp; COMPLETION</td>
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<td>WELL PRODUCTIVITY &amp; RESERVOIR - WELLBORE INTERFACE</td>
<td>5 d</td>
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<td>4</td>
<td>WELL COMPLETION EQUIPMENT &amp; PROCEDURES FOR FLOWING WELLS</td>
<td>5 d</td>
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<tr>
<td>5</td>
<td>WELLBORE TREATMENTS</td>
<td>5 d</td>
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<tr>
<td>6</td>
<td>ARTIFICIAL LIFT &amp; WELL INTERVENTION FUNDAMENTALS</td>
<td>5 d</td>
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<td>7</td>
<td>WELL ARCHITECTURE &amp; EQUIPMENT</td>
<td>5 d</td>
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<tr>
<td>8</td>
<td>DRILLING FLUIDS</td>
<td>5 d</td>
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<td>9</td>
<td>CEMENTING PRACTICES</td>
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<tr>
<td>10</td>
<td>BIT, DRILL STRING &amp; FISHING WHILE DRILLING</td>
<td>5 d</td>
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<tr>
<td>11</td>
<td>DIRECTIONAL &amp; HORIZONTAL DRILLING CERTIFICATION</td>
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<td>12</td>
<td>RIG &amp; BOP’S &amp; WELL CONTROL EQUIPMENT</td>
<td>5 d</td>
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<tr>
<td>13</td>
<td>WELL TEST OPERATION</td>
<td>5 d</td>
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<tr>
<td>14</td>
<td>DATA ACQUISITION DURING DRILLING OPERATIONS</td>
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<tr>
<td>15</td>
<td>WELL CONTROL</td>
<td>5 d</td>
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<tr>
<td>16</td>
<td>DEEPWATER DRILLING &amp; DEVELOPMENT CERTIFICATION</td>
<td>5 d</td>
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<tr>
<td>17</td>
<td>SUPERVISOR TRAINING ON DRILLING SIMULATOR</td>
<td>3 d</td>
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<td>18</td>
<td>HSE IN DRILLING OPERATIONS</td>
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<tr>
<td>19</td>
<td>DRILLING &amp; COMPLETION PROJECT</td>
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This course is also available in French: GEND/FOFPF. Please contact us for more information.

**Location Start Date End Date Tuition Fees**

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<thead>
<tr>
<th>Location</th>
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<tr>
<td>Pau</td>
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</table>

Reference: GEND/FOFPE. Can be organized as an In-House course. Contact: fp.pau@ifptraining.com
Drilling Engineering

Level: FOUNDATION

Purpose
This course provides an in-depth, practical understanding of drilling techniques, operations, equipment and procedures.

Audience
Young engineers involved in drilling and completion, supervisors, tool pushers.

Learning Objectives
Upon completion of the course, participants will be able to:

- assist in drilling operations on site, and, with some experience, manage those operations,
- define a drilling program; and, with some on-site experience, design and implement such a program,
- pass the IWCF “Combined Surface/Subsurface BOP Stack” test.

Ways & Means
- Drilling simulator.
- Well control on a simulator.
- Equipment and cutaway tools display.
- Exercises, role-playing sessions, and case studies.
- Summary notes prepared and presented by the participants.
- 10-day drilling project, ending with a presentation to a jury.
- Site visits.
- Knowledge assessment on a weekly basis.
- Upon successful completion of a knowledge test, the IWCF “Well Control” Certificate is delivered.

Learning Assessment
Quiz at the end of each week, final project presentation to a jury.

Prerequisites
No prerequisites for this course.

More info
The training includes several modules; each one can be attended independently.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: GEND/FOFPFE
Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees
Pau 28 January 15 February €41,590
& 11 March 14 June

This course is also available in French: GEND/FOFPFF. Please contact us for more information.
Completion Engineering

Level: FOUNDATION

Purpose
This course provides an in-depth, practical understanding of completion techniques, operations, equipment and procedures.

Audience
Young engineers involved in drilling and completion, supervisors, tool pushers.

Learning Objectives
Upon completion of the course, participants will be able to:
- assist in completion operations on site and, with some experience, manage those operations,
- define a completion program and, with some on-site experience, design and implement such program,
- pass the IWCF “Combined Surface/Subsurface BOP Stack” test.

Ways & Means
- Well control on a simulator.
- Equipment and cutaway tools display.
- Exercises, role-playing sessions and case studies.
- Summary notes prepared and presented by the participants.
- 10-day completion project, ending with a presentation to a jury.
- Knowledge assessment on a weekly basis.
- Upon successful completion of a knowledge test, the IWCF “Well Control” Certificate is delivered.

Learning Assessment
Quiz at the end of each week, final project presentation of project to a jury.

Prerequisites
No prerequisites for this course.

More info
The training includes several modules; each one can be attended independently.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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<tbody>
<tr>
<td>1</td>
<td>GEOLOGICAL FIELD TRIP FOR DRILLERS (page 158)</td>
<td>5 d</td>
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<tr>
<td>2</td>
<td>FUNDAMENTALS OF DRILLING &amp; COMPLETION (page 159)</td>
<td>5 d</td>
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<tr>
<td>3</td>
<td>WELL PRODUCTIVITY &amp; RESERVOIR - WELLBORE INTERFACE (page 176)</td>
<td>5 d</td>
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<td>4</td>
<td>WELL COMPLETION EQUIPMENT &amp; PROCEDURES FOR FLOWING WELLS (page 178)</td>
<td>5 d</td>
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<td>WELLBORE TREATMENTS (page 180)</td>
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<td>6</td>
<td>ARTIFICIAL LIFT &amp; WELL INTERVENTION FUNDAMENTALS (page 183)</td>
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<td>15</td>
<td>WELL CONTROL (page 196)</td>
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<tr>
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<tr>
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<td>HSE IN DRILLING OPERATIONS (page 164)</td>
<td>5 d</td>
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<tr>
<td>19</td>
<td>DRILLING &amp; COMPLETION PROJECT</td>
<td>10 d</td>
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</table>

Completion design.
Tubing calculations.
Fluids design.
Chronology of operations.
Presentation to a jury.

Reference: GEND/FOFPCE
Can be organized as an In-House course.

Contact: fp.pau@ifptraining.com

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This course is also available in French: GEND/FOFPCF. Please contact us for more information.
Practical Aspects of Well Construction & Planning

Course Content

WELL OBJECTIVES & INPUTS TO THE DRILLING PROGRAM
Typical objectives and inputs to an exploration or/and a development well program.
0.25 d
Pore and fracturation pressure evaluation.
Criteria to consider for the well design.

CASING DESIGN: SHOE POSITIONING
Swab and surge considerations, kick tolerance, hypothesis selection.
0.5 d
Selection of mud weights, additional constraints, exercises with different hypothesis.

CASING DESIGN: CASING SELECTION
Physical and mechanical properties of casings and casing connections.
Casing string calculation, selection.
1.5 d

WELLHEAD DESIGN & SELECTION
Different wellheads in onshore and offshore environments.
Wellhead and BOP selection.
0.25 d

BITS PROGRAM
Different types of bits, bit selection: bit records, cost per foot, bit hydraulics.
0.75 d
Exercises.

DRILL STRING, COMPONENTS & SELECTION
Drill string components.
Characteristics and limit of use.
BHA and drill pipe selection.
Exercises.
0.75 d

MUD & CEMENT PROGRAM
Drilling fluid types and characteristics, mechanical treatment equipment.
Selection of mud program according to the well construction criteria.
Cementing technology and procedures, cement and slurry design.
Cementing program, cementing quality control.
Exercises.
1.5 d

FORMATION EVALUATION PROGRAM
Open hole logging tools (GR, resistivity, density, neutron, sonic).
Quick look exercise.
0.5 d

DEVIA TED WELLS DESIGN: DIRECTIONAL DRILLING METHODS & TECHNOLOGY
Directional drilling tools and technology, directional program.
Trajectory planning coordinates systems.
Trajectory calculation methods, uncertainty evaluation, anti collision.
Drill string selection.
1 d

RIG SELECTION
Main drilling rig functions.
Types of rigs, rig selection criteria.
0.5 d

STUCK PIPE
Borehole stability, causes of stuck pipes and first actions.
Warning signs and method to free pipes, preventive measures.
0.5 d

WELL COMPLETION
Different ways to complete the well.
Sand control, stimulation.
Tubing, packer, safety valve selection.
Well intervention: wireline, coiled tubing, snubbing, workover.
1.5 d

TIME ESTIMATE & PROVISIONAL PROGRESS CURVE
Typical rig times required for the different operations, contingencies.
Progression curve.
Cost estimation according to the environment (type of well, rigs).
0.5 d

Reference: DRIL/PAWPCE  Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

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<td>Rueil</td>
<td>18 November</td>
<td>29 November</td>
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www.ifptraining.com
Geological Field Trip for Drillers

Level: DISCOVERY

Purpose
This course provides a practical understanding of petroleum systems, useful for integrating geological constraints and rock properties in drilling strategies which ultimately improve drilling models and reduce risk.

Audience
Non-geologists and drilling professionals with no experience in petroleum geology.

Learning Objectives
Upon completion of the course, participants will be able to:
- review main components of a petroleum system,
- learn about most common facies rocks and their physical properties,
- grasp the scope and fundamentals of the petroleum trilogy,
- analyze deformations and constraints,
- identify potential traps,
- deduce implications for drilling campaigns.

Ways & Means
Training includes classroom course with theoretical exercises and field trip observations in the Lacq gas province (Pau, South-West of France).

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

<table>
<thead>
<tr>
<th>Course Content</th>
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<tbody>
<tr>
<td>INTRODUCTION TO PETROLEUM GEOLOGY 2 d</td>
<td></td>
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<tr>
<td>Basin and sedimentary rocks - Petroleum system:</td>
<td></td>
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<tr>
<td>Sedimentary basin - Definitions, structure and terminology.</td>
<td></td>
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<tr>
<td>Sedimentary rocks - Description and main facies - Comparison clastic versus carbonates - Sedimentary process.</td>
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<tr>
<td>Petroleum system - Source rock, reservoir rock and seal rock - Trapping and migration process.</td>
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<tr>
<td>Exercises:</td>
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<tr>
<td>➤ Interpretation of geological cross section.</td>
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<tr>
<td>➤ Identification of the petroleum components, petroleum system building.</td>
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<tr>
<td>➤ Identification of potential prospects and implementation of exploration wells.</td>
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<tr>
<td>➤ Analysis of limitations and drilling constraints.</td>
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FIELD TRIP IN THE PYRENEAN LACQ FIELD (active margin basin) 3 d
Presentation of the Lacq Basin. Relations with the Pyrenean structure:
- Structural overview of the Pyrenean chain. Geomorphology and structural context.
- Lacq basin: a petroleum system in the Jurassic, lower cretaceous carbonate domain. Source, reservoir and seal rocks.
- Structure of the reservoir, trapping and potential hydrocarbon migration.
Sedimentary study of the upper cretaceous clastic formation:
- The turbidites of St Jean de Luz.
  - Detail of the sedimentary complex. Observation of the clastic deposits. Analysis of the deposit unit in a turbidite system observation and relationship with carbonate series of the Lacq field.
  - Comparison with turbidites facies of Gan (South of Pau) - Notion of lateral facies variation.
Synthesis and conclusions:
- Structural context of the Lacq gas field: an example of active margin basin in foothills domain.
- Elements of the petroleum system of the Lacq gas field: an example of petroleum system in carbonate domain.
- The upper cretaceous turbidite system: interest of this facies analysis to understand the Pyrenean structure.
  - Field observation of the turbidite series structure: interest and consequences for drilling purpose.

Reference: DRIL/FTFPF. Please contact us for more information.
Fundamentals of Drilling & Completion

Level: FOUNDATION
Purpose
This course covers an overview of fundamental knowledge in drilling and completion, and the various pressure in the well. It also provides the fundamentals knowledge in order to follow the intensive training program “Drilling & Completion Engineering” (page 154).

Audience
Young engineers involved in drilling and completion, supervisors and tool pushers.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe the basic notions about hydrostatic and hydrodynamic,
- carry out well pressures calculations,
- explain the fundamentals of drilling techniques,
- assess uncertainties with regard to pressure measured while drilling,
- explain the reaction of gaseous with regard of gaseous influx encountered while drilling.

Ways & Means
- Exercises, case study.
- Interactive animations and videos.

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>5 days</th>
<th>INITIAL TEST</th>
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<tbody>
<tr>
<td></td>
<td>General knowledge about drilling and completion.</td>
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<table>
<thead>
<tr>
<th>1 d</th>
<th>CAUSES OVERBURDEN PRESSURE, PORE PRESSURE, FRAC PRESSURE</th>
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<tbody>
<tr>
<td></td>
<td>Definitions. Causes of abnormal pore pressure. Detection of abnormal pore pressure. Determination of frac pressure, LOT.</td>
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<table>
<thead>
<tr>
<th>1 d</th>
<th>DRILLING FUNDAMENTALS</th>
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<thead>
<tr>
<th>2 d</th>
<th>HYDRODYNAMICS APPLIED TO WELL</th>
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<tbody>
<tr>
<td></td>
<td>Hydrostatic pressure, pressure losses. Relation between static and circulating well pressures.</td>
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<table>
<thead>
<tr>
<th>0.5 d</th>
<th>KNOWLEDGE ASSESSMENT</th>
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<tbody>
<tr>
<td></td>
<td>Reference: DRIL/BACFPE</td>
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Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

<table>
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<th>End Date</th>
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<td>Pau</td>
<td>4 February</td>
<td>8 February</td>
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This course is also available in French: DRIL/BACPFPF. Please contact us for more information.
**Well Architecture & Equipment**

**Level:** FOUNDATION

**Purpose**
This course provides a thorough and practical understanding of the methodology for designing a casing program.

**Audience**
Young engineers, tool pushers, supervisors, other professionals involved or interested in well architecture.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- calculate different casing strings using the Drilling Data Handbook,
- select the right position of casing shoes,
- calculate the stress applied to the casing pipes,
- select the casings as per the constraints encountered while drilling,
- choose the right wellhead with regard to the casings used.

**Ways & Means**
- Exercises.
- Application to a real case (project) for participants in the “Drilling & Completion Engineering” training course (page 154).

**Learning Assessment**
Exercises, case study, mini-project, written exam.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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**Course Content**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
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<tbody>
<tr>
<td><strong>DRILLING &amp; CASING PROGRAM</strong></td>
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<tr>
<td>Role of casings.</td>
<td></td>
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<tr>
<td>Parameters to be considered to determine well architecture:</td>
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<tr>
<td>Well type.</td>
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<td>Pore and frac pressures.</td>
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<tr>
<td>Completion, lithology.</td>
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<tr>
<td>Different types of casings:</td>
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<td>Surface.</td>
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<tr>
<td>Intermediate.</td>
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<tr>
<td>Production.</td>
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<tr>
<td><strong>WELLHEAD</strong></td>
<td>0.25 d</td>
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<tr>
<td>Different elements.</td>
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<tr>
<td>Wellhead assembly sequences.</td>
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<tr>
<td><strong>CHARACTERISTICS OF CASINGS</strong></td>
<td>0.25 d</td>
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<tr>
<td>Geometric, physical and mechanical properties of the pipes, the connections.</td>
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<tr>
<td>Use of Drilling Data Handbook.</td>
<td></td>
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<tr>
<td><strong>SHOE POSITIONING</strong></td>
<td>0.25 d</td>
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<tr>
<td>Hypotheses to be considered, casing point - Kick tolerance.</td>
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<tr>
<td>Casing point - Kick tolerance.</td>
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<tr>
<td>Examples and exercises.</td>
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<tr>
<td><strong>CASING STRING CALCULATION</strong></td>
<td>0.25 d</td>
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<tr>
<td>Principles and assumptions to remember for the different strings.</td>
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<tr>
<td>Stress cases study:</td>
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<tr>
<td>Collapse.</td>
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<td>Burst.</td>
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<tr>
<td>Tension.</td>
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<tr>
<td>Triaxial study.</td>
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<tr>
<td>Safety factors.</td>
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<tr>
<td>Casing selection: examples and exercises.</td>
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<tr>
<td><strong>CALCULATION EXAMPLES</strong></td>
<td>3 d</td>
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<tr>
<td>Case studies and writing of a spreadsheet in order to determine the casing point, the kick margin, the pressure max. . .</td>
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<tr>
<td><strong>KNOWLEDGE ASSESSMENT</strong></td>
<td>0.5 d</td>
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**Reference:** DRIL/ARCHIE Can be organized as an In-House course.  
**Contact:** fp.pau@ifptraining.com

<table>
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<th>Tuition Fees</th>
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<tr>
<td>Pau</td>
<td>11 March</td>
<td>15 March</td>
<td>€3,580</td>
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*This course is also available in French: DRIL/ARCHIF. Please contact us for more information.*
Bit & Drill String & Fishing while Drilling

Level: FOUNDATION

Purpose
This course provides an in-depth theoretical and practical knowledge of drilling bit, drill string and fishing techniques with its specific equipment.

Audience
Young engineers and supervisors, toolpushers with some experience in drilling.

Learning Objectives
Upon completion of the course, participants will be able to:
- acquire the basic knowledge on the drilling bit and the drill stem,
- carry out basic calculations on the drill stem,
- choose a drill stem,
- use the different elements of the drill stem,
- learn about main techniques and equipment used to solve a fishing problem while drilling.

Ways & Means
- Course material (PPT, video).
- Individual and group exercises.
- Visit of VAREL Europe manufacturer
- Instructor with a valuable experience in drilling operations.
- Application to a real case (project) for the participants in the “Drilling and Completion Engineering” training course (page 154).

Learning Assessment
Tests.

Prerequisites
No prerequisites for this course.

More info
The course schedule will be adapted to cover all the content.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

BIT
2 d
Bit different types and classification.
Bit use and drilling parameters.
Dull grading.
Bit nozzle selection.
Bit selection.
Visit of a Varel manufacturing unit.

DRILL STRING
1.75 d
Distribution of stresses in the drill stem, neutral point.
Drill pipes: characteristics, limits of use, combination of stresses, buckling.
Drill collars: characteristics, profile, threading, choice of diameter.
Auxiliary equipment: Kelly, heavy weight drill pipes, stabilizers.
Drill string selection: first approach.
Margin of overpull, equirestistant drill string, necessary length of DC.

FISHING WHILE DRILLING
1 d
Different problems found during drilling.
Causes for sticking.
Principles of the solutions to sticking.
Fishing equipment lost in the well, main tools used.
Avoiding sticking and losses of equipment in the well.

KNOWLEDGE ASSESSMENT
0.25 d

Reference: DRIL/OUTGARN
Can be organized as an In-House course.

Contact: fp.pau@ifptraining.com

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<thead>
<tr>
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<tr>
<td>Pau</td>
<td>1 April</td>
<td>5 April</td>
<td>€3,580</td>
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</tbody>
</table>

This course is also available in French: DRIL/OUTGARN. Please contact us for more information.
Rig, BOP’s & Well Control Equipment

**Level:** FOUNDATION

**Purpose**
This course provides a thorough, practical knowledge of rigs, BOP’s and well control equipment.

**Audience**
Young engineers and supervisors, toolpushers with some experience in drilling.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- acquire a good knowledge of drilling rigs and BOPs,
- learn about the use and limits of different pieces of equipment,
- select capacities and types of rig equipment,
- select BOPs, hydraulic units and auxiliary equipment.

**Ways & Means**
- Exercises.
- Application to a real case (project) for participants in the “Drilling & Completion Engineering” training course (page 154).

**Learning Assessment**
Quiz.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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**Course Content**

**RIG**

2.75 d

Description of the main functions:
- Hoisting.
- Pumping.
- Rotating.
- Power.

Limits of use.

Equipment selection through exercises:
- Choosing the drawworks, the drilling line, drilling line work.
- Choosing the pumps as per the drilling program.

**BOPS & WELL CONTROL EQUIPMENT**

2 d

BOP:
- Functions.
- Different types: ram BOP, annular BOP, inside BOP.
- Technical field characteristics.

Auxiliary equipment:
- Accumulation and closing unit.
- Choke manifold, chokes.
- Mud gas separator.

Equipment working test and pressure test.
- API rules.
- Exercises on BOP closing unit sizing.

**KNOWLEDGE ASSESSMENT**

0.25 d

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Reference: DRIL/BOPE

Can be organized as an In-House course.

Contact: fp.pau@ifptraining.com

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<tr>
<td>Pau</td>
<td>15 April</td>
<td>19 April</td>
<td>€3,580</td>
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</table>

This course is also available in French: DRIL/BOPF. Please contact us for more information.
Data Acquisition during Drilling Operations

Level: PROFICIENCY

Purpose
This course provides a thorough, practical knowledge of openhole logging, mud logging and coring while drilling.

Audience
Young engineers and supervisors, toolpushers with some experience in drilling.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand, assess and interpret measurements made while drilling,
- learn about techniques and equipment used for coring during drilling operations,
- understand how to prevent kicks and drilling problems with mud logging data analysis,
- understand wireline and LWD technology with regard to log data analysis,
- appreciate the geoscientists’ work in a quick-look log analysis at the rig site.

Ways & Means
- Application to a real case (project) for the participants in the “Drilling & Completion Engineering” training course (page 154).
- Case studies. Group work.
- Numerous illustrations and videos.

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

MUD LOGGING
2 d
Tasks of various professionals at the drilling site.
Main documents of various types.
Mechanical parameters (WOH, WOB, RPM, Torque, ROP) & hydraulic parameters (SPP, Flows, Pits and mud characteristics). Physical principles of sensors used on well site.
Cuttings (sampling, cleaning and analysis).
Detection and evaluation of Oil & Gas shows while drilling.
Carry out a section of geological log.

CORING OPERATIONS
0.5 d
Data collected with coring.
Conventional coring operation.
Cores bits and drilling strings for coring operations.
Advanced coring techniques: turbo-coring, soft formations coring, gel coring.
Oriented coring system.
Side wall coring.
Storage and handling process for cores during surface recovery: cores cutting, preliminary well site analysis, storing of cores.

WELL LOGGING & LOGGING WHILE DRILLING
2 d
Definition of basic concepts used in log interpretation.
Wireline logging:
- Well site setup and log records operation.
- Main logging tools and applications (caliper, GR, SP, resistivity, nuclear, acoustic).
- Quick-look interpretation: reservoir identification and characterization (lithology, porosity, fluid types, saturation).
- Case study.
Logging while drilling:
- Main LWD sensors and measurements (directional, resistivity, nuclear, acoustic, pressure...).
- Applications for directional drilling, geosteering, formation evaluation, predictive pressure.
Pressure measurement concepts.
Different techniques for sampling with wireline and LWD tools.
Prevention actions to handle sampling operations.

KNOWLEDGE ASSESSMENT
0.5 d

Reference: DRIL/LOGFIE
Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees
Pau 23 April 26 April €3,580

This course is also available in French: DRIL/LOGFIF. Please contact us for more information.

www.ifptraining.com
HSE in Drilling Operations

Level: FOUNDATION

Purpose

This course provides a thorough understanding of risks associated to drilling operations and to reinforce the HSE culture of the workplace environment.

Audience

Young engineers and technicians involved or wishing to extend their knowledge in drilling operations.

Learning Objectives

Upon completion of the course, participants will be able to:

- ensure high HSE standard during drilling operations,
- identify specific hazards, their associated risks during drilling operations and to define prevention and mitigation measures to reduce risks,
- identify the certificates necessary to ensure the suitability of equipment and personnel,
- understand and apply typical HSE management practices on site (prevention, protection, emergency planning).

Ways & Means

- Several applications and illustrations.
- Several case studies and teamwork sessions.

Learning Assessment

Quiz.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>GENERAL RISKS ASSOCIATED TO DRILLING OPERATIONS</td>
<td>0.75 d</td>
</tr>
<tr>
<td>RISKS ASSOCIATED WITH RIG EQUIPMENT</td>
<td>1 d</td>
</tr>
<tr>
<td>Introduction to risks associated to derrick, rig floor, stabbing board, derrick board and crown block. Certificates. Risk of dropped objects. Works at height. Introduction to risks associated to drawworks, top drive, travelling block, winches and pipe handling system. Certificates. HSE management of lifting and rigging operations.</td>
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<tr>
<td>RISKS ASSOCIATED WITH DRILLING FLUIDS PROCESSING &amp; CEMENTING OPERATIONS</td>
<td>0.5 d</td>
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<tr>
<td>Risks associated to mud preparation, mud tanks and mud pumps. Confined space entry procedure. Risks associated to cuttings treatment units: shakers, degasser, desander, centrifuge… Risks associated to cementing units and cementing operations. HSE management of pressurized equipment.</td>
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<tr>
<td>HSE MANAGEMENT OF WELL CONTROL EQUIPMENT</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Scenarios associated to well control and main impacts. Examples of catastrophic events. Description and action of well control equipment. Testing requirements: functional and pressure tests. Inspection and certification of equipment and personnel with responsibilities in well control scenarios.</td>
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<tr>
<td>RISKS ASSOCIATED WITH SUPPORT FACILITIES</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Engine rooms, power generation and air compressors. Risks at workshops: hand tools, compressed gas bottles. HSE management of storage areas. Introduction to HSE in logistics: materials and personnel transportation requirements.</td>
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</tr>
<tr>
<td>SAFETY ENGINEERING APPLIED TO DRILLING OPERATIONS</td>
<td>0.25 d</td>
</tr>
<tr>
<td>General layout of drilling activities: safety distances. Fire &amp; gas detection systems: certificate and testing requirements.</td>
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<tr>
<td>RISKS IN WELL INTERVENTION OPERATIONS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Introduction to common well intervention equipment. Main risks. Well control equipment in well intervention. Risks in perforation and well abandonment.</td>
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<tr>
<td>ORGANISATIONAL FRAMEWORK</td>
<td>0.75 d</td>
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<tr>
<td>ENVIRONMENTAL MANAGEMENT OF DRILLING OPERATIONS</td>
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Reference: OHSE/HSEE Can be organized as an In-House course. Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees

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<td>6 May</td>
<td>10 May</td>
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This course is also available in French: OHSE/HSEF. Please contact us for more information.
Advanced Certificate

Directional & Horizontal Drilling Certification

Successful preparation & drilling of a directional well

Level: PROFICIENCY

Purpose

This course provides a comprehensive knowledge to prepare efficiently and succeed in drilling a directional well.

Audience

Drilling engineers, supervisors, tool pushers.

Learning Objectives

Upon completion of the course, participants will be able to:

- know about the equipment needed for directional drilling,
- design a directional well,
- calculate the trajectory of a deviated well in 2D,
- design the drill stem, with regard to a well’s profile, in order to reach a target.

Ways & Means

- Exercises.
- Application to a real case (project) for participants in the “Drilling & Completion Engineering” training course (page 154).

Learning Assessment

Training exercises, writing of an Excel spreadsheet, written exam.

Prerequisites

Course “Well Architecture & Equipment” (page 160), or equivalent practical experience, is highly recommended.

Why an IFP Training Certification?

- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Directional & Horizontal Drilling.
- Ready-to-use skills.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

5 days

GENERALITIES

1 d

Applications, terms and definitions.
Well profiles, coordinates’ system.
Trajectory control.
Uncertainty calculation, anti-collision.

DIRECTIONAL DRILLING EQUIPMENT

0.75 d

Specific drilling equipment: downhole motors, rotary steerable system.
Measuring equipment: MWD.

DRILLING ENGINEERING

2.25 d

Well planning.
Limits of use of a drill string: buckling.
Drill string design.
Torque and drag calculation.
Drilling fluids and cementing program.
Logging.
Well control.

HORIZONTAL & ERD

0.25 d

ERD, multilateral and short radius.

CASE STUDIES

0.5 d

KNOWLEDGE ASSESSMENT

0.25 d

Reference: DRIL/FDTDHE Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees
Pau 8 April 12 April €3,580

This course is also available in French: DRIL/FDTDHE. Please contact us for more information.
Geomechanics for Drillers

Level: PROFICIENCY

Purpose
This training course aims to ensure the understanding of geomechanics-related drilling problems such as wellbore stability and fluid losses, and to be aware of the techniques used in the petroleum industry to mitigate these phenomena.

Audience
Engineers and supervisors involved in drilling operations.

Learning Objectives
Upon completion of the course participants will be able to:
- acquire the basic geomechanical knowledge useful for drilling operations,
- diagnose the mechanisms of wellbore instability and fluid losses including already producing fields,
- identify the drilling-related geomechanical parameters as well as the means to measure or assess them from well data and laboratory measurements,
- perform mud weight calculations that define, in addition to pore pressure, the drillability window, and make it possible to build the well architecture.

Ways & Means
Application exercises adapted to drilling situations.

Learning Assessment
Acquired knowledge will be assessed through studies based on real cases. In each study, participants will have to analyze the situation to provide a diagnosis and possible solutions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

INTRODUCTION TO GEOMECHANICS IN THE PETROLEUM INDUSTRY
Review of all the applications of geomechanics in the reservoir and drilling fields illustrated with real cases.

THEORETICAL BASES USEFUL FOR DRILLING APPLICATIONS
Stresses, deformations, elasticity.
Connection between stress, pressure and temperature.
Rock tensile failure.
Rock shearing failure.
Laboratory measurements of tensile and rupture properties.
Geomechanical model of wells (formation pressure, stresses and mechanical properties) and calibration from laboratory measurements and data and well tests.
Different types of pressure tests in drilling, in particular the leak-off test.

STRESSES & RUPTURE MECHANISMS AROUND THE WELL
Radial, axial and tangential stresses.
Shearing failure conditions and calculation of the minimum mud weight.
Conditions of tensile failure and fracture propagation and calculation of the maximum mud weight.
Impact of the well path.
Impact of reservoir production of infill drilling in already producing reservoirs.

APPLICATION
Exercise based on one or several real cases gathering the major issues of reservoir geomechanics.
Knowledge assessment.

Reference: DRIL/GEOME
Only available as an In-House course.
Contact: fp.pau@ifptraining.com

This course is also available in French: DRIL/GEOMF. Please contact us for more information.
Underbalanced & Managed Pressure Drilling: Applications, Design & Operations

Level: PROFICIENCY

Purpose
This course provides a comprehensive and practical knowledge of non-conventional techniques used in advanced drilling and completion processes to enhance drilling performance and oil recovery.

Audience
Drilling and mud engineers, superintendents and supervisors, and all professionals involved in well planning and operation.

Learning Objectives
Upon completion of the course, participants will be able to:
- deal with issues of narrow pore/fracture pressure gradient windows, lost circulation, abnormal pressures, kick/loss situations,
- drill wells in depleted reservoirs,
- acquire basic concepts of managed and underbalanced pressure drilling,
- review various managed pressure drilling methods and equipment,
- identify typical situations calling for managed pressure drilling and assess potential benefit,
- review typical applications, equipment and operation of underbalanced drilling.

Ways & Means
Several case studies and examples are discussed.

Learning Assessment
Exercises, quiz, written exam.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

BASIC PRINCIPLES OF MANAGED PRESSURE DRILLING
1 d
History, objectives and definitions.
Occurrence and implications of narrow pore and fracture pressures windows on well design and well control.
Dynamic factors affecting bottom hole pressure.
Mathematics and examples.

MUD CAP DRILLING
0.5 d
History of mud cap drilling.
Pressurized and floating mud cap.
Mud cap operation.

MANAGED PRESSURE DRILLING EQUIPMENT
0.5 d
Rotating control devices.
Chokes.
Drill pipe non return valves and downhole annular valves.
ECD reduction tools.
Coriolis flowmeter, friction pump.

MANAGED PRESSURE DRILLING USING PRESSURE AS PRIMARY CONTROL
1 d
Introduction, open and closed back pressure systems.
Automated back pressure system technology.
Continuous circulating system technology.

MANAGED PRESSURE DRILLING USING FLOW AS PRIMARY CONTROL
1 d
Process description.
Equipment and technology.
Applications.

UNDERBALANCED DRILLING
0.5 d
Underbalanced drilling objectives and applications.
Underbalanced drilling equipment and operations.

CONCLUSION
0.5 d
Advantages of managed and underbalanced drilling.
Potential and limitations.
Typical applications.

Reference: DRIL/UBDE  Only available as an In-House course.
Contact: fp.paul@ifptraining.com

www.ifptraining.com
Advanced Certificate
Deepwater Drilling & Development Certification

Course Content

OFFSHORE SPECIFICITIES
3 d
Offshore rig description: jack up, anchored and dynamic positioning floating platforms.
Specific equipment for floating platforms.
Mud line suspension.
Subsea well head and equipment.
BOP, BOP closing unit, risers, positioning.
Subsea Xmas tree and equipment:
- General overview.
- Different types: vertical, horizontal.
- Comparison.
- Running procedures.
- Examples.

SUBSEA FIELD DEVELOPMENT
1.5 d
Chronology of operations with the different types of rigs.
Typical subsea development schematic:
- Tie back.
- Deepwater stand-alone development.
- Subsea field layout.
- Production control system.
Well architecture for deep-water well:
- Typical drilling.
- Casing programs.

KNOWLEDGE ASSESSMENT
0.5 d

Reference: DRIL/OFDWE
Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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</thead>
<tbody>
<tr>
<td>Pau</td>
<td>20 May</td>
<td>24 May</td>
<td>€3,580</td>
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</tbody>
</table>

This course is also available in French: DRIL/OFDWF. Please contact us for more information.
Wellhead & Blowout Preventers

Level: PROFICIENCY

Purpose
This course provides thorough information on wellhead, BOP stack characteristics and well control equipment.

Audience
Engineers, technicians interested in well control.

Learning Objectives
Upon completion of the course, participants will be able to:
- choose the equipment (wellhead, BOP, ancillary equipment) to design a well,
- detect operating problems,
- check the equipment used.

Ways & Means
Videos and animations showing how equipment works.

Learning Assessment
Quiz, written exam.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

ONSHORE WELLHEAD & BLOWOUT PREVENTERS 1.5 d
Onshore wellhead:
- Functions, principles and technology.
- Setting procedure.
- Evolution of the wellhead according to drilling phase.
Blowout preventers:
- Function and different types.
- Characteristics and technology.

AUXILIARY EQUIPMENT 1 d
Closing and accumulation hydraulic unit.
Choke manifold, chokes, valves...
Mud gas separator.

SUBSEA EQUIPMENT 0.5 d
Wellhead, BOPs.
Risers.
Subsea BOP closing system.
API rules.
Exercises on subsea BOP closing system sizing.

Reference: DRIL/WHEAD. Only available as an In-House course.
This course is also available in French: DRIL/WHEAD. Please contact us for more information.

Contact: fp.pau@ifptraining.com
Stuck Pipe Prevention

**Level:** PROFICIENCY

**Purpose**
This course aims to raise the awareness of the negative impacts of stuck pipe incident and to provide the necessary knowledge to implement preventive measures to avoid a stuck pipe situation, and also to have the skills to supervise and plan correctly any stuck pipe incidents in the hole.

**Audience**
All personnel concerned and involved in drilling and workover operations from operators, contractors and services companies. Ex: drilling engineers, supervisors, toolpushers, drillers, assistants drillers, etc.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- understand all the consequences of a stuck pipe incident,
- implement the preventive measures to a stuck pipe incident,
- identify and interpret any warning signs of a potential stuck pipe incident,
- take the correct actions according to the stuck pipe situation,
- perform the necessary calculations in case of stuck pipe,
- recognize the efficiency of teamwork, communication and reporting.

**Ways & Means**
- Course material (PPT, video).
- Individual and group exercises.
- Instructor with a valuable experience in drilling operations.

**Learning Assessment**
Quiz.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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### Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
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<tbody>
<tr>
<td><strong>CONSEQUENCES OF STUCK PIPE INCIDENT</strong></td>
<td>0.5 d</td>
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<tr>
<td>Impacts.</td>
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<tr>
<td>Statistics.</td>
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<tr>
<td>Causes.</td>
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<tr>
<td>Basic rules.</td>
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<tr>
<td><strong>STUCK PIPE MECHANISMS</strong></td>
<td>1.5 d</td>
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<tr>
<td>Differential sticking.</td>
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<tr>
<td>Solids induced pack off.</td>
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<tr>
<td>Mechanical and wellbore geometry.</td>
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<tr>
<td><strong>DRILL STRING, MUD &amp; HOLE CLEANING</strong></td>
<td>1 d</td>
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<tr>
<td>Characteristics and limits of the drill string.</td>
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<tr>
<td>Margin of over-pull.</td>
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<tr>
<td>Roles and characteristics of the drilling mud.</td>
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<tr>
<td>Solids control equipment.</td>
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<tr>
<td>Hole cleaning.</td>
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<tr>
<td><strong>METHODS TO FREE THE DRILL STRING</strong></td>
<td>0.75 d</td>
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<tr>
<td>First actions for the driller.</td>
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<tr>
<td>Use of drilling jars.</td>
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<tr>
<td>Reduction of the differential pressure.</td>
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<tr>
<td>Use of lubricant pills.</td>
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<tr>
<td><strong>PREVENTIVE MEASURES</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Listen to the hole.</td>
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<tr>
<td>Good drilling practices while drilling and tripping.</td>
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<tr>
<td>Teamwork and monitoring.</td>
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<tr>
<td><strong>FISHING EQUIPMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Description, function and correct use of fishing equipment.</td>
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<tr>
<td><strong>HISTORY CASES</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Identify stuck pipe mechanisms and analyze the causes.</td>
<td></td>
</tr>
<tr>
<td><strong>FINAL TEST</strong></td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

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Reference: DRIL/STUCKPIPE  ➔ Only available as an In-House course.
Contact: fp.pau@ifptraining.com
HPHT Drilling Design & Operations

Course Content

5 days

Level: ADVANCED

Purpose

This course aims to provide a comprehensive knowledge on how to design and execute an HPHT well in an exploration or development context.

Audience

Drilling engineers, drilling supervisors, drilling superintendents.

Learning Objectives

Upon completion of the course, participants will be able to:

► understand the design concepts related to an HPHT well,
► learn about required operational preparedness aspects of HPHT drilling operations,
► assimilate the key aspects for executing successful operations in HPHT drilling.

Ways & Means

► Presentations.
► Exercises.
► Application to real cases.

Learning Assessment

Exercises, quiz, written exam.

Prerequisites

Familiarity with conventional drilling and completion operations and 3+ years seniority.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

GENERALITIES

Applications, terms and definitions.
PPFG aspects of HPHT reservoirs (effect of depletion, geomechanics).
Well architecture specificities of HPHT wells.

BASIC DESIGN ENGINEERING

Casing design specific to HPHT (thermal simulations/introduction to limit-state and reliability based design/survival loads).
OCTG choice (material grade, SSC, qualification).
OCTG connector choice (test and qualification).
Well equipment (liner, wellheads, casing hangers…).
Annulus management systems (N2 cushion, burst discs, crushable foams…).
Subsea HPHT specificities (wellhead fatigue, X-Mas tree choice, APB).

ADVANCED HPHT WELL ENGINEERING

Casing wear (modeling, measurement, remedial).
Wellhead growth (modeling and impacts, heat island effect).
Fluids & cement aspects of HT environments.
Kick tolerance modeling (dispersed modeling w/drill bench or equivalent, limitations of single bubble in HPHT).
Hydraulic modeling in HPHT operations.
Logging (current HT limitations on MWD tooling).
Introduction to MPD.
In-field drilling (depletion and stress caging…).

OPERATIONAL PREPARATION

Rig inspection program for HPHT operations.
Equipment specific to HPHT (mud coolers, kick assembly, early-kick-detection…).
Hydrates (formation mechanisms, prevention).
HPHT checklists.
HPHT procedures (pit management and discipline, breaking circulation, connections, flow checks, tripping procedures, pump out of hole).
HPHT coring and wireline logging.

OPERATIONAL EXECUTION

ECD management.
Wellbore breathing (breathing vs. kick, loss-gain scenarios, supercharging mechanisms, fracture…).
Well control aspects.
(E)LOT/FIT in HPHT.
Mud weight management.
Fingerprinting (dummy) connections, swab & surge, compressibility test, drain back/flow volume…).
Case studies (HPHT train wrecks, database analysis of exploration and development wells).

Reference: DRIL/HPHTE Only available as an In-House course.
Contact: fp.pau@ifptraining.com

www.ifptraining.com
Drilling Fluids

Level: FOUNDATION

Purpose
This course provides a comprehensive understanding of drilling fluids characteristics.

Audience
Drilling and completion professionals involved in drilling and engineering.

Learning Objectives
Upon completion of the course, participants will be able to:
- acquire a thorough knowledge of drilling fluids and rheology,
- learn how to choose the right equipment for solid removal,
- learn how to communicate efficiently with a drilling fluid specialist.

Ways & Means
- Exercises.
- Application to a real case (project) for participants in the “Drilling & Completion Engineering” training course (page 154).

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

FUNCTIONS OF DRILLING FLUIDS
0.5 d

PHYSICAL & CHEMICAL CHARACTERISTICS
1.5 d
Specific gravity.
Rheology.
Filtration.
Alkalinity.
Chloride.
Hardness.

TYPES OF FLUIDS
1 d
Water base mud.
Oil base mud.

SHALE INHIBITION
0.5 d
Types of shale.
Chemical and physical inhibition.

MECHANICAL & WASTE TREATMENT
0.75 d
Function.
Selection of equipment and layout.
Separation ranges.
Overall efficiency.
Waste treatment:
- Solidification.
- Re-injection.
- Desorption.

TROUBLESHOOTING
0.75 d
Losses:
- Detection.
- Analysis and decision chart.
- Treatment.
Hole cleaning:
- Vertical well.
- Deviated and horizontal wells.

Reference: FLU/FLUE. Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

<table>
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<th>Tuition Fees</th>
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<tbody>
<tr>
<td>Pau</td>
<td>18 March</td>
<td>22 March</td>
<td>€3,580</td>
</tr>
</tbody>
</table>

This course is also available in French: FLU/FLUF. Please contact us for more information.
Cementing Practices

Level: FOUNDATION

Purpose
This course provides the knowledge and skills needed to design a cementing program.

Audience
Engineers, supervisors and lab professionals involved or interested in cementing programs.

Learning Objectives
Upon completion of the course, participants will be able to:
- master the vocabulary specific to cementing,
- understand and use primary cementing techniques and procedures,
- select cement and necessary additives,
- calculate major parameters in a cementing operation,
- assess the quality of a cementing job.

Ways & Means
- Exercises, videos.
- Application to a real case.
- Visit of a laboratory.
- Application to a real case (project) for participants in the "Drilling & Completion Engineering" training course (page 154).

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

5 days

TECHNIQUES & JOB PROCEDURES
1 d
Primary cementing.
Cement job design.
Job planning and preparation.
Casing running.
Cementing job.
Cementing calculations.

CEMENT & SLURRIES
1 d
Cement, special slurries and additives.
Formulation and laboratory tests.
Rheology of mud and slurries.

SPECIAL CASES
1 d
Multistage cement job.
Liner.
Cement plugs.

CEMENTING EQUIPMENT
1 d
Pumps.
Mixers.
Cementing head.
Cement plugs.

EVALUATION OF THE CEMENTING JOB
1 d
Principles and interpretation of the cement logs:
- Thermometry.
- Sonic (CBL - VDL).
- Ultrasonic (USIT).
Log analysis on a real case.

Reference: FLU/CIM1E
Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees
Pau 25 March 29 March €3,580

This course is also available in French: FLU/CIM1F. Please contact us for more information.
Advanced Cementing Practices

Level: **PROFICIENCY**

**Purpose**

This course aims to deepen the understanding and develop the skills needed to design efficiently a cementing program.

**Audience**

Engineers, supervisors involved in cementing programs.

**Learning Objectives**

Upon completion of the course, participants will be able to:
- acquire a detailed knowledge of the different cementing techniques,
- address special cases: liner, highly deviated wells, gas zones,
- design a full cementing program for a real typical case,
- assess the quality of a cementing job.

**Ways & Means**

- Exercises.
- Teamwork on a project.

**Learning Assessment**

Quiz.

**Prerequisites**

Course “Cementing Practices” (page 173), or equivalent practical experience, is highly recommended.

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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**Course Content**

**TECHNIQUES & JOB PROCEDURES**

1.5 d

Cementing program.
- Job planning and preparation:
  - Casing running.
  - Selection of the fluids and flows.
  - Cementing calculations.
  - Primary, surface, multistage, liner cementing.
  - Cement plugs.

**CEMENT & SLURRIES**

1 d

Cement chemistry.
- Special slurries and additives.
- Formulation and laboratory tests.
- Rheology.
- Displacement in eccentric annulus.
- Salt zone and temperature problems.

**SPECIAL CASES**

0.5 d

- Gas zone cementing.
- Deviated and horizontal wells cementing.
- Remedial techniques.

**CEMENTING PROJECT**

1 d

Design of a whole well cementing job.

**EVALUATION OF THE CEMENTING JOB**

1 d

Principles and interpretation of the cement logs:
- Thermometry.
- Sonic (CBL - VDL).
- Ultrasonic (USIT).
- Logs analysis on a real case.

---

This course is also available in French: FLU/CIM2F. Please contact us for more information.

Reference: FLU/CIM2E

Only available as an In-House course.

Contact: fp.pau@ifptraining.com

[1] This course is also available in French: FLU/CIM2F. Please contact us for more information.
## Wellhead Selection & Maintenance

### Purpose
This course provides the required comprehensive knowledge and skills for wellhead selection, implementation procedures and maintenance.

### Audience
Completion, well servicing, workover or production engineers and supervisors, with client or service companies, familiar with well control and well integrity operations.

### Learning Objectives
Upon completion of the course, participants will be able to:
- select the wellhead according to operational conditions,
- select the corresponding components of the wellhead,
- write and supervise maintenance and testing procedures on wellhead.

### Ways & Means
- Numerous exercises.
- Numerous videos and animations.
- Case studies.

### Learning Assessment
Quiz.

### Prerequisites
No prerequisites for this course.

### Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION: DOWNHOLE EQUIPMENT</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Well construction.</td>
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<tr>
<td>Casing.</td>
<td></td>
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<tr>
<td>Completion equipment: tubing, SCSSV, SSD, ICV…</td>
<td></td>
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<tr>
<td><strong>WELLHEAD COMPONENTS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Casing head, casing spool, casing hanger, packoff flange.</td>
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<tr>
<td>Tubing head, tubing hanger, tubing head adapter.</td>
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<tr>
<td>Seals.</td>
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<tr>
<td><strong>X-MAS TREE (specifications)</strong></td>
<td>1.25 d</td>
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<tr>
<td>X-mas tree (natural flowing wells).</td>
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<tr>
<td>Gas well X-mas tree, requirement for materials.</td>
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<tr>
<td>X-mas tree equipment and selection (MV, SSV, SV, WW, choke).</td>
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<tr>
<td><strong>WELLHEAD MONITORING &amp; MAINTENANCE</strong></td>
<td>1.75 d</td>
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<tr>
<td>Wellhead installation procedures.</td>
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<tr>
<td>Wellhead protection during well intervention (pre-job and post job).</td>
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<tr>
<td>Surface equipment monitoring maintenance.</td>
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<td>Function tests, pressure test.</td>
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<tr>
<td>Plan &amp; execute maintenance. Well reinstatement.</td>
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<tr>
<td>Role and responsibilities over the various operational life of the well.</td>
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<tr>
<td><strong>WELL INTEGRITY DURING OPERATIONS</strong></td>
<td>0.5 d</td>
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<tr>
<td>During: well start up, steady state, well intervention.</td>
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<tr>
<td>Shut-in the well and handover.</td>
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<tr>
<td><strong>TODAY’S SUCCESSFUL TECHNICIAN</strong></td>
<td>0.5 d</td>
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<tr>
<td>HSE goal and leadership.</td>
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<tr>
<td>Role and responsibilities over the various operational life of the well.</td>
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<tr>
<td>Handover and reporting best practices.</td>
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<tr>
<td><strong>KNOWLEDGE ASSESSMENT</strong></td>
<td>0.25 d</td>
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</tbody>
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Reference: COMP/WHMAINT

Only available as an In-House course.

Contact: fp.pau@ifptraining.com

This course is also available in French: COMP/WHMAINTF. Please contact us for more information.
Well Productivity & Reservoir - Wellbore Interface

Course Content

NECESSARY FUNDAMENTALS OF RESERVOIR ENGINEERING FOR COMPLETION 1 d
Main parameters about the rock-fluid couple: porosity, permeability, saturation.
Means of reservoir knowledge: core, logging, well test.
PVT study: PV diagram, PT diagram, terminology (bubble point, dew point, \( R_y, B_o, B_g, GOR, WOR \ldots \)).
Drainage mechanisms: primary, secondary and enhanced recovery.

COMPLETION FUNDAMENTALS 0.5 d
Completion: operations involved, main phases.
Main factors influencing completion design.
Completion configurations: fundamental requirements, main configurations.

WELL PRODUCTIVITY (Part 1) 1 d
Fundamentals: overall approach of the well flow capacity:
Inflow (study of the bottom hole pressure from the upstream side): main parameters, Productivity Index (PI),
global skin and flow efficiency.
Outflow (study of the bottom hole pressure from the downstream side): case of oil wells and case of gas wells.
Analysis of inflow and outflow performance curves, need for artificial lift.

RESERVOIR WELLBORE INTERFACE IMPLEMENTATION (excluding “Wellbore treatments”) 1 d
Specific aspects linked to drilling and cementing the pay zone.
Perforating: main techniques, key parameters for productivity.
Specific case of horizontal drains.

WELL PRODUCTIVITY (Part 2) 1 d
Additional information about PI:
Productivity index and flow regime.
Inflow performance below bubble point pressure (IPR).
Additional information about skin:
Components of completion skin.
Damage skin estimation.

KNOWLEDGE ASSESSMENT 0.5 d

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Prerequisites
No prerequisites for this course.

Learning Assessment
Quiz.

Ways & Means
Numerous exercises on the influence of key parameters.
Numerous animations and videos.
Summary notes prepared and presented by the participants.
Application to a real case (project) for the participants in the “Drilling & Completion Engineering” training course (page 154).

Learning Objectives
Upon completion of the course, participants will be able to:
- select a reservoir-wellbore interface adapted to the conditions encountered in the reservoir,
- detect problems holding down productivity and select adequate solutions.

Purpose
This course provides the knowledge and skills needed to optimize the reservoir-wellbore interface and well productivity.

Audience
Young engineers involved in drilling/completion, supervisors in charge of drilling pay zone, and production professionals concerned with well productivity.

Level: FOUNDATION

Reference: COMP/PPLCTE
Can be organized as an In-House course.

Location Start Date End Date Tuition Fees
Pau 11 February 15 February €3,580

This course is also available in French: COMP/PPLCTF. Please contact us for more information.
Well Test Operation

Course Content

WELL TESTING FUNDAMENTALS

- Principle and objectives of well testing.
- Basic data for predevelopment studies.
- Fundamentals of fluid flow in porous media.

DRILL STEM TEST, PERFORATION & WELL TESTING EQUIPMENT REVIEW

- Principle of DST operation.
- Principle of perforation operation:
  - Perforation methodology.
  - Equipment selection versus well configuration and objectives.
  - Perforation tools demo (movie).
- DST string versus rig types:
  - Principle of DST String versus well testing objectives.
  - Composition of different DST strings.
- Principle of DST String:
  - DST String type composition review.
  - DST tools demo (movie).
- Well testing operation and surface set up:
  - Surface equipment and set up.
  - Well testing sequences of operation.
  - Surface well testing equipment.
  - Well testing HSE concept.
  - Data acquisition.
  - Sampling.
  - Well testing calculations.

PROGRAM IMPLEMENTATION, ORGANIZATION & RESPONSIBILITIES, WELL ABANDONMENT, DST IN SUBSEA ENVIRONMENT

- DST operations and well test program implementation:
  - Standard procedures reviews versus DST string type.
  - Running in hole the DST string.
  - Brine selection and weight.
  - Selection of the ΔP on the formation.
  - Operation instructions review.
  - Sampling.
  - Cases studies.
- Organization on board of the rig, roles and responsibility:
  - Safety instructions.
  - Contingency plan.
- Well abandonment after DST operation:
  - Well killing operation.
  - Well abandonment and safety concerns.
- Principle of DST operation in subsea environment:
  - Deep water DST operations subsea environment.
  - Deep water DST operations.
  - Deep water environment operation impact: wax deposition, paraffin, hydrates.
  - Deep water operations contingency plan.
  - DST tools demo (movie).

KNOWLEDGE ASSESSMENT

- 0.25 days

Reference: COMP/CEPE

Location: Pau
Start Date: 29 April
End Date: 3 May
Tuition Fees: €3,580

Contact: fp.pau@ifptraining.com

Can be organized as an In-House course.
Well-Completion Equipment & Procedures for Flowing Wells

Level: PROFICIENCY

Purpose
This course provides the knowledge and skills needed to choose and operate completion equipment for flowing wells.

Audience
Drilling or production engineers, supervisors involved in completion.

Learning Objectives
Upon completion of the course, participants will be able to:
- assess which equipment is required in a conventional case,
- design the corresponding completion procedure,
- work on complex completion issues with specialists.

Ways & Means
- Equipment and cutaway tools display in Pau.
- For in-house courses held elsewhere, in as much as a completion shop is made available, a visit will be organized to the said shop.
- Summary notes prepared and presented by the participants.
- Application to a real case (project) for the participants in the “Drilling & Completion Engineering” training course (page 154).

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 5 days

WELL-COMPLETION EQUIPMENT 1.5 d
Functions to be carried out and corresponding equipment.
Production string(s) configurations (conventional or tubing less, single or multi-zones).
Production wellhead: tubing head spool and Christmas tree (components, design).
Tubing & connections (main characteristics, criteria of choice).
Packers and accessories (drillable or permanent, retrievable).
Bottom hole devices (landing nipples, circulating devices…) and relevant wireline equipment.
Subsurface safety valve (subsurface controlled, surface controlled).

FUNDAMENTALS OF TUBING MOVEMENT & FORCES 1 d
Point to be verified.
Packer permitting free motion (tubing movement, tension on the tubing hanger).
Packer permitting no motion (packer to tubing force, tension on the tubing hanger).

WELL-COMPLETION PREPARATION & IMPLEMENTATION 1.5 d
Preparing for operations.
Safety recommendations during completion operations.
Standard running-in and start-up steps:
- Case of a packer set directly with the tubing string.
- Case of a packer set prior to the running-in of the tubing string.
Operating recommendations.

ADVANCED COMPLETION 0.75 d
Tubingless completion.
Intelligent completion.
Multilateral completion.
Deep water completion.
Single trip multizones gravelpack system.

KNOWLEDGE ASSESSMENT 0.25 d

Reference: COMP/EQTPEE
Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
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<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>18 February</td>
<td>22 February</td>
<td>€3,580</td>
</tr>
</tbody>
</table>

This course is also available in French: COMP/EQTPEF. Please contact us for more information.
Tubing Movement & Forces

Course Content

GENERAL PRINCIPLES
0.5 d
Presentation of the problem.
Parameters to be verified (worst place and case) and possible cures.
Reference state and present states of the well, various conventions.
Calculation principle.
Computation of temperature and pressure changes.

CASE OF A DOWNHOLE BINDING DEVICE PERMITTING FREE TUBING MOVEMENT
1 d
Temperature effect.
Balooning effect.
Piston effects (not including buckling).
Effect of the friction resulting from the fluid flow.
Buckling effect:
  - Awareness to the key parameters.
  - Buckling criteria.
  - Location of the neutral point and determination of the movement resulting from buckling.
Global effect: movement of the sliding binding device, tension force at the wellhead…

CASE OF A DOWNHOLE BINDING DEVICE PERMITTING NO TUBING MOVEMENT
0.5 d
Calculation principle.
Estimation of f_wk.
Determination of f_wk taking buckling into account.

CASE STUDY
0.75 d

KNOWLEDGE ASSESSMENT
0.25 d

Level: PROFICIENCY

Purpose
This course provides a thorough understanding of tubing movement and forces.

Audience
Completion engineers or technicians.

Learning Objectives
Upon completion of the course, participants will be able to:
- analyze data and decide which element(s) or parameter(s) of a completion equipment must be modified to solve problems related to tubing movement,
- write a completion program taking tubing behavior into account,
- analyze correctly a tubing behavior-related problem encountered during operation and provide an adequate solution.

Ways & Means
- Exercises and a large case study.
- Numerous animation and videos.

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: COMP/TUBMFE
Only available as an In-House course.
This course is also available in French: COMP/TUBMFF. Please contact us for more information.
Wellbore Treatments

Level: FOUNDATION

Purpose
This course provides knowledge and skills needed to examine well damage issues and take appropriate actions.

Audience
Drilling or completion engineers, supervisors, lab or production professionals, non-specialists in wellbore treatment.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify the nature and the origins of well damage,
- choose the adequate stimulation method,
- learn how to deal with sand production and water coning.

Ways & Means
- Animations - Exercises.
- Visit of a rock mechanics and reservoir-wellbore interface laboratory.
- Application to a real case (project) for the participants in the “Drilling & Completion Engineering” training course (page 154).

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

More info
Kindly refer to the following complementary courses which might be of interest: “Matrix Acidizing” (page 181) and “Basic Hydraulic Fracturing” (page 182).

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

INTRODUCTION TO WELLBORE TREATMENTS 1 d
Fundamental reminders on Productivity Index (PI), the skin effect and flow efficiency, the different components of the skin.
Productivity issues: cause of low productivity, nature and origins of well damage, location of problems and possible solutions.
Damage due to fluids: mechanisms, prevention.

MATRIX TREATMENT: ACIDIZING... 1 d
Aims; how it works.
Carbonate rocks and sandstones; inner characteristics, reactivity to injected fluids.
Choosing the acids and the additives.
Choosing the wells to be treated.
Design: preparation, checks and guidelines during the operation, after the acidizing (flow back…), possible cause of failure, coiled tubing…

HYDRAULIC FRACTURING 1 d
Aims and principles; candidate wells.
Frac fluids and fracture propping.
Calculation models and frac impact on PI.
Design; program, frac evaluation.
Other cases: pre-frac, minifrac, acid frac.

SAND CONTROL 1 d
Basics: consequences of sand, prediction of sand, sand analysis.
Sand control techniques; case of mechanical processes (determining the gravel and the screens…).
Design: cased hole gravel packing, openhole gravel packing, preparing the gravel pack, various methods, guidelines.

WATER OR GAS SHUT-OFF & DEPOSITS 0.75 d
Origin of the problems.
Remedial.
Debate around several examples.
Case study.

KNOWLEDGE ASSESSMENT 0.25 d

Reference: COMP/TRAITE 
Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

<table>
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<tbody>
<tr>
<td>Pau</td>
<td>25 February</td>
<td>1 March</td>
<td>€3,580</td>
</tr>
</tbody>
</table>

This course is also available in French: COMP/TRAITF. Please contact us for more information.
Matrix Acidizing

Level: PROFICIENCY

Purpose
This course provides knowledge and skills needed to identify well damage issues in sandstone and carbonate reservoirs, and design acidizing programs.

Audience
Drilling or completion engineers, supervisors, lab or production professionals, non-specialists in wellbore treatment.

Learning Objectives
Upon completion of the course, participants will be able to:
- Identify the nature and the origins of well damage,
- Design an acidizing program,
- Select the additives needed,
- Set up the acid treatment program.

Ways & Means
- Exercises - Teamwork.
- Visit of a reservoir-wellbore interface laboratory (if available).

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

More info
Kindly refer to the following complementary course which might be of interest: “Wellbore Treatments” (page 165).

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

INTRODUCTION TO RESERVOIR TREATMENTS 0.5 d
Fundamental reminders on the Productivity Index (PI), the skin effect and flow efficiency, the different components of the skin.

FORMATION DAMAGE 1 d
Productivity issues: cause of low productivity, nature and origins of the damage, location of the problems and possible solutions.
Scale deposition: scale control and prevention.

MATRIX TREATMENT: ACIDIZING CARBONATES 1 d
Aims; how it works.
Sandstones: inner characteristics, reactivity to injected fluids.
Laboratory studies.
Exercises.

MATRIX TREATMENT: ACIDIZING SANDSTONES 1 d
Aims; how it works.
Sandstones: inner characteristics, reactivity to injected fluids.
Choosing the acids.

ACIDIZING ADDITIVES 0.5 d
Review of the different additives (corrosion inhibitor, iron complexing agents, surfactants, solvents, etc.).
Selection of the additives.

MATRIX TREATMENT DESIGN 0.75 d
Candidate selection.
Matrix design methodology.
Diversions.
Treatment evaluation.
Other associated processes (water shut-off…).
Causes of failure in matrix acidizing.
Case study.

KNOWLEDGE ASSESSMENT 0.25 d

Reference: COMP/ACIDIFE
Only available as an In-House course.

Contact: fp.pau@ifptraining.com

This course is also available in French: COMP/ACIDIFE. Please contact us for more information.

www.ifptraining.com
### Course Content

**5 days**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO HYDRAULIC FRACTURING</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Productivity index, skin effect, flow efficiency. Damage in the formation and in the pack. Candidate selection.</td>
<td></td>
</tr>
<tr>
<td><strong>DESCRIPTION OF THE PROCESS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>FRACTURING FLUIDS, PROPPANTS &amp; FRACTURE CONDUCTIVITY</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Types of fracturing fluids. Types of proppants. Fluid and proppant selection.</td>
<td></td>
</tr>
<tr>
<td><strong>INPUT &amp; FRACTURE DESIGN</strong></td>
<td>1 d</td>
</tr>
<tr>
<td><strong>EQUIPMENT &amp; PLACEMENT TECHNIQUES</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Surface pumping equipment. Placement techniques in vertical and horizontal wells. Planning and executing operation.</td>
<td></td>
</tr>
<tr>
<td><strong>FLOW BACK, FRACTURE MAPPING &amp; POST-JOB ANALYSIS</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>CONCLUSION, ASSESSMENT &amp; FEEDBACK</strong></td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

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Reference: COMP/HYDFRACE. Only available as an In-House course.

Contact: fp.pau@ifptraining.com
Artificial Lift & Well Intervention Fundamentals

Course Content

**5 days**

**ARTIFICIAL LIFT BY CONTINUOUS GAS LIFT**
Continuous gas lift: principle, well unloading, operating procedure and troubleshooting, field of application.

**ARTIFICIAL LIFT BY PUMPING**
Sucker rod pumping, Electrical Submersible centrifugal Pumping (ESP): principle, specific completion equipment, operating procedure and troubleshooting, field of application.

**TYPES & MEANS OF INTERVENTION ON PRODUCING WELLS**
Mains types of intervention: measurement, maintenance, workover.
Main means (wireline unit, coiled tubing unit, snubbing unit, workover rig): principles, area of application.

**GENERAL PROCEDURE OF A WORKOVER**
Main operation steps: chronology, more tricky operations from a safety point of view, main operations.
Case of depleted reservoirs: losses and formation damage, kick-off after the workover.

**WELL KILLING PROCEDURE FOR A PRODUCING WELL**
Killing the well by circulation: area of application, basis procedures (direct or reverse circulation), elaboration of the forward-looking pumping diagram.
Killing by squeeze: area of application, basis procedure, elaboration of the operating program, case where the injectivity test is unsatisfactory, squeeze and bleed-off method.
Final killing phase: observing the well, operations to run after packer “unsetting”.

**CASE STUDY: WORKOVER PROGRAM**

**KNOWLEDGE ASSESSMENT**

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**Learning Objectives**

Upon completion of the course, participants will be able to:
- select the adequate artificial lift method with regard to some specific operational problems,
- select the adequate well intervention method with regard to some specific operational problems,
- define a well killing program (pumping diagram).

**Ways & Means**

- Exercises on key parameters of artificial lift,
- Design of a pumping diagram for killing a well,
- Case study for a workover program with an interactive game,
- Application to a real case (project) for the participants in the “Drilling & Completion Engineering” training course (page 154).

**Learning Assessment**

Quiz.

**Prerequisites**

No prerequisites for this course.

**More info**

Kindly refer to the following complementary courses which might be of interest:
“Artificial Lift: Gas lift” (page 184), “Artificial Lift: Pumping” (page 185) and “Well Servicing & Workover” (page 187).

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

---

Reference: COMP/TAWOE. Can be organized as an In-House course.

**Contact:** fp.pau@ifptraining.com

**Location**

**Pau**
4 March 8 March €3,580

This course is also available in French: COMP/TAWOF. Please contact us for more information.

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Artificial Lift: Gas Lift

Course Content

FLOWING GRADIENTS - TUBING PERFORMANCE CURVES  
1 d
Well representation and nodal analysis.
Inflow: Productivity Index (PI) and Inflow Performance Relationship (IPR) techniques.
Outflow: vertical flowing pressure gradient curves in diphasic flow and Tubing Performance Curve (TPC).

INTRODUCING GAS LIFT SYSTEMS  
1 d
Principle and active parameters.
Characteristics and advantages.
Operating parameters determination: gas injection depth, pressure and rate.
Determination of the absolute maximum flow rate versus GLR (Gas-Liquid Ratio). Optimization with time.

GAS LIFT DOWN HOLE EQUIPMENT  
0.5 d
Valve mechanics and characteristics.
IPO/Casing-operated gas lift valves.
PPO/Tubing-operated gas lift valves.
Conventional and Side Pocket Mandrel (SPM).
Miscellaneous valves and equipment.

CONTINUOUS GAS LIFT DOWN HOLE EQUIPMENT DESIGN  
1 d
Side pocket mandrel spacing and valve selection.
Manual (graphical) design.
Standard completion designs and other possibilities (dual completion, macaroni/coiled tubing).

CONTINUOUS GAS LIFT OPERATION  
1 d
Well surface equipment.
Unloading procedure.
Operating recommendations.
Surveillance and troubleshooting.

INTRODUCTION TO PROSPER™  
0.25 d
Overview of well performance software tool and methods.
PROSPER™ methodology for gas lift design and troubleshooting, manual application.

KNOWLEDGE ASSESSMENT  
0.25 d

Level: PROFICIENCY

Purpose
This course provides a comprehensive, practical knowledge of gas lift concepts, operations, equipment and potential problems.

Audience
E&P professionals involved in operating wells using gas lift.

Learning Objectives
Upon completion of the course, participants will be able to:
► perform a gas lift design,
► analyze gas lift operating conditions,
► improve well performance.

Ways & Means
► Practical exercises to grasp physical phenomena.
► Numerous animations and videos.

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

More info
Kindly refer to the following complementary course which might be of interest: “Artificial Lift: Pumping” (page 185).

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: COMP/GLIFTE  
Only available as an In-House course.
Contact: fp.pau@ifptraining.com

This course is also available in French: COMP/GLIFTF. Please contact us for more information.
**Artificial Lift: Pumping**

**Level:** PROFICIENCY

**Purpose**
This course provides a comprehensive, practical knowledge of rod and centrifugal pumping concepts, design, operations and potential problems.

**Audience**
E&P professionals involved in operating wells using rod or centrifugal pumping.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- select the most-suited pumping method,
- analyze operating conditions,
- improve well performance and manage equipment lifetime.

**Ways & Means**
- Exercises on equipment calculation.
- Numerous animations and videos.

**Learning Assessment**
Quiz.

**Prerequisites**
No prerequisites for this course.

**More info**
Kindly refer to the following complementary course which might be of interest: “Artificial Lift: Gas lift” (page 184).

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

### WHY ARTIFICIAL LIFT?
0.5 d
Main parameters relative to reservoir and well performance curve: inflow and outflow. Need for artificial lift.

### SUCKER ROD PUMPING
1.5 d
Principle, field of application, crucial parameters. Main specific equipment: surface Pumping Units (PU), downhole pumps, rodstring. Operating procedures and troubleshooting. Example of rodstring load calculation.

### ELECTRICAL SUBMERSIBLE CENTRIFUGAL PUMPING (ESP)
2.25 d
Principle, field of application. Main specific pieces of equipment: pump, seal section/protector, electric motor selection, Variable Speed Drive (VSD) interaction. Operating procedures and troubleshooting (including PROSPER™ methodology). Example of design:
- Base case: oil “without problems”.
- Specific cases: gassy oil well, ESP with VSD.

### OTHER METHODS & PROCESS SELECTION
0.5 d
Overview of other methods (hydraulic pumps, jet pumps, Progressive Cavity Pumps [PCP]): principle, fields of operation. Artificial lift methods comparison, benefits and limitations.

### KNOWLEDGE ASSESSMENT
0.25 d

Reference: COMP/APOMPE Only available as an In-House course.

Contact: fp.pau@ifptraining.com

This course is also available in French: COMP/APOMPF. Please contact us for more information.

www.ifptraining.com
Coiled Tubing & Nitrogen Operations in Completion & Workover

Course Content

**Level:** PROFICIENCY

**Purpose**
This course provides a comprehensive, practical knowledge of coiled tubing equipment and operations on a producing well.

**Audience**
Engineers, supervisors, technicians from operating or service companies, involved in completion, workover and stimulation.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- learn about coiled tubing applications in completion and workover,
- design coiled tubing programs (wellbore treatment, logging, cementing, lifting and drilling).

**Ways & Means**
Exercises - Animations.

**Learning Assessment**
Quiz.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

<table>
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<tr>
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</table>
| **BASIC DATA**
Importance of nitrogen in stimulation and workover.                          | 0.25 d   |
| Importance of coiled tubing in completion and workover.                        |          |
| **NITROGEN - NITRIFIED ACID - FOAMED ACID**
Nitrogen (properties, basic formula for design).                               | 1 d      |
| Specifications for nitrogen storage and pumping equipment.                     |          |
| Two-phase fluids and foams (properties, chart and tables for design, difference between foam and two phase fluids), diverting effect of foamed fluid. |          |
| Stimulation methodology, flow back procedure.                                 |          |
| **COILED TUBING EQUIPMENT (technology, dimension, weight)**
Main components: reel, injector, BOP and related equipment.                    | 0.75 d   |
| Auxiliary equipment: crane, pumping equipment, etc.                            |          |
| Downhole tools: connectors, safety equipment, circulating tools, downhole motor, fishing tools, inflatable packers, etc. |          |
| Guide for safe equipment rig-up.                                              |          |
| **PIPE CHARACTERISTICS & BEHAVIOR**
Geometric and mechanical properties: geometry, metallurgy, performance, characteristic curve. | 0.5 d    |
| Tubing behavior (at surface, in hole): fatigue, buckling, tension and pressure limits (tubing force analysis, model for operation design). |          |
| Measuring and recording of operating parameters.                              |          |
| **COILED TUBING APPLICATIONS**
Kick off with nitrogen, underbalance perforating.                             | 2 d      |
| Well clean out (fill removal, wax and hydrate removal).                        |          |
| Sand control.                                                                 |          |
| Matrix treatment: acid, solvent.                                              |          |
| Other applications: CT assisted DST, conveyed tool operations in high deviated well, use as producing, gas lift or chemical injection string, fishing, underreaming, drilling. |          |
| Statistics, economy, areas for future development.                            |          |
| **CEMENTING OPERATIONS WITH NITROGEN OR COILED TUBING**
Foamed cement: definition, use (primary cementing, squeeze).                  | 0.5 d    |
| Cementing through coiled tubing: cement plug, squeeze (squeeze slurry characteristics, job design, key-points). |          |

Reference: COMP/CTAE  
Only available as an In-House course.

*This course is also available in French: COMP/CTAF. Please contact us for more information.*
Well Servicing & Workover

Course Content

REASONS & WELL INTERVENTION MEANS ON PRODUCTION WELL 1 d
- Intervention means classification.
- Well intervention main reasons:
  - Measurement.
  - Maintenance.
  - Well remedial and workover.
- Main intervention means: wireline, coiled tubing, snubbing, workover rig.

REVIEW OF COMPLETION, WELLHEAD & BOP STACK SET UP 0.5 d
- Review of completion installation and equipment technology:
  - Standard completion.
  - Intelligent completion.
  - Multi-zone gravel pack completion.
  - Deepwater completion fitted with sand control equipment.
- Review of wellhead set up.
- Review of BOP stack set up versus company rules.

WELL SERVICING 1.25 d
- Safety issue during well servicing operations.
- Intervention equipment set up.
- Study of different well servicing cases:
  - Standard completion.
  - Tubing less completion.
  - Intelligent completion.
  - Multi zone gravel pack completion.
  - Deep water completion fitted with sand control equipment.
- Light intervention case study.

WORKOVER 2 d
- Safety issue during workover operations.
- Main operations:
  - Well neutralization and means.
  - Xmas-tree removal.
  - Workover rig and BOP stack installation.
  - Workover operation.
  - Fishing operation.
- Operation risk evaluation versus well operation cost and budget.
- Depleted reservoirs:
  - Losses and potential reservoir damage.
  - Well kick-off after well intervention.
- Study of different well workover cases:
  - Standard completion.
  - Tubing less completion.
  - Smart completion.
  - Multi zone gravel pack completion.
  - Deepwater completion fitted with sand control equipment.
- Workover case study.

KNOWLEDGE ASSESSMENT 0.25 d

Reference: COMP/WSWOE Only available as an In-House course.
Contact: fp.pau@ifptraining.com
Well Performance

Level: FOUNDATION

Purpose
This course provides a comprehensive understanding of well lift optimization.

Audience
E&P technical staff involved in well operations. Reservoir engineers involved in field studies with productivity and artificial lift issues. Development engineers involved in conceptual design with well architecture and artificial lift.

Learning Objectives
Upon completion of the course, participants will be able to:
► select the relevant reservoir characteristics and fluid properties related to well performance modeling,
► design artificial lift and select the adequate method,
► optimize well performance,
► analyze the impact of well completion and equipment on well performance,
► analyze the operation process.

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

More info
This course can be delivered in French, with documentation in English.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
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<tbody>
<tr>
<td><strong>PVT &amp; RESERVOIR FUNDAMENTALS</strong>&lt;br&gt; Oil &amp; Gas PVT properties: bubble point, B_p, R_v, GOR, solids…&lt;br&gt; Reservoir rock and fluids: porosity, permeability, saturation, relative permeability.&lt;br&gt; Reservoir behavior types.</td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>RESERVOIR-WELLBORE INTERFACE FUNDAMENTALS</strong>&lt;br&gt; Pay zone drilling, completion (open hole, cased hole), perforating.&lt;br&gt; Wellbore treatment: sand control, stimulations (acidizing, hydraulic fracturing).</td>
<td>0.25 d</td>
</tr>
<tr>
<td><strong>INFLOW PERFORMANCE</strong>&lt;br&gt; Flow in the reservoir: Productivity Index (PI), empirical Inflow Performance Relationship (IPR), horizontal wells. Back pressure equation for gas wells. Global skin: formation damage, perforation, partial penetration, deviation.&lt;br&gt; Applications - Exercises.</td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>OUTFLOW PERFORMANCE</strong>&lt;br&gt; Flow in the wellbore: pressure gradient and Vertical Lift Performance (VLP) curves. GLR, tubing head pressure, tubing ID impact. Monophasic vs. polyphasic flow: minimum flowrate/well loading.&lt;br&gt; Applications - Exercises.</td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>WELL PERFORMANCE</strong>&lt;br&gt; Well deliverability nodal analysis: inflow/outflow. Well performance modeling, prediction and analysis vs. reservoir pressure, PI, GLR, BSW, tubing ID.&lt;br&gt; Applications - Exercises.</td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>ARTIFICIAL LIFT</strong>&lt;br&gt; Gas lift: fundamentals, unloading procedure, surveillance and troubleshooting. Electrical Submersible Pump (ESP): components, design, problems. Rod pumping and jet pumps fundamentals. Comparison of the artificial lift methods.</td>
<td>1.5 d</td>
</tr>
<tr>
<td><strong>INTRODUCTION TO PROSPÉR™</strong>&lt;br&gt; Overview of well performance software tool and methods. PROSPÉR™ methodology for gas lift design and troubleshooting, manual application. PROSPÉR™ methodology for ESP troubleshooting.</td>
<td>0.25 d</td>
</tr>
<tr>
<td><strong>KNOWLEDGE ASSESSMENT</strong></td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

Reference: COMP/WELLPERF

Only available as an In-House course.

Contact: fp.pau@ifptraining.com
Advanced Well Performance

Course Content

Week 1

Introduction to production system 0.5 d
Introduction to well performance nodal analysis: inflow/outflow.
Overview of PROSPER™ software workflow:
    PROSPER™: building initial well system file.

PVT data/PVT modeling 0.5 d
Oil & Gas PVT properties: bubble point, B_o, R_o, GOR, solids…
    PROSPER™: building PVT model.

Reservoir properties & reservoir-wellbore interface 0.5 d
Reservoir rock & fluids: porosity, permeability, saturation, relative permeability, scales.
Reservoir behavior type.
Pay zone drilling, completion (open hole, cased hole), perforating.
Wellbore treatment: sand control, stimulations (acidizing, hydraulic fracturing).

Inflow performance/IPR modeling 1.5 d
Flow in the reservoir: Productivity Index (PI), empirical Inflow Performance Relationship (IPR).
Back pressure equation for gas wells.
Global skin: formation damage, perforation, partial penetration, deviation:
    PROSPER™: IPR modeling exercise.
Horizontal drains:
    PROSPER™: horizontal drain modeling.

Wellbore flow, outflow performance/VLP modeling 1 d
Flow in the wellbore: pressure gradient and Vertical Lift Performance (VLP) curves.
GLR, tubing head pressure, tubing ID impacts.
Monophasic vs. polyphasic flow: minimum flow rate/well loading:
    PROSPER™: tubing correlations, VLP modeling.
Choke performance.

Well performance 1 d
Well deliverability nodal analysis: inflow x outflow:
    PROSPER™: IPR + VLP natural flow well performance modeling.
Sensitivity study: prediction and analysis vs. reservoir pressure, PI, GLR, BSW, tubing ID.

Week 2

Artificial lift 2.5 d
Gas lift: fundamentals, unloading procedure, surveillance and troubleshooting:
    PROSPER™: gas lift design, prediction, analysis and diagnosis.
Electrical Submersible Pump (ESP): components, design, problems:
    PROSPER™: ESP design, prediction, analysis and diagnosis.
Rod pumping and jet pumps fundamentals.
Comparison of the artificial lift methods.

PROSPER™ case study 2 d
Application of PROSPER™ to a comprehensive case study, from PVT modeling and matching, IPR + VLP building and matching, to natural flow performance, gas lift and ESP design/performance prediction.

Knowledge assessment 0.5 d

Reference: COMP/WELLPERF2E ❧ Only available as an In-House course.
Contact: fp.pau@ifptraining.com

www.ifptraining.com
Well Inflow & Outflow Performance
E-learning with remote personal coaching

**Level:** PROFICIENCY

**Purpose**
This course aims to deepen knowledge of well lift optimization and master use of the software program PROSPER™.

**Audience**
Reservoir or well performance engineers and technicians.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- build a PVT model which will be used in a well performance study,
- analyze the link between reservoir characteristics and production,
- model and analyze crucial parameters of well performance,
- identify reasons for poor well performance,
- select and design the adequate artificial lift methods.

**Ways & Means**
- Multimedia online learning with personal coaching.
- Before training starts, 2 hours are dedicated to introduce the training agenda, methods and tools.
- The exact needs and expectations of each participant are also assessed and discussed (MCQ and phone interview with the tutor).
- During the training, individual phone contact with the tutor and web conferences with other participants.
- Use of the software program PROSPER™ (license not provided).

**Learning Assessment**
Quiz.

**Prerequisites**
No prerequisites for this course.

**More info**
Total duration of the training is 32 hours, spread over an 8-week period.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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**Course Content**

**INTRODUCTION**
Well production optimization.
PROSPER™ software.

2.5 h

**CHARACTERIZATION OF RESERVOIR FLUIDS - PVT**
Goal and application of PVT studies.
Main Oil & Gas properties.
PROSPER™ software PVT module.

2 h

**INFLOW PERFORMANCE RELATIONSHIP**
Modeling of flows in a porous medium.
Modeling of the reservoir-wellbore interface.
IPR calculation in the case of Oil & Gas reservoirs.
Specific case of horizontal and deviated wells.

6.5 h

**NATURAL FLOWING WELLS**
Introduction to the specificities of multiphase flows.
Choice of the adequate correlation.
Modeling outflow performance.
Nodal analysis of a reservoir well system.

7 h

**ARTIFICIAL LIFTED WELLS**
Introduction - Using the nodal analysis.
Gas lift system: description and design.
Electrical Submersible Pump (ESP): presentation and design.
Overview of other artificial lift methods.

4.5 h

**WELL PERFORMANCE DIAGNOSIS**
Production rate analysis of well flowing naturally.
Production rate analysis of well activated with GL or ESP.

2.5 h

**CONCLUSION - CASE STUDY**

7 h

Reference: COMP/BLPROSPER  ● Only available as an In-House course.
Contact: fp.pau@ifptraining.com
Well Production Integrity

Course Content

WELL INTEGRITY DESIGN

WELL INTEGRITY OPERATIONS

OPERATIONS: YOUR ROLE
Monitor well equipment. Perform well equipment tests. Ensure safety equipment is operational. Remember you are the first line of defense against well integrity failures.

WELL INTEGRITY MAINTENANCE
All well equipment:
- Valves.
- Safety equipment.
- Seals.
Preparation and reinstatement.

MAINTENANCE: YOUR ROLE
Perform maintenance tasks as assigned by location. Prepare the well for maintenance and well intervention activities. Reinstate the well after maintenance and well intervention activities.

INTEGRITY MANAGEMENT
Operations on the wellstock. Develop a more complete understanding of the well below the surface. Understand the independence of all well components.

TODAY’S SUCCESSFUL PRODUCTION TECHNICIAN
HSE goals. Design decisions made for the well and the relevance of those decisions to their operations. Ways that all surface and subsurface well components work together. Instruments: how the downhole conditions are reflected in the surface. Handovers: strict adherence to site-specific procedures and/or practices. Risks: daily tasks that bring increased risks to well integrity and proactive mitigation of those risks. Problems: deeper knowledge of the well to anticipate problems turn into large scale well integrity incidents.

KNOWLEDGE ASSESSMENT (workshop)

Reference: COMP/WELINT

Only available as an In-House course.

This course is also available in French: COMP/WELINT-F. Please contact us for more information.

Contact: fp.pau@ifptraining.com
# Well Production Integrity Management

## Level: PROFICIENCY

### Purpose

To deepen knowledge of well integrity management and develop the skills for designing, operating and maintaining well equipment with the ultimate objective of ensuring a permanent, safe containment of all wellbore fluids.

### Audience

Drilling, completion and production engineers and supervisors.

### Learning Objectives

Upon completion of the course, participants will be able to:

- recognize the technical, operational and organizational solutions applied to well integrity management,
- design the process of well integrity management,
- review well integrity within the framework of all strategic operations,
- focus, maintain and design of well integrity assurance,
- recognize the role of production supervisor’s duties with regard to well integrity.

### Learning Assessment

Quiz.

### Prerequisites

No prerequisites for this course.

### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

| WELL INTEGRITY MANAGEMENT: DEFINITION & CHALLENGES | 0.25 d |
| WELL INTEGRITY DESIGN | 1.5 d |
| WELL INTEGRITY OPERATIONS | 2 d |
| WELL INTEGRITY MANAGEMENT (WIM) | 1 d |

### WELL INTEGRITY DESIGN

Well construction/completion: casing, tubing, cement, produced fluids.
Well barriers: definition, requirement & design.
Wellhead and tree equipment: valves, seals, accessories.
Safety valves: downhole, surface.
Well integrity standards.

### WELL INTEGRITY OPERATIONS

Flow assurance (corrosion, sand & deposits).
Safety critical equipment/barriers.
Monitor and manage a pressure:
- Role and responsibilities.
- Monitor/perform well equipment test.
- Ensure safety critical equipment are operational.
- Report any abnormal operating condition.
- Your role over the various operational life of the well.
Well integrity maintenance:
- Downhole/well equipment maintenance.
- Surface equipment maintenance.
- Plan & execute maintenance. Well reinstatement.
Your role as a part of well integrity team:
- Perform routine maintenance (site specific requirement).
- Prepare well for maintenance/well intervention operation.
- Restart well after maintenance operation.
Today’s successful well integrity team:
- HSE goal and leadership.
- Understand site specific well design decision/equipment.
- Handover and reporting best practices.
- Major incident prevention by implementing WIM awareness.

### WELL INTEGRITY MANAGEMENT (WIM)

Introduction, concepts and definitions.
WIM key activities.
Minimum integrity requirements vs. well life cycle/phases.
Annulus pressure management.
Data management.
Well integrity review.
Well integrity performance management.

### KNOWLEDGE ASSESSMENT

0.25 d

Reference: COMP/WELINTMA  •  Only available as an In-House course.

Contact: fp.pau@ifptraining.com
Graduate Certificate
Well Performance Engineering Certification

Level: FOUNDATION

Purpose
This course provides in-depth technical knowledge in well performance engineering in order to hold rapidly and very effectively, the position of field engineer, design engineer, or project engineer.

Audience
Engineers (particularly recently graduated engineers or engineers in conversion) looking to acquire in-depth knowledge and best practices of Oil & Gas production.

Learning Objectives
Upon completion of this course the participants will be able to:
- discuss main principles of thermodynamics applied to reservoir engineering studies,
- build a PVT model for reservoir simulation and carry out a well test interpretation,
- identify main flow regimes and define or recommend a well test design,
- explain the natural, secondary and EOR mechanisms of production of Oil & Gas reservoirs and discuss their related performance,
- perform simple material balance calculations for matching reservoir parameters/forecast recovery for a real case and consequently reserve definition,
- estimate the ultimate reservoir recovery by decline curve analysis,
- select the relevant reservoir characteristics and fluid properties related to well performance modeling,
- design artificial lift, select the adequate method and optimize well performance,
- analyze the impact of well completion and equipment on well performance, analyze the operation process.

Ways & Means
- Highly interactive training with industry specialist lecturers.
- Multiple teamwork sessions and industrial case studies.
- Numerous simulation exercises using corresponding software (MBAL™, PROSPER™ & GAP™).
- Knowledge assessment on a weekly basis.

Learning Assessment
Quiz.

Prerequisites
Engineering degree or equivalent professional experience within the petroleum industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Well Performance Engineering.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

RESERVOIR FLUID PROPERTIES - PVT
- Thermodynamics: hydrocarbon families, compositional presentation of reservoir fluids.
- Thermodynamics of petroleum fluids: pure component, binary mixture, multicomponent systems. Phase behavior, hydrocarbon fluids: under saturated oil, saturated oil, dry gas, wet gas, retrograde gas. Phase envelope.
- PVT matching with a PVT EOS package.

WELL TESTING & WELL TEST ANALYSIS
- Purpose of well testing, practical well test operations: types of tests, equipment, safety and environmental issues.
- Definitions and typical flow regimes: radial flow, fractured reservoirs, limited reservoirs and closed reservoirs.
- Productivity index, radius of investigation.
- Basic equations and methods: Darcy’s law and the diffusivity equation, time superposition, multirate testing, space superposition, boundary effect, pressure curves analysis, pressure derivative analysis.
- Wellbore conditions, Boundary models, test design. Hands-on session…

DRIVE MECHANISMS

MATERIAL BALANCE & DECLINE CURVE ANALYSIS
- Material balance: material balance equations for the various drive mechanisms “Drive Index”, Practical exercises on synthetic and real field case data using MBAL™ software: PVT and reservoir parameters history match, production forecast.
- Decline curve analysis: fundamentals of decline curve analysis, Arps equation, decline exponent, Exponential, Harmonic and Hyperbolic Declines, Application and limitation of decline curve analysis.
- Type curve matching and case studies.

WELL PERFORMANCE
- Well performance design for naturally flowing well: inflow/outflow theory and practice, well completion equipment and design optimization.
- Artificial Lift (AL) methods design and practice: AL methods and corresponding equipment and performance, ESP and gas lift design.
- Gas well and water injection well performance design.
- Case study: well performance project design.

Ways & Means:
- Highly interactive training with industry specialist lecturers.
- Multiple teamwork sessions and industrial case studies.
- Numerous simulation exercises using corresponding software (MBAL™, PROSPER™ & GAP™).
- Knowledge assessment on a weekly basis.

Learning Assessment:
Quiz.

Prerequisites:
Engineering degree or equivalent professional experience within the petroleum industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Well Performance Engineering.
- Ready-to-use skills.

Expertise & Coordination:
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: COMP/WELLPERFENGE
Contact: fp.paul@ifptraining.com

www.ifptraining.com
Well Integrity Engineering Certification

Level: FOUNDATION

Purpose
This course provides in-depth technical knowledge of well integrity design, management and maintenance in order to hold rapidly and very effectively, the position of field engineer, design engineer or project engineer.

Audience
Engineers (particularly recently graduated engineers or engineers in conversion) looking to acquire in-depth knowledge and best practices of Oil & Gas production.

Learning Objectives
Upon completion of this course, the participants will be able to:
- calculate different casing strings applying well integrity roles,
- select the right position of casing shoes to safely drill the well,
- select the casings as per the constraints encountered while drilling in order to maintain the well integrity,
- design primary cementing techniques and procedures and select cement and necessary additives,
- assess the quality of a cementing job and which equipment is required in a conventional case,
- design the corresponding completion safe procedures calculate tubing movement and forces,
- work on complex completion issues with specialists and select the wellhead according to operational conditions,
- write and supervise maintenance and testing procedures on wellhead,
- recognize the technical, operational and organizational solutions applied to well integrity management,
- design the process of well integrity management and review well integrity within the framework of all strategic operations.

Ways & Means
- Highly interactive training with industry specialist lecturers.
- Multiple teamwork sessions and industrial case studies.
- Numerous simulation exercises using corresponding software PipeSim™.
- Knowledge assessment on a weekly basis.

Learning Assessment
Quiz.

Prerequisites
Engineering degree or equivalent professional experience within the petroleum industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Well Integrity Engineering.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 35 days

Casing Design & Applicable Standards 5 d
Drilling and casing program, wellhead, characteristics of casing.
Shoe positioning: hypotheses to be considered, casing point. Kick tolerance, casing point. Kick tolerance & well integrity.
Casing String Calculation: principles and assumptions, stress cases study (collapse, burst, tension, triaxial study, safety factors).
Casing selection.

Cementing: Primary & Remedial, Quality Control of Cement 5 d
Techniques and job procedures: primary cementing, cement job design, job planning and preparation, casing running, cementing job, cementing calculations.
Cement and slurries: cement, special slurries and additives, formulation and laboratory tests, rheology of mud and slurries.
Cement equipment: pumps, mixers, cementing head, cement plugs.
Cement job evaluation: principles and interpretation of the cement logs, thermometry, Sonic (CBL - VDL), Ultrasonic (USIT), log analysis on a real case.

Well Completion Equipment, Design, Acceptance Criteria 5 d
Well completion equipment: functions to be carried out and corresponding equipment.
Production string(s) configurations (conventional or tubing less, single or multi-zones).
Production wellhead, tubing & connections, packers and accessories, Bottom hole devices and relevant wireline equipment.
Subsurface safety valve (subsurface controlled, surface controlled).
Calculation of tubing movement and forces.
Well completion preparation and Implementation.

Well Integrity Management 5 d
Well integrity management system: introduction, assets, organization and people, WI Direction.
Well integrity design and standards; well construction/completion: casing, tubing, cement, produced fluids.
Well barriers: definition, requirement & design. Wellhead and tree equipment: valves, seals, accessories, Safety valves: downhole, surface.
Minimum integrity requirements vs. well life cycle/phases, annulus pressure management, well integrity review.

Well Head Integrity & Maintenance 5 d
X-mas tree specifications: X-mas tree (natural flowing wells), gas well X-mas tree, requirement for materials, X-mas tree equipment and selection (MV, SSV, SV, WV, choke).
Wellhead monitoring and maintenance: Wellhead installation procedures, Wellhead protection during well intervention (pre-job and post job), Surface equipment monitoring management, function tests, pressure test, plan & execute maintenance. Well reinstatement.
Role and responsibilities over the various operational life of the well.

Flow Assurance 5 d
Flow patterns, main considerations.
Simulation using PipeSim™: naturally flowing wells, artificial lift, skin effect.
Deposits and sand production monitoring and maintenance.
Corrosion monitoring and maintenance.

Well Surveillance & Data Management 5 d
Production reporting, production allocation and well performance monitoring.
Decline curve analysis, water and GOR control diagnostics…
Identification of a low well productivity, diagnostic, solutions implementation at the field level.
Field surveillance: field production monitoring, reserves tracking, field performance.

Reference: COMP/WELINTENGE  fp.pau@ifptraining.com

Only available as an In-House course.

Contact: fp.pau@ifptraining.com
Course Content

THE VARIOUS PRESSURES IN THE WELL
Hydrostatic pressure, pressure losses, gas law. Circulation with the well open and with the well shut in. Relationships between various pressures in the well.

DEFINITIONS OF PRESSURES
Pore pressure, frac pressure, overburden pressure (LOT and FIT). Necessity of a good casing cement job.

KICK DETECTION
Impact, consequences of a kick. Causes and signs of a kick, well shut-in methods, observation and evolution of pressures in the well. Precautions to avoid a kick, kick drills, exercises on trip sheet, kill sheet, etc.

PRINCIPLES OF WELL CONTROL METHODS
Principles and procedures. Drillers, wait and weight, volumetric methods.

EQUIPMENT & TESTING PROCEDURES

SUBSEA EQUIPMENT
Specific equipment of subsea BOP. Problems related to floating rigs.

SIMULATOR
Layout of the well control equipment used on rig floor. Demonstration: taking a kick while drilling and how to circulate this influx out in a control manner.

IWCF CERTIFICATION
Written test on principles and procedures. Written test on well control equipment.
Well Control - Level 3 or 4
IWCF Certification: “Combined Surface/Subsea BOP” - Certified IWCF training center

Level: PROFICIENCY

Purpose
This course raises the awareness of kick prevention and knowledge of well control methods and procedures.

Audience
All personnel concerned with drilling and completion operations involved in operations linked to the detection of a kick and well control: drilling engineers, mud engineers, supervisors, tool pushers, drillers, assistant drillers, etc.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify and calculate the various pressures in a well,
- understand the causes of the kicks,
- recognize/analyze the signs of a kick in order to shut in the well with the limited amount of gain,
- follow and apply shut in methods in order to secure the well after a kick occurrence,
- know the well control methods and demonstrate the ability to shut in the well (driller) and killing the well (supervisor),
- detect potential incidents during well control and take appropriate actions,
- obtain the level 3 or 4 IWCF certification on “Well Control”.

Ways & Means
- PPT presentation.
- Course material (PPT, PDF, Word).
- Exercise book.
- Practice on simulator.
- Certified IWCF instructor.

Learning Assessment
- Paper assessments.
- Practical assessment on simulator.

Prerequisites
- The certification Level 2 is recommended for a first IWCF certification (page 195).
- A period of 10 days minimum is prescribed by IWCF before any registration.

More info
Validity of Level 3 or 4 certificate is 2 years.

Expertise & Coordination
IFP Training trainer (permanent or contracted IWCF accredited) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: WEL/FPESME3-4. Can be organized as an In-House course. Contact: fp.pau@ifptraining.com

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This course is also available in French: WEL/FPESMF3-4. Please contact us for more information.
Well Intervention & Pressure Control - Level 2
IWCF Certification: “Well Intervention & Pressure Control” - Certified IWCF training center

Level: FOUNDATION

Purpose
This course aims to raise the awareness of the negative impact and effect of a well control incident. To provide the required comprehensive knowledge and skills to carry out well intervention operations.

Audience
All personnel concerned with well intervention operations (wire-line, coiled tubing, snubbing, workover) involved in operations linked to the detection of a kick: engineers, supervisors and operators who have to supervise or carry out well intervention operations.

Learning Objectives
Upon completion of the course, participants will be able to:

- understand the impact and consequences of a blowout,
- know the safety barrier principles,
- understand the behavior of a producing well,
- learn the various tools used during well interventions and workovers,
- be aware of the methods used to control well pressure,
- learn procedures and equipment used in wireline, coiled tubing, snubbing, workover,
- obtain the level 2 IWCF certification on “Well Intervention”.

Ways & Means
PPT presentation.
Course material (PPT, PDF).
Exercise book.
Certified IWCF instructor.

Learning Assessment
Paper assessments.

Prerequisites
Basic technical knowledge of the petroleum industry.

More info
The certification Level 2 is mandatory for the first IWCF certification. A period of 10 days minimum is prescribed by IWCF before any registration. Validity of Level 2 certificate is 5 years.

Expertise & Coordination
IFP Training trainer (permanent or contracted IWCF accredited) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

5 days

BASIC PRINCIPLES & WELL FUNDAMENTALS 0.5 d
Type of well effluents (heavy oil, oil, gas).
Hydrostatic and hydrodynamic pressures.
Specific gravities, densities, pressure gradient.
Over-balance/under-balance.
Pore pressure, frac. pressure.

PRESSURE CONTROL APPLIED TO COMPLETION & WELL INTERVENTION 1.5 d
Safety barriers, pressure tests.
Well calculation (pressure, volume, kill fluid, pumping time, balancing the pressure at the depth of the circulating device…).
Shut in procedures.
Kill methods (direct or reverse circulation, bull heading, lubricate and bleed…).
Specific problems linked to producing wells (losses, plugging, migration, hydrates, H₂S and CO₂ …).

COMPLETION EQUIPMENT 0.5 d
Different types of completion.
Downhole equipment (packers, safety valves), nipples, side pocket mandrels, tubing (sizes, grades and connections), Xmas tree…

DIFFERENT TYPES OF INTERVENTION WITH THEIR RESPECTIVE EQUIPMENT 2 d

Wire line intervention (optional)
Safety barriers and specific equipment.
Rigging up and pressure tests surface pressure control equipment.
Slick line: specific equipment (BOP, lubricator, stuffing box, cable cutter valve…).
Braided line, e-line : specific equipment (twin BOP, grease injection system, pack-off system, tool-trap, tool-catcher…).

Coiled tubing (optional)
Barriers and specific equipment (stripers, BOP…).
Rigging up and pressure tests surface pressure control equipment.

Snubbing (optional)
Barriers and specific equipment (stripers, annular BOP, stripping rams, safety rams…).
Rigging up and pressure tests surface pressure control equipment.

IWCF CERTIFICATION 0.5 d
Written test on Completion Equipment (compulsory).
Written test on Completion Operations (compulsory).
Written test on Wire Line operations (optional).
Written test on Coiled Tubing operations (optional).
Written test on Snubbing operations (optional).

Note: 1, 2 or 3 options has to be selected in addition to the compulsory tests.

Reference: WEL/WELINE2 - Only available as an In-House course.
Contact: fp.pau@ifptraining.com

This course is also available in French: WEL/WELINF2. Please contact us for more information.

www.ifptraining.com
Well Intervention & Pressure Control - Level 3 or 4
IWCF Certification: “Well Intervention & Pressure Control” - Certified IWCF training center

**Level:** PROFICIENCY

**Purpose**
This course aims to raise the awareness of the negative impact and effect of a well control incident, to provide an understanding of well intervention and pressure control techniques with the necessary skills to plan, supervise and carry out well intervention operations.

**Audience**
Personnel concerned with well intervention operations (wire-line, coiled tubing, snubbing, work-over): engineers, supervisors and operators who have to plan, supervise or carry out well intervention operations.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- comply with the well integrity requirements,
- know the safety barrier principles,
- understand the behavior of a producing well,
- learn the equipment of a completion,
- apply the methods used to control well pressure,
- learn procedures and equipment used in wireline, coiled tubing, snubbing, work-over,
- obtain the level 3 or 4 IWCF certification on “Well Intervention”.

**Ways & Means**
- PPT presentation.
- Course material (PPT, PDF, Word).
- Exercise book.
- Certified IWCF instructor.

**Learning Assessment**
Paper assessments.

**Prerequisites**
- The Certification Level 2 is recommended for a first IWCF Certification (page 197).
- A period of minimum 10 days is prescribed by IWCF before any registration.

**More info**
Course duration can be expanded to 2 weeks for a tailor-made program. Validity of level 3 or level 4 certificate is 2 years.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted IWCF accredited) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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**Course Content**

### BASIC PRINCIPLES & WELL FUNDAMENTALS

**Type of well effluents** (heavy oil, oil, gas).
Hydrostatic and hydrodynamic pressures.
Specific gravities, densities, pressure gradient.
Over-balance/under-balance.
Pore pressure, frac pressure.

**PRESSURE CONTROL APPLIED TO COMPLETION & WELL INTERVENTION**

- **Safety barriers, pressure tests.**
- Well calculation (pressure, volume, kill fluid, pumping time, balancing the pressure at the depth of the circulating device…).
- Shut in procedures.
- Kill methods (direct or reverse circulation, bull heading, lubricate and bleed…).
- Specific problems linked to producing wells (losses, plugging, migration, hydrates, H2S and CO2…).
- Responsibilities, decision making.

### COMPLETION EQUIPMENT

**Different types of completion.**
Downhole equipment as: packers, safety valves SCSSSV, nipples, side pocket mandrels, tubing (sizes, grades and connections), Xmas tree…

### DIFFERENT TYPES OF INTERVENTION WITH THEIR RESPECTIVE EQUIPMENT

**Wire line intervention (optional)**
- Safety barriers and specific equipment.
- Rigging up and pressure tests surface pressure control equipment.
- Slick line: specific equipment (BOP, lubricator, stuffing box, cable cutter valve…).
- Braided line, e-line: specific equipment (twin BOP, grease injection system, pack-off system, tool trap, tool catcher…).
- Problems during the interventions, interpretation and decision (shut in).

**Coiled tubing (optional)**
- Barriers and specific equipment (strippers, BOP…).
- Rigging up and pressure tests surface pressure control equipment.
- Problems during the interventions, interpretation and decision (shut in).

**Snubbing (optional)**
- Barriers and specific equipment (strippers, BOP, stripping rams, safety rams…).
- Rigging up and pressure tests surface pressure control equipment.
- Problems during the interventions, interpretation and decision (shut in).

**IWCF CERTIFICATION**

- Written test on Completion Operations (compulsory).
- Written test on Completion Equipment (compulsory).
- Written test on Wire Line operations (optional).
- Written test on Coiled Tubing operations (optional).
- Written test on Snubbing operations (optional).

**Note:** 1, 2 or 3 options have to be selected in addition to the compulsory tests.

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Reference: WEL/WELINE3-4 - Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

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\[This course is also available in French: WEL/WELINE3-4. Please contact us for more information.\]
Stripping

Level: PROFICIENCY

Purpose
This course provides the practical knowledge and skills required for stripping operations.

Audience
Drilling and completion engineers, supervisors, and experienced tool pushers.

Learning Objectives
Upon completion of the course, participants will be able to carry out stripping operations in real conditions through annular preventer alone or rams to rams.

Ways & Means
Exercises on a simulator.

Learning Assessment
Quiz.

Prerequisites
To have a valid well control certificate and to correctly know the basics on well control equipment.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

REMINDERS ON WELL CONTROL
Causes, signs of a kick.
Procedures in case of a sign of a kick.
Well shut-in procedures.
Control methods: driller’s method, wait and weight method.
Reminders on the equipment: BOP, closing unit, choke manifold, tests of equipment.
Equipment.

STRIPPING
Principle of the volumetric method, of the lubricating method.
Application of the volumetric method to a general case: change in annular capacity, deviated well, drill collar safety.
Stripping principle.
Additional equipment required for a stripping job.
Stripping through the annular preventer while running in on simulator.
How teams are organized on the rig site to carry out the job.
Stripping through ram BOP while running in on simulator.
Stripping procedure when pulling out of hole.

Reference: WEL/STRIPE
Only available as an In-House course.
This course is also available in French: WEL/STRIPEF. Please contact us for more information.

Contact: fp.pau@ifptraining.com
Production Engineering

- **Well Production**
  - Well Productivity & Reservoir - Wellbore Interface ................................................................. p. 201
  - Wellbore Treatments ..................................................................................................................... p. 202
  - Artificial Lift & Well Intervention Fundamentals ................................................................. p. 203
  - Well Servicing & Workover .......................................................................................................... p. 204
  - Well Performance ........................................................................................................................ p. 205
  - Advanced Well Performance .................................................................................................... p. 206
  - Well Inflow & Outflow Performance ...................................................................................... p. 207
  - Well Production Integrity Management .................................................................................. p. 208
  - Well Control - Level 2 ................................................................................................................ p. 209
  - Well Equipment & Operation for Production Engineer ............................................................. p. 210

- **Surface Production**
  - Production Engineering Certification ......................................................................................... p. 211
  - Metering & Allocation ................................................................................................................ p. 212
  - Integrated Production Modeling - Module 1 ............................................................................. p. 213
  - Integrated Production Modeling - Module 2 (Project) ................................................................. p. 214
  - Gathering Network: Design Engineering ................................................................................ p. 215
  - Pipeline Hydraulics & Multiphase Flow ......................................................................................... p. 216
  - Pipeline Network Engineering & Operation Certification ...................................................... p. 217
  - Mature Fields - Surface Production Issues ............................................................................... p. 218
  - Heavy Oil Production & Processing ........................................................................................ p. 219
  - Chemicals used in Production Activities .................................................................................. p. 220
  - Gas Cycling: an Integrated Approach ......................................................................................... p. 221
  - Technical Standards for Surface Facilities Design ................................................................. p. 222
Well Productivity & Reservoir - Wellbore Interface

Level: FOUNDATION

Purpose
This course provides the knowledge and skills needed to optimize the reservoir-wellbore interface and well productivity.

Audience
Young engineers involved in drilling/completion, supervisors in charge of drilling pay zone, and production professionals concerned with well productivity.

Learning Objectives
Upon completion of the course, participants will be able to:

- select a reservoir-wellbore interface adapted to the conditions encountered in the reservoir,
- detect problems holding down productivity and select adequate solutions.

Ways & Means
Numerous exercises on the influence of key parameters.
Numerous animations and videos.
Summary notes prepared and presented by the participants.
Application to a real case (project) for the participants in the “Drilling & Completion Engineering” training course (page 154).

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>NECESSARY FUNDAMENTALS OF RESERVOIR ENGINEERING FOR COMPLETION</td>
<td>1 d</td>
</tr>
<tr>
<td>Main parameters about the rock-fluid couple: porosity, permeability, saturation. Means of reservoir knowledge: core, logging, well test. PVT study: PV diagram, PT diagram, terminology (bubble point, dew point, ( R_s ), ( B_o ), ( B_g ), GOR, WOR...). Drainage mechanisms: primary, secondary and enhanced recovery.</td>
<td></td>
</tr>
<tr>
<td>COMPLETION FUNDAMENTALS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Completion: operations involved, main phases. Completion configurations: fundamental requirements, main configurations.</td>
<td></td>
</tr>
<tr>
<td>WELL PRODUCTIVITY (Part 1)</td>
<td>1 d</td>
</tr>
<tr>
<td>Fundamentals: overall approach of the well flow capacity: Inflow (study of the bottom hole pressure from the upstream side): main parameters, Productivity Index (PI), global skin and flow efficiency. Outflow (study of the bottom hole pressure from the downstream side): case of oil wells and case of gas wells. Analysis of inflow and outflow performance curves, need for artificial lift.</td>
<td></td>
</tr>
<tr>
<td>RESERVOIR WELLBORE INTERFACE IMPLEMENTATION (excluding “Wellbore treatments”)</td>
<td>1 d</td>
</tr>
<tr>
<td>Specific aspects linked to drilling and cementing the pay zone. Perforating: main techniques, key parameters for productivity. Specific case of horizontal drains.</td>
<td></td>
</tr>
<tr>
<td>WELL PRODUCTIVITY (Part 2)</td>
<td>1 d</td>
</tr>
<tr>
<td>KNOWLEDGE ASSESSMENT</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

Reference: COMP/PPLCETE  
Can be organized as an In-House course.  
Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees
Pau 11 February 15 February €3,580

This course is also available in French: COMP/PPLCETF. Please contact us for more information.

www.ifptraining.com
Wellbore Treatments

Level: FOUNDATION

Purpose
This course provides knowledge and skills needed to examine well damage issues and take appropriate actions.

Audience
Drilling or completion engineers, supervisors, lab or production professionals, non-specialists in wellbore treatment.

Learning Objectives
Upon completion of the course, participants will be able to:
► identify the nature and the origins of well damage,
► choose the adequate stimulation method,
► learn how to deal with sand production and water coning.

Ways & Means
► Animations - Exercises.
► Visit of a rock mechanics and reservoir-wellbore interface laboratory.
► Application to a real case (project) for the participants in the “Drilling & Completion Engineering” training course (page 154).

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

More info
Kindly refer to the following complementary courses which might be of interest: “Matrix Acidizing” (page 181) and “Basic Hydraulic Fracturing” (page 182).

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

INTRODUCTION TO WELLBORE TREATMENTS 1 d
Fundamental reminders on Productivity Index (PI), the skin effect and flow efficiency, the different components of the skin.
Productivity issues: cause of low productivity, nature and origins of well damage, location of problems and possible solutions.
Damage due to fluids: mechanisms, prevention.

MATRIX TREATMENT: ACIDIZING... 1 d
Aims; how it works.
Carbonate rocks and sandstones; inner characteristics, reactivity to injected fluids.
Choosing the acids and the additives.
Choosing the wells to be treated.
Design: preparation, checks and guidelines during the operation, after the acidizing (flow back...), possible cause of failure, coiled tubing...

HYDRAULIC FRACTURING 1 d
Aims and principles; candidate wells.
Frac fluids and fracture propping.
Calculation models and frac impact on PI.
Design; program, frac evaluation.
Other cases: pre-frac, minifrac, acid frac.

SAND CONTROL 1 d
Basics: consequences of sand, prediction of sand, sand analysis.
Sand control techniques; case of mechanical processes (determining the gravel and the screens...).
Design: cased hole gravel packing, openhole gravel packing, preparing the gravel pack, various methods, guidelines.

WATER OR GAS SHUT-OFF & DEPOSITS 0.75 d
Origin of the problems.
Remedial.
Debate around several examples.
Case study.

KNOWLEDGE ASSESSMENT 0.25 d

Reference: COMP/TRAITE  
Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>25 February</td>
<td>1 March</td>
<td>€3,580</td>
</tr>
</tbody>
</table>

This course is also available in French: COMP/TRAITF. Please contact us for more information.
Artificial Lift & Well Intervention Fundamentals

Level: FOUNDATION

Purpose

This course provides a comprehensive knowledge of artificial lift, workover implementation and killing procedures for a producing well.

Audience

Participants attending the training program “Drilling & Completion Engineering” (page 154).

Learning Objectives

Upon completion of the course, participants will be able to:
- select the adequate artificial lift method with regard to some specific operational problems,
- select the adequate well intervention method with regard to some specific operational problems,
- define a well killing program (pumping diagram).

Ways & Means

- Exercises on key parameters of artificial lift.
- Design of a pumping diagram for killing a well.
- Case study for a workover program with an interactive game.
- Application to a real case (project) for the participants in the “Drilling & Completion Engineering” training course (page 154).

Learning Assessment

Quiz.

Prerequisites

No prerequisites for this course.

More info

Kindly refer to the following complementary courses which might be of interest:
- “Artificial Lift: Gas lift” (page 184), “Artificial Lift: Pumping” (page 185) and “Well Servicing & Workover” (page 187).

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>5 days</th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTIFICIAL LIFT BY CONTINUOUS GAS LIFT</td>
<td></td>
</tr>
<tr>
<td>Continuous gas lift: principle, well unloading, operating procedure and troubleshooting, field of application.</td>
<td></td>
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</tbody>
</table>

| 1 d |
| ARTIFICIAL LIFT BY PUMPING |
| Sucker rod pumping, Electrical Submersible centrifugal Pumping (ESP): principle, specific completion equipment, operating procedure and troubleshooting, field of application. |

| 1 d |
| TYPES & MEANS OF INTERVENTION ON PRODUCING WELLS |
| Mains types of intervention: measurement, maintenance, workover. Main means (wireline unit, coiled tubing unit, snubbing unit, workover rig): principles, area of application. |

| 0.5 d |
| GENERAL PROCEDURE OF A WORKOVER |
| Main operation steps: chronology, more tricky operations from a safety point of view, main operations. Case of depleted reservoirs: losses and formation damage, kick-off after the workover. |

| 0.75 d |
| WELL KILLING PROCEDURE FOR A PRODUCING WELL |
| Killing the well by circulation: area of application, basis procedures (direct or reverse circulation), elaboration of the forward-looking pumping diagram. Killing by squeeze: area of application, basis procedure, elaboration of the operating program, case where the injectivity test is unsatisfactory, squeeze and bleed-off method. Final killing phase: observing the well, operations to run after packer “unsetting”. |

| 0.5 d |
| CASE STUDY: WORKOVER PROGRAM |

| 0.25 d |
| KNOWLEDGE ASSESSMENT |

Reference: COMP/TAWOE Can be organized as an In-House course. Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees
Pau 4 March 8 March €3,580

This course is also available in French: COMP/TAWOF. Please contact us for more information.
Well Servicing & Workover

**Course Content**

**Course Title:** REASONS & WELL INTERVENTION MEANS ON PRODUCTION WELL

- Intervention means classification.
- Well intervention main reasons:
  - Measurement.
  - Maintenance.
  - Well remedial and workover.
- Main intervention means: wireline, coiled tubing, snubbing, workover rig.

**Course Title:** REVIEW OF COMPLETION, WELLHEAD & BOP STACK SET UP

- Review of completion installation and equipment technology:
  - Standard completion.
  - Intelligent completion.
  - Multi-zone gravel pack completion.
  - Deepwater completion fitted with sand control equipment.
- Review of wellhead set up.
- Review of BOP stack set up versus company rules.

**Course Title:** WELL SERVICING

- Safety issue during well servicing operations.
- Intervention equipment set up.
- Study of different well servicing cases:
  - Standard completion.
  - Tubing less completion.
  - Intelligent completion.
  - Multi zone gravel pack completion.
  - Deep water completion fitted with sand control equipment.
- Light intervention case study.

**Course Title:** WORKOVER

- Safety issue during workover operations.
- Main operations:
  - Well neutralization and means.
  - Xmas-tree removal.
  - Workover rig and BOP stack installation.
  - Workover operation.
  - Fishing operation.
  - Operation risk evaluation versus well operation cost and budget.
- Depleted reservoirs:
  - Losses and potential reservoir damage.
  - Well kick-off after well intervention.
- Study of different well workover cases:
  - Standard completion.
  - Tubing less completion.
  - Smart completion.
  - Multi zone gravel pack completion.
  - Deepwater completion fitted with sand control equipment.
- Workover case study.

**Course Title:** KNOWLEDGE ASSESSMENT

- Quiz.
# Well Performance

## Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PVT &amp; RESERVOIR FUNDAMENTALS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Oil &amp; Gas PVT properties: bubble point, B\text{p}, R\text{p}, GOR, solids…</td>
<td></td>
</tr>
<tr>
<td>Reservoir rock and fluids: porosity, permeability, saturation, relative permeability.</td>
<td></td>
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<tr>
<td>Reservoir behavior types.</td>
<td></td>
</tr>
<tr>
<td><strong>RESERVOIR-WELLBORE INTERFACE FUNDAMENTALS</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Pay zone drilling, completion (open hole, cased hole), perforating.</td>
<td></td>
</tr>
<tr>
<td>Wellbore treatment: sand control, stimulations (acidizing, hydraulic fracturing).</td>
<td></td>
</tr>
<tr>
<td><strong>INFLOW PERFORMANCE</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Flow in the reservoir: Productivity Index (Pi), empirical Inflow Performance Relationship (IPR), horizontal wells.</td>
<td></td>
</tr>
<tr>
<td>Back pressure equation for gas wells.</td>
<td></td>
</tr>
<tr>
<td>Global skin: formation damage, perforation, partial penetration, deviation.</td>
<td></td>
</tr>
<tr>
<td>Applications - Exercises.</td>
<td></td>
</tr>
<tr>
<td><strong>OUTFLOW PERFORMANCE</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Flow in the wellbore: pressure gradient and Vertical Lift Performance (VLP) curves.</td>
<td></td>
</tr>
<tr>
<td>GLR, tubing head pressure, tubing ID impact.</td>
<td></td>
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<tr>
<td>Monophasic vs. polyphasic flow: minimum flowrate/well loading.</td>
<td></td>
</tr>
<tr>
<td>Applications - Exercises.</td>
<td></td>
</tr>
<tr>
<td><strong>WELL PERFORMANCE</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Well deliverability nodal analysis: inflow/outflow.</td>
<td></td>
</tr>
<tr>
<td>Well performance modeling, prediction and analysis vs. reservoir pressure, PI, GLR, BSW, tubing ID.</td>
<td></td>
</tr>
<tr>
<td>Applications - Exercises.</td>
<td></td>
</tr>
<tr>
<td><strong>ARTIFICIAL LIFT</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Gas lift: fundamentals, unloading procedure, surveillance and troubleshooting.</td>
<td></td>
</tr>
<tr>
<td>Electrical Submersible Pump (ESP): components, design, problems.</td>
<td></td>
</tr>
<tr>
<td>Rod pumping and jet pumps fundamentals.</td>
<td></td>
</tr>
<tr>
<td>Comparison of the artificial lift methods.</td>
<td></td>
</tr>
<tr>
<td><strong>INTRODUCTION TO PROSPER™</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Overview of well performance software tool and methods.</td>
<td></td>
</tr>
<tr>
<td>PROSPER™ methodology for gas lift design and troubleshooting, manual application.</td>
<td></td>
</tr>
<tr>
<td>PROSPER™ methodology for ESP troubleshooting.</td>
<td></td>
</tr>
<tr>
<td><strong>KNOWLEDGE ASSESSMENT</strong></td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

Reference: COMP/WELLPERFE  
Only available as an In-House course.  
Contact: fp.pau@ifptraining.com
Advanced Well Performance

Course Content

WEEK 1

Introduction to production system
Introduction to well performance nodal analysis: inflow/outflow. 0.5 d
Overview of PROSPER™ software workflow:
PROSPER™: building initial well system file.

PVT data/PVT modeling
Oil & Gas PVT properties: bubble point, B_o, R_g, GOR, solids… 0.5 d
PROSPER™: building PVT model.

Reservoir properties & reservoir-wellbore interface
Reservoir rock & fluids: porosity, permeability, saturation, relative permeability, scales. 0.5 d
Reservoir behavior type.
Pay zone drilling, completion (open hole, cased hole), perforating.
Wellbore treatment: sand control, stimulations (acidizing, hydraulic fracturing).

Inflow performance/IPR modeling
Flow in the reservoir: Productivity Index (PI), empirical Inflow Performance Relationship (IPR). 1.5 d
Back pressure equation for gas wells.
Global skin: formation damage, perforation, partial penetration, deviation:
PROSPER™: IPR modeling exercise.
Horizontal drains:
PROSPER™: horizontal drain modeling.

Wellbore flow, outflow performance/VLP modeling
Flow in the wellbore: pressure gradient and Vertical Lift Performance (VLP) curves. 1 d
GLR, tubing head pressure, tubing ID impacts.
Monophase vs. polyphasic flow: minimum flow rate/well loading:
PROSPER™: tubing correlations, VLP modeling.
Choke performance.

Well performance
Well deliverability nodal analysis: inflow x outflow: 1 d
PROSPER™: IPR + VLP natural flow well performance modeling.
Sensitivity study: prediction and analysis vs. reservoir pressure, PI, GLR, BSW, tubing ID.

WEEK 2

Artificial lift
Gas lift: fundamentals, unloading procedure, surveillance and troubleshooting: 2.5 d
PROSPER™: gas lift design, prediction, analysis and diagnosis.
Electrical Submersible Pump (ESP): components, design, problems:
PROSPER™: ESP design, prediction, analysis and diagnosis.
Rod pumping and jet pumps fundamentals.
Comparison of the artificial lift methods.

PROSPER™ case study
Application of PROSPER™ to a comprehensive case study, from PVT modeling and matching, IPR + VLP building and matching, to natural flow performance, gas lift and ESP design/performance prediction. 2 d

Knowledge assessment
0.5 d

Reference: COMP/WELLPERF2E  Only available as an In-House course.

Contact: fp.pau@ifptraining.com
Well Inflow & Outflow Performance
E-learning with remote personal coaching

Level: PROFICIENCY

Purpose
This course aims to deepen knowledge of well lift optimization and master use of the software program PROSPER™.

Audience
Reservoir or well performance engineers and technicians.

Learning Objectives
Upon completion of the course, participants will be able to:
- build a PVT model which will be used in a well performance study,
- analyze the link between reservoir characteristics and production,
- model and analyze crucial parameters of well performance,
- identify reasons for poor well performance,
- select and design the adequate artificial lift methods.

Ways & Means
- Multimedia online learning with personal coaching.
- Before training starts, 2 hours are dedicated to introduce the training agenda, methods and tools.
- The exact needs and expectations of each participant are also assessed and discussed (MCQ and phone interview with the tutor).
- During the training, individual phone contact with the tutor and web conferences with other participants.
- Use of the software program PROSPER™ (license not provided).

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

More info
Total duration of the training is 32 hours, spread over an 8-week period.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Section</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>2.5 h</td>
</tr>
<tr>
<td>Well production optimization. PROSPER™ software.</td>
<td></td>
</tr>
<tr>
<td>CHARACTERIZATION OF RESERVOIR FLUIDS - PVT</td>
<td>2 h</td>
</tr>
<tr>
<td>Goal and application of PVT studies. Main Oil &amp; Gas properties. PROSPER™ software PVT module.</td>
<td></td>
</tr>
<tr>
<td>INFLOW PERFORMANCE RELATIONSHIP</td>
<td>6.5 h</td>
</tr>
<tr>
<td>Modeling of flows in a porous medium. Modeling of the reservoir-wellbore interface. IPR calculation in the case of Oil &amp; Gas reservoirs. Specific case of horizontal and deviated wells.</td>
<td></td>
</tr>
<tr>
<td>NATURAL FLOWING WELLS</td>
<td>7 h</td>
</tr>
<tr>
<td>ARTIFICIAL LIFTED WELLS</td>
<td>4.5 h</td>
</tr>
<tr>
<td>WELL PERFORMANCE DIAGNOSIS</td>
<td>2.5 h</td>
</tr>
<tr>
<td>Production rate analysis of well flowing naturally. Production rate analysis of well activated with GL or ESP.</td>
<td></td>
</tr>
<tr>
<td>CONCLUSION - CASE STUDY</td>
<td>7 h</td>
</tr>
</tbody>
</table>

Reference: COMP/BLPROSPER - Only available as an In-House course.
Contact: fp.pau@ifptraining.com

www.ifptraining.com
Well Production Integrity Management

Level: PROFICIENCY

Purpose
To deepen knowledge of well integrity management and develop the skills for designing, operating and maintaining well equipment with the ultimate objective of ensuring a permanent, safe containment of all wellbore fluids.

Audience
Drilling, completion and production engineers and supervisors.

Learning Objectives
Upon completion of the course, participants will be able to:
- recognize the technical, operational and organizational solutions applied to well integrity management,
- design the process of well integrity management,
- review well integrity within the framework of all strategic operations,
- focus, maintain and design of well integrity assurance,
- recognize the role of production supervisor’s duties with regard to well integrity.

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

WELL INTEGRITY MANAGEMENT: DEFINITION & CHALLENGES 0.25 d
Introduction.
Assets.
Organization and people.
WI Direction.

WELL INTEGRITY DESIGN 1.5 d
Well construction/completion: casing, tubing, cement, produced fluids.
Well barriers: definition, requirement & design.
Wellhead and tree equipment: valves, seals, accessories.
Safety valves: downhole, surface.
Well integrity standards.

WELL INTEGRITY OPERATIONS 2 d
Flow assurance (corrosion, sand & deposits).
Safety critical equipment/barriers.
Monitor and manage a pressure:
- Role and responsibilities.
- Monitor/perform well equipment test.
- Ensure safety critical equipment are operational.
- Report any abnormal operating condition.
- Your role over the various operational life of the well.
Well integrity maintenance:
- Downhole/well equipment maintenance.
- Surface equipment maintenance.
- Plan & execute maintenance. Well reinstatement.
Your role as a part of well integrity team:
- Perform routine maintenance (site specific requirement).
- Prepare well for maintenance/well intervention operation.
- Restart well after maintenance operation.
Today’s successful well integrity team:
- HSE goal and leadership.
- Understand site specific well design decision/equipment.
- Handover and reporting best practices.
- Major incident prevention by implementing WIM awareness.

WELL INTEGRITY MANAGEMENT (WIM) 1 d
Introduction, concepts and definitions.
WIM key activities.
Minimum integrity requirements vs. well life cycle/phases.
Annulus pressure management.
Data management.
Well integrity review.
Well integrity performance management.

KNOWLEDGE ASSESSMENT 0.25 d

Reference: COMP/WELINTMA Only available as an In-House course.
Contact: fp.pau@ifptraining.com
**Well Equipment & Operation for Production Engineer**

**Drilling - Completion - Artificial Lift - Well Interventions**

**Level:** PROFICIENCY

**Purpose**

This course provides a comprehensive knowledge of well operations: from drilling, completion and artificial lift techniques and equipment to well intervention operations.

**Audience**

Production engineers and other professionals interested in well operations.

**Learning Objectives**

Upon completion of the course, participants will be able to:
- Grasp fundamentals of drilling techniques,
- Draw the architecture of a typical well completion and explain the technology of the equipment used,
- Understand operating principle and technology of artificial lift pumps,
- Comprehend operating principle, monitoring and technology of gas lift systems,
- Review main well servicing and workover operations (objectives, principles, equipment...).

**Ways & Means**

- Highly interactive training by industry specialist lecturers.
- Several applications and illustrations.

**Learning Assessment**

Assessment by test at the end of the course.

**Prerequisites**

No prerequisites for this course.

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

---

**Course Content**

| 5 days |

| **FUNDAMENTALS OF DRILLING** | 1 d |
| Drilling and casing program: function of the different casings, how to determine the drilling and casing program. Principle of drilling: different types of bits, drilling string, hoisting and pumping functions and material, mud and solid treatments, wellheads. Drilling methods and special operations: drilling parameters, turbo drilling, coring and logging, casing and cementing operations, directional drilling, well control, fishing jobs. Offshore drilling operations: different types of rigs, specific offshore problems. |

| **FUNDAMENTALS OF COMPLETION OF NORMALLY FLOWING WELLS** | 1 d |
| Operations involved in well completion. Main factors influencing a completion design. Connecting the pay-zone to the borehole: open hole and cased hole, drilling and casing of the pay zone, evaluating and restoring the cement job, perforating. Equipment of naturally flowing wells: functions to be carried out and corresponding pieces of equipment, technology and handling of the main pieces of equipment (production wellhead, tubing, packer, downhole services, subsurface safety valve). |

| **WELL PRODUCTIVITY - NEED FOR ARTIFICIAL LIFT** | 0.25 d |
| Overall approach of the well flow capacity: inflow and outflow performances. Need for artificial lift. Main artificial lift techniques. |

| **ARTIFICIAL LIFT BY PUMPING** | 0.75 d |
| Techniques to be covered: Sucker Rod Pumps. Electrical Submersible Pumps (ESP). Progressing Cavity Pumps (PCP)… Jet pumps. For each of these techniques, the following points will be highlighted: principle, technology of the involved pieces of equipment, operating procedure and troubleshooting, installation design, applications, advantages and drawbacks. How to improve performances and run-life duration? |

| **ARTIFICIAL LIFT BY CONTINUOUS GAS LIFT** | 1 d |
| Operating principle. Specific completion equipment. Factors to consider for design. Unloading, operating problems and selection criteria. |

| **WELL SERVICING & WORKOVER - WELL INTERVENTION** | 1 d |

---

**Reference:** WPQG/WELLGB  
**Can be organized as an In-House course.**

**Contact:** fp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>9 September</td>
<td>13 September</td>
<td>£3,570</td>
</tr>
</tbody>
</table>

This course is also available in French: WPQG/WELLFR. Please contact us for more information.

www.ifptraining.com 209
Course Content

**FUNDAMENTALS OF GEOLOGY, RESERVOIR ENGINEERING & PRODUCTION MODES**


**FUNDAMENTALS OF DRILLING, WELL ARCHITECTURE & COMPLETION**

Drilling fundamentals: principles of drilling, functions of the drilling fluid; drilling equipment. Well architecture and equipment: drilling and casing program; wellhead, characteristics of casings; shoe positioning, casing string calculations. Well completion equipment: main factors influencing completion design; completion configurations: requirements, main configuration; equipment of naturally flowing wells.

**WELLBORE TREATMENTS**


**WELL SERVICING & WORKOVER**

Reasons and well intervention means on production well. Well servicing. Workover: main operations; depleted reservoirs, study of different well workover cases; workover case study.

**WELL PERFORMANCE & ARTIFICIAL LIFT**

Inflow performance/outflow performance. Well performance: well deliverability nodal analysis (inflow/outflow); well performance modeling, prediction and analysis/reservoir pressure, PI, GLR, BSW, tubing ID. Artificial lift: gas lift (fundamentals, unloading procedure, surveillance and troubleshooting). Electrical Submersible Pump - ESP (components, design, problems), rod pumping and jet pumps fundamentals, comparison of the artificial lift methods. Application on PROSPER™ software: PROSPER™ methodology for gas lift design and troubleshooting, manual application; PROSPER™ methodology for ESP troubleshooting.

**GATHERING NETWORKS: DESIGN & OPERATION**


**OIL & GAS FIELD PROCESSING**

Well efficient characterization; well efficient behavior. Need for field processing of well effluents. Crude oil processing: stabilization, dehydration, desalting, Production and injection water processing, Gas processing and conditioning: dehydration, sweetening, condensates recovery and fractionation. Fundamentals of LNG chain.

**OFFSHORE FIELD DEVELOPMENT - PIPELINES & FLOW ASSURANCE**


**METERING, MATERIAL BALANCE & PRODUCTION ALLOCATION**


**HSE IN PRODUCTION ACTIVITIES**


**PRODUCTION OPTIMIZATION: INTEGRATED PRODUCTION MODELING**

Advanced well performance. Case study using PROSPER™. Reservoir performance and modeling: prediction of production profile. Case study using MBAL™. Integrated production system models. Global production modeling and optimization: full field optimization and forecasting approach; GAP™ software overview and main functions; system definition, how to link MBAL™ and PROSPER™ models to GAP™ solve network; full field development hands-on exercise: prediction constraints.

**PRODUCTION OPTIMIZATION: FIELD CASE STUDY & JURY**

5-day teamwork on an integrated project with deliverables to be presented on the last day (jury). Agenda of the 5-day group project: field presentation (objectives of the project), building the reservoir model, well performance, surface architecture, jury (project presentation, synthesis and wrap-up). Coaching throughout the project by experts using a real case study: bottle necks are identified in the production system, given reservoir and fluid properties, wellbore configuration and flowing wellhead pressure; production performance is predicted from history production trends.

---

**Why an IFP Training Certification?**

- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Production Engineering.
- Ready-to-use skills.

---

**Reference:** SPRO/PRODUCTINGENGB. Only available as an In-House course.

Contact: exp.reul@ifptraining.com

**This course is also available in French:** SPRO/PRODUCTINGENBF. Please contact us for more information.
**Metering & Allocation**

**Single-phase - Multi-phase - Transactional - Fiscal**

**Level:** PROFICIENCY

**Purpose**

This course provides a comprehensive knowledge of metering equipment and applications in the Oil & Gas industry.

**Audience**

Operational staff of Oil & Gas field treatment plants and terminals, instrumentation specialists, petroleum architects, project engineers, reservoir engineers, well performance specialists, completion specialists, personnel from engineering companies and all professionals interested in metering methods and equipment used in the petroleum industry.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- review different kinds of metering and allocation methods and assess importance of accuracy,
- grasp technology and operating principles of single-phase metering equipment,
- understand standards of liquids and gases transactional metering,
- assess operation, maintenance and calibration techniques of metering installations,
- review multiphase metering advantages, technology and operating principles.

**Ways & Means**

- Highly interactive training by industry-specialist lecturers.
- Numerous applications and illustrations from the industry.

**Learning Assessment**

Assessment by test at the end of the course.

**Prerequisites**

No prerequisites for this course.

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIFFERENT TYPES OF METERING - IMPORTANCE OF METERING</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Types of metering: technical, transactional, allocation, fiscal.</td>
<td></td>
</tr>
<tr>
<td>Importance of metering accuracy.</td>
<td></td>
</tr>
<tr>
<td>DATA TREATMENT</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Technical material balances, data reconciliation, data architecture, architecture of DCS, data recording.</td>
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</tr>
<tr>
<td>IMPLEMENTATION OF A METERING INSTALLATION - INFLUENCE ON PROCESS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Friction losses, introduction of a cold spot, intrusivity, leakage risks…</td>
<td></td>
</tr>
<tr>
<td>SINGLE-PHASE METERING: OPERATING PRINCIPLE &amp; EQUIPMENT</td>
<td>1 d</td>
</tr>
<tr>
<td>Fluids dynamics (laminar and turbulent flow).</td>
<td></td>
</tr>
<tr>
<td>Different types of single-phase meters:</td>
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<tr>
<td>Meters based on kinetic energy (Rho.V²): orifice plate meters, pitot tubes, rotameters.</td>
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<tr>
<td>Meters based on velocity: direct meters (turbines, volumetric meters) or indirect meters (ultrasounds, electromagnetic, vortex, thermal, turbines).</td>
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<tr>
<td>Derived meters: use of centrifugal pump characteristic curve, use of rotation speed of a positive displacement pump…</td>
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<tr>
<td>Tracers: chemical, radioactive, inter-correlation.</td>
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</tr>
<tr>
<td>TRANSACTIONAL METERING OF LIQUIDS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Static transactional metering or pseudo-transactional metering (tank being filled up…).</td>
<td></td>
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<tr>
<td>Metering bench; turbines, volumetric, ultrasounds.</td>
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<tr>
<td>Calibration of metering installations on test bench in manufacturing facilities or on site.</td>
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<tr>
<td>Operation of metering installations: maintenance, calibration.</td>
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<tr>
<td>Calculators: corrections, conversion into standard volumes.</td>
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<tr>
<td>Sampling, online analysis and lab analysis.</td>
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<tr>
<td>TRANSACTIONAL METERING OF GASES</td>
<td>0.5 d</td>
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<tr>
<td>Metering bench; turbines, volumetric, ultrasounds.</td>
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<tr>
<td>Calibration of metering installations on test bench in manufacturing facilities or on site.</td>
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<tr>
<td>Operation of metering installations: maintenance, calibration.</td>
<td></td>
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<tr>
<td>Calculators: corrections, conversion into standard volumes.</td>
<td></td>
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<tr>
<td>Sampling, online analysis and lab analysis.</td>
<td></td>
</tr>
<tr>
<td>MULTIPHASE METERING: OPERATING PRINCIPLE &amp; EQUIPMENT</td>
<td>1 d</td>
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<tr>
<td>Advantages of multiphase metering.</td>
<td></td>
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<tr>
<td>Fluids: flow modes, composition.</td>
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<tr>
<td>Principle of multiphase measurement: gamma-metric measurement, volume measurement, passive noise analysis use of dielectric, of Venturi, of inter-correlation.</td>
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<tr>
<td>Use of optic fibers: inter-correlation, sound velocity.</td>
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<tr>
<td>Description of some equipment available for multiphase measurement: 3D, Roxar, Agar, Haimo, MPM, Weatherford.</td>
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<tr>
<td>Installation of multiphase measurement - Impact on process: fluid conditioning, intrusiveness.</td>
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<tr>
<td>Subsea and downhole multiphase meters.</td>
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<tr>
<td>Calibration at manufacturer facilities.</td>
<td></td>
</tr>
<tr>
<td>Operation and maintenance of multiphase meters.</td>
<td></td>
</tr>
<tr>
<td>ALTERNATIVES TO THE USE OF MULTIPHASE METERS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>4D seismic. Use of natural or introduced tracers.</td>
<td></td>
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<tr>
<td>Estimation of the contribution of each reservoir (allocation).</td>
<td></td>
</tr>
</tbody>
</table>

**Reference:** SPRO/METER

- Can be organized as an In-House course.

**Contact:** exp.pau@ifptraining.com

**Location Start Date End Date Tuition Fees**

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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</thead>
<tbody>
<tr>
<td>Pau</td>
<td>30 September</td>
<td>4 October</td>
<td>€3,570</td>
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</tbody>
</table>

This course is also available in French: SPRO/COMPTAGE. Please contact us for more information.
Integrated Production Modeling - Module 1

Level: PROFICIENCY

Purpose

This course provides a thorough understanding, methodology and tools to integrate data and models from the reservoir to the surface facilities.

Audience

Production engineers, petroleum engineers or reservoir engineers willing to integrate reservoir with surface models using Integrated Production System technology.

Learning Objectives

Upon completion of the course, participants will be able to:

► predict global production through integrated modeling,
► describe MBAL™, PROSPER™ and GAP™ theory, capabilities and synergies,
► perform a case study aiming at building tank model, PVT match, well performance and surface network including the use of specialized software (IPM™, MBAL™, PROSPER™, GAP™),
► apply integrated modeling using the mentioned tools.

Ways & Means

Interactive presentations, practical exercises and hands-on activities using dedicated software (IPM™, MBAL™, PROSPER™, GAP™).

Learning Assessment

Assessment by test at the end of the course.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: SPRO/PRODOPT1GB

Only available as an In-House course.

Contact: exp.reuil@ifptraining.com

► This course is also available in French: SPRO/PRODOPT1FR. Please contact us for more information.

Course Content

5 days

WELL PERFORMANCE

2 d

Introduction to well performance nodal analysis: inflow/outflow.
Review on Productivity Index (PI).
Inflow performance relationship in oil wells, Darcy’s law, pseudo-steady state flow, Vogel IPR, composite IPR, Darcy IPR, Fetkovich IPR, Jones IPR.
Transient IPR curves.
Vertical Lift Performance (VLP) correlations and curves, downhole production considerations: skin calculation, gravel pack design.
Multiphase flow in tubing, liquid holdup, flow regimes, correlations in nodal analysis.
Overview of PROSPER™ software workflow.
PROSPER™: building initial well system file - IPR modeling using PROSPER™, building a wellbore model, sensitivity studies.
Partial penetration, deviated wells, hydraulically fractured wells, gravel pack completions, artificial lift.
Skin estimation.

RESERVOIR PERFORMANCE & MODELING: PREDICTION OF PRODUCTION PROFILE

2 d

Material balance for various reservoirs: production mechanisms.
Flow regimes (transient and pseudo-steady state flow).
Reservoir modeling through material balance.
Introduction to MBAL™.
MBAL™ data input and modeling aspects. Aquifer dimensioning and modeling.
History matching techniques on MBAL™: analytical and graphical methods.
Forecasting production performance.
Tank model building, PVT and correlations matching, history matching.

INTEGRATED PRODUCTION SYSTEM MODELS

0.5 d

Definition.
Introduction to the software tool to be used.
From reservoir to surface: the principle of linking MBAL™, PROSPER™ and GAP™.

GLOBAL PRODUCTION MODELING & OPTIMIZATION

0.5 d

Full field optimization and forecasting approach.
GAP™ software overview and main functions.
System definition, how to link MBAL™ and PROSPER™ models to GAP™ solve network.
Full field development hands-on exercise: prediction constraints.
## Integrated Production Modeling - Module 2 (Project)

### Level: PROFICIENCY

#### Purpose

This course provides a thorough understanding, as well as the methodology and tools to model and optimize production through an integrated case study.

#### Audience

Engineers from upstream Oil & Gas disciplines: production engineers, petroleum engineers or reservoir engineers willing to integrate reservoir with surface models using Integrated Production System technology.

#### Learning Objectives

Upon completion of the course, participants will be able to:

- predict global production through integrated modeling,
- develop a case study aiming at building tank model, PVT match, well performance and surface network including the use of specialized software (IPM™, MBAL™, PROSPER™, GAP™),
- apply integrated modeling using the mentioned tools.

#### Ways & Means

- 5-day work on an integrated project with deliverables to be presented the last session.
- Coaching throughout the project by experts using a real case study: bottleneck are identified in the production system, given reservoir and fluid properties, wellbore configuration and flowing wellhead pressure; production performance is predicted from history production trends.
- Use of professional software (IPM™, MBAL™, PROSPER™, GAP™).

#### Learning Assessment

Oral presentation.

#### Prerequisites

It is highly recommended to attend Module 1 first (page 212).

#### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content 5 days

#### FIELD PRESENTATION - OBJECTIVES OF THE PROJECT 0.25 d

#### BUILDING THE RESERVOIR MODEL 1.25 d

MBAL™ is used to build the tank model, according to the given data the production mechanisms must be identified and the history production data will be matched. A PVT correlation will be tuned in MBAL™ aiming to reproduce the parameters given in the PVT report.

#### WELL PERFORMANCE 2 d

Using PROSPER™, the well performance of five different wells will be generated (vertical, horizontal and deviated wells): IPR model, well test matching, VLP model, well deliverability.

#### SURFACE ARCHITECTURE 1 d

Using GAP™, the following issues will be investigated:

- Global production modeling linking MBAL™, PROSPER™ and GAP™.
- Identify the bottleneck in the production system.
- Optimize the surface network to meet the initial target production profile: elements in the network to be implemented, controls in chokes, manifolds, separator constraints.

Different solutions might be proposed to improve the production profile.

#### PROJECT PRESENTATION, SYNTHESIS & WRAP-UP 0.5 d

Reference: SPRO/PRODOPT2GB

Only available as an In-House course. Contact: exp.reuil@ifptraining.com

This course is also available in French: SPRO/PRODOPT2FR. Please contact us for more information.
Gathering Network: Design Engineering
Conceptual Design - Architecture - Tie-In

Level: FOUNDATION

Purpose
This course aims to provide a practical understanding of gathering network conceptual design and tie-in assessment.

Audience
Engineers looking to acquire best practices of Oil & Gas gathering network design and simulation using PIPESIM™.

Learning Objectives
Upon completion of the course, participants will be able to:
- explain operational constraints of single and multi-phase flow lines,
- describe multiphase flow patterns and main disturbing factors,
- assess the implications of different gathering network architectures,
- study actual network configurations and the impact of adding tie-ins using the software PIPESIM™,
- explain the different phases of the construction of a gathering network.

Ways & Means
- Highly interactive training with industry specialist lecturers.
- Methodology illustrated by multiple industrial case studies.
- Numerous design simulation using PIPESIM™.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
Understanding of well effluent behavior/thermodynamics, of well performance and activation methods, and of surface production facilities.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

FUNDAMENTALS OF FLUID MECHANICS
Total energy of a fluid; Bernoulli law.
Real fluid flow: viscosity, friction coefficient.
Flow regimes: laminar and turbulent flows.
Application: evaluation of pressure drop in a pumping station.

0.5 d

MULTIPHASE FLOW
Definition of multi-phase flow, main terminology.
Flow patterns, main considerations.
Basic understanding of different modeling approaches.

0.5 d

GATHERING SYSTEMS DESIGN & ARCHITECTURE SELECTION
Types of gathering systems, a review of common architectures.
Backpressure & well productivity.
Design practices and guidelines.
Main considerations: pressure drop, erosion velocities.
Design of pipelines, sizing criteria and sizing methodology.
Application: sizing of an oil/gas condensate production line.

0.5 d

OIL/GAS GATHERING NETWORK PROJECTS
Project planning; route selection; jurisdiction, permitting and rights of way.
Surface considerations; alignment; surveying and mapping.
Construction; inspection and testing.
Operation and maintenance.

0.5 d

GATHERING NETWORK DESIGN & OPTIMIZATION USING PIPESIM™
Introduction to PIPESIM™ software: building models, main considerations and recommendations.
PIPESIM™ will be used to study both gas production networks and crude oil production networks. For each type of system, the production network will be analyzed in detail:
Well performance vs. back-pressure.
Multiphase flow modeling (flow regimes, liquid holdup, slug characteristics and pressure loss analysis) across the production network.
Comparison of different gathering network configurations.
Determination of optimal locations for pumps and compressors.
Identification of locations most prone to flow assurance issues (erosion, corrosion, hydrate formation, deposits).
Analysis of heat transfer across the production network and associated flow assurance issues.
Identification of bottlenecks and optimization opportunities.

2 d

TIE-IN ASSESSMENT USING PIPESIM™
Tie-ins and their impact on existing networks.
Implementation strategies, design and operation considerations.
Introduction to gathering network simulation using PIPESIM™.
Tie-ins case studies using PIPESIM™.

1 d

Reference: SPRO/NETWORKGB
Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: SPRO/NETWORKFR. Please contact us for more information.
## Pipeline Hydraulics & Multiphase Flow
Simulation using OLGA™ & Multiflash™

### Level: PROFICIENCY

#### Purpose

This course provides a practical understanding of pipeline hydraulics, flow simulation and pipe friction loss calculations.

#### Audience

Engineers involved in designing, constructing or operating Oil & Gas production facilities.

#### Learning Objectives

Upon completion of the course, participants will be able to:
- Assess friction losses in a pipeline and fittings for a single-phase flow,
- Understand multiphase flow patterns and main perturbing factors,
- Grasp multiphase flow hydrodynamics for wet gas streams and crude oil streams,
- Understand operational constraints of single and multiphase flow lines,
- Deal with pipeline flow assurance issues, simulate a pipeline using the software program OLGA™.

#### Ways & Means

- Highly interactive training by industry-specialist lecturers.
- Several applications and illustrations.
- Use of simulation software programs OLGA™ and Multiflash™.

#### Learning Assessment

Assessment by test at the end of the course.

#### Prerequisites

To be at ease with process simulation.

#### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

<table>
<thead>
<tr>
<th>5 days</th>
<th><strong>Fundamentals of Fluid Mechanics Friction Losses in Single-Phase Flow</strong> 1.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total energy of a fluid. Bernoulli law.</td>
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<tr>
<td></td>
<td>Real fluid flow: viscosity, friction coefficient.</td>
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<tr>
<td></td>
<td>Flow regimes: laminar and turbulent (eddy) flows. Reynolds number.</td>
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<tr>
<td></td>
<td>Calculation of friction loss through pipes: Moody chart, AFTP charts (Lefevre).</td>
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<tr>
<td></td>
<td>Calculation of friction loss through fittings:</td>
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<tr>
<td></td>
<td>- Method 1: resistance coefficient.</td>
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<td></td>
<td>- Method 2: equivalent straight pipe length.</td>
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<td></td>
<td>Case of compressible fluids (gas) - Main empirical equations.</td>
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<td></td>
<td>Several exercises.</td>
</tr>
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<table>
<thead>
<tr>
<th>0.5 d</th>
<th><strong>Multiphase Flow in Oil &amp; Gas Production</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Incentives and stakes.</td>
</tr>
<tr>
<td></td>
<td>Definition of multiphase flow.</td>
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<tr>
<td></td>
<td>Main terminology.</td>
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<td></td>
<td>Basic understanding of different modeling approaches.</td>
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<td></td>
<td>Historical methods to study steady-state two-phase flow.</td>
</tr>
<tr>
<td></td>
<td>Example of multiphase dynamic flow simulator OLGA™.</td>
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<td>Future with multiphase flow modeling.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>1 d</th>
<th><strong>Flow Assurance</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main flow assurance issues.</td>
</tr>
<tr>
<td></td>
<td>Flow stability: flow pattern (horizontal and vertical); slugging.</td>
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<tr>
<td></td>
<td>Erosion constraints, wax, hydrates.</td>
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<tr>
<td></td>
<td>Heat transfer: main heat transfer phenomenon, OHTC, cold spot issue.</td>
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<tr>
<td></td>
<td>Fluid modeling (example with Multiflash™).</td>
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<td></td>
<td>Phase envelope, hydrate dissociation curve, emulsion, viscosity.</td>
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<thead>
<tr>
<th>1 d</th>
<th><strong>Well Gas Streams</strong></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Natural gas field development:</td>
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<tr>
<td></td>
<td>“Dry” scheme versus “Wet” scheme.</td>
</tr>
<tr>
<td></td>
<td>Main flow assurance issues (hydrates, TLC, surge liquid volume handling).</td>
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<tr>
<td></td>
<td>“Wet” scheme simulations.</td>
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<tr>
<td></td>
<td>Operating envelope.</td>
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<td></td>
<td>Geometry impacts.</td>
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<td></td>
<td>Example of slug-catcher design.</td>
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<table>
<thead>
<tr>
<th>1 d</th>
<th><strong>Crude Oil Streams</strong></th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Crude oil field development:</td>
</tr>
<tr>
<td></td>
<td>Deep water constraints.</td>
</tr>
<tr>
<td></td>
<td>Typical field preservation.</td>
</tr>
<tr>
<td></td>
<td>Classical loops versus alternative development architectures.</td>
</tr>
<tr>
<td></td>
<td>Subsea processing.</td>
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<tr>
<td></td>
<td>Crude oil stream:</td>
</tr>
<tr>
<td></td>
<td>- Severe slugging.</td>
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<tr>
<td></td>
<td>Hydodynamic slug flow. Slug-catcher design.</td>
</tr>
<tr>
<td></td>
<td>Thermal constraints during production/transient (cool down).</td>
</tr>
</tbody>
</table>

Reference: SPRO/HYDGB - Only available as an In-House course.

This course is also available in French: SPRO/HYD9FR. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
INTRODUCTION TO CRUDE OIL & NATURAL GAS PRODUCTION & TRANSPORT
5 d
Crude oil and natural gas production: fundamentals of reservoir, drilling and completion; well effluent behavior, need for effluent field processing; crude oil processing, gas processing and conditioning.
Crude oil, natural gas and Natural Gas Liquids (NGLs) transport by pipeline: overview of transport network and interaction with other blocks of the crude oil chain and natural gas chain.

DESIGN, CONSTRUCTION & OPERATION OF PIPELINES
10 d
Fundamentals of fluid mechanics and friction losses in single-phase flow.
Pipeline design standards: pressure, length, volume, diameter.
Technology of pipelines: standards, material grades, insulation techniques.
Pipe laying: different steps of pipe laying operations (onshore and offshore approaches), cost and duration of pipe laying and compression station construction.
Pipeline operation and maintenance: main flow assurance problems, main available technical solutions; introduction to pipe corrosion monitoring and prevention; introduction to pipeline maintenance.

PUMPING STATIONS
5 d
Centrifugal pump operating principle, technology and selection criteria.
Pumping system performances and operating conditions.
Centrifugal pump operation and troubleshooting.
Centrifugal pump maintenance (preventive, conditional and corrective).

COMPRESSION STATIONS
5 d
Centrifugal compressor operating principle, technology and selection criteria.
Centrifugal compressor performances and operating conditions.
Centrifugal compressor operation and troubleshooting.
Centrifugal compressor maintenance (preventive, conditional and corrective).

METALLURGY & MATERIALS, WELDING
5 d
Metallurgy: structures and behavior of metals and alloys at service conditions for static equipment, evaluation of the mechanical characteristics required for predictable behavior at service conditions.
Most widely used metals and metal alloys in transport facilities: steels, their composition, structure and behavior at service conditions.
Effect of heat treatments resulting from welding or deliberately applied. Common defects in steels.
Welding: impact of welding on metals structure, post-welding heat treatment, identification of welding defects.

CORROSION PREVENTION - CATHODIC PROTECTION
5 d
Common types of corrosion: origin and development process, possible methods of prevention.
Corrosion prevention: design of equipment, choice of materials, corrosion inhibitors, anti-corrosion coatings and systems; cathodic protection with sacrificial anodes or imposed current (principles and applications, coating and cathodic protection, cathodic protection systems design).

INSTRUMENTATION & AUTOMATION
5 d
Process control overview.
Field instrumentation, controllers, control loop structures.
Distributed Control System (DCS).

NETWORK OPERATION MANAGEMENT
10 d
Planning, material balance, allocations and accounts.
Monitoring: facilities remote monitoring, cathodic protection systems performance monitoring.
Metering stations: single-phase metering: operating principle and equipment, transactional metering of liquids, transactional metering of gases.
Management maintenance: maintenance policy and objectives, maintenance costs and failure costs; reliability process measurement and follow-up, reliability analysis and improvement methods; outsourcing and subcontracting, shutdown management.

HSE IN TRANSPORT FACILITIES
4 d
Main hazards associated with hydrocarbon transportation.
Risk in normal transport operations.
Safe isolation of plant and equipment.
HSE in maintenance and construction works. Permit to work system.
Organizational framework, human factors.
Sustainability management in transport operations. Environmental impact.

TRANSPORT ECONOMICS
1 d
Investment costs (CAPEX). Operation costs (OPEX).
Fundamentals of contracts. Pricing for access of third parties to the gas transport network.

FINAL PROJECT & JURY
5 d
5-day teamwork on a real case study with deliverables to be presented on the last day (jury).
The final project consists in proposing a design and operation philosophy for a pipeline network project.
Mature Fields - Surface Production Issues

Course Content

INTRODUCTION TO MATURE FIELD DEVELOPMENTS CHALLENGES 0.25 d

DRIVE MECHANISM & ENHANCED OIL RECOVERY 0.5 d
Concept selection of an EOR technique.
Validation process of an EOR technique.
Introduction to chemical EOR techniques.

RESERVOIR PRESSURE MAINTENANCE TECHNIQUES 0.25 d

WELL ACTIVATION 0.5 d
Gas lift.
Use of PCP, beam pump and ESPs.

WELL PRODUCTIVITY 0.5 d
Identifying a low well productivity.
Root causes and remediation.

TROUBLESHOOTING OF MATURE WELLS 0.5 d
Identifying problems of each well and associated remediation.
Strategy for optimized remediation integration at the level of a field.
Integrity of mature wells.

ADAPTATION OF OIL TREATMENT TO PRODUCTION AGING 0.5 d
Evolution of emulsion quality over time.
Evaluation of separators water handling capacity (design case/current operating conditions).
Examples of process adaptation to field aging.

ADAPTATION OF WATER TREATMENT 0.5 d
Evolution of water production over time.
Adaptation of production water treatment capacities.

ADAPTATION OF GAS TREATMENT 0.25 d
Evolution of associated gas flowrate over time.
Evolution of gas quality.
Gas recompression needs and adaptation of the gas compression package.
Condensate recovery.

ENERGY EFFICIENCY IN MATURE FIELD 0.25 d
Equipment performances.
Process optimization.
Fuel gas requirements vs. available associated gas.

EXAMPLES OF MATURE FIELD DEVELOPMENTS 0.5 d
Example of Gabon and Cameroon mature fields developments.

CORROSION MANAGEMENT IN MATURE FIELD 0.5 d
Corrosion mechanism.
Integrity of wells and flow line.

Reference: SPRO/MATUREGB

Only available as an In-House course.

Contact: exp.reuil@ifptraining.com

This course is also available in French: SPRO/MATUREFR. Please contact us for more information.
Heavy Oil Production & Processing

Level: FOUNDATION

Purpose
This course aims to acquire a comprehensive knowledge and practical know-how of the production and field processing of heavy crude oil.

Audience
Production, field or process engineers involved in heavy oil production.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe heavy oil fundamental properties, main reservoir production mechanisms and the adapted techniques,
- explain the reasons for upgrading heavy crude oils, assess the various problems induced by unwanted compounds,
- master oil and water treatment processes, operations and related operating conditions,
- understand the role of different units in a heavy crude upgrading chain,
- acquire a good understanding of the operation of the units related to extra heavy crude oil processing.

Ways & Means
Highly interactive training course delivered by industry experts and adapted to participants' experience.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

DRIVE MECHANISMS
Primary recovery. Secondary recovery: water flooding, gas injection, solvent displacement using naphta, DCO, DRU. Classic EOR methods: miscible gas injection, chemical flooding, Thermal EOR methods: Cyclic Steam Stimulation (CSS), Steam-Assisted Gravity Drainage (SAGD), In Situ Combustion (ISC), Toe-to-heel air injection.

WELL PERFORMANCE
Needs for artificial lift. Viscosity reduction: dilution/blending, heating, emulsification through the formation of an oil-in-water emulsion, pour point reduction by using Pour Point Depressant (PPD). Forecast production of heavy crudes including behavior of horizontal wells.

COMPLETION ADAPTED TO HEAVY OIL PRODUCTION
Cold production. Hot production: cyclic steam stimulation, steam assisted gravity drainage.

NEED FOR OIL FIELD PROCESSING - QUALITY REQUIREMENTS

CRUDE OIL TREATMENT
Crude stabilization (gas removal) by Multi Stage Separation (MSS): operating parameters (number of separation stages, pressures, heating and cooling needs...), influence on the quantity and quality (API grade) of the produced oil; foaming problems and main available solutions; associated gas recovery. Crude dehydration (water removal) and desalting: emulsion problems in heavy crude oil production and impact of well production techniques on surface facilities; asphaltens management in surface facilities; dehydration processes for heavy crude oils; heavy crude oil desalting. Acid crude sweetening (H2S removal); principle of stripping, stripping of heavy crude oils. Diluent recovery unit. diluent recovery assessment and maximum recovery diluent. Asphaltens precipitation in storage.

PRODUCTION WATER TREATMENT
Main treatments. Operating principle and required performances. Comparison of the different available techniques. Selection criteria. Examples of production water treatment block flow diagrams.

INJECTION WATER TREATMENT
Reasons for water injection. Quality requirements and necessary treatments. Main operating conditions of each treatment and required performances. Examples of injection water treatment block flow diagrams.

UPGRADER PRINCIPLES & OBJECTIVES
Production, fluidification and transportation of extra heavy crude oils. Different ways to upgrade heavy crude oils. Overview of an upgrader, role and purposes of the different processes.

ATMOSPHERIC & VACUUM DISTILLATION
Upgrader distillation units: principles of distillation, capacity, process flowsheets. Atmospheric and vacuum distillation unit: operating conditions, material balance, energy consumption and heat recovery. Corrosion and corrosion prevention in atmospheric and vacuum distillation units.

UPGRADER HYDROTREATMENTS TO PROCESS NAPHTHA & DISTILLATE
Hydrotreatment chemical reactions and hydrogen consumption. Hydrotreatment processes: process flow diagram, operating conditions, products characteristics.

THERMAL CONVERSION UNITS: VISBREAKING & DELAYED COKING
Heavy cuts thermal conversion processes. Visbreaking. Delayed coking process.

OTHER CONVERSION PROCESSES
Deasphalting units: vacuum residues structure and properties; deasphalting principles: different deasphalting solvents, overall flow sheet, operating conditions; integration of deasphalting units in conversion schemes.

INTEGRATION OF UPGRAVING PROCESS WITH SUBSURFACE & SURFACE PRODUCTION

Reference: SPRD/HEAVYGB. Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: SPRS/HEAVYFR. Please contact us for more information.
Chemicals used in Production Activities

Course Content

5 days

INTRODUCTION TO CHEMICAL TREATMENT IN PRODUCTION FIELD
0.5 d

CHEMICALS FOR OIL TREATMENT
1.5 d
Purpose, nature & specificities of each: demulsifiers, defoamers, corrosion inhibitors, paraffin control chemicals, drag reducers… Methodology for selecting the correct chemical & field testing. Ways for monitoring during operation. Optimization of the chemical injection and chemical performance evaluation. Troubleshooting case study.

CHEMICALS FOR GAS TREATMENT
0.75 d
Purpose, nature and specificities of each: defoamers, foamers, corrosion inhibitors, hydrate inhibitors (Methanol, DEG, TEG, KHI),… Methodology for selecting the correct chemical and field testing. Ways for monitoring during operation. Optimization of the chemical injection and chemical performance evaluation. Troubleshooting case study.

CHEMICALS FOR INJECTION & PRODUCED WATER PROCESSING
1.5 d
Purpose, nature and specificities of each: polyelectrolyte, chlorine, bactericide, oxygen scavenger, deoiliers, corrosion inhibitors, acids, mineral scale inhibitors… Methodology for selecting the correct chemical and field testing. Ways for monitoring during operation. Optimization of the chemical injection and chemical performance evaluation. Troubleshooting case study.

SPECIAL OPERATIONS
0.75 d
Scale removal and prevention in well tubing, electrochlorinator, furnaces and heat exchangers. Use of H₂S scavenger.

Reference: PROP/CHEMICAL
Only available as an In-House course.
This course is also available in French: SPRO/CHIMIQUE. Please contact us for more information.
## Gas Cycling: an Integrated Approach

### Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GAS CYCLING</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Introduction.</td>
<td></td>
</tr>
<tr>
<td>The integrated gas cycle: elements, configuration, challenges.</td>
<td></td>
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<tr>
<td>Gas cycling for pressure maintenance.</td>
<td></td>
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<tr>
<td>Gas cycling for miscible gas displacement (EOR): sweeping and soaking, compositional effects.</td>
<td></td>
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<tr>
<td>Dry gas cycling in retrograde condensate reservoirs.</td>
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<tr>
<td>Cycling non-hydrocarbon gases.</td>
<td></td>
</tr>
<tr>
<td>Major issues and constraints: reservoir, wells, flow lines and surface facilities.</td>
<td></td>
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<tr>
<td><strong>WELL EFFLUENT BEHAVIOR</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Different types of well effluent. Main characterization parameters.</td>
<td></td>
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<tr>
<td>Constituents that pose problems for storage and transport.</td>
<td></td>
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<tr>
<td>Gas composition: rich and lean gas, sweet and sour gas.</td>
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<tr>
<td>Gas PVT behavior.</td>
<td></td>
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<tr>
<td>PVT properties of pure components and mixtures.</td>
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<tr>
<td><strong>RESERVOIR FLUID BEHAVIOR &amp; NEEDS FOR GAS CYCLING</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Phase envelop, reservoir and surface PVT issues.</td>
<td></td>
</tr>
<tr>
<td>Ternary diagram, first contact miscibility, multiple contact miscibility: condensing drive and vaporizing drive, Minimum Miscibility Pressure (MMP).</td>
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<tr>
<td>Specificities of condensate gas: retrograde region.</td>
<td></td>
</tr>
<tr>
<td><strong>RESERVOIR ASPECTS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Reservoir performance.</td>
<td></td>
</tr>
<tr>
<td>Drive mechanisms: gas reservoirs, gas cap, gravity drainage displacement, tertiary gas displacement, miscible gas displacement.</td>
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</tr>
<tr>
<td>Requirements for gas quality for injection, flowrate, cycling rate and configuration of injection.</td>
<td></td>
</tr>
<tr>
<td>Field development: architecture and phasing.</td>
<td></td>
</tr>
<tr>
<td><strong>INTRODUCTION TO SURFACE FACILITIES DESIGN</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Gas specifications to conform with gas cycling (dew point, sulfur removal &amp; valorization).</td>
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<tr>
<td>Field processing of gas effluents for gas cycling.</td>
<td></td>
</tr>
<tr>
<td><strong>GAS DEHYDRATION &amp; SWEETENING</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Moisture content of natural gas.</td>
<td></td>
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<tr>
<td>Gas dehydration processes.</td>
<td></td>
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<tr>
<td>Gas sweetening, acid gases disposal.</td>
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<tr>
<td><strong>CONDENSATE: RECOVERY, STABILIZATION &amp; MONETIZATION</strong></td>
<td>0.5 d</td>
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<tr>
<td>Low-temperature separation techniques.</td>
<td></td>
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<tr>
<td>Condensate stabilization.</td>
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<tr>
<td>Monetization routes.</td>
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<tr>
<td><strong>GAS COMPRESSION</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Multistage compression: design criteria.</td>
<td></td>
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<tr>
<td>Gas compression versus field aging: effect on operating parameters, needs for booster station.</td>
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<tr>
<td><strong>COMPRESSORS &amp; DRIVERS</strong></td>
<td>0.5 d</td>
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<tr>
<td>Compressors technology: choice criteria, effect of gas density evolution.</td>
<td></td>
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<tr>
<td>Compressor drivers.</td>
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<tr>
<td><strong>INJECTION NETWORK</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Network architecture.</td>
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<tr>
<td>Network operations, backpressure management.</td>
<td></td>
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<tr>
<td>Well performance issues.</td>
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<tr>
<td><strong>CASE STUDY: SYNTHESIS - WRAP UP</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Field monitoring, adaptation of surface facilities to field aging, re-injection rate versus surface production capacities and effect on recovery, re-injection rate versus gas sales and effects on reservoir monitoring.</td>
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</tbody>
</table>

Reference: NATG/GASCYCLGB  
Only available as an In-House course.  
Contact: exp.rueil@ifptraining.com
Technical Standards for Surface Facilities Design

Course Content

Level: PROFICIENCY

Purpose
This course provides a comprehensive overview of technical standards applied in projects for construction, maintenance and operation of upstream Oil & Gas facilities.

Audience
Engineers and technicians interested or directly involved, in day-to-day activities of Oil & Gas projects: safety, design, construction, operation and/or maintenance of Oil & Gas field.

Learning Objectives
Upon completion of the course, participants will be able to:

- list the main Norms and recommended practices for Oil & Gas projects,
- assess standards that ensure the long-term productivity of surface installations,
- explain guidelines and procedures for promotion and maintenance of safe working conditions throughout construction, maintenance and operation activities,
- detail the basic requirements for safe and environmentally sound construction and maintenance of Oil & Gas infrastructures,
- grasp the key aspects of safety, design, construction and operation, necessary for the orderly and effective development of Oil & Gas projects,
- ascertain the treatment processes necessary for production water and injection water.

Ways & Means

- Several illustrations from recent projects.
- Review of applicable standards, norms and current industry best practices.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

HSE GUIDELINES FOR OIL & GAS DEVELOPMENT PROJECTS

WELDING & QUALITY CONTROL INSPECTION OF PIPING
Minimum requirements for welding of pressure containing piping and/or equipment. General requirements for the field welding and inspection of pipelines. Review of the ASME Section IX Welding and Brazing Qualifications and comparison with EN 287 Qualification Test of Welders - Fusion Welding. Review of ASME V Non-destructive examination.

PIPELINE DESIGN, STANDARD FOR CONSTRUCTION & INSPECTION
General considerations for onshore pipeline design. Specifications applicable to pre-project engineering, basic engineering, and construction engineering of the pipeline systems. Review of API 1104 Standard for Welding Pipelines and Related Facilities.

STANDARD PRACTICE FOR EQUIPMENT DESIGN, MAINTENANCE & INSPECTION
Scope of the inspections for certain stages in construction, in particular on hand over to a third party. Minimum measures regarding risk mitigation during construction and installation activities. Requirements for the evaluation and rating of the criticality of the units delivered under the contract. Requirements for the quality surveillance activities. Identification of key inspection documents using EN 10204 Types of inspection documents.

ENVIRONMENTAL REQUIREMENTS FOR PROJECTS
Establish the environmental requirements for projects design and E&P activities. Requirements for the quality surveillance activities. Minimum measures regarding risk mitigation during construction and installation activities. Effects and potential impacts of the Project on the natural and human environment, and of their extent.

LIQUID STORAGE TANKS
Minimum rules and requirements to be met with respect to design, fabrication, manufacturer quality control, inspection test and painting of single containment, double-walled metallic storage tanks.

INSPECTION PLAN FOR EQUIPMENT & STRUCTURES
Corrosion control on production facilities: field operation. Minimum inspection requirements necessary to assure the integrity of plant and structures.

GAS FACILITIES DESIGN
Minimum requirements for process sizing criteria to be used during pre-project and basic or detailed engineering phases. Review of ISO 17776 Petroleum and natural gas industries - Offshore production installations - Guidelines on tools and techniques for hazard identification and risk assessment for plant layout design and of ANSI B 31.8 Gas Transmission and Distribution Piping Systems for gathering and export networks design. Definitions, maintainability and inspectability criteria necessary to ensure the installations’ integrity throughout their life. Fundamentals for the maintenance strategy, type of equipment. Production availability studies of Oil & Gas facilities.

INTRODUCTION TO ISO 29001
Main requirements for quality management.

WATER TREATMENT SYSTEMS

Reference: PENG/STANDGB
This course is also available in French: PENG/STANDFR. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

Only available as an In-House course.

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221
Field Operations

► Production Operations
  Oil Terminals, FSO & FPSO ........................................................................................................ p. 223
  Oil & Gas Field Processing ........................................................................................................ p. 224
  Field Processing & Surface Production Facilities ...................................................................... p. 225
  Oil & Gas Field Processing Troubleshooting .............................................................................. p. 226
  Preparatory Course for Production Operator .............................................................................. p. 227
  Field Operator Certification ........................................................................................................ p. 228
  Gas & Liquid Hydrocarbons Transport Operations Certification .................................................... p. 229
  Panel Operator Certification ........................................................................................................ p. 230
  Production Supervisor Certification ............................................................................................ p. 231
  Production Superintendent Certification ....................................................................................... p. 232
  Field Operations Engineer Certification ....................................................................................... p. 233
  Mature Field Operations ............................................................................................................ p. 234
  Well Operation & Testing ........................................................................................................... p. 235
  Operation of Gas Lift Wells ......................................................................................................... p. 236
  Chemicals used in Production Activities ..................................................................................... p. 237
  Gas Processing & Compression Operations .................................................................................. p. 238
  Production Facilities Control Room Operation ............................................................................. p. 239
  Laboratory Analyses for Oil & Gas Production ........................................................................... p. 240
  Refresher Course for Production Operator ................................................................................... p. 241
  Pumps Operation ........................................................................................................................ p. 242
  Compressors Operation ............................................................................................................... p. 243

► Production Excellence & Management
  Production Planning & Monitoring ............................................................................................... p. 244
  Production Accounting & Material Balance .................................................................................... p. 245
  Asset Integrity Management .......................................................................................................... p. 246

► Maintenance
  Instrumentation Maintenance .......................................................................................................... p. 247
  Turnaround Management ............................................................................................................. p. 248
  Fundamentals of Mechanical Maintenance ................................................................................... p. 249
  Pump Maintenance Workshop ....................................................................................................... p. 250
  Compressors Maintenance .......................................................................................................... p. 251
  Maintenance & Inspection of Rotating Machinery ........................................................................ p. 252
  Maintenance Management Certification ....................................................................................... p. 253
  Machinery Vibration ..................................................................................................................... p. 254
  Upstream Maintenance Engineer Certification ............................................................................. p. 255
  Maintenance Supervisor Certification ............................................................................................ p. 256
  Maintenance Superintendent Certification ..................................................................................... p. 257
**Oil Terminals, FSO & FPSO**
Technology - Construction - Operation - Regulations

**Level:** FOUNDATION

**Purpose**
This course provides a comprehensive knowledge of the technology and operation of oil terminals in general, and of FSO/FPSO in particular.

**Audience**
Managers, staff and technicians whose activities are related to oil terminals (production, marine maintenance, operation, design, manufacturing, trading, control, regulations…).

**Learning Objectives**
Upon completion of the course, participants will be able to:
- review all loading/unloading operations on oil terminals, FSO’s and FPSO’s,
- understand technical characteristics of onshore or floating storage facilities,
- understand metering and sampling techniques used to measure volume of marketed oil,
- grasp technology of oil tanker loading facilities (jetty, loading buoy, tandem point…),
- learn about mooring crew activities, pilotage, port regulations, assess oil terminals HSE hazards and operational constraints.

**Ways & Means**
- Highly interactive training by industry specialist lecturers.
- Several applications and illustrations.

**Learning Assessment**
Assessment by test at the end of the course.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

**OVERVIEW OF OIL TERMINALS**
0.5 d
Functions of oil terminals: reception, oil processing, storage, export…
Different actors of an oil terminal.
Crude oil treatment, water treatment…
Evaluation of terminal storage capacity, tanker loading planning…

**ONSHORE STORAGE TANKS**
0.5 d
Different types of storage tank (fixed roof, floating roof). Selection criteria.
Fixed roof tank: shell, roof, bottom, foundation, retention basins and various equipment.
Floating roof tank and various equipment.
Firefighting facilities: water deluge, foam, gas extinguisher…
Safety risks on storage tanks: H2S, dangers of ignition, explosion risk, collapse, static electricity…
Incidents and equipment failures on storage tanks.
Fire types on storage tanks.

**METERING OF OIL QUANTITIES: RECEIVED, STORED & EXPORTED**
1 d
Metering and sampling on onshore tank (level, reference temperature scales).
Determination of amounts standard issued.
Counting dynamic transactional, sampling and calibration. Calculation of standard volume and weight.
Maintenance of metering unit and calibration loop and meter calibration.
Presentation of oil exported commercial documents.

**FLOATING STORAGE FACILITIES (FSO/FPSO)**
1 d
Presentation of the main functions of a FPSO.
Anchoring the FSO/FPSO.
Technology of floating storage tanks.
Storage tanks of crude oil, methanol ballast. Tanks atmosphere control. Inerting system.
Procedures for storage tanks entry. Incidents.
Safety on-board storage of FSO/FPSO.

**EXPORT & MARINE OPERATIONS**
1 d
Tanker approach operations and mooring at: jetty, loading buoy, tandem point…
Tanker loading operations, tanker loading planning, preparations before loading, monitoring during the loading operations and procedures after loading.
International Ship and Port facility Security (ISPS) code: principle, actors, responsibilities, practical difficulties.
Mooring crew operations.
Safety Port Regulations. Pilot activities.
Commercial contracts, demurrage, commercial claims.

**TANKERS TECHNOLOGY & TANKER LOADING INSTALLATIONS**
1 d
Ships transport of crude oil (tankers): different sizes of vessels, equipment related to the handling of products (cargo circuit, pump room), ballasting and deballasting, inert gas generation, tank washing.
Different modes of loading tankers: jetty, tandem and buoy. Advantages/drawbacks.
Safety checklist (IMO).
Description of tandem loading point and loading buoy.

Reference: PROP/TERMGB
This course is also available in French: PROP/TERMFRA. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
Oil & Gas Field Processing
Field treatments of Oil & Gas well effluent

Course Content

Level: FOUNDATION

Purpose
This course provides a comprehensive overview of Oil & Gas field processing technology.

Audience
Engineers and technicians interested, although not directly involved, in day-to-day Oil & Gas field processing operations: reservoir engineers, drilling and completion personnel, platform designers, petroleum architects, equipment suppliers, economists...

Learning Objectives
Upon completion of the course, participants will be able to:
- list main characteristics of Oil & Gas well effluents, assess problems induced by unwanted compounds,
- explain gathering network design and operations,
- grasp fundamentals of Oil & Gas field processing operations and related operating conditions,
- ascertain the treatment processes necessary for production water and injection water.

Ways & Means
- Course delivered by industry specialists.
- Numerous applications and illustrations.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

WELL EFFLUENTS BEHAVIOR 0.5 d
Different types of well effluent. Main characterization parameters. Liquid-vapor equilibrium of pure substances and mixtures. Effluent behavior. Constituents that pose problems for storage, transport or commercialization. Main specifications to conform with and required treatments.

FUNDAMENTALS OF RESERVOIR & DRIVE MECHANISM 0.25 d

FUNDAMENTALS OF DRILLING, COMPLETION & WELL PERFORMANCE 0.25 d
Drilling principle. Case of offshore drilling. Main completion equipment. Well performance. Needs for artificial lift: principle of artificial lift by pumping, gas lift...

WELL EFFLUENT TRANSPORTATION, FLOW-ASSURANCE & GAS HYDRATES PREVENTION 0.5 d
Gathering network design and operation:
- Main flow assurance issues.
Case studies: Gas condensate field development. Deep-offshore production.

CRUDE OIL PROCESSING 1 d
Crude stabilization by Multi Stage Separation (MSS): election of the number of stages, effect of operating parameters, management of foam issues. Crude dehydration and desalting. Emulsion treatment: operating parameters, internals, chemicals selection. Crude sweetening (H₂S removal).
Examples of oil treatment and associated gas compression process schemes.

PRODUCTION & INJECTION WATER TREATMENT 1 d

GAS PROCESSING & CONDITIONING 1 d
Gas dehydration: TEG units, solid desiccants (molecular sieves) units. Gas sweetening. Acid components (H₂S and CO₂) removal: amine units, molecular sieves, membranes. Natural Gas Liquids (NGL) extraction: use of cryogenic refrigeration, Joule-Thompson expansion, turbo-expander.

LIQUEFIED NATURAL GAS 0.5 d
Fundamentals of Liquefied Natural Gas (LNG) chain.

Reference: PROP/OGFP. Can be organized as an In-House course. Contact: exp.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>25 November</td>
<td>29 November</td>
<td>€3,570</td>
</tr>
</tbody>
</table>

This course is also available in French: PROP/IPS. Please contact us for more information.
Field Processing & Surface Production Facilities
Effluent treatment & equipment technology

Level: FOUNDATION

Purpose
This course provides a comprehensive understanding of onshore and offshore Oil & Gas field processing techniques, along with knowledge of technology and operating principles of surface production facilities equipment.

Audience
Engineers and technicians interested in onshore and offshore Oil & Gas field processing technology and equipment.

Learning Objectives
Upon completion of the course, participants will be able to:
- grasp fundamentals of Oil & Gas production techniques,
- explain operating principles and conditions of oil, water and gas treatment,
- detail the technology of main equipment and specifications of offshore production techniques,
- ascertain fundamentals of process control, draw a typical safety system layout,
- explain main metering techniques, corrosion issues, its prevention and monitoring.

Ways & Means
- Very interactive training by industry specialists.
- Numerous applications and illustrations.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

### WELL EFFLUENTS BEHAVIOR
0.5 d
Different types of well effluent. Main characterization parameters. Liquid/vapor equilibrium of pure substances and mixtures. Effluent behavior: Constituents that pose problems for storage, transport or commercialization. Main specifications to conform with and required treatments.

### FUNDAMENTALS OF RESERVOIR & DRIVE MECHANISM
0.25 d

### FUNDAMENTALS OF DRILLING, COMPLETION & WELL PERFORMANCE
0.25 d

### WELL EFFLUENT TRANSPORTATION, FLOW-ASSURANCE & GAS HYDRATES PREVENTION
0.5 d
Gathering network design and operation: main flow assurance issues; multiphase flow, flow patterns; hydrates formation prevention strategies, hydrates inhibition.
Case studies: gas condensate field development; deep-offshore production.

### CRUDE OIL PROCESSING
1 d
Crude sweetening (H2S removal).
Examples of oil treatment and associated gas compression process schemes.

### PRODUCTION & INJECTION WATER TREATMENT
1 d
Quality requirements for production water. Environment related constraints.
Main produced water treatments: API oil-water separators, plate separators, flotators, hydrocyclones…
Reasons for water injection.
Quality requirements and necessary treatments: chlorination, filtration, oxygen removal, sulfate removal.
Examples of processes schemes for production and injection water treatment.

### GAS PROCESSING & CONDITIONING
1 d
Gas dehydration: TEG units, solid desiccants (molecular sieves) units. Gas sweetening. Acid components (H2S and CO2) removal: amine units, molecular sieves, membranes. Natural Gas Liquids (NGL) extraction: use of cryogenic refrigeration, Joule-Thompson expansion, turbo-expander.

### LIQUEFIED NATURAL GAS
0.5 d
Fundamentals of Liquefied Natural Gas (LNG) chain.

### CASE OF OFFSHORE DEVELOPMENTS
1 d
Main preservation techniques and pigging solutions.

### ROTATING MACHINERY
1 d

### THERMAL EQUIPMENT
0.5 d
Heat exchangers, air coolers, furnaces: types, operation, technology.

### FUNDAMENTALS OF CORROSION
0.5 d
Different types of corrosion, prevention and monitoring.

### ELECTRICAL SYSTEMS - INSTRUMENTATION & PROCESS CONTROL - SAFETY SYSTEMS
1.5 d
Electrical power generation. Electrical power distribution network and equipment. Field instrumentation; controllers; control loop structures. Distributed Control System (DCS). Safety Instrumented Systems (SIS); ESD, HIPS, fire and gas system.

### METERING & ALLOCATION
0.5 d

Reference: PROP/FPSPF
Can be organized as an In-House course.

Location | Start Date | End Date | Tuition Fees
--- | --- | --- | ---
Rueil | 25 November | 6 December | €6,760

*This course is also available in French: PROP/PIPS. Please contact us for more information.*

Contact: exp.rueil@ifptraining.com

www.ifptraining.com

225
Oil & Gas Field Processing Troubleshooting

Level: PROFICIENCY

Purpose
To contribute to troubleshooting operations by identifying and tackling process deviations and abnormal conditions using a structured, step-by-step approach.

Audience
Field operators, control room operators, supervisors and maintenance technicians, looking to acquire best practices of Oil & Gas production facilities troubleshooting.

Learning Objectives
Upon completion of the course, participants will be able to:
- explain operation normal conditions, list common issues on main O&G processes and major equipment,
- identify roots causes to process deviations and abnormal conditions by using a structured, step-by-step approach,
- find an adapted solution to the identified problem.

Ways & Means
- Training delivery with industry specialist lecturers.
- Methodology illustrated by multiple industrial case studies.
- Use of a dynamic simulator for process control tuning.
- Specific case study related to the actual plant operated by the participants.

Learning Assessment
Case studies.

Prerequisites
A confirmed experience in field operations is required for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a solid expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

METHODOLOGY
1 d
Troubleshooting flowchart.
Recognize a trouble when occurring. Problem definition using ISHIGAWA fishbone chart.
Methodological approach to identify causes and remedial options.

CASE STUDIES
1.5 d
Operating parameters instability.
Compressor failure.
Glycol and hydrate inhibition.
Non-compliance with product specifications.
Pipeline network analysis.
Flowline erosion.

CASE STUDIES ON SIMULATOR
0.5 d
The participants will study the different types of control loops and the consequences of an inappropriate tuning of PID algorithm parameters through dynamic simulation exercises.

SPECIFIC CASE STUDY RELATED TO THE PLANT OPERATED BY THE PARTICIPANTS
2 d
During these two days:
- Describe normal production operations.
- Review production units current operating conditions.
- List recurrent abnormal conditions, operating parameters disturbances phenomena and observed consequences.
- Use methods studied on the first day to identify causes and potential corrective actions.

This course is also available in French: PROP/TROUBLEFR. Please contact us for more information.

Reference: PROP/TROUBLEGB
Only available as an In-House course.

Contact: exp.ruell@ifptraining.com
Preparatory Course for Production Operator

Level: FOUNDATION

Purpose
This course aims to consolidate mathematics, physics, chemistry and mechanics fundamentals required to attend IFP Training's Production Field Operator certification or other technical courses for operators.

Audience
Newly-hired personnel who need to strengthen their academic fundamentals before attending technical training courses.

Learning Objectives
Upon completion of the course, participants will be able to:
- reach the prerequisite academic level in mathematics, physics, chemistry and mechanics applied to Oil & Gas industry in order to attend technical courses,
- understand the basics of Oil & Gas production,
- explain the main physical phenomena governing well effluent treatment processes,
- identify the main static and rotary equipment of the production facilities and indicate their function.

Ways & Means
Numerous application exercises inspired from Oil & Gas production operations.

Learning Assessment
Assessment by test at the end of each week.

Prerequisites
No prerequisites for this course.

More info
Course duration and content can be adjusted according to participants’ profile.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVERVIEW OF OIL &amp; GAS PRODUCTION</td>
<td>1 d</td>
</tr>
<tr>
<td>APPLIED MATHEMATICS FOR OIL &amp; GAS PRODUCTION OPERATIONS</td>
<td>5 d</td>
</tr>
<tr>
<td>SYSTEMS &amp; MOTIONS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>FORCE &amp; ASSOCIATED QUANTITIES</td>
<td>1.5 d</td>
</tr>
<tr>
<td>FUNDAMENTALS OF ELECTRICITY</td>
<td>2 d</td>
</tr>
<tr>
<td>THERMAL PHYSICS</td>
<td>2 d</td>
</tr>
<tr>
<td>WELL EFFLUENT CHARACTERIZATION &amp; FLUID FLOW</td>
<td>1.5 d</td>
</tr>
<tr>
<td>FUNDAMENTALS OF ORGANIC CHEMISTRY</td>
<td>2 d</td>
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<tr>
<td>INORGANIC CHEMISTRY - FUNDAMENTALS OF AQUEOUS SOLUTION CHEMISTRY</td>
<td>1.5 d</td>
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<tr>
<td>PHYSICAL PHENOMENA OF THE SEPARATION PROCESSES</td>
<td>2 d</td>
</tr>
<tr>
<td>MATERIALS USED IN OIL &amp; GAS INDUSTRY</td>
<td>2 d</td>
</tr>
<tr>
<td>MECHANICAL PARTS OF ROTATING MACHINERY</td>
<td>2 d</td>
</tr>
</tbody>
</table>

Reference: PROP/PCBOA
Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/CPBOA. Please contact us for more information.

www.ifptraining.com
## Field Operator Certification

### Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRAINING COURSE: PIPING, VALVES, FITTINGS &amp; SCHEMATIZATION</strong></td>
<td>10 d</td>
</tr>
<tr>
<td>Piping, valves check valves filters pressure safety valves.</td>
<td></td>
</tr>
<tr>
<td>Fundamentals of metallurgy, introduction to corrosion.</td>
<td></td>
</tr>
<tr>
<td>Plant drawings: PFD, P&amp;ID reading and mechanical drawings.</td>
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</tr>
<tr>
<td><strong>ON THE JOB ORIENTATION (OJO)</strong></td>
<td>10 d</td>
</tr>
<tr>
<td>Periods alternating with classroom for 2 to 3 weeks long, carried out on-site</td>
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<tr>
<td>under the responsibility of the company and with mentors nominated within</td>
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<tr>
<td>experienced operators of the company. OJO activities allow participants to</td>
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<tr>
<td>acquire hands-on knowledge of actual plant equipment and operating conditions</td>
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<tr>
<td>and know-how of equipment operation.</td>
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<tr>
<td>Identification and study of equipment: routine surveillance and associated</td>
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<tr>
<td>operating procedures.</td>
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<tr>
<td>Operation follow-up, production team organization, familiarization with field</td>
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<tr>
<td>operators job duties.</td>
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<tr>
<td><strong>TRAINING COURSE: INSTRUMENTATION, PROCESS CONTROL &amp; THERMAL EQUIPMENT</strong></td>
<td>10 d</td>
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<tr>
<td>Sensors, transmitters, control valves, ON/OFF valves.</td>
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<tr>
<td>Controllers, control loops.</td>
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<td>Heat exchangers.</td>
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<tr>
<td>Fired heaters and boilers.</td>
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<tr>
<td><strong>ON THE JOB ORIENTATION (OJO)</strong></td>
<td>10 d</td>
</tr>
<tr>
<td><strong>TRAINING COURSE: ROTATING MACHINERY &amp; ASSOCIATED DRIVERS</strong></td>
<td>15 d</td>
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<tr>
<td>Centrifugal and volumetric pumps.</td>
<td></td>
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<tr>
<td>Centrifugal and reciprocating compressors.</td>
<td></td>
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<tr>
<td>Drivers: electric motors, gas turbines, diesel engine.</td>
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<tr>
<td><strong>ON THE JOB ORIENTATION (OJO)</strong></td>
<td>10 d</td>
</tr>
<tr>
<td><strong>TRAINING COURSE: DOWNDHOLE PRODUCTION, WELL EFFLUENTS PROCESSING, TERMINALS</strong></td>
<td>25 d</td>
</tr>
<tr>
<td>Introduction to reservoir and notions of drilling.</td>
<td></td>
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<tr>
<td>Well completion equipment, notions of well productivity, artificial lift.</td>
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<tr>
<td>Oil processing.</td>
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<tr>
<td>Gas processing.</td>
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<tr>
<td>Produced water and injection water processing.</td>
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<tr>
<td>Oil storage - Oil &amp; Gas metering - Oil &amp; Gas transfer operations.</td>
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<tr>
<td>Process safety systems.</td>
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<tr>
<td><strong>ON THE JOB ORIENTATION (OJO)</strong></td>
<td>10 d</td>
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<tr>
<td><strong>TRAINING COURSE: UTILITIES &amp; HSE PRODUCTION OPERATION</strong></td>
<td>10 d</td>
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<tr>
<td>Compressed air generation, open drain/closed drain, fuel gas, electrical</td>
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<td>power generation…</td>
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<tr>
<td>Main hazards associated with hydrocarbon processing.</td>
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<td>operations.</td>
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<tr>
<td>Safe isolation of plant and equipment. HSE in maintenance and construction</td>
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<tr>
<td>works - Permit to work system.</td>
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<tr>
<td>Environmental impact.</td>
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<tr>
<td><strong>ON THE JOB ORIENTATION (OJO)</strong></td>
<td>10 d</td>
</tr>
<tr>
<td><strong>TRAINING COURSE: OPERATION TUTORIALS, REVISIONS &amp; FINAL WRITTEN TESTS</strong></td>
<td>10 d</td>
</tr>
<tr>
<td>Cases studies and operation tutorials. Revisions of the main technical topics</td>
<td></td>
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<tr>
<td>covered throughout the theoretical modules. Final written exams concluding</td>
<td></td>
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<tr>
<td>the theoretical part of the program.</td>
<td></td>
</tr>
<tr>
<td><strong>ON THE JOB TRAINING (OJT)</strong></td>
<td>50 d</td>
</tr>
<tr>
<td>On-site training, aiming at providing the specific know-how required for</td>
<td></td>
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<tr>
<td>assuming the operator position; process, circuits, plant equipment,</td>
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<tr>
<td>instrumentation and process control, operating conditions, risks specific to</td>
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<tr>
<td>facilities and safe operating procedures. Practice of operator job duties</td>
<td></td>
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<tr>
<td>under the supervision of a mentor and the production team.</td>
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<tr>
<td><strong>FINAL ASSESSMENTS &amp; JURY</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Final oral examinations aiming at assessing the knowledge of the area of</td>
<td></td>
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<tr>
<td>OJT assignment (hazards, details of the installations, operating conditions,</td>
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<tr>
<td>equipment characteristics, site specificities…) as well as the capability</td>
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<tr>
<td>to assume operator duties (routine monitoring, execution of routine and non-</td>
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<tr>
<td>routine operations, knowledge of HSE rules and behavior in the event of</td>
<td></td>
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<tr>
<td>abnormal conditions and accident…).</td>
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<tr>
<td>Preparation of a final OJT report, as a support for the final oral</td>
<td></td>
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<tr>
<td>examinations.</td>
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</tr>
</tbody>
</table>

### Prerequisites
- Pre-recruitment in a petroleum company at an operator position.

### Learning Objectives
- Upon completion of the course, participants will be able to:
  - understand and explain processes, equipment and machinery.
  - adjust equipment operating parameters as required for safe operation and maintain product quality targets.
  - safely perform routine operations, surveillance of plant equipment and apply special operating procedures.
  - identify and react adequately to plant upsets.
  - demonstrate awareness and concern for good safety practices and procedures.
  - evolve in a multidisciplinary team and communicate effectively.

### Ways & Means
- The training program is customized to your assets specificities. It alternates between classroom lectures and practice on operational site. The alternation can be adapted to local constraints.

### Learning Assessment
- Continuous assessments all-long the program.
- Final assessment including a presentation in front of a jury.

### Reference:
**PROP/BOAGB**
- Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

*This course is also available in French: PROP/BOAFR. Please contact us for more information.*
### Course Content

**Classroom training: PIPE ACCESSORIES, SCHEMATIZATION & INTRODUCTION TO CRUDE OIL TREATMENT & TRANSPORT**

- Piping. Pipe accessories: valves, flanges, gaskets, pressure safety valves.
- Schematization: PFD, P&ID, isometrics, mechanical drawings.
- Fundamentals of Oil & Gas production and processing; well effluent behavior, need for well effluent treatment; crude oil treatment, gas treatment and conditioning.

Duration: **10 d**

**Practice on site: OJO (ON THE JOB ORIENTATION)**

- On-Job practical training periods of 2 to 3 weeks alternating with classroom lessons. Operators are under the responsibility of the Company with companionship by mentors designated among the experienced Operators. The OJO activities allow participants to acquire practical knowledge of site equipment, identify their operating conditions and learn how they are operated: identification and study of equipment; routine monitoring and associated operating procedures; operations follow-up, organization of the operations team familiarization with operator job duties.

Duration: **10 d**

**Classroom training: METALLURGY - CORROSION - CATHODIC PROTECTION - STORAGE**

- Pipeline technology and construction.
- Fundamentals of metallurgy, welding and coating materials.
- Pipeline corrosion, cathodic protection.
- Introduction to pipeline corrosion monitoring and prevention.
- Storage of liquid HC.

Duration: **10 d**

**Practice on site: OJO (ON THE JOB ORIENTATION)**

Duration: **10 d**

**Classroom training: PUMPING & COMPRESSION STATION**

- Pumping stations: pump operating principle and technology; performance of the pumping system and operating conditions; operation and troubleshooting, preventive maintenance.
- Compression stations: principle of operation and technology of compressors; compressor performance and operating conditions; operation and troubleshooting, preventive maintenance.
- Drivers: electric motor, diesel, gas turbine.
- Power supply network: HV/LV transformer station.

Duration: **10 d**

**Practice on site: OJO (ON THE JOB ORIENTATION)**

Duration: **10 d**

**Classroom training: INSTRUMENTATION, PROCESS CONTROL & METERING**

- Instrumentation: sensors, transmitters, control valves, on/off valves, electro-hydraulic valve.
- Regulator: controllers, control loops and remote monitoring of pipeline transport networks.
- Metering station. Oil & Gas metering technology: single-phase metering; principle of operation and equipment; liquid transactional metering; gas transactional metering.
- Multi-product transport: segregation and tracer injection.

Duration: **10 d**

**Practice on site: OJO (ON THE JOB ORIENTATION)**

Duration: **10 d**

**Classroom training: HSE IN HYDROCARBONS TRANSPORT**

- Main hazards associated to hydrocarbons transport.
- Risks in transport operations.
- Specific risks associated to gas transport.
- Safe isolation of facilities and equipment.
- Permit to work system. Procedures in operations.
- Environmental impact (accidental spills...).
- Incident management.

Duration: **10 d**

**Practice on site: OJO (ON THE JOB ORIENTATION)**

Duration: **10 d**

**Classroom training: OPERATIONS TUTORIALS, REVISIONS EXERCISES & FINAL TESTS**

- Case studies and operations tutorial based on actual experience feedback.
- Revision of the main subjects covered in previous theoretical modules.
- Final tests concluding the theoretical part of the program.

Duration: **10 d**

**Practice of operator job duties: OJT (ON THE JOB TRAINING)**

This practical on-site training period aims to provide the specific knowledge required to assume Pipeline Operator job duties. During this period, participants will perform the various tasks as defined in the Pipeline Operator job description, under the supervision of a mentor and operations team.

During this phase, participants are required to prepare a final, OJT report.

Duration: **50 d**

**FINAL EVALUATIONS & JURY**

- Oral presentations to assess the knowledge of participants’ concerning their OJT assignment area (specific hazards, details of facilities, operating conditions, equipment characteristics, site specificities...).
- As well as the ability of participants’ to assume Pipeline Operator job duties (routine surveillance, routine and non-routine operations, knowledge of HSE rules and behavior in case of incident/accident...).

Duration: **5 d**

**Reference:** PROP/TRANSOPFR. Please contact us for more information.
Panel Operator Certification

**Course Content**

**Module 1: PROCESS CONTROL, DCS & SIS**
- Control room organization and panel operator role.
- Panel operator reporting and handover duties. Plant documentation in control room.
- Process control:
  - Control loop, Field instrumentation.
  - Controllers operating principles & parameters. Control loops structures.
  - Standalone simulator: simple loop controller tuning and impact of P&I actions; study of various control loop structures; typical transmitters faults.
- Distributed Control System (DCS):
  - DCS architecture and system components. Human-Machine Interface (HMI).
  - HMI functions: trends, alarms... Automated sequences and Safety Instrumented Systems (SIS): PSS, ESD, HIPPS, EDG.
- Examples of simulator exercises performed: DCS views and functionalities browsing; reading safety logic; package sequence analysis.

**Module 2: WELL & PRODUCTION LINE OPERATION**
- Reservoir conditions and production modes. Production principles and physics applied to well.
- Surface wells and subsea wells: equipment, architectures, operating procedures.
- Safety and prevention/protection barriers.
- Examples of simulator exercises performed: well production lines section parameters analysis; FPSO case.

**Module 3: ROTATING MACHINERY OPERATION**
- Technology, auxiliaries, operating parameters. Protection systems.
- Pumps and operating conditions applied on simulator.
- Examples of simulator exercises performed: effect of a pressure decrease or level decrease in the upstream vessel; plugged strainer; gas carry-under.
- Reciprocating compressors:
  - Technology, auxiliaries, process circuit, operating parameters, protection systems.
  - Centrifugal compressors:
    - Technology, auxiliaries, process circuit, operating parameters, control and protection systems applied on simulator.
    - Examples of simulator exercises performed: effect of temperature change; surge conditions; start-up and shutdown sequences.

**Module 4: SURFACE PROCESSING OPERATION**
- Gas processing: sweetening, dehydration, condensate recovery and fractionation.
- Water processing: produced water treatment and introduction to injection water processing.
- Examples of simulator exercises performed: influence of oil dehydration parameter; foaming symptoms; impact of TEG unit operating conditions; loss of a compressor; limited gas lift...

**Module 5: SURFACE PROCESSING OPERATION INTEGRATED PLANT OPERATION**
- Alarm: priorities management and decision making.
- Panel operator reporting, shift handover and take-over duties: shift report and impact of a faulty report through role play situations.
- Global plant performance checks: identification and implementation of a routine checks roadmap; identifying key parameters and trending them to anticipate deviations.
- Radio communication and other communication means. Communication good practices.
- Oil transfer operations: storage and export, gas metering.
- Analysis of an integrated plant behavior: inertia and interferences.
- Analysis of production facilities shutdown philosophy: implementing safe plant shutdown procedure on simulator.

**Module 6: INTEGRATED PLANT OPERATION/SAFETY IN OPERATION**
- Analysis of production facilities start-up philosophy.
- Implementing safe plant start-up procedure on simulator:
  - Operating parameters analysis and anticipation of process upset.
  - Generation of several malfunctions (by the instructor) to be fixed.
- Learning to react and act to process upsets in a structured manner.
- Identification, analysis and containment of process upsets according to the learnt methodology.
- Examples of simulator exercises performed:
  - Operating parameter analysis and anticipation of process upset.
  - Managing bugs.
  - Gas leakage to the flare.
  - Production rate decrease.
  - Partial loss of cooling water.
  - Overpressure in storage tanks.
  - Generation of several malfunctions (by the instructor) to be fixed.

**Module 7: SAFETY IN OPERATION**
- Routine operations: Permit to Work, safe isolation of plant equipment.
- Downgraded situations. SIMOPS.
- Learning to operate the plant in critical situation, to make adequate decision, to follow-up on actions performed:
  - SIS: Process and emergency shutdown levels - Related Panel Operator role and duties.
  - Emergency shutdown procedures.
- Examples of simulator exercises performed: inhibition and downgraded situation mitigation (faulty pressure transmitter, SDV blocked open, ...); ESD activation due to process safety trip; manual ESD activation following leakage detection; emergency shutdown procedures implementation and follow-up (monitoring).

**Prerequisites**
- Experience in the petroleum industry in a position of production field operator.

**Why an IFP Training Certification?**
- An international recognition of your competencies.
- A Vocational Certificate delivered.
- An expertise confirmed in Panel Operator.
- Ready-to-use skills.

**Reference:** PROP/PANELOPGB — Only available as an In-House course.

**Contact:** exp.rueil@ifptraining.com

This course is also available in French: PROP/PANELOPFR. Please contact us for more information.
## Vocational Certificate
### Production Supervisor Certification

**Level:** FOUNDATION

### Purpose

This course provides the required skills and comprehensive knowledge to hold the position of Production Supervisor and ensure safe and efficient operations in upstream Oil & Gas facilities.

### Audience

Current or future production supervisors in Oil & Gas production, transport or storage facilities.

### Learning Objectives

Upon completion of the course, participants will be able to:
- Explain fundamental concepts underlying oil, water, and gas processing.
- Grasp technical details and operating issues of completion and artificial lift.
- Detail typical effluent processing techniques and impact of various operating parameters.
- Describe technology and operation of static equipment and rotating machinery used in production facilities.
- Identify HSE risks linked to operations, constraints and maintenance activities.
- Analyze Oil & Gas processing operations using DCS, suggest and implement adapted solutions.
- Detect and react to abnormal conditions in a structured manner by implementing troubleshooting best practices, using DCS tools readily available.

### Ways & Means

- Highly interactive training by experienced lecturers.
- Numerous examples taken from the industry and case studies derived from actual situations.
- Analysis and troubleshooting of actual production operations problems using a dynamic simulator.

### Learning Assessment

- Continuous assessments all-along the program.
- Final assessment including a presentation in front of a jury.

### Prerequisites

Basic technical knowledge of the Oil & Gas industry.

### Why an IFP Training Certification?

- An international recognition of your competencies.
- A Vocational Certificate delivered.
- An expertise confirmed in Production Supervisor.
- Ready-to-use skills.

### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

#### FUNDAMENTALS

**5 d**

- Fundamentals of chemistry: atoms, molecules, atomic weight, molecular weight.
- Hydrocarbons types and main characteristics.
- Applied physics: force, work and energy, temperature, thermal energy and heat transfer, pressure, hydrostatics, hydraulics and friction losses.
- Well effluent: composition, types and characterization parameters.
- Liquid-vapor equilibrium of pure components and mixtures.
- Well effluents behavior. Need for effluents field processing. Specifications.

#### DOWNHOLE PRODUCTION

**5 d**

- Fundamentals of reservoir engineering, information on drilling techniques, completion techniques and equipment. Wellhead equipment.
- Fundamentals of well performance. Artificial lift by Gas lift (GL), Electrical Submersible Pumps (ESP), Sucker Rod Pumps (SRP), Progressing Cavity Pumps (PCP).
- Operating principle, selection criteria, operations, troubleshooting.

#### EFFLUENT PROCESSING

**10 d**

- Oil treatment:
  - Stabilization (degassing): principle, process parameters, foaming problems.
  - Dehydration (water removal): principle, process parameters, emulsion problems.
  - Sweetening (H₂S removal): different techniques, process parameters.
- Production and injection water treatment.
- Gas treatment:
  - Gas dehydration and hydrate formation inhibition.
  - Gas sweetening.
  - NGL extraction/recovery.
- Fundamentals of LNG.
- Oil & Gas metering.
- Terminals, FPSO & FPSO, offshore development.
- Fundamentals of process troubleshooting.

#### STATIC EQUIPMENT

**5 d**

- Piping and valves. Metallurgy and corrosion.
- Storage equipment.
- Thermal equipment.
- Instrumentation, process control. Distributed Control System (DCS). Electricity.
- Safety System: HIPS, ESD, EDP, F&G, USS.

#### ROTATING MACHINERY

**5 d**

- Pumps: centrifugal and positive displacement.
- Compressors: centrifugal and reciprocating.
- Gas turbines.

#### CONTROL ROOM OPERATION & SURFACE PRODUCTION TROUBLESHOOTING

**10 d**

- Troubleshooting methodology:
  - Troubleshooting flowchart.
  - Recognize a trouble when occurring.
  - Methodological approach to identify causes and remedial options. Action plan.
  - Implement operational/design modification.
  - Troubleshooting toolbox.
- Case study: Feedbacks from industry.
- Troubleshooting in control room operations (on dynamic simulator):
  - Use of DCS tools (trends, historical, alarm summary...) to anticipate deviations, identify and react to common production operations problems.
  - Surface production units operation and troubleshooting: wells and production lines. Rotating machines. Oil & Gas treatment.
- Production facilities start-up and shutdown.
- Troubleshooting mini-project on real case studies.

**HSE**

**5 d**

- Main HSE risks.
- Hazards for personnel.
- HSE in production operations.
- HSE in construction and maintenance works.
- Risks inherent to SIMultaneous OPerationS (SIMOPS).
- HSE management. Responsibilities.
- Risk analysis. Safety Engineering concepts.

Reference: PROP/PRODSUP

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/SUPPROD. Please contact us for more information.

www.ifptraining.com
Level: FOUNDATION

Purpose
This certifying course provides the in-depth technical knowledge of Oil & Gas processing operations along with managerial and communication skills for qualifying to hold the postion of production superintendents. The required high-level knowledge stretches over a wide range of issues in relation to reservoir, corrosion, inspection, maintenance, well performance, flow assurance...

Audience
Professionals with a significant experience in Oil & Gas surface production who are called on to hold position of production superintendents.

Learning Objectives
Upon completion of the course, participants will be able to:
► describe the overall production process, from reservoir to offloading facilities,
► explain available tools and techniques for well performance enhancement and production optimization,
► explain state-of-the-art Oil & Gas production techniques,
► describe HSE management rules and responsibilities,
► acquire world class work methods and communication skills,
► anticipate anomalous events and react effectively to troubleshooting to avoid production loss.

Ways & Means
► Several applications and illustrations.
► Intensive teamwork.
► Use of dynamic training simulations,
► Practical sessions with equipment in a workshop.

Learning Assessment
► Continuous assessments all-along the program.
► Final assessment including a presentation in front of a jury.

Prerequisites
Significant experience in Oil & Gas surface production.

Why an IFP Training Certification?
► An international recognition of your competencies.
► A Vocational Certificate delivered.
► An expertise confirmed in Production Superintendent.
► Ready-to-use skills.

More info
The training duration includes 2 days of written and oral competencies evaluation. This training is organized together with the HSE and Maintenance Superintendents trainings. The effective scheduling of the common and specific modules of the three sessions may imply a slightly different chaining of the modules.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

INTRODUCTION
Welcome and program overview. Entry test. Units. Dimensions.

58 days

DOWNHOLE PRODUCTION - WELL PERFORMANCE - PRODUCTION FUNDAMENTALS

5 d

OIL, WATER & GAS PROCESSING
Oil processing: required specifications; stabilization; dehydration, desalting. Production and injection water treatment: quality requirements and associated treatments; operating conditions. Gas processing: required specifications; dehydration; hydrates, consequences and treatments; Natural Gas Liquids recovery.

5 d

OFFSHORE DEVELOPMENTS, FLOW ASSURANCE

2 d

ADVANCED TREATMENTS
Oil & Gas sweetening. Liquefied Natural Gas, principles and liquefactions processes. Natural gas liquids treatments. Operations troubleshooting methodology and case studies: recognize a trouble when occurring; ISHIKAWA grid; methodological approach to identify causes and remedial options; PARETO graph; troubleshooting toolbox.

5 d

PRODUCTION FACILITIES TROUBLESHOOTING, DYNAMIC SIMULATOR
Oral presentations of facilities actual malfunctions and teamwork investigation. Case studies on a dynamic simulator: wells and production lines; rotating equipment; crude oil and associated gas; operation and troubleshooting; production shutdown and restart.

5 d

BEHAVIORAL MANAGEMENT
Teamwork management, written and oral communication. Active listening and communication tools. Team cohesion and stress management. Problems analysis and investigation: tools and behaviors. How to better analyze and know oneself.

5 d

INSTRUMENTATION & PROCESS CONTROL - ELECTRICITY
Instrumentation and process control: functional blocks, symbolization; pneumatic, electrical and digital technologies; measurements, sensors, security equipment; control equipment, actuators; controllers and control loops; Distributed Control System (DCS); architecture, connections; Safety Instrumented Systems (SIS); HIPS, ESD, EDP, FGS. Electricity: generation (turbines, alternators, monitoring, troubleshooting); distribution (HT-BT networks, power supply, stability, constituents, cabinets, transformers, batteries, isolation, protections).

5 d

ROTATING MACHINERY
Pumps: pumping prerequisites (pressure, flowrate, head); centrifugal pumps (types, technology, auxiliaries, performances); volumetric pumps (rotating, reciprocating).

5 d

Compressors: compression prerequisites (technology, auxiliaries, practical laws); centrifugal compressors (rotor, stator, bearings, shafts, seals balance); reciprocating compressors (frame, cylinders, pistons and rings, bearings, lubrication, cooling). Gas turbin: operating principles, compression, combustion, expansion, performances; technologies (compressor, combustion chamber, turbine, internal cooling); auxiliaries, HSE concerns.

5 d

TERMINAL, FSO & FPSO
Overview of oil terminals. FSO & FPSO technologies. Metering of oil quantities.

1 d

CORROSION, INSPECTION & INTEGRITY
Corrosion mechanisms. Types of corrosions in the Oil & Gas industry. Corrosion prevention and monitoring, fundamentals of inspection.

2 d

HSE RISKS & MANAGEMENT

15 d

REVIZIONS - ORAL ASSESSMENT

2 d

Reference: PROP/PRODSI
This course is also available in French: PROP/SPRODSI. Please contact us for more information.
**Graduate Certificate**

**Field Operations Engineer Certification**

---

**Level:** FOUNDATION

**Purpose**

This course aims to provide the in-depth technical knowledge of Oil & Gas production facilities design and operation necessary to hold rapidly, and very effectively, the position of field operations engineer or project engineer.

**Audience**

Engineers (particularly recently graduated field, design or project engineers) interested in a specialization in Oil & Gas surface production operations.

**Learning Objectives**

Upon completion of the course, participants will be able to:
- Grasp fundamentals of reservoir engineering, drilling, well completion and servicing.
- Evaluate well performance and identify needs for artificial lift.
- Explain fundamental concepts underlying Oil & Gas processing.
- Analyze operating conditions and basic design of oil, water and gas treatment.
- Describe the technology of static equipment and rotating machinery used in production facilities.
- Identify offshore development techniques and flow assurance issues.
- Identify main risks related to O&G production operations and contribute to process safety management.
- Contribute to the dynamics of field development projects studies.

**Ways & Means**

- Highly interactive training with industry experts and specialist lecturers.
- Numerical applications and illustrations.
- Multiple workshop sessions. Use of dynamic simulations and industrial case studies.
- Numerous simulations performed using the PRO/I™ or HYSYS™ software.
- Several tutorials with equipment in a mechanical workshop.

**Learning Assessment**

- Continuous assessments all-along the program.
- Final assessment including a presentation in front of a jury.

**Prerequisites**

No prerequisites for this course.

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**Why an IFP Training Certification?**

- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Field Operations Engineer.
- Ready-to-use skills.

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**More info**

This training includes 1 week in Pau (south of France) for mechanical workshop and site visits.

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**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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**Course Content**

**60 days**

**FUNDAMENTALS OF GEOSCIENCES & RESERVOIR ENGINEERING**

- Petroleum geology and geophysics. Reservoir fluids. Petrophysics.
- Well log interpretation. Well testing. Reservoir engineering and simulation.

**FUNDAMENTALS OF DRILLING, WELL COMPLETION & WELL PERFORMANCE**


**ADVANCED OIL & GAS FIELD PROCESSING**

**Module I: Thermodynamics applied to well effluent processing**

- Well effluent. Ideal gas and real fluid behavior.
- Gas compression and expansion.
- Liquid-vapor equilibrium of pure components and mixtures. Mixture separation.
- Heat transfer, heat balance and thermal equipment.

**Module II: Oil & water treatment**

- Crude oil treatment: stabilization, dehydration, sweetening.
- Storage equipment.
- Reject and injection water treatment.

**Module III: Gas processing & conditioning**

- Gas processing: dehydration, sweetening, NGL recovery.
- Fundamentals of Liquefied Natural Gas (LNG) chain.

**PIPING & INSTRUMENTED SYSTEMS**


**ROTATING MACHINERY - TECHNOLOGY, SELECTION & OPERATION**

**in mechanical workshop**

- Centrifugal and positive displacement pumps. Centrifugal and reciprocating compressors.
- Gas turbines. Turbo-expanders.

**OFFSHORE FIELD DEVELOPMENT - PIPELINES & FLOW ASSURANCE**


**PRODUCTION ACCOUNTING & MATERIAL BALANCE**

- Measures and metering systems along the chain. Liquid and gas balances. Performance monitoring and production reporting.
- Case study and production balances reconstruction: back allocation, satellite fields…

**PETROLEUM ECONOMICS & PROJECT MANAGEMENT**


**PROCESS SAFETY MANAGEMENT**


**FIELD DEVELOPMENT PROJECT - JURY**

- This 10-day teamwork project is a real case study based on actual data. Participants are coached throughout the project to produce the required deliverables, which are to be presented on the last day (jury).

---

**Reference:** PROP/FIELDENG

- Only available as an In-House course.

**Contact:** exp.reuil@ifptraining.com

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This course is also available in French: PROP/INGPROD. Please contact us for more information.
# Mature Field Operations

## Purpose
This course provides an overview of field aging effects on production and of the needed adaptation of the methods.

## Audience
Production supervisors and operators.

## Learning Objectives
Upon completion of the course, participants will be able to:
- understand the specifics of mature field production,
- maintain well productivity,
- compensate production decline,
- adapt methods and procedures to aging of the field,
- adopt safety rules for well interventions and workovers.

## Ways & Means
- Highly interactive training by industry-specialist lecturers.
- Numerous applications and illustrations.

## Learning Assessment
Assessment by test at the end of the course.

## Prerequisites
Experience in operation.

## Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO MATURE FIELD DEVELOPMENTS CHALLENGES</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Evolution of fluid characteristics.</td>
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<tr>
<td>Comparison between initial design and current conditions, needed adaptations.</td>
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<tr>
<td>Common issues in mature fields.</td>
<td></td>
</tr>
<tr>
<td><strong>WELL ACTIVATION</strong></td>
<td>0.25 d</td>
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<tr>
<td>Gas lift.</td>
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<tr>
<td>Use of PCP, beam pump and ESPs.</td>
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<tr>
<td><strong>SAFETY DURING WELL INTERVENTIONS &amp; WORKOVERS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>ADAPTATION OF OIL TREATMENT TO PRODUCTION AGING</strong></td>
<td>0.5 d</td>
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<tr>
<td>Evolution of emulsion quality over time.</td>
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<tr>
<td>Evaluation of separators water handling capacity (design case/current operating conditions).</td>
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<tr>
<td>Production aging versus storage tank management.</td>
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<tr>
<td>Examples of process adaptation to field aging.</td>
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<tr>
<td><strong>ADAPTATION OF WATER TREATMENT</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Evolution of water production over time.</td>
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<tr>
<td>Evolution of water quality and use of chemicals.</td>
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<tr>
<td>Adaptation of production water treatment in mature fields.</td>
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<tr>
<td><strong>ENERGY EFFICIENCY IN MATURE FIELD</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Equipment performances.</td>
<td></td>
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<tr>
<td>Fuel gas requirements vs. available associated gas.</td>
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<tr>
<td><strong>EQUIPMENT OBSOLESCENCE</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Reasons for obsolescence of static and rotating equipment.</td>
<td></td>
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<tr>
<td>Effect of obsolescence on equipment.</td>
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<tr>
<td>Evaluation of operational capacity of obsolete equipment: pumps, heat exchangers, pipes, transmitters.</td>
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<tr>
<td>Operation and maintenance of obsolete equipment.</td>
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<tr>
<td>Notion of lifetime cost of an equipment.</td>
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<tr>
<td>Spare parts and relations with the manufacturer.</td>
<td></td>
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<tr>
<td><strong>CORROSION MANAGEMENT IN MATURE FIELD</strong></td>
<td>0.5 d</td>
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<tr>
<td>Corrosion mechanism and possible mitigation steps.</td>
<td></td>
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<tr>
<td>Integrity of wells and flow lines.</td>
<td></td>
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<tr>
<td>Inspection techniques.</td>
<td></td>
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<tr>
<td>Reporting and actions in case of non-conformity.</td>
<td></td>
</tr>
<tr>
<td><strong>SAFETY IN PRODUCTION OPERATIONS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Use of utilities: inert gases, liquid water, steam, air, gas oil, fuel gas.</td>
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<tr>
<td>Blow-down and drainage toward: flare, slops, tanks, oily water…</td>
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<tr>
<td>Mechanical lockout: blinds, spading plan.</td>
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<tr>
<td>Degasging-inerting: steam, nitrogen, water.</td>
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<tr>
<td>Entry into vessels - Ventilation and atmosphere analysis: oxygen content explosivity, toxicity.</td>
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<tr>
<td>Start-up: checks, accessibility and cleanliness, line up, deaeration, seal tests, oil in.</td>
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<tr>
<td><strong>SAFETY IN MAINTENANCE &amp; CONSTRUCTION WORKS</strong></td>
<td>0.5 d</td>
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<tr>
<td>Inventory of risks in works.</td>
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<tr>
<td>Lifting and rigging.</td>
<td></td>
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<tr>
<td>Works at height: ladders, scaffolding, mobile elevated working platforms…</td>
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<tr>
<td>Use of tools: sand blasting, grinding, HP cleaning…</td>
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<tr>
<td>Radioactive sources: working on electrical equipment.</td>
<td></td>
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<tr>
<td>Work permits: various types, responsibilities.</td>
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</tr>
<tr>
<td><strong>SAFETY MANAGEMENT - RESPONSIBILITIES</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Human factors in risk management, safe and unsafe habits, motivation, exemplarity, difficulties in improving safety results.</td>
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<tr>
<td>Simultaneous Operations (SIMOPS) management - Management of modifications.</td>
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<tr>
<td>Learning from incidents and accidents: near misses, reporting and cause tree analysis.</td>
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<tr>
<td>Human factors in risk management, safe and unsafe habits, motivation, exemplarity, difficulties in improving safety results.</td>
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<tr>
<td>Responsibilities.</td>
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<tr>
<td><strong>ADAPTATION OF METHODS &amp; PROCEDURES DURING FIELD LIFE</strong></td>
<td>0.5 d</td>
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<tr>
<td>Reasons to update methods and procedure during field life.</td>
<td></td>
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<tr>
<td>Management of updates in operations.</td>
<td></td>
</tr>
<tr>
<td>Updates validation processes.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: PROP/MATUREOPSGB. Only available as an In-House course. Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/MATUREOPSF. Please contact us for more information.
Well Operation & Testing

Course Content

3 days

**ESSENTIALS OF RESERVOIRS & WELL EQUIPMENT**

0.5 d

Hydrocarbon in place. Composition and volume.
Permeability/porosity/reservoir/borehole interface. Productivity Index (IP).
Various completions; eruptive wells/activated wells.
Role of completion.
Hydrostatic and dynamic wells:
- Conditions for eruptive wells.
- Notions of fluid flow. Pressure drop/skin effect.

**ARTIFICIAL LIFT**

1 d

Stimulation and activation principle.
The various methods of activation.
Well activation by gas lift:
- Gas lift principle.
- Pros and Cons.
- Bottom hole and surface gas lift equipment.
- Gas lift valve: role/technology.
- Start-up methods in gas lift well.
- Operation of multiple wells.

**WELL INTERVENTIONS - WORKOVER, WIREFLINE, METROLOGY - SAFETY**

0.5 d

Heavy/light wells intervention. Equipment.
Wireline/workover operations.
Metrology associated with the operating mode for eruptive or activated wells.
Downhole and surface safety equipment.
Safety levels.

**WELL MONITORING & TESTING - TEST SEPARATOR**

1 d

Test separator:
- Equipment, metrology and test separator control.
- Control and stability of tested well.
- Metering equipment.
- Wells parameters determination: GLR, GOR, WOR, BSW, Specific gravity…
- Sampling procedure.
- Multi-Phase Flow Meter (MPFM):
  - Operating principle and equipment technology.
  - Results analysis.
- Stability control and well test validation.
- Potential problems. Tuning difficulties: analysis, solutions.
- Troubleshooting of gas lift wells.
- Troubleshooting of wells activated by Electric Submersible Pump (ESP).

Reference: PROP/WELLOPGB

Only available as an In-House course.

This course is also available in French: PROP/WELLOPFR. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
# Operation of Gas Lift Wells

## Course Content

<table>
<thead>
<tr>
<th>HYDROSTATICS &amp; WELL DYNAMICS</th>
<th>0.75 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Gradient. Condition for eruptive well:</td>
<td></td>
</tr>
<tr>
<td>Fundamentals of fluid flow. Pressure drop/skin effect.</td>
<td></td>
</tr>
<tr>
<td>Wells activation method, stimulation/activation operating principle:</td>
<td></td>
</tr>
<tr>
<td>Evolution of reservoir parameters.</td>
<td></td>
</tr>
<tr>
<td>Common stimulation methods.</td>
<td></td>
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<tr>
<td>Comparison and selection of activation methods.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>GAS LIFT OPERATING PRINCIPLE &amp; ASSOCIATED EQUIPMENT</th>
<th>0.75 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas lift principle:</td>
<td></td>
</tr>
<tr>
<td>Pressure gradient evolution.</td>
<td></td>
</tr>
<tr>
<td>Downhole equipment:</td>
<td></td>
</tr>
<tr>
<td>Completion.</td>
<td></td>
</tr>
<tr>
<td>Gas lift valve principle. Different types of valves.</td>
<td></td>
</tr>
<tr>
<td>Surface equipment:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GAS LIFT WELL START-UP METHOD &amp; SEQUENCE</th>
<th>0.75 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sequential start-up of gas lift wells:</td>
<td></td>
</tr>
<tr>
<td>Initial start (first start-up).</td>
<td></td>
</tr>
<tr>
<td>Simple Start (after ESD shutdown).</td>
<td></td>
</tr>
<tr>
<td>Start-up problems.</td>
<td></td>
</tr>
<tr>
<td>Gas lift wells start-up method:</td>
<td></td>
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<tr>
<td>Open tubing start-up sequence.</td>
<td></td>
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<tr>
<td>Closed tubing start-up sequence.</td>
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<tr>
<td>Troubleshooting:</td>
<td></td>
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<tr>
<td>Stabilization and tuning difficulties.</td>
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<tr>
<td>Potential problems and associated solutions.</td>
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</table>

<table>
<thead>
<tr>
<th>PROS &amp; CONS OF GAS LIFT</th>
<th>0.25 d</th>
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<table>
<thead>
<tr>
<th>TEAMWORK EXERCISES - TROUBLESHOOTING OPERATIONS</th>
<th>0.5 d</th>
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</thead>
</table>

## Level: PROFICIENCY

### Purpose

This course provides a comprehensive knowledge and know-how of gas lift wells operation. To identify and troubleshoot most common operations issues.

### Audience

Control room operators and field operators involved in gas lift wells monitoring and operation.

### Learning Objectives

Upon completion of the course, participants will be able to:

- Explain eruptive and assisted well dynamics,
- Identify gas potential available to ensure gas lift activation,
- Describe downhole and surface equipment of gas lift wells,
- Implement and monitor gas lift wells start-up sequence,
- Operate and start-up gas lift wells, identify and troubleshoot gas lift wells instabilities.

### Ways & Means

- Very interactive training by industry specialists.
- Numerous teamwork exercises on operation and troubleshooting.

### Learning Assessment

Assessment by test at the end of the course.

### Prerequisites

No prerequisites for this course.

### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: PROP/GASLIFTGB. Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/GASLIFTFR. Please contact us for more information.

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Production Operations

236
Chemicals used in Production Activities

Level: FOUNDATION

Purpose

This comprehensive course provides an advanced knowledge on how production chemicals may improve production processes and cure problems in Oil & Gas production. Chemical natures, properties, selection, treatments monitoring, troubleshooting, optimizations are covered.

Audience

Production Engineers looking for comprehensive technical information on production chemicals use, monitoring, optimization.

Learning Objectives

Upon completion of the training, participants will be able to:

- detail the nature and purpose of each frequently used production chemicals, their specificities and limits,
- explain in which domain and how chemical treatments are applicable,
- select and apply safely the best treating chemicals,
- monitor chemical treatments and detect dysfunctions,
- evaluate chemical performance in a given process, optimize chemical treatments.

Ways & Means

- Highly interactive training by industry specialist lecturers.
- Several applications and case studies.

Learning Assessment

Assessment by test at the end of the course.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

<table>
<thead>
<tr>
<th>Component</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO CHEMICAL TREATMENT IN PRODUCTION FIELD</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Review of different types of chemicals used in Oil &amp; Gas production.</td>
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<tr>
<td>Brief description of the associated logistics and chemical-specific hazards.</td>
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</tr>
<tr>
<td>Methods for implementing chemical treatment.</td>
<td></td>
</tr>
<tr>
<td><strong>CHEMICALS FOR OIL TREATMENT</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Purpose, nature &amp; specificities of each: demulsifiers, defoamers, corrosion inhibitors, paraffin control chemicals, drag reducers…</td>
<td></td>
</tr>
<tr>
<td>Methodology for selecting the correct chemical &amp; field testing.</td>
<td></td>
</tr>
<tr>
<td>Ways for monitoring during operation.</td>
<td></td>
</tr>
<tr>
<td>Optimization of the chemical injection and chemical performance evaluation.</td>
<td></td>
</tr>
<tr>
<td>Troubleshooting case study.</td>
<td></td>
</tr>
<tr>
<td><strong>CHEMICALS FOR GAS TREATMENT</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Purpose, nature and specificities of each: defoamers, foamers, corrosion inhibitors, hydrate inhibitors (Methanol, DEG, TEG, KHI)…</td>
<td></td>
</tr>
<tr>
<td>Methodology for selecting the correct chemical and field testing.</td>
<td></td>
</tr>
<tr>
<td>Ways for monitoring during operation.</td>
<td></td>
</tr>
<tr>
<td>Optimization of the chemical injection and chemical performance evaluation.</td>
<td></td>
</tr>
<tr>
<td>Troubleshooting case study.</td>
<td></td>
</tr>
<tr>
<td><strong>CHEMICALS FOR INJECTION &amp; PRODUCED WATER PROCESSING</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Purpose, nature and specificities of each: polyelectrolyte, chlorine, bactericide, oxygen scavenger, deoilers, corrosion inhibitors, acids, mineral scale inhibitors…</td>
<td></td>
</tr>
<tr>
<td>Methodology for selecting the correct chemical and field testing.</td>
<td></td>
</tr>
<tr>
<td>Ways for monitoring during operation.</td>
<td></td>
</tr>
<tr>
<td>Optimization of the chemical injection and chemical performance evaluation.</td>
<td></td>
</tr>
<tr>
<td>Troubleshooting case study.</td>
<td></td>
</tr>
<tr>
<td><strong>SPECIAL OPERATIONS</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Scale removal and prevention in well tubing, electrochlorinator, furnaces and heat exchangers. Use of H2S scavenger.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: PROP/CHEMICAL

This course is also available in French: SPRO/CHIMIQUE. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
Gas Processing & Compression Operations

Technology - Operation

**Level:** PROFICIENCY

**Purpose**
This course provides technical and operational knowledge related to natural gas treatment and transportation.

**Audience**
Any person wishing to improve her/his technical and operational knowledge on gas treatment and transportation.
Particularly operating personnel (from operator to engineer) requiring a better understanding of the issues related to natural gas processing and transportation.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- understand the basic concepts and operational principle, know the specification (water content of gas and issues),
- analyze the operating conditions to detect problems more quickly at the production level, improve the existing processes performances,
- understand the operation and the detailed equipment technology of compressors,
- analyze the operating parameters associated to those rotating machines and their auxiliary circuits,
- operate compressors properly.

**Ways & Means**
- Highly interactive training by industry specialist lecturers.
- Feedback, case studies and illustrations (possibility to adapt according client assets specificities).

**Learning Assessment**
Assessment by test at the end of the course.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Reference:** PROP/GASCHAINGB

**Course Content**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VAPO-LIQUID EQUILIBRIUM, ELEMENTS OF DISTILLATION &amp; ABSORPTION</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>SPECIFICATIONS &amp; WATER CONTENT OF GAS - HYDRATES</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>GAS DEHYDRATION: TEG ABSORPTION, MOLECULAR SIEVES</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>GAS TREATMENT: SWEETENING, CONDENSATE EXTRACTION &amp; FRACTIONATION</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>TECHNOLOGY &amp; OPERATION OF CENTRIFUGAL &amp; RECIPROCATING COMPRESSORS</strong></td>
<td>1 d</td>
</tr>
<tr>
<td><strong>COMPRESSORS OPERATION (case studies)</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>FEEDBACK &amp; CASE STUDIES - TROUBLESHOOTING SPECIFIC TO CLIENT ASSETS</strong></td>
<td>0.75 d</td>
</tr>
</tbody>
</table>

This course is also available in French: PROP/GASCHAINFR. Please contact us for more information.
# Production Facilities Control Room Operation

## Level: PROFICIENCY

### Purpose
This course aims to acquire best practices of production facilities control room operation through role-play situations on integrated Oil & Gas production plant dynamic simulator.

### Audience
Experienced control room operators and production supervisors looking to advance their knowledge in control room operation.

### Learning Objectives
Upon completion of the course, participants will be able to:
- Analyze and anticipate behavior of main control loop structures (DCS and SIS systems architectures and functionalities).
- Explain production equipment, process operating parameters, and perform troubleshooting.
- Implement proactive, anticipatory control room operation and acquire a safety mindset.
- React and act in a structured manner to anomalies and plant upsets.
- Enforce safety guidelines during downgraded and critical situations.

### Ways & Means
- Extensive practice on integrated Oil & Gas production plant dynamic simulator.
- Numerous case studies and role-play situations.

### Learning Assessment
Assessment by test at the end of the course.

### Prerequisites
No prerequisites for this course.

### Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Title</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10 days</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GETTING STARTED - DCS FUNCTIONALITIES FOR PROPER ANALYSIS</strong></td>
<td>1 d</td>
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</tr>
<tr>
<td></td>
<td>Familiarization with HMI functions and operation.</td>
<td></td>
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<tr>
<td></td>
<td>DCS tools review.</td>
<td></td>
</tr>
<tr>
<td><strong>PROCESS CONTROL &amp; SAFETY INSTRUMENTED SYSTEMS</strong></td>
<td>1 d</td>
<td></td>
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<tr>
<td></td>
<td>Impact of P&amp;ID parameters and simple closed loop tuning.</td>
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<tr>
<td></td>
<td>Study of control loop structures: cascade, split-range on simulator.</td>
<td></td>
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<tr>
<td></td>
<td>Programmable logic controllers: introduction to automated sequences.</td>
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<tr>
<td></td>
<td>Monitoring of start-up sequence (compressor) through MMI.</td>
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<tr>
<td><strong>WELLS &amp; PRODUCTION LINES OPERATION</strong></td>
<td>1 d</td>
<td></td>
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<tr>
<td></td>
<td>Well start-up (ramp-up) and shutdown.</td>
<td></td>
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<tr>
<td></td>
<td>Analysis of automatic well control.</td>
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<tr>
<td></td>
<td>Well monitoring and detection of abnormal conditions.</td>
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<tr>
<td><strong>ROTATING MACHINERY OPERATION</strong></td>
<td>1.5 d</td>
<td></td>
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<tr>
<td></td>
<td>Centrifugal pumps.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Centrifugal compressors: Technology review, study of process and auxiliary lines, protection systems.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Start-up and shutdown sequences.</td>
<td></td>
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<tr>
<td></td>
<td>Analysis of operating conditions and operating parameters.</td>
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<tr>
<td><strong>PROCESS UPSET MANAGEMENT</strong></td>
<td>2.5 d</td>
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<tr>
<td></td>
<td>Alarms: priorities management and decision making.</td>
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<tr>
<td></td>
<td>Becoming aware of the need for anticipation versus on-alarm action.</td>
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<td></td>
<td>Managing and predicting process disturbances by using trend views. Use of trends to anticipate deviations.</td>
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<tr>
<td></td>
<td>Global plant performance checks: identification and implementation of a routine checks roadmap.</td>
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<tr>
<td></td>
<td>Shift report and impact of a faulty report through role play situations.</td>
<td></td>
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<tr>
<td></td>
<td>Process upsets: learning to react and act in a structured manner.</td>
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<tr>
<td></td>
<td>Identification, analysis, and containment of process upsets according to the learned methodology.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example of simulator exercises performed: Loss of centrifugal compressor.</td>
<td></td>
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<tr>
<td></td>
<td>Loss of cooling media.</td>
<td></td>
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<tr>
<td></td>
<td>Production rate decrease.</td>
<td></td>
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<td></td>
<td>Unexpected slugging.</td>
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<td></td>
<td>ESD activation due to process safety trip.</td>
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<tr>
<td></td>
<td>…</td>
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</tr>
<tr>
<td><strong>SAFETY IN OPERATION</strong></td>
<td>1 d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Learning to operate the plant in critical situation, to make adequate decision, to follow-up on actions performed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example of simulator exercises performed: Gas leakage to the flare.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inhibition and downgraded situation mitigation (faulty pressure transmitter, SDV blocked open…).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manual ESD activation following leakage detection.</td>
<td></td>
</tr>
<tr>
<td><strong>PRODUCTION START-UP</strong></td>
<td>1 d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analysis of production facilities start-up philosophy.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safe plant start-up.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementing start-up procedure on simulator: Operating parameters analysis and anticipation of process upset.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Generation of several malfunctions (by the instructor) to be fixed.</td>
<td></td>
</tr>
<tr>
<td><strong>CONTINUOUS ASSESSMENT TEST</strong></td>
<td>1 d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weekly tests on simulator.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: PROP/ADVCCRFRB. Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/ADVCCRFR. Please contact us for more information.
# Laboratory Analyses for Oil & Gas Production

## Methodology - Results analysis - HSE

### Level: PROFICIENCY

### Purpose

This course provides a comprehensive knowledge and develops practical skills in conducting reliable and safe laboratory analyses for the Oil & Gas industry.

### Audience

Laboratory personnel, operational staff and other professionals interested in laboratory analyzes dedicated to Oil & Gas operations.

### Learning Objectives

Upon completion of the course, participants will be able to:
- grasp the physical and chemical concepts involved in various analyzes,
- comprehend issues requiring special attention in various analyzes,
- assess the results of an analysis and decide whether to carry out the analysis over again,
- review main Occupational Health and Safety rules within the framework of laboratory activities.

### Ways & Means

- Several applications and illustrations.
- Lab visit.

### Learning Assessment

Assessment by test at the end of the course.

### Prerequisites

No prerequisites for this course.

### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

<table>
<thead>
<tr>
<th>Component</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROLE &amp; RESPONSIBILITIES OF LABORATORY STAFF</td>
<td>0.5 d</td>
</tr>
<tr>
<td>ANALYZES SPECIFIC TO CRUDE OIL</td>
<td>1 d</td>
</tr>
<tr>
<td>ANALYZES SPECIFIC TO GAS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>ANALYZES FOR THE FOLLOW-UP OF EFFLUENT TREATMENT OPERATIONS</td>
<td>1 d</td>
</tr>
<tr>
<td>LABORATORY VISIT</td>
<td>1 d</td>
</tr>
<tr>
<td>ANALYZES DONE TO OPTIMIZE ANTICORROSION TREATMENTS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>HSE IN LABORATORY ACTIVITIES</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

### Role & Responsibilities of Laboratory Staff

Member of production staff. Equipment yields controls/monitoring. Final product quality controls/monitoring. Recommendations to improve treatments.

### Analyzes Specific to Crude Oil

<table>
<thead>
<tr>
<th>Analyze</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific gravity or density.</td>
<td>Vapor Pressure (Reid VP).</td>
</tr>
<tr>
<td>Water content: Basic Sediment &amp; Water (BSW), dean stark distillation.</td>
<td>Salt content: chlorides content, conductimetry.</td>
</tr>
<tr>
<td>Acid components content:</td>
<td>Fluid rheology: pour point, kinematic viscosity, wax content.</td>
</tr>
<tr>
<td>H₂S content (methylene blue).</td>
<td>H₂S and mercaptans by potentiometry.</td>
</tr>
<tr>
<td>Total Acid Number (TAN) of liquid hydrocarbons.</td>
<td></td>
</tr>
</tbody>
</table>

### Analyzes Specific to Gas

<table>
<thead>
<tr>
<th>Analyze</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas characterization analyzes:</td>
<td>Dew point (HC and water).</td>
</tr>
<tr>
<td>Gas composition by Gas Phase Chromatography (GPC).</td>
<td>Gas specific gravity estimate from composition.</td>
</tr>
<tr>
<td>Acid components content:</td>
<td>H₂S content (Dräger), H₂S and mercaptans content (potentiometry, iodometry).</td>
</tr>
<tr>
<td>CO₂ content (Dräger and acidimetry).</td>
<td></td>
</tr>
</tbody>
</table>

### Analyzes for the Follow-up of Effluent Treatment Operations

<table>
<thead>
<tr>
<th>Analyze</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demulsifiers evaluation and selection (bottle tests, field tests).</td>
<td>Quality controls/monitoring of poor and rich Triethyleneglycol (TEG):</td>
</tr>
<tr>
<td>Water content, pH. Hydrocarbon content.</td>
<td>Follow-up of equipment performances: water content, residual emulsion.</td>
</tr>
</tbody>
</table>

### Laboratory Visit

Equipment visualization.

### Analyzes Done to Optimize Anticorrosion Treatments

Deposits and scale analyzes.

### HSE in Laboratory Activities

Laboratory facilities design and implementation.

**Reference:** PROP/LABOGB

Only available as an In-House course. Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/LABOFR. Please contact us for more information.
Refresher Course for Production Operator

Level: FOUNDATION

Purpose

This course aims to increase the knowledge in oil/gas/water processing operations, as well as acquiring or validating fundamentals of rotating machines and static equipment operation.

Audience

Experienced operations personnel who need to validate or strengthen their technical knowledge.

Learning Objectives

Upon completion of the training, participants will be able to:

- efficiently operate Oil & Gas production units, solve operational problems, analyze cause-and-effect relationships related to an action or operation, detect malfunction and anticipate process deviation,
- better monitor rotating machines and their ancillaries by focusing on their critical parameters and equipment,
- help extend equipment uptime,
- take into account machine and process safety aspects,
- optimize static equipment operation, taking into account their technology as well as the related process safety aspects.

Ways & Means

- Numerous exercises and applications concerning the operation of production facilities.
- The course can be adapted according to the experience and/or actual equipment operated by the participants.

Learning Assessment

Assessment by test at the end of each module.

Prerequisites

One year minimum work experience on a gas and/or oil production site.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OIL, GAS & WATER PROCESSING & OPERATOR DUTIES  5 d

Wells: performance, activation, monitoring and operation.
Oil treatment: multi-stage separation, dehydration, desalting, treatment of emulsions, treatment of foaming, sweetening.
Gas treatment: sweetening, dehydration, NGL and condensate recovery.

ROTATING EQUIPMENT OPERATION & MONITORING  5 d

Centrifugal and volumetric pumps, centrifugal and reciprocating compressor:
- Technology, seal (gas or oil) system, ancillary circuit, UCP/DCS HMI, safety system.
- Normal operation.
- Troubleshooting.
Drivers: electrical motors, diesel engines, gas turbines. Associated safety system.

STATIC EQUIPMENT USED IN OIL & GAS PRODUCTION  5 d

Wells: from downhole to choke valve, manual valves, automatic valves, safety system, control cabinet.
Separator, distillation column, dehydrator and desalter, wash tanks: technology, control system & safety equipment.
Thermal equipment:
- Heat exchanger: shell and tube, plate heat exchanger, air cooler.
- Furnaces and boiler.
- Technology, operation, control system and safety equipment.
Storage tank: floating roof, fixed roof. Associated safety equipment.

Reference: PROP/REFRESHOPGB  Only available as an In-House course.
Contact: exp.rueil@ifptraining.com
This course is also available in French: PROP/REFRESHOPFR. Please contact us for more information.
Pumps Operation

Course Content

**PUMPING PREREQUISITES**

Pump performance:
- Hydraulic pumping fundamentals.
- Pressure, flowrate, specific gravity, friction losses, centrifugal force, height/pressure relation, mechanic and hydraulic power, vapor pressure curve, energy conservation.
- Pump choice and typical upstream implementations.

**TECHNOLOGY & PERFORMANCE**

Centrifugal pumps:
- Functional approach: Study step by step of the main functions.
- Process: impeller, wear rings, balancing, pump body shape...
- Sealing: mechanical sealing, typical arrangements (single, dual, dry seal). Selection according API 382 standard, materials, type. Friction face heating.
- Support: axial and radial, thrust and journal bearings.
- Lubrication: oil and grease…
- Monitoring: rotor displacement, vibrations, temperature, pressure…
- Building step by step a monocellular centrifugal pump.

Volumetric pumps:
- Different types of pumps: rotary and reciprocating pumps.
- Operating principle and utilization of the different types of pumps.
- Influence of clearance, internal leaks, nature of product on flow rate and pressure.
- Flow rate control.
- Installation guidelines: position of tanks, line diameters, metering drums, pulsation dampeners, pressure valves.
- Particular choices:
  - Coupling and driven machines.
  - ATEX: material consequences.

**OPERATION & MONITORING**

- Preparation: filling, draining; spare pumps: heating, ancillaries.
- Start-up/shutdown: priming, controls, hammer shock, risks for process and pump.
- Surveillance: parameters (vibration levels, noises, bearing housing temperature, motor intensity, pressures); impact of stream parameters; hazards.
- Parallel and series operations: risks, dysfunction.

**TROUBLESHOOTING**

- Troubleshooting of most frequent problems (cavitation, priming situation, low flowrate…).

**SAFETY IN OPERATION**

- Leaks, vibrations, feed, overcharge…
- Analysis of industrial incidents and accidents.

Reference: PROP/PUMP/PGB

Only available as an In-House course. Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/PUMP/PFR. Please contact us for more information.
Compressors Operation

Level: PROFICIENCY

Purpose
This course provides a better understanding of the technology, performance and operation of centrifugal and volumetric compressors.

Audience
Operation and technical department staff involved in the operation of centrifugal and volumetric compressors. Employees in charge of running and checking compression systems.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe the technology of centrifugal and volumetric compressors,
- select the adequate operating conditions,
- explain the main operating problems,
- be involved in a troubleshooting process.

Ways & Means
Functional approach for a better understanding.
Numerous examples and cases studies from the Oil & Gas production industry and analysis of manufacturer file.

Learning Assessment
Written test upon training course completion.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content
5 days

COMPRESSOR PREREQUISITES
0.5 d
Compression fundamentals: isentropic and polytropic compression.
Pressure, flowrate, specific gravity, friction losses, centrifugal force, mechanic and aerodynamic power, energy conservation.
Compressor choice and typical upstream implementations.

TECHNOLOGY & PERFORMANCE
2 d
Centrifugal compressors:
- Different types of centrifugal compressors.
- Component parts and architecture of a centrifugal compressor.
- Technology of the essential components: stator, rotor, bearings, thrust bearing, seals.
- Vibrations, critical speed, dynamic balancing.
- Auxiliary equipment: lubrication system, buffer gas, balancing line...
- Safety parameters: axial displacement, vibrations, bearing and thrust bearing temperatures, oil pressure...
- Changes in gas velocity and pressure in a centrifugal compressor.
- Mass and volume flow rate as a function of pressure, temperature and the nature of the gas.
- Discharge temperature, power absorbed as a function of the nature of the gas and the operating conditions.
- Compressor performance: influence of process parameters, impeller velocity and geometry.
- Characteristic curves of the circuit and the compressor: Influence of the operating conditions: intake pressure and temperature, nature of the gas, rotation speed, lGV position.

Reciprocating compressors:
- Different types of reciprocating compressors.
- Component parts and architecture of a reciprocating compressor.
- Technology of the essential components: cylinder, piston, valves, sealing systems, crankshaft, connecting rod...
- Auxiliary equipment: lubrication of motion parts and cylinders, cooling interstage and cooling devices systems, connections to the flare.
- Safety devices: sealing systems, connections to the flare circuit.
- Compression rate and volume flow rate: influence of the operating conditions: intake pressure and temperature, nature of the gas, rotation speed.
- Discharge temperature, power absorbed as a function of the nature of the gas and the operating conditions.
- Characteristic curves of the compressor.

Rotary compressors:
- Different types: screw, liquid ring, lobes, sliding vanes...
- Component parts and architecture of a rotary compressor.
- Auxiliary equipment: lubrication system.
- Typical using.

OPERATION
1.5 d
Centrifugal compressors:
- P&ID and logic security matrix analysis.
- Flow rate regulation. Adaptation to service conditions.
- Surge and antisurge devices. Conventional control.
- Start-up, shutdown and isolation: hazards related to these phases.
- Survey and monitoring the compressor and auxiliary equipment under normal operating conditions.

Reciprocating compressors:
- Flow adjustment.
- Conventional control: start-up, shutdown and isolation.
- Monitoring the compressor and auxiliary equipment under normal operating conditions.
- Series and parallel functioning.

TROUBLESHOOTING
0.5 d
Frequent problems: surge, slugging, lack of lubrication, vibrations...

SAFETY IN OPERATION
0.5 d
Industrials incidents and accidents analysis.

Reference: PROP/COMPOPGB
Only available as an In-House course.

This course is also available in French: PROP/COMPOPFR. Please contact us for more information.
Production Planning & Monitoring

Level: FOUNDATION

Purpose
This course aims to provide production engineers and/or planning engineers with the methodology and know-how in order to plan and analyze production taking in consideration the integrated production system.

Audience
Production engineers, petroleum engineers, reservoir engineers, method engineers, production planning engineers seeking to acquire a global approach of production planning and gap analysis considering the integrated subsurface surface production system, i.e. from reservoir to tank.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe choke model, explain its components (chokes) and identify required input to build production planning model,
- identify factors impacting well production capacity, production and export facilities capacity so as to derived overall constrained production capacity,
- analyze production gaps and identify production opportunities,
- analyze production reports, evaluate and monitor production KPI’s.

Ways & Means
- Highly interactive course delivered by industry experts.
- Numerous examples and feedbacks from the industry.
- Full-fledge production planning and analysis concluding the course.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

5 days

THE PRODUCTION CHAIN: FROM THE RESERVOIR TO THE EXPORT POINT 0.25 d
Field operations mapping.
Nature and characteristics of fluids accounted for.
Product specifications to conform with and quality requirements.
Field processing of well effluents: gathering network and surface production facilities.

PRODUCTION PLANNING USING CHOKE MODEL 0.75 d
Choke model (or Integrated Capacity Model) to define production potential and constraints.
Choke model overview: static and dynamic.
Review of typical choke model components (i.e. “chokes”): well production capacity factor, production facilities capacity factor.
Export facilities capacity factor. Commercial capacity factor.
Example of typical choke model reports.

WELL PRODUCTION CAPACITY FACTOR 1 d
Reservoir performance. Production profile:
- Fundamentals of reservoir engineering.
- Reserves definitions; reserves estimation and production profile.
- Forecasting production performance: material balance, decline curves analysis. Water cut.
- Well performance and operation:
  - Fundamentals of well completion and well performance.
  - Well potential definition through well deliverability nodal analysis.
- Artificial lift methods and operation.
- Fundamentals of well interventions and workovers.
- Impact of field development activities: new wells/ tie-ins to gathering network, workover wells.
- Impact of production operations activities: well interventions, maintenance.

PRODUCTION FACILITIES CAPACITY FACTOR 1 d
Surface processing of well effluents:
- Fundamentals of oil processing/water processing/gas processing.
- Review of main static- and rotating-equipment.
- Analysis of typical process equipment design parameters and capacity constraints.
- Maintenance management:
  - Introduction to the different types of maintenance: planned preventive, condition-based, predictive. Planned shutdowns.
  - Equipment criticality. Equipment availability: main equipment sparing philosophy and management of standby equipment.
- Impact of preventive maintenance, planned shutdowns and inspection programs, upgrade programs on plant capacity.

EXPORT FACILITIES CAPACITY FACTOR 0.5 d
- Oil terminal:
  - Functions of oil terminals: oil reception, oil storage, export.
  - Evaluation of terminal storage capacity, tanker loading planning.
- Crude oil, natural gas and Natural Gas Liquids (NGLs) transport by pipeline:
  - Pipeline network. Boosting stations, typical design constraints.
- Gas balances: Dry gas and Wet gas field cases.
- Impact of third party on pipeline availability/ capacity constraints.

PERFORMANCE MONITORING & PRODUCTION REPORTING 1 d
- Measures and metering systems along the chain:
  - Well measurements and production tests. Well tests planning and impact on well maximum production capacity.
  - Multiphase metering and indirect allocation systems.
- Metering & allocation rules:
  - Fundamentals of metering systems (technology, accuracy, calibration & locations) ; fiscal metering.
  - Introduction to production accounting rules (based on API MPMS 20.1).
- Technical material balances; data reconciliation, data architecture:
  - Gas balances: Dry gas and Wet gas field cases.
- Production KPI definition and monitoring.

PRODUCTION PLANNING & ANALYSIS CASE STUDY 0.5 d
- For a given production facility:
  - Predict network through decline curve and performance analysis.
  - Establish chokes maximum production capacity to derive constrained production capacity.
  - Review integrated activity planning and establish choke model to plan production.
  - Reconstruct production balance and back-allocation.
  - Analyze actual production discrepancy with constrained production capacity.
  - Identify prioritize production opportunities on ‘well’, ‘facility’ and ‘export’ chokes.

Reference: PMGT/PLANNING
Contact: exp.rueil@ifptraining.com

Only available as an In-House course.

This course is also available in French: PMGT/PLANNINGFR. Please contact us for more information.
Production Accounting & Material Balance
Liquid & gas balances - Measures & metering - Production reporting

Level: FOUNDATION

Purpose
This course provides the fundamental knowledge for understanding production balance, linking relevant operations and production figures which impact issues such as transfer fee, exchange between fields, field use…

Audience
Managers, engineers, non-technical staff involved in production reporting or material balance handling (assessing fee, value created, etc.).

Learning Objectives
Upon completion of the course, participants will be able to:
- establish production balance from basic data (well tests, process measurements, fiscal data),
- explain performance monitoring mechanisms and production reporting tools,
- assess impact of field operations on material balances,
- describe accounting and back allocation rules specific to process or production mode.

Ways & Means
- Highly interactive and applied course by industry specialist lecturers.
- Numerous illustrations and cases studies.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

THE PRODUCTION CHAIN FROM THE RESERVOIR TO THE EXPORT POINT 0.5 d
Field operations mapping.
Nature and characteristics of fluids accounted for.
Field processing of well effluent: surface facilities.
BFD studies.

MEASURES & METERING SYSTEMS ALONG THE CHAIN 0.5 d
Well measurements and production tests.
Metering systems and their location in the plant:
- Technology, accuracy, calibration.
- “Filter” concept of a metering system.
- Process metering.
- Transactional metering.
- Tank gauging.

LIQUID & GAS BALANCES 1.25 d
Production accounting rules.
PFD studies of Oil & Gas treatment units.
Gas balances: dry gas and wet gas field cases.
Case studies:
- Study of oil and condensate balances.
- Reconstruction of a natural gas and associated gas balance (Oil & Gas cap ring).

PERFORMANCE MONITORING & PRODUCTION REPORTING 0.25 d

CASE STUDY & PRODUCTION BALANCES RECONSTRUCTION:
BACK ALLOCATION, SATELLITE FIELDS, MAIN PRODUCTION CENTERS 0.5 d

Reference: PMGT/BALSH. Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

This course is also available in French: PMGT/BILMAT. Please contact us for more information.
NEW Asset Integrity Management

Level: PROFICIENCY

Purpose
This course aims to bring elements related to the implementation of actions, such as the inspections and tests required to ensure that the installations and equipment important to safety and productivity will correctly work for their whole service life.

Audience
This course is intended for engineers, operation managers and supervisors of industrial sites.

Learning Objectives
Upon completion of the course, participants will be able to:

- know the asset integrity management process, from the failure mode and effects analysis to the implementation of adapted actions and reference standards,
- formulate or use equipment specifications, Identify the corrosion mechanisms,
- implement the risk assessment and critical safety element identification techniques,
- identify the test and inspection elements that ensure a machine is in good operating condition,
- implement the culture of asset integrity management.

Ways & Means

- Applications and case studies illustrating the techniques studied.
- Active pedagogy calling on participants' experiences.

Learning Assessment
Written test upon training course completion.

Prerequisites

- Management on site equipment and installation operation and maintenance.
- Significant experience in the industry.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

ASSET INTEGRITY MANAGEMENT PROCESS
Definition of risk, failure, reliability, availability of installations.
Concept and identification of major risk of equipment failure.
Measurement and follow-up of reliability.
Criticality, safety critical elements.

CRITICALITY & RISK ASSESSMENT TOOLS
Main models, failure probability, statistical functions.
FMECA and cause tree: areas of application, method principle, examples.
Identification of 3 groups: static equipment, dynamic equipment, and safety instrumented systems.
Understanding the functioning, the failure possibilities and the need for an adequate policy of operating condition maintenance.

INSPECTION & TESTS
Standards and regulations in force.
Inspection tools and techniques: non-destructive examinations, sampling.
Example of installation commissioning.

CORROSION
Definition of corrosion.
Elements of metallurgy.
Corrosion mechanisms.
Different types of corrosion.
Corrosion control methods.

INSPECTION & MAINTENANCE BASED ON FAILURE RISK (RBI)
Integrating Asset Integrity Management in the operating and maintenance policy.
Preventive, condition-based and predictive maintenance.
Maintenance and inspection based on failure risks.
Notion of life cycle cost.

IMPLEMENTATION & CHALLENGE
Safety and productivity objectives.
From outage management to equipment management.
Lowering the tolerance threshold to anomalies and involvement of the operators.
Need for general commitment: implementation of the Total Productive Maintenance.
Detailed preparation, planning, identification of critical operations.
Maintenance plans by equipment item and type of equipment.

Reference: PMGT/INTEGRITYGB • Only available as an In-House course.
Contact: exp.rueil@ifptraining.com
Instrumentation Maintenance

**Level:** PROFICIENCY

**Purpose**
This course provides a comprehensive knowledge for the monitoring and maintenance of instrumented systems used in Oil & Gas production facilities.

**Audience**
Engineers and technicians involved in installation, monitoring and maintenance of instrumented systems used in the Oil & Gas production facilities.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- explain the importance of measurements quality, calibration methods and associated preventive actions,
- optimize process control loop - PID controllers,
- describe the typical architecture of a DCS: I/O interfaces, communication protocols,
- describe process safety systems and fire and gas detection systems,
- master procedures for instrument calibration, process control and safety loops synchronization.

**Ways & Means**
- Highly interactive training by industry specialist lecturers.
- Process control practice on dynamic simulator and on-site (if possible).
- Exercises on calibration of process measures, process control and safety loops.

**Learning Assessment**
Written test upon training course completion.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

**PROCESS INSTRUMENTATION**
1 d

Process instrumentation:
- Scope of the Oil & Gas industry. Identification and symbolization of process parameter to control. Identification and symbolization of process equipment. PFD and PID drawings.
- Communication and signal types:
  - Signal codes and standardization. Pneumatic. Electrical (voltage, amps).
  - Digital/HART protocol, Modbus, Fieldbus.
- Sensors, transmitters:
- Process measures:
  - Measure and measurement loop for process control.
  - Pressure measurement (principle, technology, calibration).
  - Level measurement (principle, technology, calibration).
  - Flowrate measurement (principle, technology, calibration).
  - Temperature measurement (principle, technology, calibration).

**PROCESS CONTROL**
1 d

Control loop:
- Control valves:
  - Principle. Technology of constitutive elements (servomotor and valve body).
  - Choice of action applied to process. Valve flowrate characteristic.
  - Other constitutive elements: valve positioner, P/P and I/P converter.
- Valve sizing. Cv coefficient.
- ON/OFF valves:

**AUTOMATION OF PRODUCTION PROCESSES**
0.5 d

- Principle of systems networking.
- Sequential flowcharts. Grafcet.

**SAFETY INSTRUMENTED SYSTEM**
0.5 d

Safety Instrumented Systems (SIS):
- HIPS (High Integrity Protection System): principle, equipment.
- Principle of emergency blow-down.
- System maintenance and calibration. Periodic testing and preventive maintenance of detectors.
- Fire & Gas System (FGS):
  - FGS logic. Detectors location: process areas, machine package, technical rooms.
  - Gas detectors: refresher on industrial gas LEL/UEL. Various types of sensors: technology, principle, calibration procedures, periodic tests and preventive maintenance for portable and fixed detectors.
  - Fire and smoke detectors. Various types of detectors: technology, principle.
  - Firefighting network: equipment, configuration, triggering detector (Auto/Manual).

**MAINTENANCE & CALIBRATION STANDARDS**
2 d

Maintenance, calibration and preventive maintenance standards.
- Main procedures:
  - Synchronization application and calibrations (measures, control loop and control valves, ON/OFF valves, fire and gas sensors).
  - Implementation of preventive maintenance tasks list to the various components of a loop.

Reference: MA1/INSTMAINTGB. Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: MA1/INSTMAINTFR. Please contact us for more information.
# Turnaround Management

**Level:** PROFICIENCY

**Purpose**
This course aims to bring elements pertaining to the management specificities of major turnarounds, their organization, the concerns and processes implemented during this period of life of a unit or an industrial site.

**Audience**
Personnel involved in the preparation or completion of a major turnaround.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- understand what motivates or dictates the planning of turnarounds, know the terminology on pressure equipment regulations,
- actively take part in the management and supervision of a turnaround,
- have a better approach to the regulatory and legal framework of outsourcing,
- have a broader understanding of the hazards and risks (products, works) and the associated prevention measures,
- carry out inspections and site audits.

**Ways & Means**
- Applications and case studies illustrating turnaround situations and stages.
- Active pedagogy based on participants’ experiences.

**Learning Assessment**
Written test upon training course completion.

**Prerequisites**
No prerequisites for this course.

## Course Content

### 5 days

#### ROLES & REQUIREMENTS OF A TURNAROUND
Frequency and duration of turnarounds, running rate of units, economic impact of a turnaround. Elements of maintenance policy.

Turnaround constraints: legal obligations, safety, technical and economic reasons:
- Pressure equipment operating constraints.
- Notion of lifetime cost of large machines.
- Maintenance works and new works – modifications – carried out during a turnaround.
- Compliance with the cost, deadlines, quality, environment and safety.

**1 d**

### PREPARATION OF A TURNAROUND
Turnaround preparation team, organization chart, turnaround manager, definition of tasks and processes.
Collection, analysis and preparation of work: written compilation of jobs, job process reviews.

- Equipment reservation, cost estimate and budget.
- Preparation of the logistics. Preparation of the specific spare parts and tools.
- Planning, identification of the critical operations.
- Selection of trades, markets, integration of quality and safety in the call for tenders.
- Scope changes and closure of job requests (scope freeze).
- Effluent and waste management, safety and prevention, quality, QHSE manual.

**1 d**

### SCHEDULING & DELAYS CONTROL
Concerns of the turnaround manager (pilotage, overview, key dates).

Planning methods PERT, GANTT:
- Tracking task levels.
- Calculation of task dates, at the earliest, at the latest.
- Optimize work programs (work in parallel, avoid wasting time...).
- Concept of total and free margins. Identification of the critical path. Exercises.

**0.75 d**

### INSPECTION OF PRESSURE EQUIPMENT
Effect of pressure and temperature.

- Metals, alloys and potential risks.
- Process fluid aggressiveness.
- Pressure equipment design and manufacturing.
- Legal orders: regulations on pressure equipment operation.

**0.25 d**

### OUTSOURCING & SUBCONTRACTING
Definition, origins, interests, risks.

- Problems due to cascading subcontracting.
- Purpose, conditions for efficiency. Why outsourcing? Which abilities to be kept? How to keep control?
- Different type of contracts.

**0.25 d**

### WORKS EXECUTION, CONTROLS & AUDITS
General principles of the works activity.

- Preliminary activities: scaffolding, worksite installation, drawings and documents.
- Permit issuance, management of recommendations, inspection.
- Follow-up of works progress: supervisors’ reporting to the planning manager, cost control.
- Worksite audits: communication and observation techniques, report and recommendations.
- Equipment closure and leak test.
- Unit preparation to re-startup: operation review, start-up acceptance, assistance to start-up.
- Commissioning organization.
- Production start-up organization and procedure.

**0.75 d**

### SAFETY IN WORKS
Implementation of a HSE management system.

- HSE management of turnover and construction activities.
- Technical and safety worksite audits.
- Management of change.

**0.75 d**

### END OF WORKS & TERMINATION OF TURNAROUND
Detail review, final acceptance.

- Turnaround report: inspection report, operation report…
- Turnaround manager’s report.
- Use of performance indicators and sharing of feedback.

**0.25 d**

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*Reference: MAI/TURNAROUNDGB*  
*Only available as an In-House course.*

*Contact: exp.pau@ifptraining.com*

*This course is also available in French: MAI/TURNAROUNDFR. Please contact us for more information.*
Fundamentals of Mechanical Maintenance

Level: FOUNDATION

Purpose
This course aims to master the elements of language and understanding of mechanical systems, in terms of design, characterization and maintenance/repair. This will allow/contribute to the maintenance follow-up, but also to the optimized operation of the static and dynamic mechanical systems (rotating machinery).

Audience
All professionals from the Oil & Gas industry who work in connection with equipment and mechanical systems (operation, maintenance) and who do not know/no longer know the fundamentals of design of these systems (or who wish to deepen their knowledge). Jobs mainly concerned: mechanicals, mechanical assistants, mechanical supervisors.

Learning Objectives
Upon completion of the course, participants will be able to:

- know the basics of technical drawing, characterize a part, a mechanical assembly,
- identify the different mechanical construction materials,
- know the fundamentals of mechanical system design, the main assemblies (bearing assemblies),
- know the main power transmission elements (gears, joints…), wisely use the metrology devices used in workshop,
- describe the mechanical strength, chemical resistance and thermal resistance.

Ways & Means

- Very interactive training given by highly experienced trainers.
- Gradual mechanical approach, from the dimensioning of a simple mechanical part to the design basis of a dynamic system such as a rotating machine.

Learning Assessment
Written test upon training course completion.

Prerequisites
No prerequisites for this course.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: MAI/GENMAINTGB
Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: MAI/GENMAINTFR. Please contact us for more information.

www.ifptraining.com
NEW Pump Maintenance Workshop

Course Content

**Purpose**
This course aims to master the elements of language and to understand the mechanical systems, in terms of design, characterization and maintenance/repair and to remind or learn how to work on a pump, and more generally on a machine, in a workshop.

**Audience**
Professionals from the Oil & Gas industry in connection with equipment and mechanical systems (operation, maintenance) who wish to acquire best practices or to upgrade their knowledge about these systems.

**Level:** FOUNDATION

**WEEK 1: APPLIED THEORY**

**Oil & Gas pump technology**

Centrifugal pumps - Functional approach

- Step-by-step study of the main functions:
  - Process: impeller, wear ring, balancing, shape of the pump casing…
  - Sealing: mechanical seal, typical arrangements (simple, double, dry seal). Selection as per API 382 standard, materials, type.
  - Supporting: axial and radial, thrust bearing, plain bearing and anti-friction bearings.
  - Lubrication: oil and grease, mist, lubricating rings.
  - Monitoring and troubleshooting.

- Step-by-step construction of a single-stage centrifugal pump.

Positive displacement pumps:
- Different types of pumps: rotating and positive displacement pumps.
- Operating principle and use of the different types of pumps.
- Influence of the clearance, the internals leaks, and the type of product on the flowrate and pressure.
- Monitoring and troubleshooting.

**Specific choices:**
- Driving systems.
- ATEX: material consequences.

**Fundamentals of mechanics**

- Standards of technical drawing: 2D and isometric views, projections, sectional and cutaway views, perspectives, technical vocabulary.
- Dimensioning of parts and mechanical systems, ISO tolerances and main adjustments.
- Dimensional tolerances and functional clearance.
- Geometrical tolerances and surface conditions characterization.
- Bearing design and assemblies.
- Presentation of the tools in a metrology workshop, performances and rules of use.
- Measurements with the caliper, comparators, micrometers.

**Tutorials:**
- Dimensioning and full geometrical inspection of a pump shaft.
- Understanding the cutaway view of a simple pump.
- Representation of a machine element in 2D projections and perspectives.

**Disassembly, overhaul & reassembly of an overhung centrifugal pump**

- All the disassembly and reassembly stages step-by-step (routings).
- Explanation of the metrological inspection.
- Measuring diameters, runout.
- Measuring functional clearances (expansion taken into account).
- Seal inspection.

**Technology of anti-friction bearings & couplings**

- Description of the different bearings: description, internal clearances, mounting.
- Lifespan: influence of the load, lubrication, humidity, clearances.
- Lubrication.
- Coupling used depending on the load and the machine speed.

**Machine alignment**

- Machine alignment techniques: comparators and lasers.
- Calculations on practical cases.

**WEEK 2: HANDS-ON ACTIVITIES IN WORKSHOP**

**Hands-on activities in our workshops with our tools and metrology instruments:**

- Work on motor/pump block (asynchronous motor/overhung centrifugal pump) and work on double shaft centrifugal pump.
- Use of the technical file, maintenance routings and understanding of anything related to the schemes and information files: dimensions, adjustments, tolerances, functional clearance.
- Identification of the spare parts.
- Presentation of the tools in a metrology workshop, performances and rules of use.
- Compliance with disassembling/assembly procedures.
- Geometrical inspection of the piece of equipment.
- Inspection of the condition of the elements and the wearing parts at disassembly: corrosion, defects, coupling, wear, rupture.
- Inspection of clearances at disassembly.
- Functioning and use of support equipment: bearing heating by induction, monochromatic light for mechanical seal inspection...
- Tests after repair and compliance with good practices.
- Preparation of an intervention report.

For in-house courses, the above-described hands-on activities can be carried out in your workshops and on-site, on a piece of equipment to be repaired or overhauled, with your tools and metrological instruments.

(\*): indicates activities that can only be performed in the case of an in-house course in your workshop.

Reference: MAI/PUMPMAINTGB

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

\[\text{This course is also available in French: MAI/PUMPMAINTFR. Please contact us for more information.}\]
Compressors Maintenance

Level: PROFICIENCY

Purpose
This course provides a better understanding of the technology, performance and maintenance of centrifugal and volumetric compressors.

Audience
Engineers and technicians involved in centrifugal and volumetric compressor maintenance or engineering. Employees in charge of maintenance running of the compression systems.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe the behavior and the technology of compressors,
- provide the maintaining solutions applied in their compression units,
- establish a diagnosis of the incidents and participate in the troubleshooting meetings.

Ways & Means
- Functional approach for a better understanding.
- Numerous examples and cases studies from the Oil & Gas production industry and analysis of manufacturer file.

Learning Assessment
Written test upon training course completion.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

TECHNOLOGY & OPERATION 2 d
Centrifugal compressors:
- Different types of centrifugal compressors.
- Component parts and architecture of a centrifugal compressor.
- Technology of the essential components: stator, rotor, bearings, thrust bearing, seals.
- Vibrations, critical speed, dynamic balancing.
- Auxiliary equipment: lubrication system, buffer gas, balancing line…
- Safety parameters: axial displacement, vibrations, bearing and thrust bearing temperatures, oil pressure…
Reciprocating compressors:
- Different types of reciprocating compressors.
- Component parts and architecture of a reciprocating compressor.
- Technology of the essential components: cylinder, piston, valves, sealing systems, crankshaft, connecting rod…
- Auxiliary equipment: lubrication of motion parts and cylinders, cooling interstage and cooling devices systems, connections to the flare.
Rotary compressors:
- Different types: screw, liquid ring, lobes, sliding vanes…
- Component parts and architecture of a rotary compressor.
- Typical using.

MAINTENANCE (preventive, conditional, corrective) 2 d
Preventive maintenance: systematic actions, routine, alignment…
Conditional maintenance: vibrations measurement, oil of lubrication analysis, thermography…
Corrective maintenance: mounting, dismounting, metrology, repairing technics.

ANALYSIS OF A MANUFACTURER DATABOOK 0.5 d
Data sheet.
Technologic choices.
P&ID reading.

TROUBLESHOOTING 0.5 d
Failure and incidents: surge, slugging, over limits functioning…

Reference: MAI/COMPMAINTGB
Only available as an In-House course.

This course is also available in French: MAI/COMPMAINTFR. Please contact us for more information.

Contact: exp.pau@ifptraining.com

www.ifptraining.com
Maintenance & Inspection of Rotating Machinery

Course Content

**GENERAL CHARACTERISTICS & TECHNOLOGY OF ROTATING MACHINES**

3 d

Fields of use and characteristics of the main rotating machines.
Reliability of the different machines.
Technological descriptions.

**Functioning (2 days)**

Operating parameters, meaning, how to interpret changes: pressure, temperature, flow rate, speed, head, efficiency...
Characteristics of the machines, comparisons.
Effect of external process-related parameters: composition of the products, modified suction or discharge conditions.

Mechanical aspects:
- Stresses in the machine in normal operation and in abnormal conditions: operating limits.
- Case of internal stresses: thrust, radial reaction, vibrations.
- Case of external stresses: dilatation, vibrations, casing and supporting.
- Influence on the machine lifespan.

**Operating conditions (1 day)**

General operating rules to comply with, effect on reliability.
Associated risks.

**TECHNOLOGY & MAINTENANCE OF THE COMMON ELEMENTS**

4 d

**Bearings (1 day)**

Ball bearings:
- Description of the different rolling elements; identification, internal clearances, assembly.
- Calculation of lifespans: effect of the feed, lubrication, humidity, clearances.

Hydrodynamic bearings:
- Plain and pad bearings: description, functioning.
- Incidents, problems of instability.

Magnetic bearings:
- Description, functioning.

Lubrication of the bearings.

**Shaft outlet sealing systems (1 day)**

From braided seals to mechanical seals: functioning, description of the different types, conditions of stability, auxiliaries.
Application to pumps and compressors.
P&ID study of a complex mechanical seal of a centrifugal compressor.

**Rotors and shafts (0.5 day)**

Balancing: imbalance, eccentricity, balancing class.
Shaft geometric controls.

**Couplings and alignments (0.5 day)**

Different types of couplings.
Transmission stresses.
Alignment of the shafts of machines.

**INSPECTION & FAILURE FORECAST**

3 d

**Diagnosis from process data (0.5 day)**

Determining a functioning point.
Checking the performance: head, flow rate, efficiency.

**Diagnosis of a failure by vibrations and oil analyses (0.5 day)**

Measuring the vibrations: initiation, global levels, spectrum, frequency/failing element association.
Oil analyses: water content, water and air separation, viscosity, acid value, chemical analyses, ferrography.
Application: examination of different oil spectrum and reports of analysis.

**Knowledge of wear and rupture phenomena (1 day)**

Fundamentals of inspection and deduction.
Friction and materials, roughness, surface condition, fretting corrosion.
Main rupture modes (stress, fatigue, impact, creep…).
Notion of elastic resistance, plastic resistance, resilience.

**Frequent problems: detection and troubleshooting (1 day)**

Reference: MAI/ROTMAINT

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: MAI/MACHMAINTFR. Please contact us for more information.
Advanced Certificate
Maintenance Management Certification

Course Content

5 days

MAINTENANCE POLICY & OBJECTIVES 0.5 d
Integration of the maintenance policy to the plant policy. Financial, technical and workforce objectives.
Current methods and trends: criticality analysis, TPM, RCM, RBM, maintenance program optimization based on criticalities (redundancy, utilization rate, impact on production, age…), risk analysis, local conditions.
Different types of maintenance and respective importance: planned condition, predicted, critical, corrective.
Importance of condition-based and predictive maintenance in modern maintenance policies, and particularly data importance (from SAP, PI, site report, root causes…) for the use of efficient methods (RED, e-monitoring…). Application of the methods studied: criticality ranking, emergency levels, spare parts management.

RELIABILITY MEASUREMENT & FOLLOW-UP 1 d
Descriptive statistics: reliability and reliability indicators, equipment performance monitoring in terms of availability, MTBF, MTTR…
Statistical functions and their applications to preventive maintenance. Main models, application to the search for preventive control optimization, equipment redundancy studies, standby equipment management. Pereto law, identification of bad-actors.

RELIABILITY ANALYSIS & IMPROVEMENT METHODS 1 d
FMEA (Failure Modes, Effects and their Criticality Analysis). Areas of application, basic techniques, probability assessment, common methodological errors. Action plan.
Failure trees, method principle.
RCM – Overall policy. Interest of the decision logics.
TPM – Total Productive Maintenance (global involvement to maintain the production tool).
Concept of asset integrity management as a SECE (Safety and Environment Critical Element).
Concept of machine learning: failure prediction by accumulation and cross analysis of process and equipment data.

MAINTENANCE COSTS & FAILURE COSTS 1 d
Overall failure costs versus direct costs (materials, spare parts, repair contractors…) and indirect (shortfall in production or injection, quality defect, reputation…). Notion of cost efficiency: overall effectiveness, adaptation to petroleum industry and practical calculations.
Life Cycle Cost (LCC). Application to the choice of investments; application to the search for optimum equipment lifetime.
Spare parts management. Cost of inventory. Unsuitability of some conventional stock management calculations, cost of risk.
Computerized maintenance management. System (CMMS) and related processes.

OUTSOURCING & SUBCONTRACTING 0.5 d
Purpose, condition for efficiency. Why outsourcing? Which abilities to be kept? How to keep control?
Different types of contracts. When to use them? How to combine them?
Concepts of General Maintenance Operation Contract (GMOC) and Maintenance and Inspection Engineering Contractor (MIEC).
Comparison between specific maintenance contract (“Specific Maintenance Contract” (SMC), “Original Equipment Manufacturer” (OEM)) and integrated maintenance contract (“Integrated Services Provider” (ISP)).

SHUTDOWN MANAGEMENT 0.5 d

IMPROVEMENT PLANS 0.5 d
From failure management to equipment management.
Lowering the tolerance threshold to defects and operators’ involvement.
Maintenance plans by equipment item and equipment type.

Why an IFP Training Certification?

An international recognition of your competencies.
An Advanced Certificate delivered.
An expertise confirmed in Maintenance Management.
Ready-to-use skills.

Level: PROFICIENCY

Purpose

This certifying course aims to bring elements related to the implementation of a modern and adapted maintenance policy (such as the risk-based maintenance policy), to define a continuous improvement of reliability, to consider failure direct and indirect costs, to be able to manage maintenance contracts as well as unit shutdowns or turnarounds.

Audience

Maintenance engineers and managers from process industries, as well as production managers concerned by operation costs and equipment management.

Learning Objectives

Upon completion of the course, participants will be able to:
- know the proven maintenance policies (TPM, RCM, RBM, key performance indicators, preventive maintenance tools…) in order to be able to set goals in terms of company global efficiency,
- implement reliability measurement, analysis and improvement techniques (reliability indicators, assessment matrix, failure tree, FMECA, Pareto, Weibull…).
- know the necessary elements to define a subcontracting policy as well as to efficiently manage shutdowns.
- through various unexpected exercises, to remind that multidisciplinary and reactivity are part of maintenance managers’ jobs.

Ways & Means

- Applications and case studies illustrating the techniques studied.
- Active pedagogy based on participants’ experiences.
- Short scenarios of the most frequent and the most serious key equipment failures, proposed by the trainer and analyzed by the group. Participants shall use their technical knowledge, reasoning skills, multidisciplinarity and operational capacities.

Learning Assessment

- Entry test at the beginning of the course.
- Final written assessment upon course completion.

Prerequisites

- Engineer degree or equivalent experience in the petroleum industry.
- A 10-year experience in the field.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: MAI/MAINTMGT
Can be organized as an In-House course.
Contact: exp.pau@ifptraining.com

Pau 4 November 8 November €3,570

www.ifptraining.com
253
Machinery Vibration

Course Content

4 days

BASIC DEFINITIONS - OVERALL MEASUREMENTS
0.75 d
Frequency and amplitude. Displacement, velocity, acceleration.
Different types of vibration: periodic, random, shocks.
Overall measurements: limitations, severity charts, high frequency techniques for anti-friction bearings, practical recommendations.

RESONANCE
0.5 d
Simple system behavior: amplitude and phase. Actual rotor and bearings systems. Critical speeds.
Using phase to study resonance. Identifying and solving problems.

TOOLS FOR DIAGNOSIS
0.5 d
FFT analyzers: Fourier transforms and actual plots. Accelerometers, fixation methods.
Selecting analysis parameters: scales, units, windows. Using special functions: zoom, cepstrum, envelope detection.
Using non-contacting probes for monitoring large machinery running on plain or tilt-pad bearings.

MACHINERY DEFECTS & VIBRATION SIGNATURE
2 d
Unbalance. Shaft and coupling misalignment.
Antifriction bearings - Typical defects.
Plain or tilt pad bearings instabilities.
Mechanical looseness, cracks, friction between rotor and static parts. Gear failures.
Electromagnetic defects of induction electric motors.
Drive belt vibration.

PRACTICAL MACHINERY VIBRATION MONITORING
0.25 d
Vibration control policy: machinery improvement program. Different policies according to the type of machinery and its criticality.
Developing an effective program.

Reference: MTM/PAVIB-E
Only available as an In-House course.

Contact: rc.contact@ifptraining.com

This course is also available in French: MTM/DIAVIB. Please contact us for more information.
Graduate Certificate

Upstream Maintenance Engineer Certificate

Course Content

60 days

**WELL EQUIPMENT & WELL EFFLUENT TREATMENTS**

Notions of drilling/completion. Artificial lift; pumping, gas lift. Oil field processing (stabilization, dehydration, sweetening) and water processing (production and injection water). Gas processing and conditioning (dehydration, sweetening).

2 d

**TECHNOLOGY & MAINTENANCE OF STATIC EQUIPMENT**

Wellhead, pipe, fittings and line equipment, safety valve, tanks, pressure vessel. Thermal equipment: heat exchangers, boilers, heaters, condensers. Standards, design, operation, inspection, maintenance. PFD, P&ID, isometric drawings.

3 d

**TECHNOLOGY & MAINTENANCE OF PUMPS**

Pumping fundamentals (pressure, flow rate, conservation of energy, mechanical and hydraulic powers...). Dynamic pumps. Functional approach: different types of dynamic pumps and integration into the processes; generic functional study (process, sealing, supporting/guiding, lubrication). Positive displacement pumps: different types (piston pumps and rotary pumps); operating principles, influence of the clearances, internal leaks, impact of the type of product on the flow rate and pressures. Maintenance management, condition-based maintenance (measurement of vibrations, oil analysis, thermography), corrective maintenance (troubleshooting and repair techniques). Analysis of manufacturer folders and P&ID.

5 d

**PRACTICE IN MECHANICAL WORKSHOP**


5 d

**TECHNOLOGY & MAINTENANCE OF COMPRESSORS**


5 d

**TECHNOLOGY & MAINTENANCE OF DRIVING MACHINES**


5 d

**COMMON ELEMENTS OF MACHINES & STRUCTURES**

Moving part lubrication: grease, oil (designation, characteristics). Pressurized and bubbled lubrication, sealing rings. Rotors and shafts: balancing (unbalance, eccentricity, balancing class) and shafts geometric alignment. Roller bearings (designation, internal clearances, assembling rules), plain bearings (calculations, incidents, instability) and magnetic bearings. Shaft output seals: braided packings, mechanical seals (functioning, description of the different types, conditions of stability, auxiliaries); P&ID study of a complex mechanical seal, of a centrifugal compressor. Couplings and alignment. Machine shaft alignment techniques. Corrosion: main types. Corrosion prevention and basics of inspection.

5 d

**TECHNOLOGY & MAINTENANCE OF ELECTRICAL EQUIPMENT**

Sources of electrical power (alternator, generator) and motors (alternate and direct current); functioning, technology, operation, maintenance, safety. Electrical power distribution and networks: constitution of HV and LV networks, distribution philosophy, control and protection elements, transformers, circuit breakers; redundancy of sources and supply means. Earthing and neutral systems. Protection against the electrical risks and hazardous areas and ATEX standards.

5 d

**INSTRUMENTATION, CONTROL, SAFETY INSTRUMENTED SYSTEMS**


5 d

**HSE DURING MAINTENANCE WORKS**

Identification of the hazards and specific risks on site, in maintenance situation. Job safety analysis procedures and steps, permit to work. Audit and improvement of HSE performance. Safety in construction and maintenance works (lifting and rigging, sand blasting, test, works on electrical equipment, in confined spaces, welding...). HSE management system: SIMultaneous Operation&Safety (SIMOPS), management of changes, downgraded situation, human factors.

5 d

**MAINTENANCE MANAGEMENT**


5 d

**PROJECT: MAINTENANCE ENGINEERING - JURY**

During the final project, participants will progress and develop a project related to the maintenance, the energizing of the functioning of the support, the management of a machine overhaul, a manufacturer brief... This 10-day project is based on existing data. Participants are coached along the project to help them reach the objectives set: writing a report and presentation to a jury of personnel from the company and IFP Training.

10 d
Maintenance Supervisor Certification

Level: FOUNDATION

Purpose
This certification aims to develop the knowledge and skills needed to perform the supervision and maintenance of equipment, systems and networks used in Oil & Gas production facilities. It includes machines mechanical aspects, wears, rupture, lubrication problems, the control and maintenance of instrumented systems, the generation, distribution and use of electrical power and provides a thorough understanding of the associated HSE considerations.

Audience
All people working for the Oil & Gas production, transport or storage facilities with experience in the maintenance area:
- experienced field operators, control room operators, supervisors,
- maintenance technicians,
- maintenance professionals who want to consolidate and develop their skills.

Learning Objectives
Upon completion of the course, participants will be able to:
- know the physical phenomena involved in the Oil & Gas treatments,
- understand the fundamentals of maintenance,
- be familiar with the technology and operation of static equipment and rotating machinery used in the Oil & Gas production facilities and know the different elements concerned by maintenance and inspection policies,
- know field instrumentation technology, understand DCS architecture and safety logics, be familiar with the calibration and synchronization procedures and be aware of the importance of measurement quality,
- be able to analyze and monitor electrical equipment and electrical networks and know how to identify and mitigate associated electrical hazard,
- understand the risks associated to products, equipment and operations and plan adequate resources to carry out activities adopting industry best practices.

Ways & Means
- Lecturing by industry specialists.
- Team work exercises.
- Course sessions in relation with practical exercises and case studies.
- Mechanical workshops.

Learning Assessment
- Continuous assessments all along the program.
- Final assessment including a presentation in front of a jury.

Prerequisites
Significant experience in Oil & Gas production facilities operation and maintenance.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Vocational Certificate delivered.
- An expertise confirmed in Maintenance and whose competencies are kept up-to-date.
- A Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and experience of the related topics, trained in adult teaching methods, and whose competencies are kept up-to-date.

Course Content

FUNDAMENTALS OF OIL & GAS PRODUCTION
Fundamentals of chemistry: atoms, molecules, atomic weight, molecular weight.
Hydrocarbons types and main characteristics.
Applied physics: force, work and energy, temperature, thermal energy and heat transfer, pressure, hydrostatics, hydrodynamics and friction losses.
Well effluents behavior. Need for effluents field processing. Specifications.

FUNDAMENTALS OF MECHANICAL MAINTENANCE
Technical representation of parts and simple mechanical systems; technical drawing and vocabulary (2D views, projections, section and cut-away views, perspectives); dimensioning, tolerances, main adjustments, surface conditions; tools of metrology, performances and rules of use.
Elements of construction: metals, alloys, plastics and composites, operating and maintenance rules; screwed, bolted, welded and stuck constructions; bearings, seals. Pipe, valves and main line accessories.
Elements of repair: surface treatments and coatings; overlay welding and reconstitution; test and recalibration.

MAINTENANCE & INSPECTION OF ROTATING MACHINERY
General characteristics and technology of rotating machines: reliability, technological descriptions, operating parameters, characteristics; effect of external process parameters: composition of the products, modified suction or discharge conditions, stresses in normal operation and in abnormal conditions, operating limits; influence on the machine lifespan, general operating rules: effect on reliability, associated risks.
Technology and maintenance of the common elements: ball bearings, hydrodynamic bearings, magnetic bearings; sealing systems; balancing: imbalance, eccentricity, balancing class; couplings and alignments; lubrication.
Inspection and failure forecast: diagnosis, functioning point, checking the performance, detection of failure by vibrations and oil analysis; fundamentals of inspection; friction and materials, roughness, surface conditions, fretting corrosion; main rupture modes (stress, fatigue, impact, creep...).

INSTRUMENTATION, PROCESS CONTROL & SAFETY INSTRUMENTED SYSTEMS
Sensors and transmitters: measurement of operating parameters, measurement uncertainties; physical principles, technologies, units of measurement, local reading/transmission; transmitter technology; preventive maintenance.
Controls and actuators: control valves (technology, types of valves, characteristic curves, safety position); positioners: principle of operation, types; ON/OFF valves: types, technology. Special ON/OFF valves: SDV, ESDV, BDV.
Controllers and control loop structures: behavior of a P&ID controller: operating point, gain, interactions...; control loops: simple, cascade and split-range.
Distributed Control Systems (DCS), architecture, security/redundancy; alarms, history, newspapers.
Safety Instrumented Systems (SIS): safety loop and safety functions, Safety Integrity Level, High Integrity Protection Systems (HIPPS), Emergency Shutdown (ESD), Emergency DePressurization (EDP); Fire & Gas system (F&G).

ELECTRICAL EQUIPMENT & POWER DISTRIBUTION NETWORK
Electricity generation: gas turbine, alternator; monitoring and maintenance of the equipment, troubleshooting.
Electrical distribution and networks: HV and LV networks, architectures and equipment, distribution philosophy, differential protection; switchboards and switchgears, transformers, circuit breakers; protection and isolation elements, batteries; equipotential networks, earthing.
Electric motors: functioning and operation of AC and DC electric motors, windings coupling, adjustment to site conditions; routine monitoring, troubleshooting, starting systems, variable speed systems, maintenance.
Protection against electrical risks (as per the UTE C-18 S10); hazards, voltage levels, safe approach distances, related safety devices; effects and consequences of the electrical risks; protections.

HSE IN MAINTENANCE & CONSTRUCTION ACTIVITIES
Operations and HSE.
Permit to work system procedure.
Hazard identification and risk assessment of maintenance and construction works.
Environmental management in maintenance and construction operations.
Organizational framework. Human factors.

Reference: MAI/MAINTSUPGB. [Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: MAI/MAINTSUPFR. Please contact us for more information.
Vocational Certificate

Maintenance Superintendent Certification

Course Content

**INTRODUCTION**
Welcome and program overview. Entry test. Units. Dimensions.

**DOWNHOLE PRODUCTION - WELL PERFORMANCE - PRODUCTION FUNDAMENTALS**

**OIL, WATER & GAS PROCESSING**
Oil processing: required specifications; stabilization; dehydration, desalting. Production and injection water treatment: why a water treatment; expected qualities and required treatments; operating conditions. Gas processing: required specifications; dehydration; hydrates, consequences and treatments; Natural Gas Liquids recovery. Work on study cases to detail processes and concerns.

**OFFSHORE DEVELOPMENTS, FLOW ASSURANCE**

**TERMINAL, FSO & FPSO**
Overview of oil terminals. FSO & FPSO technologies. Metering of oil quantities.

**BEHAVIORAL MANAGEMENT**
Teamwork management, written and oral communication. Active listening and communication tools. Team cohesion and stress management. Problems analysis and investigation: tools and behaviors. How to better analyze and know oneself.

**INSTRUMENTATION & PROCESS CONTROL - ELECTRICITY**
Instrumentation and process control: functional blocks, symbolization; pneumatic, electrical and digital technologies; measurements, sensors, security equipment; control equipment, actuators; controllers and control loops; Distributed Control System (DCS): architecture, connections; Safety Instrumented Systems (SIS): HIPS, ESD, EDP, FGS. Electricity: generation (turbines, alternators, monitoring, troubleshooting); distribution (HT-BT networks, power supply, stability, constituents, cabinets, transformers, batteries, isolation, protections).

**ROTATING MACHINERY (in mechanical workshop)**
Pumps: pumping prerequisites: pressure, flowrate, head; centrifugal pumps: types, technology, auxiliaries, performances; volumetric pumps. Compressors: compression prerequisites: technology, auxiliaries, practical laws; centrifugal compressors: rotor, stator, bearings, shafts, seals balance; reciprocating compressors: frame, cylinders, pistons and rings, bearings, lubrication, cooling. Gas turbines: operating principles, compression, combustion, expansion, performances; technologies: compressor, combustion chamber, turbine, internal cooling; auxiliaries. HSE concerns. Technology and maintenance of the elements: bearings (ball, hydrodynamics, magnetic); shaft outlet sealing systems: braided and mechanical seals; rotors and shafts: balancing, geometric controls; coupling and alignments: types, stresses; diagnostics from process, vibration or oil analysis data; wear and rupture phenomena.

**CORROSION, INSPECTION & INTEGRITY**
Corrosion mechanisms. Types of corrosions in the Oil & Gas industry. Corrosion prevention and monitoring, fundamentals of inspection.

**MAINTENANCE MANAGEMENT - EQUIPMENT AVAILABILITY CONTROL**

**HSE RISKS & MANAGEMENT**

**REVISIONS - ORAL ASSESSMENT**
2 d

Ways & Means
- Several applications and illustrations.
- Several teamwork sessions.
- Several tutorials with equipment in a fully equipped workshop.

Learning Assessment
- Continuous assessments all-along the program.
- Final examination including a presentation in front of a jury.

Prerequisites
Significant experience in Oil & Gas production facilities.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Vocational Certificate delivered.
- An expertise confirmed in Maintenance Superintendent.
- Ready-to-use skills.

More info
The training duration includes 3 days of written and oral competency evaluation. This training is organized together with the Production and HSE Superintendents trainings. The effective scheduling of the common and specific modules of the three sessions may imply a slightly different chaining of the modules.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: MAI/MAINS I Can be organized as an In-House course. Contact: exp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
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<tbody>
<tr>
<td>Pau, Rueil &amp; Martigues</td>
<td>11 September</td>
<td>4 December</td>
<td>€41,990</td>
</tr>
</tbody>
</table>

This course is also available in French: MAI/MAINS. Please contact us for more information.
Surface Facilities Engineering

Process Engineering
- Oil & Gas Process Engineering Certification .................................................. p. 259
- Advanced Oil & Gas Process Engineering Certification ................................ p. 260
- Gas Production & Processing Engineer Certification ............................... p. 261
- LNG Processing Engineer Certification ........................................................ p. 262
- LNG Process Simulation .............................................................................. p. 263
- Advanced Oil & Gas Field Processing Certification .................................. p. 264
- Module 1: Thermodynamics Applied to Well Effluent Processing .......... p. 265
- Module 2: Oil & Water Processing ............................................................... p. 266
- Module 3: Gas Processing & Conditioning ................................................ p. 267
- Advanced Water Processing ....................................................................... p. 268
- Oil & Gas Process Simulation ..................................................................... p. 269
- Overview of Oil & Gas Design Engineering ............................................... p. 270
- Schematization of Oil & Gas Processes ...................................................... p. 271
- Gas Sweetening & Sulfur Recovery ............................................................. p. 272
- Fundamentals of Engineering Activities ..................................................... p. 273
- Technical Standards for Surface Facilities Design ..................................... p. 274

Static Equipment
- Process Equipment Engineering ................................................................. p. 275
- Flare Network Design Engineering ............................................................. p. 276

Rotating Machinery
- Rotating Machinery Technology ................................................................. p. 277
- Mechanical Design Engineering ................................................................. p. 278
- Gas Turbines .............................................................................................. p. 279

Electricity & Inspection
- E&I Technology for Oil & Gas Facilities ...................................................... p. 280
- E&I Design Engineering ............................................................................. p. 281
- Instrumentation, Process Control & Safety Instrumented Systems .......... p. 282
- Instrumentation Maintenance ..................................................................... p. 283
- Design of Instrumented Systems Certification .......................................... p. 284
- Electrical Equipment & Power Distribution Network (Advanced) ........... p. 286
- Asset Integrity Management ....................................................................... p. 287

Maintenance & Inspection
- Turnaround Management .......................................................................... p. 288
- Fundamentals of Mechanical Maintenance ............................................... p. 289
- Pump Maintenance Workshop .................................................................. p. 290
- Compressors Maintenance ........................................................................ p. 291
- Maintenance & Inspection of Rotating Machinery .................................... p. 292
- Maintenance Management Certification ................................................... p. 293
- Machinery Vibration .................................................................................. p. 294
- Upstream Maintenance Engineer Certification .......................................... p. 295
- Subsea Integrity Management (I) - Inspection, Corrosion Prevention in Oil & Gas Production ......................................................... p. 296
- Maintenance & Inspection of Static Equipment ......................................... p. 297
- Monitoring & Testing ................................................................................ p. 298
- Subsea Integrity Management (II) - Non Conformity Management ......... p. 299
Graduate Certificate

Oil & Gas Process Engineering Certification

Level: FOUNDATION

Purpose

This course provides in-depth technical knowledge of Oil & Gas production facilities design and optimization in order to provide Process Engineer with industry international best practices.

Audience

Engineers (particularly recently graduated Engineers or Engineers in conversion) looking to acquire in-depth knowledge and best practices of Oil & Gas production facilities design.

Learning Objectives

Upon completion of the course, participants will be able to:
- describe fundamental concepts underlying Oil & Gas processing.
- analyze operating conditions and basic design of oil, water and gas treatment.
- design oil, gas and water processing facilities and anticipate process performances by simulation and troubleshooting process operations.
- describe technology of static equipment and rotating machinery used in production facilities and analyze performances and key operating parameters.
- size main process equipment of surface facilities.
- identify main risks related to Oil & Gas production and to contribute to safety engineering studies.
- contribute to the dynamics of process development projects.

Ways & Means

- Highly interactive training course delivered by industry experts and adapted to participants’ experience.
- Multiple teamwork sessions and industrial case studies.
- Hands-on activities on professional software: HYSYS™ or PRO/I™ for process simulation, PIPESIM™ and OLGA™ for gathering networks and flow assurance.
- Teamwork project on a real case study of surface facilities design.

Learning Assessment

- Continuous assessments all-along the program.
- Final assessment including a presentation in front of a jury.

Prerequisites

Engineering degree or equivalent professional experience within the petroleum industry.

Why an IFP Training Certification?

- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Oil & Gas Process Engineering.
- Ready-to-use skills.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 60 days

**THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING**


**OIL & WATER TREATMENT**


**GAS PROCESSING & CONDITIONING**


**DYNAMIC SIMULATION OF OIL & GAS PROCESSING FACILITIES**

- During this week, case study and exercises are performed using a dynamic simulator replicating a DCs environment in order to allow the participants to understand process dynamics: analysis of wellhead pressure/temperature variations choke valve tuning, hydrates detection and inhibition; crude oil processing (study of operating parameters on oil stabilization, dehydration and desalting); gas dehydration (impact of TEG operating conditions); multistage gas compression and export: effect of operating parameters.

**PIPING SYSTEMS & PROCESS EQUIPMENT: SIZING & OPERATION**


**GATHERING & DISTRIBUTION SYSTEMS DESIGN - FLOW ASSURANCE**


**INSTRUMENTATION, PROCESS CONTROL, AUTOMATION & ELECTRICAL SYSTEMS**


**ROTATING EQUIPMENT - TECHNOLOGY, SELECTION & OPERATION**

- Fundamentals of pumping circuits and gas compression. Operating principles, technology, selection criteria, performances and operating conditions of centrifugal and volumetric pumps; centrifugal and reciprocating compressors: gas turbines; turbo-expanders.

**OIL & GAS PROCESSING FACILITIES TROUBLESHOOTING**


**SAFETY ENGINEERING CASE STUDIES**

- Main safety engineering studies: HAZID and HAZOP workflow and application; plant layout case study; QRA: consequence analysis methodology.

**PROCESS DEVELOPMENT PROJECT - JURY**

- This final project, participants will be required to design a process, simulate it, evaluate its performances with reference to various production scenarios, select and size associated key equipment. This 10-day teamwork project is real case study based on actual data. Participants are coached throughout the project to produce the required deliverables, which are to be presented on the last day (jury): process design and simulation, main equipment sizing, heat and mass balance, fuel gas requirements; HAZID and plant layout.

Reference: PENG/PROCESSING. Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/INGPROC. Please contact us for more information.

www.ifptraining.com
Advanced Certificate
Advanced Oil & Gas Process Engineering Certification

Level: ADVANCED

Purpose
The program proposed hereafter aims at providing an advanced knowledge of and industry best practices in Oil & Gas processing and in management.

Audience
Senior process engineers involved in Oil & Gas field processing facilities engineering seeking to acquire advanced knowledge in process and equipment design and operation.

Learning Objectives
Upon completion of the course, participants will be able to:
- support oil, gas and water field processing plant and equipment,
- participate to troubleshooting studies,
- review, comment and validate engineering documents (process and equipment datasheets, safety engineering results),
- lead a project according to project management best practices,
- efficiently manage a team.

Ways & Means
- Highly interactive training by industry-specialist lecturers.
- Numerous case studies, applications, illustrations and teamwork sessions.

Learning Assessment
Continuous evaluation.

Prerequisites
10 years minimum of experience as process, production or site engineer.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Advanced Oil & Gas Process Engineering.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Title</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1</td>
<td>OVERVIEW OF OIL &amp; GAS FIELD PROCESSING</td>
<td>2 d</td>
</tr>
<tr>
<td>Module 2</td>
<td>EQUIPMENT DESIGN &amp; OPERATION</td>
<td>6 d</td>
</tr>
<tr>
<td>Module 3</td>
<td>CORROSION MANAGEMENT IN OPERATION</td>
<td>1 d</td>
</tr>
<tr>
<td>Module 4</td>
<td>PROCESS CONTROL &amp; SAFETY</td>
<td>4 d</td>
</tr>
<tr>
<td>Module 5</td>
<td>PROCESS DESIGN DOCUMENTS VERIFICATION METHODOLOGY</td>
<td>2 d</td>
</tr>
<tr>
<td>Module 6</td>
<td>PROCESS TROUBLESHOOTING METHODOLOGY</td>
<td>2 d</td>
</tr>
<tr>
<td>Module 7</td>
<td>TROUBLESHOOTING EXERCISES</td>
<td>3 d</td>
</tr>
<tr>
<td>Module 8</td>
<td>HAZID, HAZOP &amp; QRA REVIEW METHODOLOGY</td>
<td>4 d</td>
</tr>
<tr>
<td>Module 9</td>
<td>PLANT LAYOUT &amp; GAD REVIEW</td>
<td>2 d</td>
</tr>
<tr>
<td>Module 10</td>
<td>PROJECT MANAGEMENT</td>
<td>3 d</td>
</tr>
<tr>
<td>Module 11</td>
<td>TEAM MANAGEMENT &amp; TEAM LEADING</td>
<td>6 d</td>
</tr>
</tbody>
</table>

Module Content

Module 1: OVERVIEW OF OIL & GAS FIELD PROCESSING
2 d

Module 2: EQUIPMENT DESIGN & OPERATION
6 d
Separator design methodology and case studies.
Desalters design and operation.
Rotating equipment technology pumps and compressors design and datasheet review methodology and case studies.
Relief system and flare network design methodology.

Module 3: CORROSION MANAGEMENT IN OPERATION
1 d

Module 4: PROCESS CONTROL & SAFETY
4 d
Process control overview.
Controllers - Control structures.
Safety Instrumented Systems (SIS) review.
Impact of HAZID and HAZOP studies on design.

Module 5: PROCESS DESIGN DOCUMENTS VERIFICATION METHODOLOGY
2 d
Process documents to be prepared during engineering phase.
Process datasheets review methodology and checklist.
Engineering document verification workshop.

Module 6: PROCESS TROUBLESHOOTING METHODOLOGY
2 d
Troubleshooting methodology and case studies.
EFR compressor failure, injection water scaling, emulsion case, desalting scheme, flowline erosion.

Module 7: TROUBLESHOOTING EXERCISES
3 d
Troubleshooting exercises in total learning plant and associated control room.

Module 8: HAZID, HAZOP & QRA REVIEW METHODOLOGY
4 d
HAZID exercise.
HAZOP exercise.
QRA review exercise.
Bow-tie construction method.

Module 9: PLANT LAYOUT & GAD REVIEW
2 d
Plant layout review tools application.
Management of iterative design.
Technical workshop: plant layout review.

Module 10: PROJECT MANAGEMENT
3 d
Integration and scope management.
Project execution: contracting.
Project execution: organization.
Project control: cost and schedule.

Module 11: TEAM MANAGEMENT & TEAM LEADING
6 d
Develop deep listening and expression skills.
Identify your own behavior style.
Providing feedback and getting things done.
Assertiveness assessment.
Regulate the team and prevent conflict.
Mastering a specific regulation tool: the DESC.
Situational management.
Identifying preferred managing style through co-development.
Mentorship, work organization and delegation.
Mentorship monitor.
Intermediate management.

Reference: PENG/ADVPROCESSGB
Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/ADVPROCESSFR. Please contact us for more information.
# Gas Certificate
## Gas Production & Processing Engineer Certification

**Level:** FOUNDATION  
**Purpose**
This course aims to acquire comprehensive and practical knowledge of natural gas production, processing and transport engineering in order to quickly and efficiently adapt and contribute to a broad range of engineering positions within the gas industry.

**Audience**
Production engineers, field engineers, process engineers… seeking to acquire comprehensive and solid engineering capabilities in gas production, from the reservoir to the transport network. This certification program is well suited for junior engineers and engineers in conversion. It can also be tailored to experienced engineers.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- Identify key subsurface parameters impacting gas production.
- Design gas processing plants and anticipate process performances by simulation.
- Select appropriate technology of static/rotating equipment according to service and analyze key operating parameters/performance.
- Identify main risks related to gas production facilities and participate to safety engineering studies.
- Efficiently contribute to gas field development studies.

**Ways & Means**
- Highly interactive training course delivered by industry experts and adapted to participants’ experience.
- Multiple teamwork sessions and industrial case studies.
- Hands-on activities on professional software: HYSYS™ or PRO/II™ for process simulation, PIPESIM™ and OLGA™ for gathering networks and flow assurance.
- Teamwork project on a real case study of gas field development.

**Learning Assessment**
- Continuous assessments all-along the program.
- Final assessment including a presentation in front of a jury.

**Prerequisites**
Engineering degree or equivalent professional experience within the petroleum industry.

**Why an IFP Training Certification?**
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Gas Production & Processing Engineer.
- Ready-to-use skills.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td><strong>FUNDAMENTALS OF GEOLOGY, RESERVOIR ENGINEERING &amp; PRODUCTION MODES</strong></td>
<td>Petroleum geology and geophysics. Reservoir fluids. Petrophysics. Well log interpretation. Well testing. Reservoir engineering and simulation.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>FUNDAMENTALS OF DRILLING, WELL COMPLETION &amp; WELL PERFORMANCE</strong></td>
<td>Drilling fundamentals. Well completion equipment. Well performance. Well servicing and workover.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING</strong></td>
<td>Well effluent. Ideal gas and real fluid behavior. Gas compression and expansion. Liquid-vapor equilibrium of pure components and mixtures. Mixture separation. HYSYS™ or PRO/I™ simulation: propane cryogenic loop. Fundamentals of distillation. HYSYS™ or PRO/I™ simulation: NGL splitter.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>PROCESS SIMULATION</strong></td>
<td>Using HYSYS™ or PRO/I™; participants are coached throughout the week to build a complete gas plant model including: gas field treatment (primary separation, dehydration, compression); NGL recovery and fractionation: propane loop, distillation. Analysis of gas plant design and operating parameters.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>NATURAL GAS STORAGE &amp; TRANSPORT BY PIPELINE</strong></td>
<td>Gas storage: storage types, storage equipment, compression. Gas transport by pipelines: transport network; design and construction of gas pipelines; compression, corrosion prevention, metering stations; operation of a network.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>PIPING SYSTEMS &amp; PROCESS EQUIPMENT: SIZING &amp; OPERATION</strong></td>
<td>Piping and valves. Metallurgy. Corrosion. Cathodic protection. Pressure relief systems - PSVs and flare network. Thermal equipment, pressure vessels, separation columns.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>ELECTRICAL SYSTEMS, INSTRUMENTATION, PROCESS CONTROL &amp; SAFETY SYSTEMS</strong></td>
<td>Electrical power generation. Electrical power distribution network and equipment. Field instrumentation; controllers; control loop structures. Distributed Control System (DCS). Safety Instrumented Systems (SIS): ESD, HIPS, Fire &amp; gas system.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>ROTATING MACHINERY: TECHNOLOGY, SELECTION &amp; OPERATION</strong></td>
<td>Operating principles, technology, selection criteria, performances and operating conditions of centrifugal and volumetric pumps; centrifugal and reciprocating compressors; gas turbines; turbo-expanders.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>HSE &amp; SAFETY ENGINEERING APPLIED TO GAS PLANTS</strong></td>
<td>Main hazards in gas production facilities. Risk in normal production operations. Safe isolation of plant and equipment. Main safety engineering studies: HAZID/HAZOP workflow and application; plant layout case study; QRA - Consequence analysis methodology.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>PROJECT MANAGEMENT &amp; ECONOMICS</strong></td>
<td>Project phases: preliminary studies, FEED, detailed engineering, procurement, construction and commissioning. Project cost estimation and cost control. Quality and HSE management in projects. Overview of Natural Gas Economics.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>GAS FIELD DEVELOPMENT PROJECT &amp; JURY</strong></td>
<td>10-day teamwork on a real case study with deliverables to be presented on the last day (jury).</td>
<td>10 d</td>
</tr>
</tbody>
</table>

Reference: PENG/GASENG  
Only available as an In-House course.  
Contact: exp.rue@ifptraining.com  
This course is also available in French: PENG/INGGAZ. Please contact us for more information.

www.ifptraining.com
LNG Processing Engineer Certification

Course Content

**THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING**


**GAS PROCESSING & CONDITIONING**


**DYNAMIC SIMULATION OF GAS PROCESSING FACILITIES**

During this week, case study and exercises are performed using a DCS replica in order to allow the participants to understand process dynamics. Hydrates detection and inhibition in gathering network. Gas processing. Gas dehydRATION: impact of operating conditions. Multistage gas compression and export: study of operating parameters.

**LIQUEFIED NATURAL GAS**

The LNG chain. Specific properties of LNG. Liquefaction processes. Regazification processes. LNG storage, loading/offloading systems. Technology of LNG-specific equipment.

**LNG PROCESS SIMULATION**

During this week, case study and exercises are performed using HYSYS™ or PROII™ software in order to allow the participants to design and optimize liquefaction processes: gas field treatment (separators, dehydration, compression); NGL fractionation and stabilization; simulation of a cascade liquefaction process, of a CSMR liquefaction process, of a turbo-expander based liquefaction process; integration of the liquefaction processes with the LNG recovery/fractionation; comparison of the efficiency of the processes versus load and conditions.

**PUMP SYSTEMS & PROCESS EQUIPMENT: TECHNOLOGY & SIZING**


**INSTRUMENTATION, PROCESS CONTROL & SCHEMATIZATION**


**PUMPS & COMPRESSORS**

Fundamentals of hydraulic circuits and gas compression. Operating principles, technology, selection criteria, performances and operating conditions of centrifugal and ventialm pumps as well as centrifugal and reciprocating compressors.

**GAS TURBINES - ELECTRICAL GENERATION**

Upon customer request, this module can be tuned to team generation and team turbines operations. Gas turbines: equipment technology, operating conditions, performances, operation. Turbo-expander: technology, operation. Electrical power generation. Electrical power distribution network and equipment.

**LNG - SPECIFIC SAFETY ENGINEERING**

LNG specific hazards: stratification/roll-over, sloshing, LNG clouds ignition, asphyxiation risks, cryogenic liquids, piping behavior. LNG spillage control at design stage and in operation. LNG clouds control in operation. LNG fires control at design stage and in operation. Main safety engineering studies: HAZID and HAZOP workflow and application; plant layout case study; QRA - Consequence analysis methodology.

**HSE IN OPERATIONS & MAINTENANCE WORKS**


**CASE STUDY BASED ON LNG PLANT P&IDs & JURY**

During this week, participants will work in teams to analyze LNG plant P&ID's and present the results of their analysis to a jury; this 5-day teamwork project is a real case study based on actual data. Participants are coached throughout the project to produce the required deliverables, which are to be presented on the last day (jury): process operating parameters, process control loops and safety loops; operating philosophy; materials and equipment selection.

Reference: LMG/INGG. Only available as an In-House course. Contact: exp.ruei@iptraining.com

This course is also available in French: LNG/INGGNL. Please contact us for more information.
**LNG Process Simulation**

**Course Content**

**NEED FOR GAS FIELD PROCESSING - QUALITY REQUIREMENTS** 0.25 d
- Review of main concepts and products within the gas/condensate chain.
- Undesired constituents for storage, transport, or end use of natural gas.
- Different specifications and quality requirements for natural gas: sales gas specifications, reach/lean gas specifications.
- Required treatments and overview of gas processing.
- Examples of compositions of commercialized natural gases.

**STEADY-STATE PRO/II™ OR HYSYS™ SIMULATION CASE STUDIES** 0.75 d
- Equations Of State (EOS); uses, examples, selection:
  - Reservoir fluids phase envelope.
  - Flash separation of multicomponent mixtures.
  - Phase envelope of gases versus composition.
  - GHV and WI calculation using PRO/II™ or HYSYS™.
- Construction of simulation reports.

**CONDENSATE RECOVERY, FRACTIONATION & REFRIGERANT MAKE-UP** 0.5 d
- Condensate fractionation: choice of the operating conditions.
- Quality requirements for methane, ethane, propane and butane used for MR make-up.
- Storage of methane, ethane, propane and butane for make-up.
- Nitrogen requirements for make-up.

**SIMULATION OF CONDENSATE RECOVERY & FRACTIONATION USING PRO/II™ OR HYSYS™** 0.5 d
- Selection of thermodynamics packages.
- Simulation of a condensate fractionation and stabilization process.

**CASCADE PROCESS OPERATING CONDITIONS & SIMULATION** 0.5 d
- Process diagram and operating parameters.
- Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing.

**COMPARISON OF THE MAIN MIXED REFRIGERANTS LIQUEFACTION PROCESSES** 0.5 d
- Fields of application of liquefaction processes.
- Comparison with cascade process and turbo expander based process.

**LlQUEFACTION WITH C3 - MIXED REFRIGERANTS - OPERATING CONDITIONS & SIMULATION** 1 d
- Process diagram and operating parameters.
- Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing.
- Optimization of MR composition.

**LlQUEFACTION WITH 2 MIXED REFRIGERANTS - OPERATING CONDITIONS & SIMULATION** 0.5 d
- Process diagram and operating parameters.
- Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing.
- Optimization of MR composition.

**LlQUEFACTION PROCESSES PERFORMANCES COMPARISON** 0.5 d
- Heat and mass balance for each process.
- Comparison of power requirements for the different processes.

**Ways & Means**
- Highly interactive training course delivered by industry experts and adapted to participants’ experience.
- Numerous simulation and case studies performed using PRO/II™ or HYSYS™.

**Prerequisites**
- Advanced knowledge in Process Design Engineering.
- Use of process simulators (PRO/II™ or HYSYS™).

**Expertise & Coordination**
- IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.
Advanced Certificate

Advanced Oil & Gas Field Processing Certification

Level: PROFICIENCY

Purpose
This course aims to deepen understanding of Oil & Gas field processing techniques.

Audience
Engineers involved in operating or designing Oil & Gas field processing facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand main thermodynamic transformations involved in Oil & Gas processing,
- grasp a comprehensive picture of Oil & Gas processing facilities,
- simulate main Oil & Gas facilities,
- master operating variables and conditions of processing facilities.

Ways & Means
- Highly interactive training with industry-specialist lecturers.
- Numerous applications and illustrations.
- Extensive practice of PRO/II™ process simulation software: a case study will be developed along these 3 weeks (simulation of a crude oil and associated gas processing process).

Learning Assessment
Assessment by test at the end of each module.

Prerequisites
Engineering degree or equivalent professional experience within the petroleum industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Advanced Oil & Gas Field Processing.
- Ready-to-use skills.

Course Content

Module 1: THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING (page 265) 5 d
Well effluent.
Ideal and real fluid behavior.
Liquid-vapor equilibrium of pure substances:
- Vapor pressure curves.
- Enthalpy diagrams.
- PRO/II™ simulation exercises.
Liquid-vapor equilibrium of mixtures - Mixture separation processes:
- Phase envelopes.
- Flash, distillation, absorption, stripping.
- PRO/II™ simulation exercises.
- Heat transfer, heat balance and thermal equipment.

Module 2: OIL & WATER TREATMENT (page 266) 5 d
Need for field processing of oil - Quality requirements.
Crude oil treatment:
- Crude stabilization.
- Crude dehydration.
- Acid crude sweetening.
- Crude oil treatment process simulation using PRO/II™.
Storage tanks: technology, operations and maintenance.
Production water treatment:
- Regulation for disposal.
- Main treatments.
Injection water treatment:
- Quality requirements.
- Main treatments.

Module 3: GAS PROCESSING & CONDITIONING (page 267) 5 d
Need for field processing of gas - Quality requirements.
Gas processing:
- Gas dehydration.
- Gas sweetening.
- NGL extraction.
- Simulation of a gas processing chain using PRO/II™.
Liquefied Natural Gas (LNG).

Reference: PENG/ADVGH
Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/ADVFR. Please contact us for more information.
Module 1: Thermodynamics Applied to Well Effluent Processing
Fluid behavior - Mixture separation - Gas compression

Level: PROFICIENCY

Purpose
This course provides a thorough understanding of thermodynamics principles underlying operation and design of Oil & Gas processing facilities.

Audience
Engineers involved in operating or designing Oil & Gas field processing facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
► describe Oil & Gas well effluents composition, properties and characteristics,
► grasp ideal gas law, real fluid behavior and characterization methods,
► explain liquid-vapor equilibrium of pure substances and mixtures,
► master the operating principles and performances of mixture separation processes,
► perform simulations with PRO/II™ and master the fundamentals of equations of state.

Ways & Means
► Highly interactive training with industry-specialist lecturers.
► Numerous applications and illustrations.
► Extensive practice of PRO/II™ process simulation software.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

WELL EFFLUENT
0.75 d
Constitution and physical states of matter.
 Constituents of well effluents: hydrocarbons, impurities, water, sediments…
 Different types of effluents: black oil, light oil, volatile oil, condensate gas, dry gas…
 Characterization parameters: GOR, CGR, BSW, WOR, water cut, Bo, Bg, B’g…
 Examples of compositions of crude oil and natural gas effluent.

LIQUID-VAPOR EQUILIBRIUM OF PURE SUBSTANCES
1.25 d
Vapor pressure curves.
 Overall phase diagram of a pure substance (three dimensions: P, T and V).
 Enthalpy diagrams of pure substances.
 Exercises: vapor pressure and boiling points of pure components; vapor pressure and boiling point; case of a column.
 PRO/II™ simulation: propane cryogenic loop; operating parameters optimization; effect of ambient conditions.

LIQUID-VAPOR EQUILIBRIUM OF MIXTURES - MIXTURE SEPARATION PROCESSES
2 d
Phase envelopes.
 PRO/II™ simulation: phase envelope of well effluents, sales gas, stabilized crudes.
 Well effluents behavior from pay zone to surface processing facilities.
 PRO/II™ simulation: evolution of the effluent behavior in a well.
 Techniques applied to mixture separation: flash process, distillation process.
 Absorption and stripping phenomena.
 PRO/II™ simulation: LPG recovery by physical absorption; mixture separation by distillation (LPG splitter).

IDEAL GAS & REAL FLUID BEHAVIOR
0.5 d
Ideal gas behavior.
 Behavior of real fluids: compressibility factor, Amagat’s law, law of corresponding state with two and three parameters.
 Equations Of State (EOS): conception, uses, examples, selection.

HEAT TRANSFER, HEAT BALANCE & THERMAL EQUIPMENT
0.5 d
Fundamentals of heat transfer.
 Heat balance.
 Technology of heat exchangers and air coolers.
 Examples of thermal equipment applications.

Reference: PENG/ADV1GB
Can be organized as an In-House course.
Contact: exp.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>16 September</td>
<td>20 September</td>
<td>€3,570</td>
</tr>
</tbody>
</table>

This course is also available in French: PENG/ADV1FR. Please contact us for more information.
Module 2: Oil & Water Processing
Sizing - Simulation - Operation

Level: PROFICIENCY

Purpose
This course provides a comprehensive understanding of oil and water treatment processes, operation and troubleshooting.

Audience
Engineers involved in operating or designing oil and water field processing facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
- list various problems that can be induced by unwanted elements and compounds in crude oil streams,
- master oil and water treatment processes, operations and related operating conditions,
- design main equipment used for oil processing,
- troubleshoot main operating problems encountered in oil and water processing and related solutions,
- simulate crude oil treatment processes using the PRO/II™ software,
- describe technology, operating principles and maintenance of storage tanks.

Ways & Means
- Highly interactive training with industry-specialist lecturers.
- Numerous applications and illustrations.
- Extensive practice of PRO/II™ process simulation software.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
It is highly recommended to attend Module 1 first (page 265).

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

NEED FOR OIL FIELD PROCESSING - QUALITY REQUIREMENTS 0.25 d
Constituents raising problems for storage, transport, or crude oil sale.
Different specifications and quality requirements of crude oils.
Necessary treatments to reach these specifications.
Examples of compositions of commercialized crude oils.

CRUDE OIL TREATMENT 2.75 d
Crude stabilization by Multi Stage Separation (MSS):
- Process principle.
- Operating parameters: number of separation stages, pressures, heating and cooling needs… - Influence on the quality and quality (API grade) of the produced oil.
- Foaming problems and main available solutions.
- Associated gas recompression - Typical associated gas compression schemes.
- Applications: practice of separator summary design methods.
- PRO/II™ simulation: study of the influence of separation stage number on the performances of a MSS process.
Crude dehydration and desalting:
- Emulsion problems.
- Main dehydration processes.
- Crude oil desalting.
- Applications: practice of desalter summary design methods.
Acid crude sweetening (H₂S removal):
- Cold stripping: origin of stripping gas, need for sweetening of stripping gas.
- Hot stripping.
- Applications: practice of stripping column summary design methods.
- PRO/II™ simulation: simulation of a crude oil stripping units case study.
Case study: simulation of a whole crude oil field treatment plant; study of an offshore crude oil field treatment unit, based on a Multiple Stage Separation (MSS) process scheme; optimization of the operating parameters.

STORAGE EQUIPMENT 0.5 d
Atmospherics tanks.
Case of floating storage vessels (FSO, FPSO).
Maintenance and operation.

PRODUCTION WATER TREATMENT 0.5 d
Regulations for disposal.
Main treatments. Operating principle and required performances.
Comparison of the different available techniques. Selection criteria.
Examples of production water treatment block flow diagrams.

INJECTION WATER TREATMENT 1 d
Reasons for water injection.
Quality requirements and necessary treatments.
Main operating conditions of each treatment and required performances.
Examples of injection water treatment block flow diagrams.

Reference: PENG/ADV2GB
Contact: exp.rueil@ifptraining.com

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<tr>
<td>Rueil</td>
<td>23 September</td>
<td>27 September</td>
<td>€3,570</td>
</tr>
</tbody>
</table>

This course is also available in French: PENG/ADV2FR. Please contact us for more information.
Module 3: Gas Processing & Conditioning
Sizing - Simulation - Operation

Course Content

5 days

NEED FOR FIELD PROCESSING OF GAS - QUALITY REQUIREMENTS 0.25 d
Constituents raising problems for storage, transport or end use of natural gas.
Different specifications and quality requirements for natural gas.
Necessary treatments to conform these specifications.
Examples of compositions of commercialized natural gases.

GAS DEHYDRATION (drying) & HYDRATE FORMATION INHIBITION 1.25 d
System behavior. Moisture content of a saturated gas:
Applications: moisture content of different gases of various compositions.
Hydrate formation inhibition by injection of inhibitors: MeOH, MEG, DEG, LDHI…
Gas dehydration processes: TEG units, molecular sieves…
Application: summary design of TEG unit.
PRO/II™ simulation: simulation of TEG unit.

GAS SWEETENING: REMOVAL OF ACID COMPONENTS (H₂S and/or CO₂) 0.75 d
Overview of the techniques dedicated to gas sweetening:
Chemical solvent processes. Amine units (MEA, DEA, DGA, MDEA…).
Physical solvent processes.
Hybrid (physico-chemical) solvent processes.
Application: conversion of H₂S: sulfur production (CLAUS process) and tail gas processing.
Application: summary design of an amine unit.

NATURAL GAS LIQUIDS (NGL) EXTRACTION (removal of heavy components) 0.75 d
External refrigeration loop.
Joule-Thomson expansion.
Turbo-expander.
Application: calculation of cryogenic loop used for extraction.
PRO/II™ simulation: simulation of NGL extraction unit - Process selection.

CASE STUDY: SIMULATION OF A WHOLE NATURAL GAS FIELD PROCESSING PLANT 1 d
Study of a natural gas dehydration, NGL extraction and compression unit.
Optimization of the operating parameters.
Analysis of hydrate formation risks.

LIQUEFIED NATURAL GAS (LNG) 1 d
Liquefaction processes: operating principle, typical operating conditions, technology of specific equipment (plate fin heat exchangers, spiral-wound heat exchanges, refrigeration loop compressors…), power consumption…
LNG storage and transport: storage tanks, LNG carriers, jetty, loading arms…
Safety considerations specific to natural gas liquefaction plants.
Industrial examples of natural gas liquefaction units.

Reference: PENG/ADV3GB
Can be organized as an In-House course.
Contact: exp.rueil@ifptraining.com

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<tr>
<td>Rueil</td>
<td>30 September</td>
<td>4 October</td>
<td>€3,570</td>
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</table>

This course is also available in French: PENG/ADV3FR. Please contact us for more information.
Advanced Water Processing

Level: PROFICIENCY

Purpose
This course aims to acquire a detailed understanding of produced water and injection water treatment involved in Oil & Gas field processing operations, as well as the technology and operation of main equipment involved.

Audience
Managers, engineers, and chemists, looking for technical information and understanding of water treatment related issues in Oil & Gas production facilities.

Learning Objectives
Upon completion of the course, participants will be able to:

- acquire technical knowledge and practical approach of water management and treatment in Oil & Gas processing facilities, as well as the technology and operating principle of the equipment used in these facilities,
- be aware of water reject and disposal specifications as well as water injection quality requirements,
- detail available process technologies allowing to respect reject regulations and ensure water injection compatibility,
- describe the technology of the main equipment used in these type of processing facilities,
- design a production water processing and size associated main equipment.

Ways & Means
Numerous application exercises inspired from actual Oil & Gas production facilities.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

NEEDS FOR INJECTION WATER & PRODUCED WATER PROCESSING
0.5 d
Fundamentals of reservoir:
- Types and characteristics. Pressure profiles.
- Enhanced oil recovery and needs for water injection.
Well effluent behavior and characterization:
- Water cut, BSW.
- Oil processing. Primary separation equipment.
- Associated produced water.
Drain systems.

ENVIRONMENTAL REGULATION
0.5 d
Environmental considerations:
- Strategic environmental assessment.
- Key regulatory bodies.
Issues due to water pollution by oil: effects on marine fauna and flora.

PRODUCED WATER TREATMENT
1.5 d
Produced water chemistry and characterization.
Factor affecting the water treatment.
Produced water processing:
- Primary: API tanks, plate separators.
- Secondary: flotation, coalescent filters, hydrocyclones.
- Tertiary: membranes, biological treatments.
Chemicals and chemical treatments.
Comparison of available technics:
- Selection criteria. Performances comparison.
- Design.
- Reference costs.
Produced water systems monitoring.

PRODUCED WATER TREATMENT DESIGN & IMPLEMENTATION
1.5 d
Design of a produced water processing system for a given set of data and disposal specifications.
Main equipment sizing, identification of chemical treatments.
Examples of existing plants design, layouts and operating philosophies.

INJECTION WATER TREATMENT
1 d
Water injection well design and construction.
Injection water impurities, quality requirements and necessary treatments:
- Filtration.
- De-oxygenation processes (vacuum tower, stripping tower, O₂ scavenger).
- Sulfate Removal Units (SRU).
- Chemical treatments (chlorination, corrosion inhibition, biological control).
Main equipment and pumping systems.
Comparison of available technics:
- Selection criteria - Performances comparison.
- Design.
- Monitoring.
- Reference costs.
Examples of existing installations.

Reference: PENG/ADVWATER
This course is also available in French: PENG/ADVWAT. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

Only available as an In-House course.
Oil & Gas Process Simulation
Simulation using HYSYS™ & PRO/II™

Level: FOUNDATION

Purpose
This course provides a comprehensive knowledge of all field treatments, and develops practical skills in simulation of Oil & Gas treatment processes using the software HYSYS™ and PRO/II™.

Audience
Professionals involved or interested in Oil & Gas field treatment processes: operation or process personnel, engineering staff, R&D engineers...

Learning Objectives
Upon completion of the course, participants will be able to:
- understand Oil & Gas processing operations: flash separation, compression, expansion, heating or cooling, mixing, pumping, etc.,
- grasp common Oil & Gas processing schemes and operating parameters,
- build a Process Flow Diagram (PFD) and optimize existing process schemes,
- simulate an industrial unit at different operating stages,
- extract thermodynamics data from the simulation software database (phase envelope, critical point parameters, hydrate formation risk area, different physical properties...).

Ways & Means
- Highly interactive training by industry-specialist lecturers.
- Several simulation case studies, addressing most of Oil & Gas field treatments.
- Extensive practice of PRO/II™ and HYSYS™ simulation software.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

SOFTWARE PRESENTATION 0.25 d
Presentation of the different pieces of equipment: pumps, compressors, heat exchangers, turbines, turbo expanders, separators, valves, pipes.
Choice of the thermodynamic model: PR, SRK...
Definition of components, pseudo-components, heavy cuts.

SIMULATION OF A CRUDE OIL FIELD TREATMENT UNIT 1 d
Main field treatments for crude oils: stabilization, sweetening, desalting and dehydration, associated gas compression and treatment.
Study of an offshore crude oil field treatment unit, based on Multiple Stage Separation (MSS).
Influence of the number of separators on the quality (API°, RVP...) and quantity of stabilized oil.
Optimization of the operating parameters: pressures and temperatures of separators, suction and discharge condition of compressors, pumping needs for export by pipe.
Identification and adjustment of the controlling parameters.

SIMULATION OF A NATURAL GAS FIELD TREATMENT UNIT 1 d
Main field treatments for natural gases: dehydration, sweetening, LNG extraction/recovery, compression and export...
Study of an offshore natural gas dehydration, liquids extraction and compression unit.
Optimization of the operating parameters: primary separator operating conditions, dehydration parameters, cooling temperature for a sufficient liquid extraction, compression needs upstream the export pipe.
Identification and adjustment of the controlling parameters.
Analysis of hydrate formation risks.

SIMULATION OF A GAS DEHYDRATION UNIT BY PHYSICAL ABSORPTION (TEG) 0.75 d
Simulation of the glycol loop: contactor, flash separator, regenerator (still), circulation pumps, glycol/glycol exchanger.
Adjustment of controlling parameters: dry gas residual moisture content versus purity of lean TEG, moisture flow to be removed versus TEG circulation flow.

SIMULATION OF A NATURAL GAS LIQUIDS (NGL) EXTRACTION/RECOVERY UNIT 0.75 d
Progressive build up of the PFD of a Natural Gas Liquids (NGL) extraction unit.
Three processes are studied:
- External refrigeration loop (cryogenic loop).
- Joule Thomson expansion valve.
- Turbo Expander.
Illustration of the results on phase envelope diagram.

SIMULATION OF A PROPANE CRYOGENIC LOOP 0.75 d
Study of a simple loop.
Improvement of loop performances by addition of an intermediate expansion.
Use of propane enthalpy diagram to validate the software results.
Influence of propane purity and consequences of air ingress.

SIMULATION OF NATURAL GAS LIQUID FRACTIONATION UNIT - DISTILLATION PROCESS 0.5 d
Principle of separation by distillation process and main operating parameters.
Simulation of a LNG fractionation unit using distillation columns.
Characteristics and operating conditions of the main equipment. Specific constraints.

Reference: PENG/SIMULGB

Can be organized as an In-House course.
Contact: exp.rueil@ifptraining.com

Location | Start Date | End Date | Tuition Fees
---|---|---|---
Rueil | 2 December | 6 December | €3,570

This course is also available in French: PENG/SIMULFR. Please contact us for more information.
Overview of Oil & Gas Design Engineering

**Course Content**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OIL &amp; GAS UPSTREAM PROJECTS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>E&amp;P activities.</td>
<td></td>
</tr>
<tr>
<td>Main phases of a field’s life.</td>
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<tr>
<td>Reasons and battery limit of design engineering during a project.</td>
<td></td>
</tr>
<tr>
<td>Case study: review of some onshore and offshore projects.</td>
<td></td>
</tr>
<tr>
<td><strong>NEEDED INFORMATION FOR SUMMARY DESIGN</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>General considerations for plant design.</td>
<td></td>
</tr>
<tr>
<td>Review of the plant conditions: selection of export routes, power generation versus power from the grid, weather and seasonal conditions.</td>
<td></td>
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<tr>
<td>Analysis of the process function: export specifications, injection/disposal specifications.</td>
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<tr>
<td>Operating philosophy selection.</td>
<td></td>
</tr>
<tr>
<td><strong>GATHERING NETWORK DESIGN OVERVIEW</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Types of gathering systems, a review of common architectures.</td>
<td></td>
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<tr>
<td>Main considerations: backpressure, pressure drop, erosion velocities.</td>
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</tr>
<tr>
<td>Gathering network engineering: architecture, location of pumping/booster stations, summary sizing of the lines, operating conditions and operating philosophy.</td>
<td></td>
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<tr>
<td>Case study: gathering network of 4 oil fields.</td>
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</tr>
<tr>
<td><strong>METHODOLOGY FOR PLANT SUMMARY DESIGN</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Review of ISO 10418/API RP 14C Petroleum and natural gas industries production installations Basic surface process.</td>
<td></td>
</tr>
<tr>
<td>Process flow diagram selection methodology: production trains number versus production, operating philosophy and trains and equipment redundancy.</td>
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<tr>
<td>Requirements for process sizing criteria to be used during pre-project and basic or detailed engineering phases.</td>
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<tr>
<td>Utilities verification and checklist.</td>
<td></td>
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<tr>
<td><strong>OBSOLESCENCE &amp; PLANT LIFETIME CYCLE MANAGEMENT</strong></td>
<td>0.5 d</td>
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<tr>
<td>Obsolescence and production aging management.</td>
<td></td>
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<tr>
<td>Plant design philosophy: phasing opportunities identification, anticipation of plant revamping.</td>
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<tr>
<td>Project and operation deliverables list.</td>
<td></td>
</tr>
<tr>
<td><strong>DESIGN ENGINEERING WORKFLOW &amp; USE OF SIMULATORS IN GATHERING NETWORKS &amp; PROCESS DESIGN</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Process design workflow: identification of production scenario, process summary design, simulation, heat and material balance, sizing of the main equipment, design validation.</td>
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<tr>
<td>Needed inputs for simulation.</td>
<td></td>
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<tr>
<td>Engineering outputs of a process or gathering network simulation: heat and material balance, equipment datasheets…</td>
<td></td>
</tr>
<tr>
<td><strong>CASE STUDY: OIL TREATMENT &amp; ASSOCIATED GAS COMPRESSION FIELD TREATMENT PLANT SUMMARY DESIGN</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Fundamentals of flare network design.</td>
<td></td>
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<tr>
<td>Flare network description, control, safety systems and operation.</td>
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</tr>
<tr>
<td>Outputs of a flare network design: architecture of flare network, design of lines and flare KO drums, flare tips datasheets.</td>
<td></td>
</tr>
<tr>
<td><strong>FLARE NETWORK DESIGN OVERVIEW</strong></td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

Reference: PENG/O&GDESIGNGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/O&GDESIGNFR. Please contact us for more information.
Schematization of Oil & Gas Processes
Block Flow Diagrams, PFD, P&ID, Plot Plans & Isometrics

Level: FOUNDATION

Purpose
This course aims to provide technical knowledge of the Oil & Gas process schematization.

Audience
Engineers and technicians, who need to read Oil & Gas process schemes. Process, design and construction staff, equipment suppliers for Oil & Gas processing facilities, etc.

Learning Objectives
Upon completion of the course, participants will be able to:
- distinguish between the different diagrams used in the Oil & Gas industry,
- read and analyze each of these types of schemes,
- know which type of diagram to refer to, in order to obtain specific required information,
- communicate better with other teams from different disciplines, contributing to an Oil & Gas project.

Ways & Means
- Highly interactive training with industry specialist lecturers.
- This course rely on several case studies based on common Oil & Gas processing facilities.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

DIFFERENT DIAGRAMS USED IN OIL & GAS PROCESSING 0.25 d
Different types of diagrams used in the Oil & Gas industry:
- Block Flow Diagrams.
- Process Flow diagrams (PFD).
- Piping & Instrumentation Diagram (P&ID).
- Plot plan onshore and offshore.
- Isometrics.
Symbolization: representation of the different pieces of equipment, the instrumentation… Illustration by examples of schemes corresponding to the same process unit.

DRAWING A BLOCK FLOW DIAGRAM 0.25 d
Drawing the Block Flow Diagram.
Identification of the different connections between the blocks.
Analysis of the working principle of the whole process.

DRAWING A PROCESS FLOW DIAGRAM 0.75 d
Reminder of the working principle of main equipment: valves, separators, desalter, pumps, compressors, heat exchangers…
Drawing of a PFD starting from an illustration and a written description of a crude oil stabilization plant, including associated gases compression unit, crude oil storage and export pumps.
Emphasis on the schematization pitfalls to avoid: inlet and outlet connections of each piece of equipment, tube side and shell side of heat exchangers, suction and discharge lines of rotating machinery, typical arrangement of compressors (gas cooler, scrubber, anti-surge line…).
Implementation of the different control loops on the previous schematic, starting from a written description.
Emphasis on the instrumentation pitfalls to avoid: connection of sensors, positioning of control valves (inlet or outlet of capacities, suction or discharge or rotating machinery, inlet or outlet of heat exchangers…).

STUDY & ANALYSIS OF A P&ID 1 d
Team work exercises.
Analysis of a set of Process and Instrumentation Diagrams, symbols, line numbering, safety systems, etc.
Identification of the different systems: hydrocarbon, water, utilities…
Analysis of the instrumentation and process control.
Drawing of the Process Flow Diagrams corresponding to the studied P&ID’s.
Presentation of the results of each team to the other groups.

DRAWING OF ISOMETRICS 0.75 d
Use of isometrics.
Exercises of isometric drawing.

Reference: PENG/SCHEMGB
Only available as an In-House course.

This course is also available in French: PENG/SCHEMFR. Please contact us for more information.
Gas Sweetening & Sulfur Recovery

Course Content

OVERVIEW OF GAS SWEETENING PROCESSES
0.25 d
Nature, origins and compositions of the streams to be treated.
The properties of sulfur compounds and CO₂.
Reasons for removing acid gases, usual specifications.
Cost impact of gas sweetening and stakes.
Acid gas management, impact on the sweetening unit.
The different types of gas sweetening processes.

AMINE SWEETENING PROCESSES
1.5 d
General principles.
Generic processes and proprietary processes.
Typical process flow scheme.
Amine unit design: key design parameters.
Specific process arrangements.
Equipment review, process control.
Operational issues and troubleshooting.
Specificities of amine units.
Elgin-Franklin, an example of a versatile MDEA sweetening unit.
An example of successive revamping of an amine unit.
Acid gas enrichment.

OTHER GAS SWEETENING PROCESSES
0.75 d
Scavengers.
Solid bed processes.
Redox processes.
Other solvent processes: hot carbonate, physical solvents, hybrid solvents.
Permeation membranes.
Cryogenic distillation processes.
LPG sweetening.
Guidelines for process selection.

RECOVERING SULFUR FROM ACID GASES
0.25 d
Architecture of the sulfur recovery facilities.
Sulfur properties.
The sulfur market (sulfur uses).

SULFUR RECOVERY UNITS (Claus)
1.25 d
Chemical mechanisms & general process flow diagram.
Key parameters of the Claus process.
The thermal stage.
The catalytic stages.
Adapting the process to the acid gas quality (rich/lean acid gas).
Operational issues.

TAIL GAS TREATMENT
0.75 d
Types of TGT processes.
Direct oxidation processes.
Sub-dew point processes.
Wet sub-dew point process.
H₂S absorption processes.

SULFUR CONDITIONING & STORAGE
0.25 d
Liquid sulfur degassing.
Sulfur forming.
Sulfur storage.

Reference: PENG/ACIDGB
Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/ACIDFR. Please contact us for more information.
Fundamentals of Engineering Activities

**Level:** FOUNDATION

**Purpose**
This course provides an overview of the engineering studies of Oil & Gas projects, from conceptual phase to end of detailed studies.

**Audience**
Professionals wishing to gain a clear understanding of engineering activities, their execution by a contractor and their supervision by company. This includes discipline engineers, project engineers and project engineering managers.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- coordinate all engineering activities, deliverables, work sequence and interfaces,
- evaluate the main risks: schedule, vendors, interfaces, quality and how to mitigate them,
- control engineering execution: critical issues and controls/KPI to put in place,
- apply best practices, including management of changes, progress control, interfaces, etc.

**Ways & Means**
Half of the training is devoted to hands-on exercises on engineering discipline and management tasks.

**Learning Assessment**
Quiz at the end of the module.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

<table>
<thead>
<tr>
<th>FROM PRE-PROJECT STUDIES TO ENGINEERING</th>
<th>0.75 d</th>
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<table>
<thead>
<tr>
<th>CONTRACTUAL SCHEMES</th>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope of works of the engineering activities. Statement of requirements and basis of design. Roles of contractors and subcontractors. Supervision role by company team. Organization requirements for each party involved.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PROCESS DESIGN</th>
<th>0.5 d</th>
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</thead>
<tbody>
<tr>
<td>Specifications for crude oil and natural gas and necessary treatments. Equipment standards, basis of design, equipment list and sizing. Flare, power supply, control and safety loops. Process simulations. Oil &amp; Gas process diagrams: block flow, process flow, piping and instrumentation.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>STRUCTURE &amp; MECHANICAL</th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe racks, loads and pipe supports. Equipment design. Static and rotating equipment. Types of pumps.</td>
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</table>

<table>
<thead>
<tr>
<th>SAFETY IN DESIGN</th>
<th>0.5 d</th>
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</thead>
<tbody>
<tr>
<td>HAZID, HAZAN and HAZOP. Plant layout, escape routes and fire zones.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SITE PREPARATION &amp; CIVIL WORKS</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete slabs and foundations. Vendor drawings.</td>
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</table>

<table>
<thead>
<tr>
<th>MATERIALS &amp; CORROSION</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material classes and selection, corrosion control. Cathodic protection system design. Painting insulation specifications. Piping material, classes, installation and stress analysis.</td>
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</table>

<table>
<thead>
<tr>
<th>ELECTRICITY &amp; INSTRUMENTATION</th>
<th>0.5 d</th>
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</thead>
<tbody>
<tr>
<td>Single-line diagrams. Database management.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>AREAS OF CONCERN DURING ENGINEERING EXECUTION</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical critical path of an Oil &amp; Gas project. Internal constraints of the engineering schedule: interfaces between disciplines, vendor input. Coordination between engineering, procurement and construction activities. Interface management, change management. Actual progress control and reporting. Standardization procedures.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: PENG/FENGB Only available as an In-House course. Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/FENGFR. Please contact us for more information.
## Technical Standards for Surface Facilities Design

### Level: PROFICIENCY

#### Purpose
This course provides a comprehensive overview of technical standards applied in projects for construction, maintenance and operation of upstream Oil & Gas facilities.

#### Audience
Engineers and technicians interested or directly involved, in day-to-day activities of Oil & Gas projects: safety, design, construction, operation and/or maintenance of Oil & Gas field.

#### Learning Objectives
Upon completion of the course, participants will be able to:
- list the main Norms and recommended practices for Oil & Gas projects,
- assess standards that ensure the long-term productivity of surface installations,
- explain guidelines and procedures for promotion and maintenance of safe working conditions throughout construction, maintenance and operation activities,
- detail the basic requirements for safe and environmentally sound construction and maintenance of Oil & Gas infrastructures,
- grasp the key aspects of safety, design, construction and operation, necessary for the orderly and effective development of Oil & Gas projects,
- ascertain the treatment processes necessary for production water and injection water.

#### Ways & Means
- Several illustrations from recent projects.
- Review of applicable standards, norms and current industry best practices.

#### Learning Assessment
Quiz at the end of the module.

#### Prerequisites
No prerequisites for this course.

### Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

#### HSE GUIDELINES FOR OIL & GAS DEVELOPMENT PROJECTS
Settle down the minimum safety requirements for the layout of installations.
0.5 d

#### WELDING & QUALITY CONTROL INSPECTION OF PIPING
Minimum requirements for welding of pressure containing piping and/or equipment.
General requirements for the field welding and inspection of pipelines.
Review of the ASME Section IX Welding and Brazing Qualifications and comparison with EN 287 Qualification Test of Welders - Fusion Welding.
Review of ASME V Non-destructive examination.
0.25 d

#### PIPELINE DESIGN, STANDARD FOR CONSTRUCTION & INSPECTION
General considerations for onshore pipeline design.
Specifications applicable to pre-project engineering, basic engineering, and construction engineering of the pipeline systems.
Review of API 1104 Standard for Welding Pipelines and Related Facilities.
0.25 d

#### STANDARD PRACTICE FOR EQUIPMENT DESIGN, MAINTENANCE & INSPECTION
Scope of the inspections for certain stages in construction, in particular on hand over to a third party.
Minimum measures regarding risk mitigation during construction and installation activities.
Requirements for the evaluation and rating of the criticality of the units delivered under the contract.
Requirements for the quality surveillance activities.
Identification of key inspection documents using EN 10204 Types of inspection documents.
0.5 d

#### ENVIRONMENTAL REQUIREMENTS FOR PROJECTS
Establish the environmental requirements for projects design and E&P activities.
Environmental Baseline Survey (EBS) and Environmental Impact Assessment (EIA).
Effects and potential impacts of the Project on the natural and human environment, and of their extent.
0.25 d

#### LIQUID STORAGE TANKS
Minimum rules and requirements to be met with respect to design, fabrication, manufacturer quality control, inspection test and painting of single containment, double-walled metallic storage tanks.
0.25 d

#### INSPECTION PLAN FOR EQUIPMENT & STRUCTURES
Corrosion control on production facilities: field operation.
Minimum inspection requirements necessary to assure the integrity of plant and structures.
0.25 d

#### GAS FACILITIES DESIGN
Minimum requirements for process sizing criteria to be used during pre-project and basic or detailed engineering phases.
Defining maintainability and inspectability criteria necessary to ensure the installations’ integrity throughout their life.
Fundamentals for the maintenance strategy, by type of equipment.
Production availability studies of Oil & Gas facilities.
2 d

#### INTRODUCTION TO ISO 29001
Main requirements for quality management.
0.25 d

#### WATER TREATMENT SYSTEMS
Emulsions in crude oil processing.
Produced water treatment.
Injection water treatment.
0.5 d

Reference: PENG/STANDGB
Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

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1 This course is also available in French: PENG/STANDFR. Please contact us for more information.
**Process Equipment Engineering**

**Level:** FOUNDATION

**Purpose**
This course aims to select and size piping system equipment, process equipment and review main problems in operation.

**Audience**
Engineers looking to acquire best practices for equipment design and troubleshooting.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- understand pipe standards and metallurgy,
- be able to select several types of control valves, safety valves and restriction orifices,
- describe heat exchangers technology and design,
- describe oil-water separation equipment and gas-liquid separation equipment technology and design,
- identify and propose adequate solutions to process equipment common operating issues.

**Ways & Means**
- Highly interactive training with industry specialist lecturers.
- Methodology illustrated by case studies for the sizing of key equipment.

**Learning Assessment**
Assessment by test at the end of the course.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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**Course Content**

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PIPING SYSTEMS</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Main concepts and definitions: operating/design pressure, piping schedules and rating, thickness…</td>
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<tr>
<td>Piping codes and standards.</td>
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<tr>
<td>Pipe materials and manufacturing.</td>
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<tr>
<td>Flanges assembly, fittings, gaskets and other pipework elements (spectacle blinds, strainers…).</td>
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<tr>
<td>Valves for flow control and flow shut-off: technology and selection criteria; check valves.</td>
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</tr>
<tr>
<td>Pressure relief equipment sizing guidelines and datasheet review: pressure safety valves, thermal expansion valves, rupture disks, restriction orifices.</td>
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<tr>
<td>Line sizing basics; pipe and valves material selection according to service; consequences of an incorrect choice or assembly.</td>
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<tr>
<td>Basics of pipe stress and rupture analysis.</td>
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<tr>
<td>Pressure vessels: various types of pressure vessels, vessels behavior under pressure and under vacuum.</td>
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<tr>
<td><strong>HEAT EXCHANGERS</strong></td>
<td>1 d</td>
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<tr>
<td>Fundamentals of heat transfer.</td>
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<tr>
<td>Technology of heat exchangers and air coolers: selection criteria.</td>
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<tr>
<td>Fundamentals of design and heat exchanger performance.</td>
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</tr>
<tr>
<td><strong>CRUDE OIL PROCESSING EQUIPMENT DESIGN &amp; SIZING</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Separators technology (review of typical internals and impact on sizing) and selection criteria.</td>
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</tr>
<tr>
<td>Operating parameters and operations problems.</td>
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<tr>
<td>Elements of calculation standards (thickness, welding coefficient…).</td>
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<tr>
<td>Sizing a 2-phase and 3-phase separator (nozzles, diameter, thickness, liquid hold-up times…).</td>
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<tr>
<td><strong>GAS PROCESSING EQUIPMENT DESIGN &amp; SIZING</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Columns technology (review of typical internals and impact on sizing).</td>
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<tr>
<td>Selection criteria.</td>
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<tr>
<td>Operating parameters: pressure, temperature, flowrate…</td>
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<tr>
<td>Elements of sizing (diameter, number of theoretical and actual trays…).</td>
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<tr>
<td>Case study: summary design of a TEG column.</td>
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<tr>
<td>Column troubleshooting.</td>
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</tr>
</tbody>
</table>

Reference: STAT/PROCDESIGNGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: STAT/PROCDESIGNFR. Please contact us for more information.
Flare Network Design Engineering

Level: FOUNDATION

Purpose
This course aims to acquire a detailed understanding of relief systems and flare network, as well as the technology of main equipment involved and monitoring basics.

Audience
Managers, engineers and technicians looking for technical information and understanding of flare network in Oil & Gas production facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
- provide technical knowledge and practical approach of relief system and flare network in Oil & Gas processing facilities, as well as the technology and operating principle of the equipment used in these facilities,
- review the basics of Oil & Gas field protection against overpressure,
- detail the available process technologies allowing to respect reject regulations,
- select and size the key components of those networks,
- describe the technology of the main equipment used.

Ways & Means
- Numerous application exercises inspired from actual Oil & Gas production facilities.
- Design practice on Aspen Flare System simulator.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: STAT/FLARE. Only available as an In-House course. Contact: exp.rueil@ifptraining.com

This course is also available in French: STAT/TORCHE. Please contact us for more information.

Course Content

OVERVIEW OF TYPICAL RELIEF & FLARE SYSTEMS
Codes and standards typical in Oil & Gas facilities.
Safety implications and causes of overpressure.
Overpressure source:
- Protection philosophy.
- Source isolation.
- Relief.
Environmental regulation and standards.
0.5 d

MECHANICAL SPECIFICATION OF PRESSURE VESSELS & HEAT EXCHANGERS
Vessels codes and standards.
Material selection.
Metallurgy, heat effect and corrosion mechanism.
Design calculation for pressure vessels and heat exchangers.
Vessel integrity, evaluation according to the Oil & Gas standards.
0.75 d

RELIEF GAS SYSTEM OVERVIEW
System equipment and components.
Relief gas parameters and process safety management.
Monitoring systems and procedures.
Blow down:
- Purpose.
- Operational consideration.
Design and specification.
0.75 d

FLARE SYSTEM
Flare gas recovery, smokeless flaring and purge gas conservation.
Defining need and quantity of purge gas.
Selection and design of key components:
- KO drum, vent and flare stack, vent and flare tips.
- Flare ignition systems.
Thermal oxidizers:
- Principle of operation.
- Components and equipment.
Radiation calculation.
1.5 d

CASE STUDY: FLARE SYSTEM SIZING
Study of an existing plant.
Introduction to Aspen Flare System.
Design of the relief gas system and the corresponding flare network using Aspen Flare System.
1.5 d
Rotating Machinery Technology

Pumps - Compressors & Expanders - Gas Turbines

Level: PROFICIENCY

Purpose
This course provides a comprehensive knowledge of technology, operating principles and performance of rotating machinery used in Oil & Gas processing facilities.

Audience
Engineers and managers involved in operating or designing Oil & Gas field processing facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
- learn about the practical use of different types of rotating machinery,
- understand operating principles and performance,
- master technology, operating constraints and maintenance of rotating machinery.

Ways & Means
- Numerous applications and illustrations.
- Field/site visit (if possible).
- Tutorials in mechanical workshop.
- Identification of frequent problems and troubleshooting.

Learning Assessment
Written test upon training course completion.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

5 days

PUMPS

2 d

Pumping prerequisites: pressure, flow rate, specific gravity, manometric head, viscosity, pressure losses…
Main types of pumps and classification - Selection criteria.
Centrifugal pumps:
Types of centrifugal pumps: single or multiple stage, radial of horizontal split, high speed, in line, vertical barrel, pit suction, magnetic drive, canned motor, Electric Submersible Pump (ESP).
Typical centrifugal pump installation in a circuit: block valves, filter, check-valve, manometers, vent and drain.
Technology of the centrifugal pumps: impellers, seals, couplings, bearings, driving machine…
Auxiliaries: flushing, lubrication, cooling.
Centrifugal pumps performances: characteristic curves, pump-circuit coupling, problems encountered (cavitation and NPSH, unpriming adaptation to operating conditions).
Positive displacement pumps:
Rotating positive displacement pumps: Progressing Cavity Pumps (PCP).
Reciprocating positive displacement pumps (piston or plunger type).
Technology of the positive displacement pumps and main applications.
HSE related to pumps operation.

COMPRESSORS & EXPANDERS

2 d

Compression prerequisites: isentropic, polytropic compression, practical laws.
Main types of compressors and classification. Selection criteria.
Reciprocating compressors:
Technology of reciprocating compressors: frame, cylinders, piston and rings, piston rod and crank head, crankshaft and connecting rods, bearings, compartment distance piece, specific emphasis on valves.
Auxiliaries: pulsation dampeners, crank mechanism and cylinder lubrication systems, cooling system, safety devices.
Centrifugal compressors:
Technology of centrifugal compressors: rotor and stator, journal and thrust bearings, internal and shaft seals, balance disc.
Auxiliaries: lubrication, sealing (liquid or gas) and cooling systems.
Turbo-expanders: technology and main uses.
HSE related to compressors and expanders operation.

GAS TURBINES

1 d

Operating principle: compression, combustion and expansion. Typical cycles and performances.
Technology of gas turbines: compressor part, combustion chamber, turbines part, internal cooling.
Auxiliaries: fuel supply and filtering, air filtration, lubricating circuits, fire-fighting system.

Reference: ROT/EQUIP2
Can be organized as an In-House course.
Contact: exp.pau@ifptraining.com

Location Start Date End Date Tuition Fees
Pau 14 October 18 October €3,570

This course is also available in French: ROT/MAT2. Please contact us for more information.
Course Content

PREREQUISITES
Operating physico-chemical parameters.
Machines specifications.
Energy and power, specific power.
Head, polytropic head, polytropic efficiency.

DESIGN METHODOLOGY
Knowledge of transported fluid.
Knowledge of the implementation circuit.
Constraint in terms of safety, environment, reliability, bulk, mass.
Knowledge of design flowrate.
Consideration of normative aspects and use of existing standards and regulations.
Identification of all configurations of the installation and the energizing equipment (number, power).
Calculation of hydraulic/aerodynamic and mechanical powers, taking into account margins.
Experimental or statistical rules.
Mechanical and hydraulic pre-dimensioning.
Choice of technology.
Simulation.

FLUID INPUT DATA
Knowledge of all the physicochemical data of the transported product:
Nature (hydrocarbon, water, chemical…).
Presence of pollutants (salts, H₂S…).
Operating parameters (pressure, temperature).
Viscosity, volatility…

KNOWLEDGE OF THE IMPLEMENTATION CIRCUIT
Nominal flow for nominal operating conditions.
Maximum delivery pressure at design flowrate.
Minimum suction pressure at design flowrate.
NPSH, at design flow (case of a pump).
Losses under load at the speeds considered.
Operating point.
Arrangement of energizing equipment.
Downgraded situations.

KNOWLEDGE & CONSTRAINTS ON EQUIPMENT
Range, stability and flowrate accuracy.
Ability to adapt to network pressure.
Cost (operation, maintenance, spares, need for tools and specific skills…).
Maintainability (simplicity, need for tools and specific competence…).
Self-priming capability.
Footprint.
Constraints related to safety, environment, reliability.
Tolerance to dirty, non-lubricating, viscous liquids…
Respect for fragile liquids, poorly supporting compression or shearing for example.
Machine components: bearings, coupling, seals, lubrication.
Operating limits in relation with selected technology.

ENVIRONMENTAL CONSTRAINTS & SAFETY
Natural reserve.
Hazardous zones.

PARTICULARIZATION
With pumps.
With compressors.

REGULATION & REFERENCE STANDARDS
Normative aspect (safety).
Practical, specific or global aspects (API, ISO, ATEX…).

APPROACH & MODELING
Use of dimensionless coefficients.
1D approach: geometric pre-dimensioning and analysis of desired performances for the machine.
3D study: necessary for the design and analysis of compressors.
Gas Turbines

Course Content

PRESENTATION & CLASSIFICATION
0.5 d
Presentation: history, functions of the different elements, machines available on the markets, evolution.
Classification: uses and architectures.

APPLIED THERMODYNAMICS
0.5 d
Brayton cycle and real cycle.
Isentropic efficiency of compressor and expansion turbine.
Cyle developments (combined cycles, cogeneration…).
Ability to do energy and power balances, cycle and engine efficiency calculations...
Application exercises.

TECHNOLOGY & OPERATION
1 d
On-site integration.
Technology, operation and axial compressor functions: IGV, VGV, triangle of velocities, flow rate adjustment, pumping. Air for combustion, cooling, oil containment.
Combustion chamber: types, burners, internals, materials, low NOx technology.
Turbine: technology and operation, power consumption, materials, vane manufacturing process, impulse and reaction turbines.
Performance related to ambient conditions, the fuel chosen.
Support and guiding of rotors: bearings, thrust, materials, oil containment and temperature issue.
Usual damage and problems on compressor, combustion chamber and turbine.

COMBUSTION & POLLUTANTS
0.5 d
Fuels: types and properties, pollutants, WOBBE index, PCI.
Convention combustion and low NOx combustion.
Low NOx combustion: combustion chamber types, combustion operation, influence of fuel. Main pollutants and current strategies to reduce emissions of these pollutants (steam injection, DLE, recombination with ammonia).

CIRCUITS & AUXILIARIES
1 d
Air, oil, fuel circuits. Safety equipment.
Starter, rachet.
Washing of compressor and turbine.

OPERATION & PERFORMANCES
0.75 d
Startup and shutdown sequences.
Control and safety system.
Functioning on several fuels and impact.
Load adjustment.
Operating parameters: speed, critical T3, IGV. Examples of open-cycle and cogeneration (combined cycle) strategies.
Monitoring of the inlet fluid quality (air, fuel oil): thresholds.
Main problems listed and degradation mechanisms.

INSPECTION & MAINTENANCE
0.75 d
Notion of maintenance plan.
Influence of the operating conditions.
Endoscopic examination.
Elements of inspection on hot equipment and of general review.

Reference: ROT/GT
Contact: exp.pau@ifptraining.com
This course is also available in French: ROT/GS. Please contact us for more information.
E&I Technology for Oil & Gas Facilities

Level: FOUNDATION

Purpose
This course provides the knowledge of the hardware and construction standards of electrical equipment used in the Oil & Gas industry (generation and distribution of electrical energy) and instrumentation materials used in control and safety instrumented systems.

Audience
Engineers and technicians working on electrical and instrumented installations, equipment used in the Oil & Gas industry, for the purpose of operation, maintenance, inspection, project, file instruction.

Learning Objectives
Upon completion of the training, participants will be able to:
- identify electrical and instrumentation equipment used in O&G & Gas,
- develop expertise to optimize the operation and deem the performance of electrical equipment and networks,
- acquire the technological knowledge necessary to understand and analyze the control and safety processes,
- be familiarized with instrumentation equipment, digital control systems and programmable logic controllers.

Ways & Means
- Interactive animation by specialists from the Oil & Gas and the energy fields.
- Numerous applications and illustrations.

Learning Assessment
Written test upon training course completion.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

ELECTROTECHNIC PREREQUISITES
Generalities:
- Origin of electricity, electrical energy production, alternate and direct currents, the electrical circuits.
- Main magnitudes and formulas on electricity and magnetism.
- Voltage, intensity, frequency, energy, power, Ohm's, Joule's and Laplace's laws.
- Standards, symbols, diagrams:
  - SI units, symbols and drawings.
  - Different types of electrical drawings, how to interpret/read a basic electrical drawing.

ELECTRICAL GENERATION
Alternator: constitution, operation, control of the voltage and frequency produced, protections.
Coping of sources and throughput on structured networks. Equipment monitoring and maintenance.

ELECTRICAL NETWORKS
Electrical networks:
- Constitution and constituents of an HV and LV network, architectures and equipment.
- Distribution philosophy: power distribution, network stability, selectivity, source redundancy and power supply.
- Constituents:
  - HV & LV boards and cabinets.
  - Transformers: types, main parameters, protections, auxiliaries.
  - Breakers, control elements and isolation.
  - UPS, inverters/battery chargers.
  - Batteries: battery types, charging modes.
- Protections: types of electrical protection, specialized relays.

ASYNCHRONOUS MOTORS
Constitution and operation of three-phases AC electric motors:
- Constitution and technology of AC, induction three-phases motors (asynchronous motors).
- Windings coupling, adjustment to site conditions.
- Routine monitoring.
- Troubleshooting:
  - Electric motor-related equipment:
    - Starting systems.
    - Variable speed systems: principle, functioning, constitution.
    - Maintenance.

PROTECTION AGAINST THE ELECTRICAL RISKS
Electrical risks (as per the UTE C 18-510):
- Hazards in the electrical installations.
- Effects and consequences of the electrical risks.
- Protection against the electrical risks: concept and protection classes.

HAZARDOUS AREAS & ATEX STANDARDS
ATEX specifications and standards:
- Current standards: concept and philosophy.
- Protection and identification of the material set in hazardous area.
- Impact for the organization (certification, accreditation, operating and maintenance guidance).

INSTRUMENTATION
Functional study, functional blocks, symbolization.
- Pneumatic, electrical and digital technologies.
- Power and pneumatic power supply, signal transmission and conversion.

MEASURING ELEMENT - SENSORS
Operating parameters measurement (temperatures, pressures, flowrates, levels). Measurement uncertainties.
- Physical principles, technologies, units of measurement, local reading/transmission.
- End position sensors, position sensor.
- Security equipment: temperature security devices, pressure, flow, level…

ACTUATORS - CONTROL VALVES
Control valves: technology, types of valves, characteristic curves, safety position.
- Positioners: principle of operation, types (pneumatic, electro-pneumatic,…).
- Special technologies: single or double seat valves, cage valve, “CAMFLEX”, three-way valve…
- Contactors: position sensors, solenoid valves for safety.
- ON/OFF valves: different types, single or double actuator. Special ON/OFF valves: SDV, ESDV, BDV.

CONTROLLER - CONTROL STRUCTURE
Purpose, principle of operation, direct or inverse action, operating procedures.
- Behavior of a PID regulator: operating point, gain, interactions, proportional, integral and derivative characteristics of a controller.
- Control (fixed setpoint), servo control (variable setpoint).
- Control loops: simple, cascade and split-range.

DISTRIBUTED CONTROL SYSTEM
Processing philosophy, workstation, terminology-glossary.
- Architectural:
  - Functional organization, hardware architecture.
  - Safety/redundancy.
  - Connection (sensors, actuators, networks, PLCs, others).

SAFETY INSTRUMENTED SYSTEMS (SIS)
Safety loops, safety functions.
High Integrity Protection Systems (HIPPS), Emergency Shutdown (ESD), Emergency DePressurization (EDP).

Can be organized as an In-House course.
E&I Design Engineering

**Level:** FOUNDATION

**Purpose**
This course provides the basic knowledge for selection and sizing of electrical production and distribution installations and instrumented systems.

**Audience**
Engineers and technicians involved in the design of oil installations, technicians of the methods offices, technicians of technical supports in charge of modifications, revamping of installations or upgrades to standards.

**Learning Objectives**
At the end of the training, participants will be able to identify the parameters and specifications to be considered when selecting and sizing electrical power generation, distribution systems, instrumented systems for control and safety of oil installations.

**Ways & Means**
- Interactive animation by specialists from the Oil & Gas and the energy areas.
- Numerous applications and illustrations.

**Learning Assessment**
Written test upon training course completion.

**Prerequisites**
Engineer or technician experienced in the electrical and instrumented systems areas.

**Expertise & Coordination**
IFP Training trainer (permanent or contract) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

<table>
<thead>
<tr>
<th><strong>Course Content</strong></th>
<th><strong>Duration</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PREREQUISITES</strong></td>
<td>0.25 d</td>
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<tr>
<td>Electrical units.</td>
<td></td>
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<tr>
<td>Reading of electrical plans and instrumentation P&amp;ID, PFD.</td>
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<tr>
<td><strong>METHODOLOGY</strong></td>
<td>0.5 d</td>
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<tr>
<td>Determination of:</td>
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<tr>
<td>Network power consumption and power factor.</td>
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<td>Number of sources and redundancies.</td>
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<tr>
<td>Required voltage levels.</td>
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<tr>
<td>Vital, essential and normal equipment.</td>
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<tr>
<td>Emergency power sources: EDG (Emergency Diesel Generator), network synchronization, UPS (Uninterruptible Power Supply) 220VAC, 48 and 24VDC.</td>
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<tr>
<td><strong>ELECTRICAL NETWORKS ARCHITECTURES</strong></td>
<td>0.75 d</td>
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<tr>
<td>Current standards (UTE C 18-510) and IEC 38 on voltage levels.</td>
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<tr>
<td>General structure of a HV and LV network.</td>
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<tr>
<td>Power philosophy: simplicity, reliability, maintainability, OPEX, CAPEX...</td>
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<tr>
<td>Basic feeding patterns (radial, loop).</td>
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<tr>
<td>Elements of control, protection, insulation: circuit breakers, contactors, disconnectors, specialized relays.</td>
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<tr>
<td>Transformers and voltage levels.</td>
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<tr>
<td>Earthing and neutral regimes.</td>
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<tr>
<td>Reactive energy compensation systems.</td>
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<tr>
<td>Plan of selectivity and technological choices.</td>
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<tr>
<td>PDCS (Power Distribution &amp; Control System): specific communication network e.g. for network protection relays.</td>
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<tr>
<td><strong>ELECTRICAL POWER GENERATION</strong></td>
<td>0.5 d</td>
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<tr>
<td>Drive gas turbine: one or 2 shafts.</td>
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<tr>
<td>Alternator: apparent power, output voltage, excitation voltage, speed, frequency.</td>
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<tr>
<td>Insulation class.</td>
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<tr>
<td>ATEX Certification.</td>
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<tr>
<td><strong>PROTECTION AGAINST ELECTRICAL HAZARDS</strong></td>
<td>0.5 d</td>
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<tr>
<td>Current standards (UTE C 18-510) in HV and LV.</td>
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<tr>
<td>Staff certifications.</td>
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<tr>
<td>Isolation rules.</td>
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<tr>
<td>Hazardous areas and ATEX standards.</td>
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<tr>
<td><strong>INSTRUMENTATION</strong></td>
<td>1 d</td>
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<tr>
<td>Presentation of ISA-5.1 to 5.3.</td>
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</tr>
<tr>
<td>PFD, P&amp;ID, identification of instruments, symbols, codification.</td>
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<tr>
<td>Analog and digital instrumentation (threshold, programming), simple measuring instruments and analyzers.</td>
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<tr>
<td>Field instrumentation reminders: 4-20 mA standard and HART.</td>
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<tr>
<td>Measuring instruments choice (data sheet, instrumentation database).</td>
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<tr>
<td>Loop diagram: segregation of functions, earthing.</td>
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<tr>
<td>Notions of classified areas.</td>
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<tr>
<td>Protection against electromagnetic disturbances.</td>
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<tr>
<td>Protection in explosive atmospheres (ATEX Directive 94/9/EC).</td>
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<tr>
<td>Mounting elements, installation rules (pipe classes, assembly diagrams, wiring and segregation).</td>
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<tr>
<td>Approach to calculations of flowrates and uncertainties (ISO 5167).</td>
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<tr>
<td><strong>CONTROL ACTUATORS</strong></td>
<td>0.5 d</td>
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<tr>
<td>Determination of a valve in a circuit (Cv).</td>
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<tr>
<td>Control valve technology choice (&quot;Fail&quot; positions, positioner, accessories, accuracy and law of flowrate).</td>
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<tr>
<td>Introduction to control valves calculation, sealing classes.</td>
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<tr>
<td>ON/OFF valves technological choice (pneumatic or electric actuator, single or double acting).</td>
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<tr>
<td><strong>CONTROL &amp; SAFETY INSTRUMENTED SYSTEMS</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Study of a development project of DCS or PLC: engineering documents (functional analysis) and phases of the project.</td>
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<tr>
<td>Segregation of PCS/PPS/ESD/FGS functions.</td>
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<tr>
<td>Communication networks: ring, star, distributed, coaxial and fiber optic cables, advantages and drawbacks.</td>
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<tr>
<td>Approaches to the quantification and distribution of inputs/outputs of a system: dimensioning approach of system cabinets and marshaling.</td>
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<tr>
<td>SIS (Safety Instrumented System): remind PSS, ESD, HIPPS, EDP. Impact of HAZID and HAZOP studies on design.</td>
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<tr>
<td>SIL, concept of instrumented loops (application of standards IEC 61508 and 61511).</td>
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<tr>
<td>Redundancy, voting.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: E&I/E&I2GB

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: E&I/E&I2FR. Please contact us for more information.

www.ifptraining.com
# Instrumentation, Process Control & Safety Instrumented Systems

**Level:** PROFICIENCY  

## Purpose
This course provides a comprehensive knowledge of process control and safety systems.

## Audience
Engineers and technicians involved in designing, constructing, commissioning or operating Oil & Gas surface production facilities.

## Learning Objectives
Upon completion of the course, participants will be able to:
- understand control loops and safety loops, as well as ICSS and associated equipment technologies,
- comprehend technology and operating principles of instruments most commonly used in the Oil & Gas industry,
- understand impact of P&ID controllers parameters on process control,
- grasp main process control structures encountered in Oil & Gas surface processing,
- draw the outline of a typical DCS architecture, learn the functions of safety instrumented systems.

## Ways & Means
- Highly interactive training by industry specialist lecturer.
- Numerous applications and illustrations.
- Process control practice on dynamic simulator.

## Learning Assessment
Written test upon training course completion.

## Prerequisites
No prerequisites for this course.

## Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROCESS CONTROL OVERVIEW</strong></td>
<td>0.5 d</td>
</tr>
</tbody>
</table>
| Controlling and controlled systems.  
Controlled variable, manipulated variable, disturbance variable, actuators, set point…  
Control topology.  
Functional analysis, functional blocks, symbolization.  
Pneumatic, electric and digital control loops.  
Pneumatic and electric power supply, signal transmission… and conversion. | 0.5 d |
| **MEASURING ELEMENT - SENSORS** | 0.5 d |
| Operating parameters measurement. Measurement errors.  
Temperature, pressure, flowrate, level measurement.  
Operating principle, technology, measurement unit, local reading/transmission.  
Safety instruments: limit switches, position sensors, temperature, pressure, flowrate level detectors… | 0.5 d |
| **SIGNAL TRANSMISSION - TRANSMITTERS** | 0.5 d |
| Pneumatic transmitters: transformation of force into a pneumatic signal and amplification, technology and transmitter tuning.  
Operation of the sensor-transmitter combination.  
Electric and electronic transmitters: operating principle.  
Digital and programmable transmitters. | 0.5 d |
| **ACTUATORS - CONTROL VALVES** | 0.5 d |
| Linear displacement valves: technology, different plug types, characteristic curves, safety position: AO, AC, FC, FO…  
Positioners: operating principle, types (pneumatic, electro pneumatic…).  
Other types of control valves: simple and double seat valves, cage valves, “Camflex” type valves, three-way valves.  
Contactors: position sensors, electro-valves.  
ON/OFF valves: types, simple and double actuators. | 0.5 d |
| **CONTROLLERS - CONTROL STRUCTURES** | 0.5 d |
| Controllers: role, operating principle, direct or inverted action, operating modes.  
Behavior of P&ID type controllers: operating point, gain, interactions.  
Control loops: simple, cascade, and split-range.  
Ratio control, elaborated variable control, feed-forward control systems. | 0.5 d |
| **DISTRIBUTED CONTROL SYSTEM (DCS)** | 0.5 d |
| Plant control philosophy, workstation, glossary.  
Architecture: Functional organization, equipment architecture.  
Data allocation, communication network.  
Safety/redundancy.  
Interfaces (sensors, actuators, network, PLC, others).  
Plant control: hardware, software, types and organization of views.  
Alarms, historian. | 0.5 d |
| **P&ID CONTROLLERS** | 1 d |
| P&ID tuning: process and control loop response.  
Robustness, rapidity, accuracy.  
Regulation (fixed set point) and closed-loop control (variable set point).  
Proportional, integral, derivative controller characteristic.  
Applications on dynamic simulator. | 0.5 d |
| **SAFETY INSTRUMENTED SYSTEMS (SIS)** | 1 d |
| Safety loop.  
Safety function. Safety Integrity Level.  
High Integrity Protection Systems (HIPS), Emergency ShutDown (ESD), Fire & Gas (F&G), Emergency DePressurization (EDP). | 1 d |

Reference: E&I/INST1GB  
Only available as an In-House course.  
Contact: exp.pau@ifptraining.com  
This course is also available in French: E&I/INST1FR. Please contact us for more information.
Instrumentation Maintenance

Level: PROFICIENCY

Purpose

This course provides a comprehensive knowledge for the monitoring and maintenance of instrumented systems used in Oil & Gas production facilities.

Audience

Engineers and technicians involved in installation, monitoring and maintenance of instrumented systems used in the Oil & Gas production facilities.

Learning Objectives

Upon completion of the course, participants will be able to:
- Explain the importance of measurements quality, calibration methods and associated preventive actions,
- Optimize process control loop - PID controllers,
- Describe the typical architecture of a DCS: I/O interfaces, communication protocols,
- Describe process safety systems and fire and gas detection systems,
- Master procedures for instrument calibration, process control and safety loops synchronization.

Ways & Means

- Highly interactive training by industry specialist lecturers.
- Process control practice on dynamic simulator and on-site (if possible).
- Exercises on calibration of process measures, process control and safety loops.

Learning Assessment

Written test upon training course completion.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

PROCESS INSTRUMENTATION

Process instrumentation:
- Scope of the Oil & Gas industry. Identification and symbolization of process parameter to control. Identification and symbolization of process equipment. PFD and PID drawings.
- Communication and signal types:
  - Signal codes and standardization. Pneumatic. Electrical (voltage, amps).
  - Digital/HART protocol, Modbus, Fieldbus.
- Sensors, transmitters:
- Process measures:
  - Measure and measurement loop for process control.
  - Pressure measurement (principle, technology, calibration).
  - Level measurement (principle, technology, calibration).
  - Flowrate measurement (principle, technology, calibration).
  - Temperature measurement (principle, technology, calibration).

PROCESS CONTROL

Control loop:
- Constitutive elements of a control loop. Controller principle and technology.
- PID controller algorithm. Control loop optimization with regard to process.
- Practical tuning method of PID controller.
- Control valves:
  - Principle. Technology of constitutive elements (servomotor and valve body).
  - Choice of action applied to process. Valve flowrate characteristic.
  - Other constitutive elements: valve positioner, P/P and I/P converter.
- Valve sizing. Cv coefficient.
- ON/OFF valves:

AUTOMATION OF PRODUCTION PROCESSES

Distributed Control System (DCS):
- Principle of systems networking.
- Sequential flowcharts. Grafcet.

SAFETY INSTRUMENTED SYSTEM

Safety Instrumented Systems (SIS):
- HIPS (High Integrity Protection System): principle, equipment.
- Principle of emergency blow-down.
- System maintenance and calibration. Periodic testing and preventive maintenance of detectors.
- Fire & Gas System (FGS):
  - FGS logic. Detectors location: process areas, machine package, technical rooms.
  - Gas detectors: refresher on industrial gas LEL/UEL. Various types of sensors: technology, principle, calibration procedures, periodic tests and preventive maintenance for portable and fixed detectors.
  - Fire and smoke detectors. Various types of detectors: technology, principle.
  - Firefighting network: equipment, configuration, triggering procedure (Auto/Manual).

MAINTENANCE & CALIBRATION STANDARDS

Maintenance, calibration and preventive maintenance standards.

Main procedures:
- Synchronization application and calibrations (measures, control loop and control valves, ON/OFF valves, fire and gas sensors).
- Implementation of preventive maintenance tasks list to the various components of a loop.

Reference: MA/INSTMAINTGB

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: MA/INSTMAINTFR. Please contact us for more information.
Advanced Certificate

Design of Instrumented Systems Certification

Course Content

**PROCESS INSTRUMENTATION**
Field instrumentation refresher: 4-20 mA standard and HART instruments, digital instruments. Instruments scales and calibration methods.
Calibrated orifice calculation according to ISO 5167 standard, approach for measurement error calculation.
Flow-rate calculation corrected for pressure and temperature.
Instrument cables and junction boxes definition.
Introduction to on-site industrial analyzers.

**PROCESS CONTROL**
Oil & Gas processes identification.
P&ID controllers study: series, parallel and mix structures. Impact of controller parameters on process control.
Controllers tuning.
Study and adjustment of control loops: simple closed loop, cascade, split-range, ratio.
Applications on dynamic simulator: case of a well/separator process section.

**SAFETY INSTRUMENTED SYSTEMS (SIS)**
Refresher on Safety Instrumented Systems (SIS): PSS, ESD, HIPPS, EDP.
Impact on HAZID and HAZOP studies on design.
Definition and implementation of Safety Integrated Levels (SIL) on instruments loops: Oil & Gas companies approach to IEC 61508 and 61511 standards. Application exercises.
Applications on dynamic simulator: implementation of PSS and ESD systems. Case of a well/separator process section.

**AUTOMATION (DCS/PLC)**
Distributed Control System (DCS) architecture:
Equipment architecture: controller, input/output cards, software architecture.
Man-machine interface: views management (mimics, alarms, historian, trends), plant control strategy (overview, tree structure) and functionalities of the various types of views.
Alarm management: alarm types, hierarchy, processing.
DCS and PLC implementation projects:
Approach to quantification and allocation of system input/output.
Notion of system life cycle and integrity (IEC 61508)/implementation of SIL.
Study of a DCS or PLC implementation project: engineering documents (functional analysis) and project phases: Factory Acceptance Test (FAT), Site Acceptance Test (SAT) and commissioning.

Reference: E&I/INST2GB

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: E&I/INST2FR. Please contact us for more information.
# Fundamentals of Electrical Power Generation & Distribution Equipment

**Level:** FOUNDATION

**Purpose**
This course aims to acquire a basic knowledge of industrial electrotechnics: main units, drawings, laws, operation and technics, analogies, notion of network, electrical safety.

**Audience**
All non-specialist professionals, who will have to work with production, distribution and services electrical equipment, for operation, maintenance or within the framework of a “project”.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- know the basic standards, symbols and drawings,
- know the basics of electricity generation and distribution,
- know the main electrical users used in the Oil & Gas industry,
- know and apply the safety rules.

**Ways & Means**
- Very interactive training given by highly experienced trainers.
- Numerous applications, illustrations and practical exercises.

**Learning Assessment**
Written test upon training course completion.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

<table>
<thead>
<tr>
<th>5 days</th>
<th>GENERALITIES, MAIN FORMULAS, STANDARDS &amp; SYMBOLS, DRAWINGS</th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERALITIES: Origin of electricity, electrical energy production, alternate and direct currents, the electrical circuits. Main magnitudes and formulas on electricity and magnetism: Voltage, intensity, frequency, energy, power, Ohm’s, Joule’s, Lenz’s, and Laplace’s laws. Standards, symbols, diagrams: SI units, symbols and drawings. Different types of electrical drawings, how to interpret/read an electrical drawing.</td>
<td></td>
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</tr>
<tr>
<td>PRODUCTION &amp; DISTRIBUTION NETWORKS, HV/LV SWITCHBOARDS</td>
<td>1 d</td>
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</tr>
<tr>
<td>BATTERIES, CHARGERS, MEASUREMENT &amp; MEASURING DEVICES, ELECTRICAL PROTECTIONS</td>
<td>1 d</td>
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</tr>
<tr>
<td>ELECTRIC MOTORS, CABLES &amp; ACCESSORIES, TRANSFORMERS, LIGHTING SYSTEMS</td>
<td>1 d</td>
<td></td>
</tr>
<tr>
<td>ELECTRICAL SAFETY, HAZARDOUS AREAS</td>
<td>1 d</td>
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</tr>
</tbody>
</table>

Reference: E&I/ELEC1GB
Only available as an In-House course.

This course is also available in French: E&I/ELECT1FR. Please contact us for more information.

Contact: exp.pau@ifptraining.com
### Electrical Equipment & Power Distribution Network (Advanced)

#### Purpose

This course aims to acquire a thorough understanding of the electrical equipment and the design of the distribution network architectures used in the Oil & Gas industry (generation, distribution and use of the electrical energy), making it possible to assess and optimize their performances.

#### Audience

Engineers and technicians working on electrical installations and equipment used in the Oil & Gas industry, for operations, maintenance, inspection, projects, investigation.

#### Learning Objectives

Upon completion of the course, participants will be able to:

- improve the understanding of the electrical materials and equipment used in the Oil & Gas industry,
- develop an expertise allowing to optimize the operation, to size and assess the performances of equipment and networks,
- know the electrical equipment and network maintenance and prevention principles,
- know, apply and set the electrical safety rules in the Oil & Gas industry.

#### Ways & Means

- Very interactive training given by highly experienced trainers.
- Numerous applications, illustrations and practical exercises.

#### Learning Assessment

Written test upon training course completion.

#### Prerequisites

Experienced professional on electrical installations and equipment.

#### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Power Generation</td>
<td>1 d</td>
</tr>
<tr>
<td>Electrical Distribution &amp; Networks</td>
<td>1 d</td>
</tr>
<tr>
<td>Electric Motors</td>
<td>1.5 d</td>
</tr>
<tr>
<td>Protection against the Electrical Risks (as per the UTE C 18-510)</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Hazardous Areas &amp; ATEX Standards</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Elements of Power Management System</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

#### Reference: E&I/ELEC2GB

Only available as an In-House course. Contact: exp.pau@ifptraining.com

This course is also available in French: E&I/ELEC2FR. Please contact us for more information.
NEW Asset Integrity Management

Level: PROFICIENCY

Purpose
This course aims to bring elements related to the implementation of actions, such as the inspections and tests required to ensure that the installations and equipment important to safety and productivity will correctly work for their whole service life.

Audience
This course is intended for engineers, operation managers and supervisors of industrial sites.

Learning Objectives
Upon completion of the course, participants will be able to:

- know the asset integrity management process, from the failure mode and effects analysis to the implementation of adapted actions and reference standards,
- formulate or use equipment specifications, identify the corrosion mechanisms,
- implement the risk assessment and critical safety element identification techniques,
- identify the test and inspection elements that ensure a machine is in good operating condition,
- implement the culture of asset integrity management.

Ways & Means
- Applications and case studies illustrating the techniques studied.
- Active pedagogy calling on participants’ experiences.

Learning Assessment
Written test upon training course completion.

Prerequisites
- Management on site equipment and installation operation and maintenance.
- Significant experience in the industry.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSET INTEGRITY MANAGEMENT PROCESS 0.5 d</td>
</tr>
<tr>
<td>Definition of risk, failure, reliability, availability of installations.</td>
</tr>
<tr>
<td>Concept and identification of major risk of equipment failure.</td>
</tr>
<tr>
<td>Measurement and follow-up of reliability.</td>
</tr>
<tr>
<td>Criticality, safety critical elements.</td>
</tr>
</tbody>
</table>

| 1 d |
| CRITICALITY & RISK ASSESSMENT TOOLS |
| Main models, failure probability, statistical functions. |
| FMECA and cause tree: areas of application, method principle, examples. |
| Identification of 3 groups: static equipment, dynamic equipment, and safety instrumented systems. |
| Understanding the functioning, the failure possibilities and the need for an adequate policy of operating condition maintenance. |

| 1 d |
| INSPECTION & TESTS |
| Standards and regulations in force. |
| Inspection tools and techniques: non-destructive examinations, sampling. |
| Example of installation commissioning. |

| 1 d |
| CORROSION |
| Definition of corrosion. |
| Elements of metallurgy. |
| Corrosion mechanisms. |
| Different types of corrosion. |
| Corrosion control methods. |

| 1 d |
| INSPECTION & MAINTENANCE BASED ON FAILURE RISK (RBI) |
| Integrating Asset Integrity Management in the operating and maintenance policy. |
| Preventive, condition-based and predictive maintenance. |
| Maintenance and inspection based on failure risks. |
| Notion of life cycle cost. |

| 0.5 d |
| IMPLEMENTATION & CHALLENGE |
| Safety and productivity objectives. |
| From outage management to equipment management. |
| Lowering the tolerance threshold to anomalies and involvement of the operators. |
| Need for general commitment: implementation of the Total Productive Maintenance. |
| Detailed preparation, planning, identification of critical operations. |
| Maintenance plans by equipment item and type of equipment. |

Reference: PMGT/INTEGRITYGB - Only available as an In-House course. Contact: exp.rueil@ifptraining.com

www.ifptraining.com
**Course Content**

### ROLES & REQUIREMENTS OF A TURNAROUND

**Frequency and duration of turnarounds, running rate of units, economic impact of a turnaround.**

- Elements of maintenance policy.
- Turnaround constraints: legal obligations, safety, technical and economic reasons:
  - Pressure equipment operating constraints.
  - Notion of lifetime cost of large machines.
- Maintenance works and new works — modifications — carried out during a turnaround.
- Compliance with the cost, deadlines, quality, environment and safety.

#### 1 d

### PREPARATION OF A TURNAROUND

**Turnaround preparation team, organization chart, turnaround manager, definition of tasks and processes.**

- Collection, analysis and preparation of work: written compilation of jobs, job process reviews.
- Equipment reservation, cost estimate and budget.
- Preparation of the logistics. Preparation of the specific spare parts and tools.
- Planning, identification of the critical operations.
- Selection of trades, markets, integration of quality and safety in the call for tenders.
- Scope changes and closure of job requests (scope freeze).
- Effluent and waste management, safety and prevention, quality, QHSE manual.

#### 1 d

### SCHEDULING & DELAYS CONTROL

**Concerns of the turnaround manager (pilotage, overview, key dates).**

- Planning methods PERT, GANTT:
  - Tracking task levels.
  - Calculation of task dates, at the earliest, at the latest.
  - Optimize work programs (work in parallel, avoid wasting time...).
- Concept of total and free margins. Identification of the critical path. *Exercises.*

#### 0.75 d

### INSPECTION OF PRESSURE EQUIPMENT

**Effect of pressure and temperature.**

- Metals, alloys and potential risks.
- Process fluid aggressiveness.
- Pressure equipment design and manufacturing.
- Legal orders: regulations on pressure equipment operation.

#### 0.25 d

### OUTSOURCING & SUBCONTRACTING

**Definition, origins, interests, risks.**

- Problems due to cascading subcontracting.
- Purpose, conditions for efficiency. Why outsourcing? Which abilities to be kept? How to keep control? Different types of contracts.

#### 0.25 d

### WORKS EXECUTION, CONTROLS & AUDITS

**General principles of the works activity.**

- Preliminary activities: scaffolding, worksite installation, drawings and documents.
- Permit issuance, management of recommendations, inspection.
- Follow-up of works progress: supervisors’ reporting to the planning manager, cost control.
- Worksite audits: communication and observation techniques, report and recommendations.
- Equipment closure and leak test.
- Unit preparation to re-startup: operation review, start-up acceptance, assistance to start-up.
- Commissioning organization.
- Production start-up organization and procedure.

#### 0.75 d

### SAFETY IN WORKS

**Implementation of a HSE management system.**

- HSE management of turnover and construction activities.
- Technical and safety worksite audits.
- Management of change.

#### 0.75 d

### END OF WORKS & TERMINATION OF TURNAROUND

**Detail review, final acceptance.**

- Turnaround report: inspection report, operation report…
- Turnaround manager’s report.
- Use of performance indicators and sharing of feedback.

#### 0.25 d

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**Reference:** MAI/TURNAROUNDGB  
Only available as an In-House course.  
Contact: exp.pau@ifptraining.com

- This course is also available in French: MAI/TURNAROUNDFR. Please contact us for more information.
Fundamentals of Mechanical Maintenance

Level: FOUNDATION

Purpose
This course aims to master the elements of language and understanding of mechanical systems, in terms of design, characterization and maintenance/repair. This will allow/contribute to the maintenance follow-up, but also to the optimized operation of the static and dynamic mechanical systems (rotating machinery).

Audience
All professionals from the Oil & Gas industry who work in connection with equipment and mechanical systems (operation, maintenance) and who do not know/no longer know the fundamentals of design of these systems (or who wish to deepen their knowledge). Jobs mainly concerned: mechanicals, mechanical assistants, mechanical supervisors.

Learning Objectives
Upon completion of the course, participants will be able to:
- know the basics of technical drawing, characterize a part, a mechanical assembly.
- identify the different mechanical construction materials.
- know the fundamentals of mechanical system design, the main assemblies (bearing assemblies).
- know the main power transmission elements (gears, joints…), wisely use the metrology devices used in workshop.
- describe the mechanical strength, chemical resistance and thermal resistance.

Ways & Means
- Very interactive training given by highly experienced trainers.
- Gradual mechanical approach, from the dimensioning of a simple mechanical part to the design basis of a dynamic system such as a rotating machine.

Learning Assessment
Written test upon training course completion.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 5 days

TECHNICAL REPRESENTATION OF PARTS & SIMPLE MECHANICAL SYSTEMS 2 d
Technical drawing agreement: 2D and isometric views, projections, section and cut-away views, perspectives, technical vocabulary.
Dimensioning of parts and mechanical systems, ISO tolerances and main adjustments.
Dimensional tolerances and clearance.
Geometric tolerances and surface condition characterization.
Presentation of the tools in a metrology shop, performances and rules of use.
Practical exercises:
  - Dimensioning and full geometric control of a pump shaft.
  - Understanding of a simple machine cut-away view.
  - Representation of a machine element in 2D projection and perspectives.

ELEMENTS OF CONSTRUCTION 1 d
Materials used in the Oil & Gas industry: identification of the metals, alloys, plastics and composites, operating and maintenance rules.
Expansion and effects on the assemblies.
Manufacturing process of metallic parts, molding, forging.
Frequent screwed, bolted, welded and stuck constructions.
Characterization of threads and bores, petroleum thread pitch.
Removable power transmission: keys, gears, hinged connections (joint…), cone interface.
Non-removable power transmission: shrink fitting.
Bearings: characterization, types, identification, assembly rules.
Seals of static systems (between flanges) and dynamic systems (mechanical seals on bearing boxes), analysis and selection of the materials.
Pipe, valves and main line accessories: identification, operation and maintenance rules.
Practical exercises: selection, identification and assembly of the ball bearings in a simple process pump.

ELEMENTS OF MAINTENANCE 1 d
Tightening: importance of torque, order, techniques.
Alignment: understanding the operation, controlling the mating of piping.
Lubrication: properties and characterization of common oil and greases, lubricating systems.
Controlling the condition of parts at disassembly: corrosion, defaults, mating, wear, rupture.
Controlling the clearances at disassembly.
Practical exercise: mechanical completion of a pump on site (control and implementation).

ELEMENTS OF REPAIR 1 d
Surface treatments and coatings.
Overlay welding and reconstitution.
Machining.
Casing repair with staples.
Expertise controlling: dye penetrant testing, metrology, ultrasonic, hardness testing.
Test and requalification: balancing, test, control of performances.

Reference: MAI/GENMAINTGB  Only available as an In-House course.
Contact: exp.pau@ifptraining.com
This course is also available in French: MAI/GENMAINTFR. Please contact us for more information.

www.ifptraining.com
**Level:** FOUNDATION

**Purpose**

This course aims to master the elements of language and to understand the mechanical systems, in terms of design, characterization and maintenance/repair and to remind or learn how to work on a pump, and more generally on a machine, in a workshop.

**Audience**

Professionals from the Oil & Gas industry in connection with equipment and mechanical systems (operation, maintenance) who wish to acquire best practices or to upgrade their knowledge about these systems. Positions mainly concerned are: mechanics, mechanical work preparators, mechanical supervisors.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- know the basics of technical drawing, characterize a part, a mechanical assembly,
- master the rules of the art of mechanical system design, identify the main assemblies such as bearing assemblies, know the main elements of power transmission (gears, gimbals...),
- wisely use the metrology instruments used in the workshop (use, performances, calibration), carry out a disassembly and assembly routing of a centrifugal pump – and more generally of a machine – by completing the dimensional and geometrical inspection required.

**Ways & Means**

- Very interactive animation by highly experienced trainers.
- Stepwise approach, from the dimensioning of a simple part to the assembly in the workshop.

**Learning Assessment**

Written test and practical assessment in the workshop.

**Prerequisites**

No prerequisites for this course.

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

10 days

**WEEK 1: APPLIED THEORY**

**Oil & Gas pump technology**

Centrifugal pumps - Functional approach

Step-by-step study of the main functions:

- Process: impeller, wear ring, balancing, shape of the pump casing…
- Sealing: mechanical seal, typical arrangements (simple, double, dry seal). Selection as per API 382 standard, materials, type.
- Supporting: axial and radial, thrust bearing, plain bearing and anti-friction bearings.
- Lubrication: oil and grease, mist, lubricating rings.
- Monitoring and troubleshooting.

Step-by-step construction of a single-stage centrifugal pump.

Positive displacement pumps:

- Different types of pumps: rotating and positive displacement pumps.
- Operating principle and use of the different types of pumps.
- Influence of the clearance, the internals leaks, and the type of product on the flowrate and pressure.
- Monitoring and troubleshooting.

Specific choices:

- Driving systems.
- ATEX: material consequences.

**Fundamentals of mechanics**

Standards of technical drawing: 2D and isometric views, projections, sectional and cutaway views, perspectives, technical vocabulary.

Dimensioning of parts and mechanical systems, ISO tolerances and main adjustments.

Dimensional tolerances and functional clearance.

Geometrical tolerances and surface conditions characterization.

Bearing design and assemblies.

Presentation of the tools in a metrology workshop, performances and rules of use.

Measurements with the caliper, comparators, micrometers.

**Tutorials:**

- Dimensioning and full geometrical inspection of a pump shaft.
- Understanding the cutaway view of a simple pump.
- Representation of a machine element in 2D projections and perspectives.

**Disassembly, overhaul & reassembly of an overhung centrifugal pump**

All the disassembly and reassembly stages step-by-step (routings).

Explanation of the metrological inspection.

Measuring diameters, runout.

Measuring functional clearances (expansion taken into account).

Seal inspection.

**Technology of anti-friction bearings & couplings**

Description of the different bearings: description, internal clearances, mounting.

Lifespan: influence of the load, lubrication, humidity, clearances.

Lubrication.

Coupling used depending on the load and the machine speed.

**Machine alignment**

Machine alignment techniques: comparators and lasers.

Calculations on practical cases.

**WEEK 2: HANDS-ON ACTIVITIES IN WORKSHOP**

Hands-on activities in our workshops with our tools and metrology instruments:

- Work on motor/pump block (asynchronous motor/overhung centrifugal pump) and work on double shaft centrifugal pump.
- Receipt of a pump from the plant or the site².
- Use of the technical file, maintenance routings and understanding of anything related to the schemes and information files: dimensions, adjustments, tolerances, functional clearance identification of the spare parts².
- Presentation of the tools in a metrology workshop, performances and rules of use.
- Compliance with disassembling/assembly procedures.
- Geometrical inspection of the piece of equipment.
- Inspection of the condition of the elements and the wearing parts at disassembly: corrosion, defects, coupling, wear, rupture.
- Inspection of clearances at disassembly.
- Functioning and use of support equipment: bearing heating by induction, monochromatic light for mechanical seal inspection²…
- Tests after repair and compliance with good practices.
- Preparation of an intervention report.

For in-house courses, the above-described hands-on activities can be carried out in your workshops and on-site, on a piece of equipment to be repaired or overhauled, with your tools and metrological instruments.

(*): indicates activities that can only be performed in the case of an in-house course in your workshop.

**Course Content**

Reference: MAI/PUMPMAINTGB

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: MAI/PUMPMAINTFR. Please contact us for more information.
Compressors Maintenance

**Purpose**
This course provides a better understanding of the technology, performance and maintenance of centrifugal and volumetric compressors.

**Audience**
Engineers and technicians involved in centrifugal and volumetric compressor maintenance or engineering. Employees in charge of maintenance running of the compression systems.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- describe the behavior and the technology of compressors,
- provide the maintaining solutions applied in their compression units,
- establish a diagnosis of the incidents and participate in the troubleshooting meetings.

**Ways & Means**
- Functional approach for a better understanding.
- Numerous examples and cases studies from the Oil & Gas production industry and analysis of manufacturer file.

**Learning Assessment**
Written test upon training course completion.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

**TECHNOLOGY & OPERATION**
- Centrifugal compressors:
  - Different types of centrifugal compressors.
  - Component parts and architecture of a centrifugal compressor.
  - Technology of the essential components: stator, rotor, bearings, thrust bearing, seals.
  - Vibrations, critical speed, dynamic balancing.
  - Auxiliary equipment: lubrication system, buffer gas, balancing line…
  - Safety parameters: axial displacement, vibrations, bearing and thrust bearing temperatures, oil pressure…
- Reciprocating compressors:
  - Different types of reciprocating compressors.
  - Component parts and architecture of a reciprocating compressor.
  - Technology of the essential components: cylinder, piston, valves, sealing systems, crankshaft, connecting rod…
  - Auxiliary equipment: lubrication of motion parts and cylinders, cooling interstage and cooling devices systems, connections to the flare.
- Rotary compressors:
  - Different types: screw, liquid ring, lobes, sliding vanes…
  - Component parts and architecture of a rotary compressor.
  - Auxiliary equipment: lubrication system.
  - Typical using.

**MAINTENANCE (preventive, conditional, corrective)**
- Preventive maintenance: systematic actions, routine, alignment…
- Conditional maintenance: vibrations measurement, oil of lubrication analysis, thermography…
- Corrective maintenance: mounting, dismounting, metrology, repairing technics.

**ANALYSIS OF A MANUFACTURER DATABOOK**
- Data sheet.
- Technologic choices.
- P&ID reading.

**TROUBLESHOOTING**
- Failure and incidents: surge, slugging, over limits functioning…

This course is also available in French: MAI/COMPMAINTFR. Please contact us for more information.

Reference: MAI/COMPMAINTGB  Only available as an In-House course.
- This course is also available in French: MAI/COMPMAINTFR. Please contact us for more information.

Contact: exp.pau@ifptraining.com

www.ifptraining.com
Maintenance & Inspection

Course Content

10 days

GENERAL CHARACTERISTICS & TECHNOLOGY OF ROTATING MACHINES 3 d
Fields of use and characteristics of the main rotating machines.
Reliability of the different machines.
Technological descriptions.

Functioning (2 days)
Operating parameters, meaning, how to interpret changes: pressure, temperature, flow rate, speed, head, efficiency…
Characteristics of the machines, comparisons.
Effect of external process-related parameters: composition of the products, modified suction or discharge conditions.

Mechanical aspects:
► Stresses in the machine in normal operation and in abnormal conditions: operating limits.
► Case of internal stresses: thrust, radial reaction, vibrations.
► Case of external stresses: dilatation, vibrations, casing and supporting.
► Influence on the machine lifespan.

Operating conditions (1 day)
General operating rules to comply with, effect on reliability.
Associated risks.

TECHNOLOGY & MAINTENANCE OF THE COMMON ELEMENTS 4 d

Bearings (1 day)
Ball bearings:
► Description of the different rolling elements; identification, internal clearances, assembly.
► Calculation of lifespans: effect of the feed, lubrication, humidity, clearances.
Hydrodynamic bearings:
► Plain and pad bearings: description, functioning.
► Incidents, problems of instability.
Magnetic bearings:
► Description, functioning.
Lubrication of the bearings.

Shaft outlet sealing systems (1 day)
From braided seals to mechanical seals: functioning, description of the different types, conditions of stability, auxiliaries.
Application to pumps and compressors.
P&ID study of a complex mechanical seal of a centrifugal compressor.

Rotors and shafts (0.5 day)
Balancing: imbalance, eccentricity, balancing class.
Shaft geometric controls.

Couplings and alignments (0.5 day)
Different types of couplings.
Transmission stresses.
Alignment of the shafts of machines.

INSPECTION & FAILURE FORECAST 3 d

Diagnosis from process data (0.5 day)
Determining a functioning point.
Checking the performance: head, flow rate, efficiency.

Diagnosis of a failure by vibrations and oil analyses (0.5 day)
Measuring the vibrations: initiation, global levels, spectrum, frequency/failing element association.
Oil analyses: water content, water and air separation, viscosity, acid value, chemical analyses, ferrography.
Application: examination of different oil spectrum and reports of analysis.

Knowledge of wear and rupture phenomena (1 day)
Fundamentals of inspection and deduction.
Friction and materials, roughness, surface condition, fretting corrosion.
Main rupture modes (stress, fatigue, impact, creep…).
Notion of elastic resistance, plastic resistance, resilience.
Frequent problems: detection and troubleshooting (1 day)

Reference: MAI/ROTMAINT
Contact: exp.pau@ifptraining.com

This course is also available in French: MAI/MAICH/MAINTFR. Please contact us for more information.
Advanced Certificate

Maintenance Management Certification

Course Content

MAINTENANCE POLICY & OBJECTIVES
Integration of the maintenance policy to the plant policy. Financial, technical and workforce objectives.
Current methods and trends: criticality analysis, TPM, RCM, RBM, maintenance program optimization based on criticalities (redundancy, utilization rate, impact on production, age...), risk analysis, local conditions.
Different types of maintenance and respective importance: planned condition-based, predictive, corrective. Importance of condition-based and predictive maintenances in modern maintenance policies, and particularly data importance (from SAPPi, PI, site report, root causes...) for the use of efficient methods (RED, e-monitoring...).
Application of the methods studied: criticality ranking, emergency levels, spare parts management.

RELIABILITY MEASUREMENT & FOLLOW-UP
Descriptive statistics: reliability and reliability indicators, equipment performance monitoring in terms of availability, MTBF, MTR...
Statistical functions and their applications to preventive maintenance. Main models, application to the search for preventive control optimization, equipment redundancy studies, standby equipment management. Pereto law, identification of bad-actors.

RELIABILITY ANALYSIS & IMPROVEMENT METHODS
FMEA (Failure Modes, Effects and their Criticality Analysis). Areas of application, basic techniques, probability assessment, common methodological errors. Action plan.
Failure trees, method principle.
RCM - Overall policy. Interest of the decision logics.
TPM - Total Productive Maintenance (global involvement to maintain the production tool).
Concept of asset integrity management as a SECE (Safety and Environment Critical Element).
Concept of machine learning: failure prediction by accumulation and cross analysis of process and equipment data.

MAINTENANCE COSTS & FAILURE COSTS
Overall failure costs versus direct costs (materials, spare parts, repair contractors...) and indirect (shortfall in production or injection, quality defect, reputation...). Notion of cost efficiency: overall effectiveness, adaptation to petroleum industry and practical calculations.
Life Cycle Cost (LCC). Application to the choice of investments; application to the search for optimum equipment life duration.
Spare parts management. Cost of inventory. Unsuitability of some conventional stock management calculations, cost of risk.
Computerized maintenance management. System (CMMS) and related processes.

OUTSOURCING & SUBCONTRACTING
Purpose, condition for efficiency. Why outsourcing? Which abilities to be kept? How to keep control?
Different types of contracts. When to use them? How to combine them?
Concepts of General Maintenance Operation Contract (GMOC) and Maintenance and Inspection Engineering Contractor (MIEC).
Comparison between specific maintenance contract (“Specific Maintenance Contract” (SMC), “Original Equipment Manufacturer” (OEM)) and integrated maintenance contract (“Integrated Services Provider” (ISP)).

SHUTDOWM MANAGEMENT

IMPROVEMENT PLANS
From failure management to equipment management.
Lowering the tolerance threshold to defects and operators’ involvement.
Maintenance plans by equipment item and equipment type.

TROUBLESHOOTING
The trainer regularly proposes short operational scenarios that are analyzed by the group. These are related to practical problems that maintenance managers may face on an Oil & Gas site (pump cavitation, compressor pumping, a defect or injection, quality defect, reputation...). To solve these problems, participants must use their technical knowledge, reasoning skills, multidisciplinarity and operational capability.
# Machinery Vibration

**Level:** ADVANCED

**Purpose**

This course assesses the cause and evolution of mechanical failures by analysis of vibration signals. It emphasizes the implementation of an efficient predictive maintenance program.

**Audience**

Supervisors and technical staff involved in the technical inspection and maintenance of rotating equipment.

**Learning Objectives**

Upon completion of the course, participants will be able to:
- explain the measurement devices: sensors, analyzers, software, etc.,
- recognize standard signatures of the most common mechanical failures,
- decide the kind of signal treatments to apply, in order to understand failure details and evaluate its severity,
- implement a maintenance plan for each machine based on the criticality.

**Ways & Means**

- Study of industrial cases.
- Various illustrations of actual systems.
- Use a professional measurement software and/or test benches.
- The practical approach makes the course suitable for full-time vibration specialists.

**Learning Assessment**

Quiz.

**Prerequisites**

It is advised to have a basic mechanical knowledge or experience in vibration monitoring.

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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## Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
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<tr>
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<tr>
<td><strong>RESONANCE</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>TOOLS FOR DIAGNOSIS</strong></td>
<td>0.5 d</td>
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<tr>
<td><strong>MACHINERY DEFECTS &amp; VIBRATION SIGNATURE</strong></td>
<td>2 d</td>
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<tr>
<td><strong>PRACTICAL MACHINERY VIBRATION MONITORING</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Vibration control policy: machinery improvement program. Different policies according to the type of machinery and its criticality. Developing an effective program.</td>
<td></td>
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</tbody>
</table>

Reference: MTM/PAVIB-E  
Only available as an In-House course.  
Contact: rc.contact@ifptraining.com  
This course is also available in French: MTM/DIAVIB. Please contact us for more information.
Upstream Maintenance Engineer Certification

Course Content

WELL EQUIPMENT & WELL EFFLUENT TREATMENTS
Notions of drilling/completion. Artificial lift: pumping, gas lift. Oil field processing (stabilization, dehydration, sweetening) and water processing (production and injection water). Gas processing and conditioning (dehydration, sweetening).

TECHNOLOGY & MAINTENANCE OF STATIC EQUIPMENT
Wellhead, pipe, fittings and line equipment, safety valve, tanks, pressure vessel. Thermal equipment: heat exchangers, boilers, heaters, condensers. Standards, design, operation, inspection, maintenance. PFD, P&ID, isometric drawings.

TECHNOLOGY & MAINTENANCE OF PUMPS
Pumping fundamentals (pressure, flow rate, conservation of energy, mechanical and hydraulic powers…). Dynamic pumps. Functional approach: different types of dynamic pumps and integration into the processes; generic functional study (process, sealing, supporting/guiding, lubrication). Positive displacement pumps: different types (piston pumps and rotary pumps); operating principles, influence of the clearances, internal leaks, impact of the type of product on the flow rate and pressures.

TECHNOLOGY & MAINTENANCE OF COMPRESSORS
Compression fundamentals (ideal gas, real gas, isentropic compression, polytropic compression). Dynamic compressors: different types and integration into the processes; technology of auxiliary and auxiliary elements (pump, piston, valves, seal, supporting, guide, lubrication). Reciprocating compressors: different types and integration into the processes; technology of auxiliary elements (pump, piston, valves, seal, supporting, guide, lubrication). Centrifugal compressors: different types and integration into the processes; technology of auxiliary elements (pump, piston, valves, seal, supporting, guide, lubrication).

PRACTICE IN MECHANICAL WORKSHOP

TECHNOLOGY & MAINTENANCE OF DRIVING MACHINES

COMMON ELEMENTS OF MACHINES & STRUCTURES

TECHNOLOGY & MAINTENANCE OF ELECTRICAL EQUIPMENT
Sources of electrical power (alternator, generator) and motors (alternate and direct current); functioning, technology, operation, maintenance, safety. Electrical power distribution and networks: constitution of HV and LV networks, distribution philosophy, control and protection elements, transformers, circuit breakers; redundancy of sources and supply means. Earthing and neutral systems. Protection against the electrical risks and hazardous areas and ATEX standards.

INSTRUMENTATION, CONTROL, SAFETY INSTRUMENTED SYSTEMS

HSE DURING MAINTENANCE WORKS
Identification of the hazards and specific risks on site, in maintenance situation. Job safety analysis procedures and steps, permit to work. Audit and improvement of HSE performance. Safety in construction and maintenance works (lifting and rigging, sand blasting, test, works on electrical equipment, in confined spaces, welding…). HSE management system: SIMultaneous OperationS (SIMOPS), management of changes, downgraded situation, human factors.

MAINTENANCE MANAGEMENT

PROJECT: MAINTENANCE ENGINEERING - JURY
During the final project, participants will develop and defend a project related to the maintenance, the energizing of the supporting, the management of a machine overhaul, a manufacturer brief… This 10-day project is based on existing data. Participants are coached along the project to help them reach the objectives set: writing a report and presentation to a jury of personnel from the company and IFP Training.

Level: FOUNDATION

Purpose
This certification provides the technical knowledge to quickly and successfully integrate maintenance or design teams of Oil & Gas production facilities.

Audience
Engineers and technical executives, wishing to get specialized in the maintenance of Oil & Gas and energy production installations. Junior engineers with one of the following positions: site engineer, support engineer, design/engineering engineer or project engineer. Senior engineers in the framework of a retraining or skill development.

Learning Objectives
Upon completion of the training, participants will be able to:
- Explain operation and maintenance of static equipment (wellhead, pipe, line elements, tanks, thermal equipment...).
- Master the technology, working principle, operation, maintenance and safety of the rotating machines used in Oil & Gas production and energy production.
- Understand the behavior of items such as bearings and seal packings in the machines.
- Identify the electrical power production and distribution, the instrumentation and the control of the systems.
- Participate in or carry out the maintenance management of one or several production sites.

Ways & Means
- Interactive animation by industrial, maintenance and energy specialists.
- Numerous applications and illustrations.
- Understanding of all energy and the system maintenance areas.
- Disassembly, expertise, measurements, re-assembly of pumping equipment in an equipped workshop.
- Practical application of new knowledge: site energizing project, organization of major machine overhaul, use of manufacturer folders… (10 days and assessment by a jury).

Learning Assessment
Entry test. Continuous assessment throughout the program. Final project presentation in front of a mixed jury of assessors composed of a group of personnel from the company and IFP Training.

Prerequisites
Engineering degree or equivalent experience in the oil industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expert confirmed in Upstream Maintenance Engineer.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: MAU/MAINTENG
This course is also available in French: MAU/MAINTENG. Please contact us for more information.

Contact: exp.paul@ifptraining.com

295
www.ifptraining.com
Corrosion Prevention in Oil & Gas Production

**Course Content**

**DEFINITION & MECHANISMS OF CORROSION**
1 d
Ferrous and non-ferrous metals: structure, composition, mechanical properties, metallurgy.
Definitions: wet corrosion, dry corrosion.
Cost of corrosion: financial and human.
Basics: electrochemical mechanisms, polarization, passivity, diffusion.

**COMMON TYPES OF CORROSION**
1 d
Analysis of the origin and development process of each form of corrosion and possible methods of prevention.
Forms of corrosion studied: uniform, galvanic, pitting, crevice, inter-granular, selective, corrosion-erosion and cavitation, stress corrosion, contact corrosion.

**TYPES OF CORROSION ENCOUNTERED IN THE OIL & GAS INDUSTRY**
1 d
Each type of corrosion is studied together with possible remedial treatment:
- Corrosion by hydrogen sulfide.
- Corrosion by carbon dioxide.
- Corrosion due to oxygen in aqueous environment.
- Caustic soda corrosion.
- Corrosion in acid gas treatment units.
- Atmospheric corrosion or corrosion by sea water.
- Corrosion by mercury.
- Corrosion of reinforced concrete.

Case studies of corrosion observed in Oil & Gas installations: identification of the types of corrosion and suggested remedial treatments.

**CORROSION PREVENTION**
1 d
Design of equipment aimed at avoiding certain types of corrosion.
Choice of the materials best suited to the environment.
Corrosion inhibitors, filming, passivating, neutralizing, absorbing the oxygen.
Anticorrosion coatings and systems.
Cathodic protection with sacrificial anodes or imposed current.
Methodology and control of processes. Control of process and environmental parameters.
Analysis of the means of prevention implemented in the units.

**CORROSION MONITORING - FUNDAMENTALS OF INSPECTION**
1 d
Corrosion coupons and probes.
Non-destructive testing of the state of walls.
Corrosion monitoring plan.
Fundamentals of inspection.

Reference: INSP/CORGB

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: INSP/CORFR. Please contact us for more information.
Maintenance & Inspection of Static Equipment

**Course Content**

**Module 1: INSPECTOR OCCUPATION & STATUTORY REGULATIONS RELATING TO PRESSURE VESSELS**  
5 d

- Introduction to production facilities inspection:
  - Impact on safety, pressure vessel integrity, accident analysis.
- Inspector occupation:
  - Duties and organization of inspection services; inspector role and responsibilities.
  - Inspection plan: definition, set-up, implementation.
  - Inspection report: interaction with the other departments.
- Statutory regulations applicable to pressure vessels:
  - Main regulatory texts. Area of application and regulatory context of pressure vessels.
  - Roles and responsibilities of various parties. Managing feedback and lessons learnt.

**Module 2: METALLURGY & MATERIALS, WELDING**  
5 d

- Metallurgy:
  - Ferrous and non-ferrous metals.
  - Structures and behavior of metals and alloys at service conditions for static equipment.
- Evaluation of the mechanical characteristics required for predictable behavior at service conditions:
  - Most widely used metals and metal alloys in production facilities: steels, their composition, structure and behavior at service conditions.
  - Steels: HIC-resistant, CRA resistant, cupronickel, aluminium bronze.
- Effect of heating and cooling on steels: current heat treatments resulting from welding or deliberately applied.
- Common defects in steels.
- Boilermaking - Welding:
  - Current cutting, forming and welding processes; impact on metals structure.
  - Post-welding heat treatment.
  - Identification of welding defects in welded assemblies using non-destructive checks and destructive tests on weld test pieces.
  - Qualification of welding procedures and welders.
  - Technique for the permanent assembly of heat exchanger bundle tubes and tube plates: roll and mechanical expansion.

**Module 3: CONSTRUCTIVE TECHNOLOGY, NON DESTRUCTIVE & DESTRUCTIVE TESTING**  
5 d

- Equipment construction technology:
  - General information on static equipment.
  - Type of pressure vessels and pressurized accessories.
- Drawings: reminder on PFD, P&ID, Isometrics reading.
- Introduction to construction codes and standards:
  - Rules and regulations application areas, standards, harmonized standards, professional guides.
  - Notions of materials strength and pressure vessel shells calculations. Safety and welding margins.
- Construction monitoring, destructive and non-destructive testing.
- Notions of strength test.
- Techniques for non-destructive and destructive testing:
  - Standard faults in external and internal walls.
  - Principles, possibilities and areas of application of main NDTs: visual, sweating, magnetic crack detection, ultrasound, X-ray, sealing, acoustic emission.
  - Review of innovative NDTs: digital radio, phased array, TOFD, IRIS, MFL, intelligent pigging, ROVs, drones, reinforced visual inspection.
- Implementation in equipment inspection: on base materials and components, during production, on acceptance, in operation.
- Principles, possibilities and areas of application of destructive test methods.

**Module 4: CORROSION PREVENTION IN PRODUCTION FACILITIES**  
5 d

- Definition and mechanisms of corrosion:
  - Wet corrosion, dry corrosion.
  - Elements of electrochemistry.
- Cost of corrosion: both financial and human, impact on safety.
- Common types of corrosion: origin and development process, possible methods of prevention.
- Types of corrosion encountered in the Oil & Gas industry:
  - Case studies of corrosion observed in Oil & Gas installations: identification of the types of corrosion and suggested remedial treatments.
- Corrosion prevention:
  - Design of equipment: choice of materials; corrosion inhibitors; anti-corrosion coatings and systems.
  - Cathodic protection with sacrificial anodes or imposed current.
  - Methodology and control of processes. Control of process and environmental parameters.
- Corrosion monitoring:
  - Corrosion coupons and probes; non-destructive testing of wall condition.
  - Corrosion monitoring plan.

Reference: INSPECTGB  Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: INSPECTFR. Please contact us for more information.

www.ifptraining.com
**Subsea Integrity Management (I) - Inspection, Monitoring & Testing**

**Level:** PROFICIENCY

**Purpose**
This course provides technical knowledge pertaining to the integrity management of subsea systems.

**Audience**
Engineers and technicians whose activity is related to the operation of Oil & Gas subsea facilities.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- fix objectives for inspection campaigns,
- write specifications for the inspection of installation (with ROV, etc.).

**Ways & Means**
- Lectures carry numerous examples from ongoing projects.
- Trainers are specialized engineers currently involved in deep offshore projects.

**Learning Assessment**
Written test upon training course completion.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IPF Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

<table>
<thead>
<tr>
<th>Course Content</th>
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<tbody>
<tr>
<td><strong>INSPECTIONS &amp; THEIR OBJECTIVES</strong></td>
</tr>
<tr>
<td>By contractor (with operator follow-up).</td>
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<tr>
<td>By operator.</td>
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</tbody>
</table>

| **DEEP WATER SYSTEMS INSPECTION ACTIVITIES** |
| “Standard” types. |
| Means, constraints, limitations. |
| Visual indications specific to deep subsea conditions. |
| Main challenges. |

| **INSPECTION PLAN/INTERVALS** |
| Regulatory requirements, RBI approach… |
| Inspection plan. |
| Inspection zones, inspection mean times. |
| Inspection plan revision. |

**GENERIC SUPPORT DOCUMENTS**

**SPECIFIC SUPPORT DOCUMENTS**

**INSPECTION MANAGEMENT DATABASE**
Objectives and functionalities. 
Contents and structure. 
Inputs and outputs.

**KEYS FOR THE SUCCESSFUL IMPLEMENTATION OF AN INSPECTION DATABASE**
Usability. 
Portability.

**“INITIAL STATUS” REFERENCES**
Technical specifications, manufacturing dossiers. 
Inspections reports. 
Installation/commissioning reports.

**SPECIFIC INSPECTIONS**
Flowlines intelligent pigging. 
Occurrence/anomaly follow-up.

**MONITORING**
Adequate response to commands. 
Adequate operating parameters. 
Sand production monitoring. 
Sand erosion monitoring. 
Flexible risers/IPBs. 
Riser towers/risers.

**TESTING**
Valves testing. 
“Safety valves” testing. 
Others. 
Control fluid consumption. 
Downhole chemical injection flow test.

Reference: INSP/SUBINT1 Only available as an In-House course. 
Contact: exp.pau@ifptraining.com
Subsea Integrity Management (II) - Non Conformity Management

Level: PROFICIENCY

Purpose
This course provides technical knowledge pertaining to the integrity management of subsea systems.

Audience
Engineers and technicians whose activity is related to the operation of Oil & Gas subsea facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
- determine integrity characteristics,
- evaluate consequences of failures,
- plan repairs.

Ways & Means
Lectures carry numerous examples from ongoing projects.
Trainers are specialized engineers currently involved in deep offshore projects.

Learning Assessment
Written test upon training course completion.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

PHYSICAL & STRUCTURAL INTEGRITY ISSUES & THEIR MAIN CONSEQUENCES
Stress and fatigue, External corrosion, internal erosion/corrosion, Hydrogen induced stress cracking, External event, Thermal Insulation, heat loss.
Case studies, prevention & remediation.

“FUNCTIONAL” INTEGRITY ISSUES & THEIR MAIN CONSEQUENCES
Defective subsea retrievable modules.
“Internal” leakages (passing valves, passing non-return valves...).
Leaks to environment.
Electrical lines/conductors defects.
Monitoring sensors signal loss.
Hydraulic locks.
Chemical lines blockages.

NON CONFORMITY MANAGEMENT
Objective.
Non conformity.
Non conformity “dossiers”.
Non-conformity register/database.

MAINTENANCE & REPAIR
Planned events.
Unplanned events.

Reference: INSP/SUBINT2 Only available as an In-House course.
Contact: exp.pau@ifptraining.com

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Project Implementation
E&P Project Management Certification ................................................................. p. 301
Upstream Project Management Certification ....................................................... p. 302
E&P Value Chain & Front-End Development ....................................................... p. 303
E&P Projects Value Management ....................................................................... p. 304
E&P Project Risk & Decision Analysis Workshop ................................................. p. 305
E&P Project Quality & Risk Management ............................................................ p. 306
Offshore E&P Project Management .................................................................... p. 307
Building a Project Management Office (PMO) ................................................... p. 308
E&P Project Logistics Management ..................................................................... p. 309

Project Control
E&P Project Control Tools ................................................................................... p. 310
E&P Technical Service Contracts .......................................................................... p. 311
E&P Technical Contract Negotiation ..................................................................... p. 312
E&P Project Cost Estimation & Control Certification ............................................ p. 313
E&P Project Operating Expenses Optimization .................................................. p. 314
E&P Project Planning & Scheduling Workshop .................................................... p. 315

Project Construction
Upstream Project Construction Techniques ......................................................... p. 316
Upstream Project Construction Site Administration ............................................ p. 317
Upstream Project Construction HSE Management ............................................. p. 318
Offshore Oil & Gas Project Installation ............................................................... p. 319
Upstream Project Construction Works Supervision ............................................ p. 320
Upstream Project Precommissioning, Commissioning & Start-Up ...................... p. 321
Upstream Project Abandonment Operations ..................................................... p. 322
Subsea Production Systems (SPS) ...................................................................... p. 323
Subsea Pipelines ................................................................................................. p. 324
E&P Project Construction Certification ............................................................... p. 325
E&P Construction Superintendent Certification .................................................. p. 326
Advanced Certificate
E&P Project Management Certification

Level: PROFICIENCY

Purpose
This course explains how large E&P projects are managed from initial stage to completion.

Audience
Professionals who require a comprehensive understanding of project management practices for E&P projects.

Learning Objectives
Upon completion of this course, participants will be able to:
- conduct the preliminary stages of the project: conceptual and feasibility studies, economic evaluation, FEED,
- enforce project control processes to meet scope, cost and schedule objectives,
- strengthen HSE in project design and construction,
- select the right type of technical contract,
- manage construction phases: mainly engineering, procurement, construction and commissioning.

Ways & Means
The course is illustrated with several examples taken from E&P projects.
A project case study is used throughout the course to illustrate each chapter.

Learning Assessment
Quiz at the end of the module.

Prerequisites
Basic knowledge of petroleum industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in E&P Project Management.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

E&P CHAIN VALUE MANAGEMENT
Project evaluation and choices throughout the exploration and production value chain.

INTEGRATION & SCOPE MANAGEMENT
Preliminary, conceptual and pre-project studies and their deliverables.
EPC phase objectives and project execution plan.
Local content and sustainable development.

TECHNICAL SERVICE CONTRACTS
Contracting strategy (project breakdown into contracts).
Types and comparison of technical contracts.
Endorsements and assignments.
Tendering process.

PROJECT ORGANIZATION
Interface management.
Management of human resources, organization charts, project manager’s role.
Stakeholder management.
Communication management.

HSE, QUALITY & RISK MANAGEMENT
HSE: tools and techniques for safety and environment design, project reviews, safety concept and safety dossier.
HSE during construction phase, HSE indicators.
Quality: assurance, control and surveillance management.
Risks: identification, ranking, action plans.

PROJECT CONTROL: COSTS & SCHEDULE
Planning and scheduling: schedule elaboration, progress control, recovery plan.
Costs: estimation of facilities expenditures, budget elaboration, cost control, reporting.

OIL & GAS PROJECT PHASES
Detailed engineering: work packages, main deliverables, project reviews, documentation control, changes.
Procurement: activities (purchasing, expediting, inspection, shipping), long lead items, company supplied items, material control systems.
Construction/fabrication challenges: contractors and resources, (sub) contract types.
Construction at site: execution plan, construction methods (temporary construction facilities, prefabrication, modularization, delivery, erection), interface with commissioning.
Fabrication at yards: load-out, transport and installation.
Completion activities: methodology, sequence, completion dossiers, commissioning systems, hand-over and acceptance of the facilities.
Project close out and management of collective knowledge.

Ways & Means
The course is illustrated with several examples taken from E&P projects.
A project case study is used throughout the course to illustrate each chapter.

Learning Assessment
Quiz at the end of the module.

Prerequisites
Basic knowledge of petroleum industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in E&P Project Management.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: PIMP/PROJGB • Can be organized as an In-House course. Contact: pl.rueil@ifptraining.com

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<th>Location</th>
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<th>End Date</th>
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<td>Rueil</td>
<td>3 June</td>
<td>7 June</td>
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<tr>
<td>Rueil</td>
<td>18 November</td>
<td>22 November</td>
<td>€3,570</td>
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</table>
Graduate Certificate

Upstream Project Management Certification

Level: DISCOVERY

Purpose
This course provides an understanding of the structure of an E&P project and aims to acquire the necessary techniques and know-how to successfully manage them.

Audience
Engineers who are newly involved in project activities and who are in need of a global understanding of upstream projects.

Learning Objectives
Upon completion of this course, participants will be able to:
- grasp Oil & Gas activities, vocabulary, economy,
- conduct the stage-gate preliminary phase and the relevant economic studies,
- appraise project planning: schedule, costs, execution plan,
- strengthen HSE in project design and construction,
- choose within the various technical contract types,
- manage pre-construction phases: basics, calls for tenders, etc.,
- manage construction phases: engineering, procurement, construction and commissioning.

Ways & Means
- Each step of the training is illustrated by numerous examples, drawings, photos and videos taken from actual Oil & Gas upstream projects.
- Practical case studies in each module can account for some 50% of training time.

Learning Assessment
Quiz at the end of each module and project presentation at the end of the program.

Prerequisites
No prerequisites for this course.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Upstream Project Management.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 65 days

Part 1: E&P TECHNOLOGIES OVERVIEW 5 d
Geosciences. Drilling and well completion. Field processing, surface facilities, field development and decision making process. E&P challenges and new technologies.

Part 2: PROCESS EQUIPMENT & MATERIAL 5 d

Part 3: E&P CONTRACTUAL & ECONOMIC FRAMEWORK 5 d
Upstream economic and contractual framework, economic analysis and investment decision.

Part 4: PROJECT MANAGEMENT 5 d
Introduction and preliminary studies. Feed or basic engineering. Detailed engineering, procurement and construction.

Part 5: ENGINEERING, QUALITY & RISK MANAGEMENT 5 d

Part 6: TECHNICAL SERVICE CONTRACTS 5 d

Part 7: PLANNING & SCHEDULING 5 d
Planning and scheduling processes. Onshore case study using MS Project and offshore case study using Primavera.

Part 8: COST ESTIMATION & CONTROL 5 d
Cost estimation methods and case studies. Cost control.

Part 9: PRECOMMISSIONING - COMMISSIONING 5 d
Mechanical completion, commissioning activities and start-up.

Part 10: LOGISTICS 5 d
Logistics base and warehouse management. Transportation issues.

Part 11: TECHNICAL CONTRACT NEGOTIATION 5 d
Presentation of negotiation methods to deal with issues related to technical service contracts.

Part 12: FIELD DEVELOPMENT PROJECT 10 d
The trainees will work in groups to produce typical field development project deliverables (risk register, contracting and procurement strategy, overall project schedule, cost estimate, logistic considerations, etc.) and consolidate them into a final project dossier. On the last day, each group will present their work to a jury.

Reference: PIMP/UMCGB

This course is also available in French: PIMP/UPMCGB. Please contact us for more information.
E&P Value Chain & Front-End Development

Course Content

**DECISION PATH ALONG THE E&P VALUE CHAIN**
1.5 d

Strategic issues in exploration-production:
- Requirements for decision in the Oil & Gas industry. Primary objectives of an Oil & Gas company. Strategies to feed the E&P portfolio asset funnel. E&P risk dynamics and objectives of economic analysis. Life cycle of upstream assets.
- Critical decision points and value creation at experts meeting points.

Decision process from block evaluation to exploration drilling:
- Exploration risk mitigation through farm-out agreements. Decision process for a farm-out strategy (case study).

Decision process from discovery to development and production:
- Discovery appraisal, reserves recovery and recovery mechanisms. Reserves probability distribution and classification. Oil & Gas field development scenarios. Decision tree analysis for choosing optimal strategy (case study).
- Expected value of perfect and imperfect information (case studies). Framework and interaction of various disciplines. Forward investment analysis for a development project. Steps along the decision path up to the FID (Final Investment Decision). Overview of appraisal, development and project studies.

**VALUE ASSESSMENT OF DEVELOPMENT PROJECTS**
2 d

Fundamental contractual and economic aspects:
- Economic rent: value and sharing, bottom line of Oil & Gas E&P contracts. Overview of the contractual framework of E&P activities. Motivations for State participation and role of NOCs (National Oil Companies). Risk mitigation through Joint-Ventures and JOAs (Joint-Operating Agreements).
- Shared value through concession and production-sharing contracts (case studies). Regressive aspects of E&P contracts and fields' economic thresholds (case studies).

A field development project economic evaluation:
- Investment decision based on cash-flow modeling and analysis. Corporate finance and remuneration of capital employed. Importance of weighted average cost of capital. Fundamental condition for value creation. Project's cash flow modeling and discounting. Project's economic indicators and sensitivity analysis. A field development project economic model and analysis report (case study). Choosing the most economically viable option, with or without capital constraints (case studies).
- Methodology of quantitative risk analysis:

**CONCEPTS FOR SUCCESSFUL FRONT-END DEVELOPMENT**
0.5 d

Closer look at why projects fail:
- Discussion of issues and constraints facing Oil & Gas projects. Large capital Oil & Gas projects challenges and performance. Aggressive pursuit and conservative response. Project risks, organizational risks, external risks and the influence curve. Asset front-end loading index. Keys to successful project delivery.
- FEED (Front-End Loading) purpose and methodology:
- Foundation for smarter project execution. Important effort in the FED (Front-End Development). FEED phases and deliverables: visualization, conception, definition. Goals for FED and benefits of FEED. Risk exposure and amount of control.
- Oil & Gas field development project definition:
- Activities and stages leading to the FID. Studies to be performed to reach that goal. Stage-gated project management process. Interaction between various disciplines involved in the project.

**DYNAMICS OF FEL 1 & FEL**
0.5 d

FEL 1: Prefeasibility stage:
- Objective of preliminary studies and appraisal requirements. Preliminary scheme and technical feasibility. Preliminary schedule and cost estimates. Economic, safety, environment and stakeholders issues.
- FEL 2: Feasibility stage:
- Objective of conceptual studies. Screening of alternatives and confirmation of feasibility. Key parameters definition and various technical options. Concept study content and concept selection criteria. Pre-project or pre-FEED study content and output. Field development plan, project economics and execution principles. Pre-requisites for launching the FEED or Basic Engineering. Case study.

**DYNAMICS OF FEL 3 & FID**
0.5 d

FEL 3: basic engineering and development stage:
- Project scope definition and integration management. Work breakdown structure for an Oil & Gas field. Scope of the basic engineering package. Reference documents needed and validation process. FEED activities, deliverables and organizations. Company and contractor execution plans.
- Final Investment Decision:
- Project sanction. Typical project organization. FEED contract types. Managing changes to the scope baseline. SOR (Statement of Requirements) modifications.
- Key field development planning and FEL issues to keep in mind.

Reference: PIMP/PROJAFLGB  
Only available as an In-House course.
Contact: pl.rueil@ifptraining.com

www.ifptraining.com 303
E&P Projects Value Management

Level: PROFICIENCY

Purpose
This course aims to acquire a thorough understanding of how upstream projects are structured and carried out within their contractual and economic framework.

Audience
Oil & Gas professionals from various disciplines who require formal training in management and are particularly interested in a comprehensive view of the methodology and tools needed for evaluating projects in the exploration-production sector.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify the various components in the Oil & Gas chains,
- see the various technical components of upstream projects,
- grasp the essence of Oil & Gas contracts, and economic rent sharing,
- comprehend the risks involved in and the decision process for exploration-production projects,
- follow the methodology of Oil & Gas project studies leading to a final investment decision,
- understand the concepts behind various indicators of value and profitability,
- see the fundamentals of project management techniques applied to E&P projects.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

STRUCTURE & DYNAMICS OF UPSTREAM PROJECTS

3 d
Strategic issues in Oil & Gas: structure of the Oil & Gas industries, picture of worldwide Oil & Gas supply and demand, primary objectives of an oil company, economic analysis and long-term planning, E&P portfolio components and risk dynamics, focus on geological risk and economic risk, important value drivers, life cycle of upstream assets, critical decision points and value creation, E&P assets valuation, stakeholders, business and operational processes.

Development/production phase: from discovery to development and production, appraisal phase, uncertainties and reserves evaluation, reserves probability distribution and classification, techniques and expertise involved (geology, geophysics, geological modeling, exploration drilling), exploration risk and reward analysis, probability of success and decision tree analysis, expected monetary value, exploration block valuation and basis for decision in exploration, impact of state participation, exploration risk mitigation through farm-out agreements.

OIL & GAS PROJECT STUDIES & MANAGEMENT

2 d
Front-end development studies: front-end loading as a foundation for smarter project execution, phases and deliverables (prefeasibility stage, feasibility stage, basic engineering), project scope definition and execution plan.

Fundamentals of financial management: corporate finance, project finance, cost of debt capital, cost of equity capital, balance sheet, return on capital employed, return on equity, weighted average cost of capital and fundamental condition for project value creation, cost accounting and budgeting.

Field development project economic evaluation: methodology for assessing the economic value of an Oil & Gas field development project, global project cash flows (Revenues, Capex, Opex and Gvt Take), discounting, risks and discount rate, economic indicators (net present value, internal rate of return, pay-out-time), quantitative risk analysis.

Case study: oil field development project with State participation within the framework of a PSC.

Principles of project management: large capital Oil & Gas projects challenges and performance, final investment decision, project risks, organizational risks and external risks, FEED and EPC contracts, project organization, control and management (schedule, cost, quality, HSE, and risk issues), keys to successful project delivery.

Reference: PIMP/PVMGB

Only available as an In-House course.

Contact: pl.rueil@ifptraining.com
E&P Project Risk & Decision Analysis Workshop

Level: PROFICIENCY

Purpose
This course aims to comprehend the methods and gain a practical knowledge of the probabilistic models applied in Oil & Gas project decision analysis through a workshop dedicated to problem solving with spreadsheet applications.

Audience
Oil & Gas professionals from various disciplines who need to acquire the skills needed to analyze risk of Oil & Gas projects and build probabilistic models to provide the decision analysis required for analyzing investment opportunities.

Learning Objectives
Upon completion of the course, participants will be able to:

- understand the concepts of risks, uncertainties and probability distributions and tables,
- practice the use of the various tools of expected values, decision trees and Monte Carlo simulation,
- develop and solve different types of probabilistic models used in prospect evaluation and field development projects.

Ways & Means
- Spreadsheet applications for numerous problems of decision analysis in the upstream sector.
- Illustration with software @Risk and PrecisionTree.

Learning Assessment
Quiz at the end of the module.

Prerequisites
Good practical knowledge of Microsoft Excel.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OVERVIEW OF THE DECISION PROCESS
Strategic issues in Oil & Gas: E&P portfolio components and risk dynamics, important value drivers, life cycle of upstream assets, critical decision points and value creation, economic rent sharing through Oil & Gas contracts.

Exploration phase: exploration rounds and blocks, fundamental questions for a manager, speculation and decision process, exploration risk and prospect reserves evaluation, techniques and expertise involved, exploration risk and reward analysis, impact of state participation, risk mitigation.

Development/production phase: appraisal, uncertainties and discovery reserves evaluation, techniques and expertise involved, field development schemes, capital expenditures, operating expenses, abandonment issues and costs, economic modeling, value of a discovery, fundamental condition for value creation.

Fundamental issues in decision analysis: uncertainty in capital investments, decision analysis process, terminology used in decision analysis, various applications in the Oil & Gas industry.

MAIN STATISTICS & PROBABILITY CONCEPTS
Descriptive statistics: measures of central tendency, measures of dispersion, grouping of large data sets, frequency distribution, cumulative and decumulative relative frequency.

Probability concepts: simple, conditional, joint, and marginal probability, probability rules, discrete probability distributions, continuous probability distributions.

Spreadsheet applications: drilling data, exploration drilling, reservoir data, workover...

RISK & DECISION ANALYSIS
Expected value concepts: expected value and standard deviation of random variables, structural elements of decision problems, payoff tables, expected monetary value, expected profitability index, performance index, expected opportunity loss, sensitivity analysis, mean-variance analysis.

Decision tree analysis: designing and solving decision trees, risk profiles, expected value of information (perfect or imperfect), expected net gain, prior, conditional and posterior probabilities, Baye’s rule.

Attitudes towards risk: expected preference value or expected utility, utility function, risk tolerance, certainty equivalent and risk premium, assessing the utility function, mathematical representation of utility functions, gambler’s ruin, risk-adjusted value and working interest.

Simulation in decision analysis: applications of simulation, steps in simulation modeling, probabilistic dependence of input variables.

Spreadsheet applications: decision tree analysis with the software PrecisionTree, Monte Carlo simulation with the software @Risk, reserves probability distribution, reserves uncertainties in the valuation of a simple prospect, Bayesian tree analysis for prospect evaluation, drilling prospect with farm-out option, cost and value of information from a delineation, seismic option, investment decision with a risk tolerance...

Reference: PIMP/PRDAWGB
Only available as an In-House course.

Contact: pl.rueil@ifptraining.com
E&P Project Quality & Risk Management

Course Content

FROM CORPORATE MANAGEMENT SYSTEM TO PROJECT OBJECTIVES
0.5 d
Project reference standards and associated requirements.
Definition of project objectives in terms of quality, safety and health, environmental, security, social, etc.
Integrated management systems to meet these objectives.
Support project documentation and helpful Key Performance Indicators (KPIs).

SETTING UP A PROJECT QUALITY MANAGEMENT SYSTEM
0.5 d
Links between management and project process.
Project processes: identification and cartography.
Management processes and process owners.
Project organization and quality responsibilities.
Involvement of the management team and quality independence.
Transversal key documents: project execution plan, quality plan (and associated procedures), HSE plan.
Key documents for each project phase: engineering plan, procurement plan, construction plan, commissioning plan.
Related processes: interface management plan, documentation management, change management, risk management.

QUALITY ASSURANCE ACTIVITIES PRIOR TO PROJECT START
0.25 d
Requirements from ISO-9001 standard and application to projects.
Document control practices.
Audit planning and preparation.
Inspection planning and issue of Inspection and Test Plans (ITPs).

QUALITY CONTROL ACTIVITIES DURING PROJECT EXECUTION
0.25 d
Surveillance plan to be enforced during procurement and construction phases.
Factory Acceptance Test (FAT), company witnesses, quality surveyors and vendor representatives.
Workshop assessments and visits to contractors’ and subcontractors’ premises.

CLOSING THE QUALITY IMPROVEMENT LOOP
0.5 d
PDCA cycle of continuous improvement.
Periodical surveillance meetings and follow-up of actions.
Feedback gathering and use for benchmarking.
Review of vendor documentation, approvals and updates.
Management of quality records.
Use of project non-conformances for improvement purposes.
Consolidation of project as-built documentation.

RISK MANAGEMENT
1 d
Risks and opportunities.
Risk identification methods.
Severity, probability and criticality.
Risk register: organization, owners, meetings and stakeholders.
Risk mitigation plan.
Example of contingency calculation.

Reference: FIMP1040CGB
Only available as an In-House course.
Contact: pl.rueil@ifptraining.com
Offshore E&P Project Management

Level: PROFICIENCY

Purpose
This course provides an understanding of all major aspects specific to offshore project management.

Audience
Technical supervisors and managers, project and general managers and government officials.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand Offshore project management constraints,
- dealing with internal (company) and external requirements (government, partners, contractors, etc.),
- comply with core requirements for major projects in terms of planning, costs and risks,
- master the specific vocabulary of offshore projects and toll gating processes.

Ways & Means
- Guidelines and standards, as well as best practices will be illustrated by numerous examples.
- Case studies will be used throughout the training to explain why real projects have fallen short from expectations.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

0.5 d
SPECIFIC TOPICS OF PROJECT MANAGEMENT APPLIED TO OFFSHORE PROJECTS
- Risk Management - Group session and discussion.
- Costs and schedule control.
- Management of facilities risks and safety.

0.5 d
DESIGN CONSIDERATIONS
- Pre-feasibility and feasibility checklists - Group session and discussion.
- Plan and value improvement practices.

0.5 d
WORKS PREPARATION
- Introduction and planning for success - Principles and elements.
- Phases, organization and teamwork.

0.5 d
CONSTRUCTION ISSUES
- Modularization.
- Safety.
- Quality.

0.5 d
LIFTING & INSTALLATION
- Heavy lifts offshore and cranes.
- Lifting offshore (center of gravity, weight control).

0.5 d
CASE STUDIES
- Case History I: Project Risks for FLNG - Shell - Prelude.
- Case History II: The Dangers of “Entering a New Country”.
- Case History III: The World’s First Gas Pipeline Export.
- Case History IV: All Subsea Development, the Future?

Reference: PIMP/OPFMGB
Only available as an In-House course.

Contact: pl.rueil@ifptraining.com

www.ifptraining.com
Building a Project Management Office (PMO)

Course Content

VALUE OF A PROJECT MANAGEMENT OFFICE
0.5 d
Setting up a PMO vision and creating a charter.
State of project and portfolio management.
Defining the to-be state and analyzing the gap.
Planning for success and defining PMO responsibilities within the organization.
Roadmap to mature the PMO.

PROJECT MANAGEMENT PROCESSES
0.75 d
Benefits of standardizing project management processes.
Developing and updating processes and standard document templates.
Standards for project content storage.
Project management and portfolio management.
Project Portfolio Management (PPM) tools.
Issues of capacity management.

PROJECT TRAINING & SUPPORT
0.5 d
Project staffing, knowledge management and career development.
Project managers’ skill development.
Project/portfolio management competencies.
Audits and project recovery assistance.

PERFORMANCE MEASURES
0.75 d
Portfolio analysis and project progress.
Key Performance Indicators (KPI).
Measuring project costs and benefits.
Establishing KPI roles and responsibilities.
Assessing at-risk projects/portfolios and reporting progress.
Performance reports.

CONTINUOUS IMPROVEMENT
0.5 d
Providing guidance and control.
Structuring PMO roles and responsibilities.
Validating compliance to standards and regulations.
Incorporating best practices and implementing change.
E&P Project Logistics Management

Level: PROFICIENCY

Purpose
This course aims to provide an overall view of the logistics issues of Oil & Gas upstream projects.

Audience
Engineers or technicians who will hold positions in an E&P logistics organization.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify the stakes and challenges related to the development of an Oil & Gas field,
- explain the differences between road, sea and air transport,
- deal with HSE challenges.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

TRANSPORT
2.5 d
Road transport:
Characteristics of road transportation.
Transport of dangerous goods.
Risks, contracts.
Operation, maintenance.
Referential.
Infrastructure.

Air transport:
Aircraft.
International referential.

Sea transport:
Vessels.
Marine inspection.
Port facilities.
Transportation of personnel.
Tanker loading.
Rig move.
Marine operations.
Weather.

LOGISTICS
2.5 d
Logistics base management:
Base concept.
Organization and sizing.
Material management.
Base operations.

Warehouse management:
Warehouse concept.
Warehouse organization.
Transit areas.
Shelter.
Workshop.

Lifting and handling operations.
Industrial risks.
Waste management.

Reference: PIMP/LOGGB
Only available as an In-House course.

Contact: pl.руэй@ifptraining.com

This course is also available in French: PIMP/LOGFR. Please contact us for more information.

www.ifptraining.com
E&P Project Control Tools

Level: PROFICIENCY

Purpose
This course provides a comprehensive understanding of the techniques used to control a project.

Audience
Professionals who have already occupied a position within a project task force and need to understand the fundamental project control processes.

Learning Objectives
Upon completion of the course, participants will be able to:
- specify scope and interfaces of the project control function,
- improve communication among project actors,
- master project control information: collection, process, report,
- apply different methods and tools related to project control,
- identify areas of concern and propose a corrective action plan.

Ways & Means
- The course is illustrated by numerous examples taken from actual Exploration & Production projects.
- A project case study is used stage-by-stage while constantly comparing the standpoints of the company and the contractor.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

PROJECT CONTROL FRAMEWORK
- Project control process map.
- Project scope and execution strategy.
- Project control plan implementation.

SCHEDULE
- Schedule planning and development.
- Progress and performance measurement.
- Assess schedule and resource performance.

COSTS
- Cost estimating and budgeting.
- Resource planning.
- Project cost accounting.
- Assess cost performance.
- Forecasting.
- Project historical database management.

VALUE ANALYSIS & RISKS
- Value analysis and engineering.
- Risk management.
- Assess risks factors.

PERFORMANCE ASSESSMENT ROUND-UP, PROCUREMENT & CHANGES
- Assess integrated earned value.
- Assess work process and productivity.
- Report project performance assessment.
- Procurement planning.
- Change management.

Reference: PCTR/PCGB
- Can be organized as an In-House course.

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>14 October</td>
<td>18 October</td>
<td>€3,570</td>
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</table>

Contact: pl.rueil@ifptraining.com
E&P Technical Service Contracts

Level: **PROFICIENCY**

**Purpose**
This course provides a comprehensive understanding of project contract and procurement issues as seen by an oil company and a contractor.

**Audience**
Project engineers strongly involved in contractual issues of upstream Oil & Gas projects.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- grasp the increasingly challenging contractual relations involved in an Oil & Gas project,
- apply proven methods to solve the issues and put successfully a project in the right contractual framework.

**Ways & Means**
The course is illustrated by numerous examples taken from actual Exploration & Production projects.

**Learning Assessment**
Quiz at the end of the module.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Time (days)</th>
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<tbody>
<tr>
<td><strong>INTRODUCTION</strong></td>
<td><strong>0.25 d</strong></td>
</tr>
<tr>
<td>Different types of technical contracts.</td>
<td></td>
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</tbody>
</table>

**CONTRACTING STRATEGY**
**0.5 d**

**CALL FOR TENDER PROCEDURES**
**0.75 d**

**LEGAL ISSUES**
**0.25 d**
Interfaces between patrimonial agreements and operations contracts. Legal issues and contract negotiation/administration.

**LIABILITIES & INSURANCES**
**0.5 d**

**CONTRACT ARTICLES**
**0.75 d**

**CONTRACT ADMINISTRATION**
**0.5 d**
Progress measurement and control. Change orders. Claim management.

**PROCUREMENT ACTIVITIES**
**0.5 d**

**SPECIFIC TOOLS & REQUIREMENTS**
**1 d**

Reference: PCTR/CPGB  Can be organized as an In-House course.  Contact: pl.rueil@ifptraining.com

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</table>

www.ifptraining.com
# E&P Technical Contract Negotiation

**Level:** PROFICIENCY  
**Purpose**
This course provides an understanding of the constraints, challenges, and methods inherent to the negotiation of upstream technical service contracts.

**Audience**
Professionals who need to grasp the methodology used in negotiating upstream technical contracts for projects, in the increasingly challenging upstream environment.

**Learning Objectives**
Upon completion of the course, participants will be able to negotiate technical contracts for upstream Oil & Gas projects.

**Ways & Means**
- Case studies with a debriefing session.
- Exercises performed on software.

**Learning Assessment**
Quiz at the end of the module.

**Prerequisites**
Knowledge of upstream technical service contracts.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

<table>
<thead>
<tr>
<th>4 days</th>
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<tbody>
<tr>
<td><strong>METHODOLOGY</strong></td>
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<tr>
<td>Principles.</td>
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<tr>
<td>Preparation and discussions wheels.</td>
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<tr>
<td>Performance evaluation.</td>
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<tr>
<td><em>Case study A - LILAC Project: negotiation of a claim.</em></td>
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<tr>
<td><strong>METHODOLOGY APPLIED TO PROJECTS</strong></td>
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<tr>
<td>Preparation and discussions wheels.</td>
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<tr>
<td>Performance evaluation.</td>
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<tr>
<td><em>Case study B - TUMACO Project: how to manage variations in time schedules.</em></td>
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<tr>
<td><strong>SIMULATION 1</strong></td>
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<tr>
<td><em>Case study: negotiation of a claim.</em></td>
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<tr>
<td><strong>ARGUMENTS &amp; SEARCHING FOR A COMPROMISE</strong></td>
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<tr>
<td>The 3 “Ego states”.</td>
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<td>Arguments and objections.</td>
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<tr>
<td>Looking for a compromise. Reciprocity. Tools and tactics.</td>
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<tr>
<td><strong>SIMULATION 2</strong></td>
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<tr>
<td><em>Case study: resolution of a technical dispute linked with problems occurred during transportation of equipment.</em></td>
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<tr>
<td><strong>CLAIM MANAGEMENT</strong></td>
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<tr>
<td>Methodology. Application to projects.</td>
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<tr>
<td><em>Case study C - CARACAL project: modernization of existing plant &amp; construction of a new 16&quot; pipeline.</em></td>
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<tr>
<td><strong>SIMULATION 3</strong></td>
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<tr>
<td><em>Case study D - PANALPINA Project: negotiation of a transit contractor and the supplier of a sub-equipment required by CPY for the safety of its helicopter fleet.</em></td>
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<tr>
<td><strong>INFLUENCE GAMES &amp; GROUP DYNAMICS</strong></td>
</tr>
<tr>
<td>Decode the games of influence.</td>
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<tr>
<td>How to identify and manage them?</td>
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<tr>
<td>Group dynamics:</td>
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<tr>
<td>How to build a team?</td>
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<tr>
<td>Legitimacy and credibility.</td>
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<tr>
<td>Your group dynamic and the one of the other party.</td>
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<tr>
<td><em>Final case study (compilation of cases A, B, C and D).</em></td>
</tr>
</tbody>
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**Reference:** PCTR/NEGOGB  
**Only available as an In-House course.**  
**Contact:** pl.rueil@ifptraining.com

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<td>28 October</td>
<td>31 October</td>
<td>€3,300</td>
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</tbody>
</table>
Advanced Certificate
E&P Project Cost Estimation & Control Certification

Level: PROFICIENCY

Purpose
This course provides a structured and comprehensive approach towards cost estimation and control of upstream Oil & Gas projects.

Audience
Project engineers and managers, petroleum architects, engineers in charge of the modification/extension of existing facilities and R&D engineers.

Learning Objectives
Upon completion of the course, participants will be able to:
- technically define a project to provide a comprehensive cost estimate,
- perform estimates using a variety of methods and tools,
- apply the main cost control techniques used throughout the project execution.

Ways & Means
- Case studies from upstream projects.
- Spreadsheets will be used to perform project cost estimates from basic design parameters.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in E&P Project Cost Estimation & Control.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OVERVIEW OF E&P PROJECTS
Introduction to exploration and production projects:
- Decision process from discovery to production.
Technical fundamentals:
- Production facilities.
- Structures and pipelines.

PROJECT COST ESTIMATION
Estimation framework:
Cost evaluation during project evaluation phases:
- Order of magnitude estimate. Factored/modular estimate.
Cost evaluation during basic engineering and contracting phases:
- Semi detailed estimate. Detailed estimate.
From historical data to present time cost evaluation:
- Cost escalation, cost indexes, inflation. Location factors.
Additional cost elements:

CASE STUDIES ON COST ESTIMATION
CAPEx of an onshore project:
- Cost estimate of well clusters, CPF, flow lines, trunk lines and infrastructures using diverse documents (historical data, curves, etc.).
CAPEx of an offshore project:
- Cost estimate of a satellite field development.
CAPEx of a deep offshore project:
- Cost estimate of the three main packages (FPSO, UFR and SPS).
OPEX of an onshore field:
- Production, transformation and transport costs. Routine and non-routine costs.

COST CONTROL
Overview of cost control process.
- Impact of contracting strategy.
- Breakdown structures and budget.
- Commitment process.
- Change management.
- Forecasts and reporting.

Location
Start Date
End Date
Tuition Fees
Rueil
25 November
29 November
€3,570

Reference: PCTR/COSTGB
Can be organized as an In-House course.

Contact: pl.rueil@ifptraining.com

This course is also available in French: PCTR/COSTFR. Please contact us for more information.
E&P Project Operating Expenses Optimization

**Course Content**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25d</td>
<td><strong>IDENTIFY OPEX SAVINGS</strong>&lt;br&gt;Use of an open standard technology.&lt;br&gt;Increased information for better operation, accuracy of measurement and control.&lt;br&gt;Enhancement in control function and the performance.&lt;br&gt;Improved throughput.&lt;br&gt;Online diagnosis enables true preventive maintenance.&lt;br&gt;Improve troubleshooting.</td>
</tr>
<tr>
<td>0.25d</td>
<td><strong>INCREASING PLANT AVAILABILITY</strong>&lt;br&gt;Faster time-to-profit.&lt;br&gt;Higher sustained production with minimized costs.&lt;br&gt;Safer operation.&lt;br&gt;Fewer unscheduled outages.</td>
</tr>
<tr>
<td>0.25d</td>
<td><strong>MANAGING OPERATION &amp; PRODUCTION COSTS</strong>&lt;br&gt;Improved maintenance for fewer process upsets and high availability.&lt;br&gt;Improved quality and productivity.&lt;br&gt;Improved alert capabilities for better operation.&lt;br&gt;Improved accuracy of measurement and control.&lt;br&gt;Data access for business intelligence.</td>
</tr>
<tr>
<td>0.25d</td>
<td><strong>MANAGING MAINTENANCE COSTS</strong>&lt;br&gt;Reducing unnecessary trips to plant.&lt;br&gt;Avoiding failure instead of solve failure.&lt;br&gt;Reducing time to repair.&lt;br&gt;Identification and elimination of root causes.&lt;br&gt;Reducing inventory costs.&lt;br&gt;Centralizing maintenance.&lt;br&gt;Centralizing data management.</td>
</tr>
<tr>
<td>0.25d</td>
<td><strong>CONTROL IN THE FIELD</strong>&lt;br&gt;Synchronizing data sampling and control.&lt;br&gt;Reducing latency effects in the control chain.&lt;br&gt;Enhancing process integrity.&lt;br&gt;Reducing variability.&lt;br&gt;Tighter loop control.</td>
</tr>
<tr>
<td>0.25d</td>
<td><strong>MAXIMIZING ASSETS UTILIZATION</strong>&lt;br&gt;Field controllers.&lt;br&gt;Equipment monitoring.&lt;br&gt;Role-based diagnostics.</td>
</tr>
<tr>
<td>0.5d</td>
<td><strong>MANAGING MAINTENANCE OPERATIONS</strong>&lt;br&gt;Wear reserve.&lt;br&gt;Centralized tooling and configuration data.&lt;br&gt;Audits and data management.&lt;br&gt;Better calibration management.&lt;br&gt;Asset management software.&lt;br&gt;Asset data access.</td>
</tr>
</tbody>
</table>

Reference: PCTR/OPEXGB  
Only available as an In-House course.  
Contact: pl.rueil@ifptraining.com
E&P Project Planning & Scheduling Workshop

Level: FOUNDATION

Purpose
This course provides participants with the know-how to elaborate, optimize and control a project schedule.

Audience
Project engineers responsible for building, optimizing and controlling the schedule of upstream projects.

Learning Objectives
Upon completion of the course, participants will be able to:
- take into consideration the different project execution phases when building the schedule,
- understand the advantages and drawbacks of the various schedule computer tools available on the marketplace,
- create the schedule of a project using one of these tools (Microsoft Project, Primavera).

Ways & Means
- Examples of onshore and offshore exploration and production projects.
- Comprehensive case studies using renowned industry software.

Learning Assessment
Quiz at the end of the module.

Prerequisites
Basic experience with Primavera or MS Project.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 5 days

PLANNING & SCHEDULING PROCESSES 1 d
Planning basis, scheduling sequence and critical path. Schedule updates reflecting actual performance. Progress measurement and control of each execution phase (engineering, procurement and construction).

ONSHORE CASE STUDY USING MS PROJECT 1 d
Presentation of a fictitious revamping onshore project (which entails a plant shutdown) to be used as case study. Demonstration of software functions. Critical path visualization. Input and coding of activities, tasks and resources. Reporting levels. Physical progress update for reporting purposes.

OFFSHORE CASE STUDY USING PRIMAVERA 3 d
Presentation of a fictitious deep offshore project to be used as a case study. Demonstration of software functions. Definition of the list of project activities to be carried out according to the project scope of works. Input and coding of activities, tasks and resources necessary to project execution. Sequence of the activities and estimation of their duration. Probabilistic approach in scheduling. Critical path visualization. Various types of progress (physical, cost, hours). Follow-up methods. Relationship between cost progress and schedule.

Reference: PCTR/PSPCGB

Only available as an In-House course.

Contact: pl.rueil@ifptraining.com

This course is also available in French: PCTR/PSPCFR. Please contact us for more information.

www.ifptraining.com
Upstream Project Construction Techniques

Level: FOUNDATION

Purpose
This course provides a thorough understanding of construction techniques and is reinforced by an optional site visit.

Audience
Professionals from the upstream sector that are responsible for managing construction activities on site.

Learning Objectives
Upon completion of the course, participants will be able to:
- evaluate and manage construction site risks,
- manage construction projects with efficient skills,
- monitor and control construction quality.

Ways & Means
- Exercises for each step of the construction process,
- Numerous examples taken from Oil & Gas construction activities.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

CONSTRUCTION WORKS & THEIR CONTEXT
- Overview of E&P projects.
- Importance and criticality of the construction phase.
- Main areas of concern.

CIVIL & STRUCTURAL WORKS
- Mechanics of materials.
- Construction methods.
- Supervision.

ELECTRICAL WORKS
- Potential issues.
- Installation of power and instrument cables.

STRUCTURES
- Types of offshore platforms.
- Fabrication yard requirements.
- Yard construction techniques.
- Topsides erection sequence studies.
- Platform load-out and integration techniques.

PIPING
- Characteristics and design of a piping system.
- Main components.
- Preservation.
- Piping connection.
- Strength tests.

CATHODIC PROTECTION & PAINTING
- Introduction to corrosion.
- Cathodic protection.
- Painting and coating.

CRANES & LIFTING OPERATIONS ON SITE
- Definitions and fundamentals about lifting.
- Main types of cranes.
- Crane operation.
- Mobile crane load charts.
- Responsibilities.

SITE VISIT
Visit of a construction yard in order to illustrate the techniques presented during the first three days of training. Such a visit is to be organized with the assistance of the company requesting the training in order to select the most suitable local construction contractor.
If the training is held in France, the visit will be organized by IFP Training.

Reference: PCONS/CONST1GB
Contact: pl.rueil@ifptraining.com

Only available as an In-House course.
## Upstream Project Construction Site Administration

### Course Content

<table>
<thead>
<tr>
<th>Team Management</th>
<th>2 d</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Site Control Schedule, Costs &amp; Contracts</th>
<th>2 d</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Precommissioning, Commissioning &amp; Quality</th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>Quality control of work on site, non-conformity reports, technical queries, site instructions. Material control: warehouses, storage areas, receipt/control of main equipment and bulk material. Mechanical completion, commissioning and start-up of the facilities.</td>
</tr>
</tbody>
</table>

### Learning Objectives

Upon completion of the course, participants will be able to:
- Evaluate and manage construction site risks,
- Apply construction management skills,
- Monitor and control quality, schedule, and costs during construction activities.

### Ways & Means

- Exercises for each step of the construction process,
- Numerous examples taken from Oil & Gas construction activities.

### Learning Assessment

Quiz at the end of the module.

### Prerequisites

No prerequisites for this course.

### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: PCONS/CONST2GIB – Only available as an In-House course.

Contact: pl.rueil@ifptraining.com
Upstream Project Construction HSE Management

Level: PROFICIENCY

Purpose
This course raises awareness about HSE on the construction site and the necessity to develop management tools.

Audience
Field engineers and supervisors from the upstream sector who are responsible for the overall management of construction site activities.

Learning Objectives
Upon completion of the course, participants will be able to:
- evaluate and manage HSE and security risks on the construction site,
- apply construction management skills,
- monitor and control HSE tools.

Ways & Means
- Exercises for each step of the construction process,
- Numerous examples taken from Oil & Gas construction activities.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>5 days</th>
<th>SAFETY RISK MANAGEMENT ON THE FIELD</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HSE prevention plan: definition and evaluation of risk, subcontractor organization and training. Preventive action plan.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.5 d</th>
<th>HSE MANAGEMENT</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>0.5 d</th>
<th>ON SITE HSE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Surveillance: surveillance plan, field HSE audits, safety tour, behavioral observations, subcontractor HSE evaluation. Monitoring of SIMOPS activities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0.5 d</th>
<th>AUDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Objectives of an audit. Pre-audit preparations: boundaries, expectations, checklists, plans. Findings vs. expectations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.5 d</th>
<th>HAZARD IDENTIFICATION &amp; RISK ASSESSMENT OF MAINTENANCE &amp; CONSTRUCTION WORKS</th>
</tr>
</thead>
</table>
|        | Risk assessment and recommended mitigation measures associated to:

<table>
<thead>
<tr>
<th>0.5 d</th>
<th>SECURITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Security management: definition, site management with regards to external events (robbery, kidnapping, data). Security control and technologies.</td>
</tr>
</tbody>
</table>

Reference: PCONS/CONST3GB • Only available as an In-House course.
Contact: pl.rueil@ifptraining.com
Offshore Oil & Gas Project Installation

Level: PROFICIENCY

Purpose
This course provides a thorough understanding of offshore installation and works, management challenges and control tools.

Audience
Field engineers and supervisors from the upstream sector who are responsible for the overall management of construction site activities.

Learning Objectives
Upon completion of the course, participants will be able to:
- differentiate among the various installation processes,
- apply installation management skills,
- monitor and control quality and schedule during installation.

Ways & Means
This course is illustrated by:
- exercises for each step of the construction process,
- numerous examples taken from Oil & Gas construction activities.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

DEVELOPMENT CONCEPTS
Evolution of development schemes.
Brief offshore history.
Fixed platforms.
Floating units.
Full subsea based developments.

CONTRACTING MATTERS
Field development process.
EPCI contracts.

KEY STAKEHOLDERS & THEIR ROLE
National and International Oil Companies (NOC, IOC).
Operators.
Contractors.
Contractors and subcontractors.

ORGANIZATION & OPERATIONS MANAGEMENT
Organization:
- Project objectives.
- Development studies.
- Project management team.
- Installation campaign.
Offshore operations management:
- Prior to offshore operations.
- Work on offshore site.
- Management of offshore operations.
- Reporting.

OFFSHORE OPERATIONS
Generalities.
Offshore development concepts.
Fundamental offshore operations.
Installation of fixed platforms:
- Load-out, sea fastening, transport.
- Launching, piling.
- Topsides installation.
Installation of floating units:
- TLP.
- SPAR.
- FPSO.
- Semi-submersibles.
- Mooring systems.
Installation of subsea systems:
- Mobilization of offshore spreads.
- Use of Remote Operated Vehicles (ROV).
- Diving operations.

Reference: PCONS/CONST4GB - Only available as an In-House course.
Contact: pl.rueil@ifptraining.com
Upstream Project Construction Works Supervision

Level: DISCOVERY

Purpose
This course provides transverse experience, know-how and soft skills that are essential to construction supervising positions.

Audience
Managers, engineers, plant supervisory staff (construction, maintenance, operation) and contractor staff (engineering contractors and constructors) in charge of upstream Oil & Gas projects.

Learning Objectives
Upon completion of the course, participants will be able to:
- apply proven practices within operational situations,
- define a suitable organization and execution plan, adapted to the plant requirements,
- manage critical interfaces with operational staff, at each step of the project implementation,
- identify and manage safety, health and environment issues during project design and execution.

Ways & Means
Photos and videos will be used to illustrate the issues.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

CONSTRUCTION WORKS FRAMEWORK
Roles and responsibilities of stakeholders in an Oil & Gas project.
Different stages of an Oil & Gas project.
Importance of preliminary stages.
Field modification works: responsibilities, constraints and challenges.
Working on operating facilities.
Roles and constraints of field operators.
Site organization, typical site construction manual.
Construction contractor organization and relationship with it.

HSE ISSUES
Typical construction risk analysis.
Organization of operations on the facilities.
SIMultaneous OPerationS (SIMOPS).
Work permits (instructions, procedure, audit).

WORK INSTRUCTIONS & QUALITY ISSUES
Procedures to be enforced, their objectives, base principles and validation process.
Learning how to read the plans.
How to supervise quality of prefabricated and site works.
Quality control at supplier’s premises.
Visiting a construction contractor.
Visit reports.

CONSTRUCTION SUPERVISION
Preparation and organization of successful meetings with the contractor.
Basic notions of welding (principles and used techniques).
Follow-up of works for each discipline (piping, E&I and mechanical).
Pre-commissioning and commissioning.
Planning, cost and schedule control.

RELATIONSHIPS & TEAM WORK
Roles and responsibilities of team leaders (leadership and relationships with the other stakeholders).
Qualification, knowledge and aptitude.
Reflexes, rules and obligations.
Non-conflictual interpersonal relationships.
Ethics.
Feedback and lessons learned.
Proper communication.
Use of emails.

Reference: PCONS/CONSUPGB
This course is also available in French: PCONS/CONSUPFR. Please contact us for more information.

Only available as an In-House course.

Contact: pl.rueil@ifptraining.com
# Upstream Project Precommissioning, Commissioning & Start-Up

**Level:** PROFICIENCY

**Purpose**
This course provides a comprehensive and practical knowledge of all issues involved in the long procedure leading to a successful start-up of Oil & Gas processing facilities.

**Audience**
Supervisors, engineers and technicians in the E&P field and professionals responsible for commissioning, start-up, acceptance and operation of new processing facilities or revamping projects.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- plan and organize the start-up and acceptance of processing units with respect to specific constraints,
- anticipate the problems related to the financial, technical, operational and organizational aspects,
- avoid the most common errors and reduce their impact,
- take into account the distinct objectives of, and the communication channels between, all stakeholders (contractor, oil company’s project team and operating group).

**Ways & Means**
Start-up and incident analysis from real situations.

**Learning Assessment**
Quiz at the end of the module.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMPORTANCE OF E&amp;P PROJECT COMPLETION</td>
<td>1 d</td>
<td>Main phases of a project: pre-FEED, FEED (basic engineering), detailed engineering, construction, precommissioning, commissioning, start-up. Categories of engineering, procurement, construction (EPC) contracts: EPC, EPCC, EPCC/start-up. Reimbursable versus long sum types of EPC contracts.</td>
</tr>
<tr>
<td>PRECOMMISSIONING: MECHANICAL COMPLETION</td>
<td>1 d</td>
<td>Definition and responsibilities. Operations to be performed. Ready for commissioning. Hand over to commissioning team. Typical precommissioning dossier. Case studies.</td>
</tr>
<tr>
<td>COMMISSIONING ACTIVITIES</td>
<td>1.5 d</td>
<td>Definition and responsibilities. System and subsystem approach, packages. Commissioning preparation: organization and man-power (including vendors and future operators), planning, budget, documentation/commissioning spare parts. Case studies. Operations to be performed in each discipline: mechanical, electrical, instrumentation, OTP’s. Hand over. Safety during commissioning (SIMOPS…). Commissioning costs.</td>
</tr>
<tr>
<td>START-UP</td>
<td>1.5 d</td>
<td>Preparation: manpower (operators; vendors…), training, spare parts, planning, procedures/operating manual. Safety. Performances tests. Start-up costs. Case study: start-up sequence exercise in teams of three to four.</td>
</tr>
</tbody>
</table>

Reference: PCONS/PRECOMGB - Only available as an In-House course. Contact: pl.rueil@ifptraining.com

This course is also available in French: PCONS/PRECOMFR. Please contact us for more information.

www.ifptraining.com
Upstream Project Abandonment Operations

Level: PROFICIENCY

Purpose
More than ever, decommissioning is on the horizon for the Oil & Gas industry, accelerated by the sustained low oil price, ageing assets and government interventions. However, it’s not an easy decision or process. There’s the challenge of balancing Maximizing Economic Recovery (MER) with decommissioning objectives, as well as effectively managing operations in later life to ensure the cost burden is minimized and safety still maintained prior to Cessation of Production (CoP).

This course covers the various ways towards a smooth transition from operation to cessation of production (CoP).

Audience
Engineers and technicians whose activities are related to the decommissioning of Oil & Gas facilities either onshore or offshore.

Learning Objectives
Upon completion of the course, participants will be able to understand:
- the regulatory and technical complexities of late life operations and decommissioning,
- cessation of production (CoP) preparation,
- planning and surveys,
- plug and abandonment,
- waste management,
- monitoring post removal.

Ways & Means
Highly interactive course delivered by experts of the E&P industry:
- 3 case studies,
- Few videos and animations illustrating the main aspects of dismantlement.

Learning Assessment
Quiz at the end of the module.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

DECOMMISSIONING PROJECTS MANAGEMENT  1 d
Overview of platform decommissioning projects.
Engineering analysis.
Operational planning.
Logistics constraints.
Contracting.

Case study day 1: DECOMMISSIONING COST LIABILITY ESTIMATION
LR was requested to estimate the decommissioning cost liability for a large number of non-operated SNS offshore assets varying significantly in complexity and type, with various different infrastructures.

PERMITTING & REGULATORY COMPLIANCE  1 d
Regulatory framework.
Decommissioning execution plan.
Environmental impact assessment:
- Pre/Post decommissioning surveys.
- Soil, surface water and ground water pollution control.
- Soil pollution remediation.
Optimize decommissioning spendings.
Project efficiency.
Best practice adherence.
Understand and reduce risk.

Case study day 2: INTEGRATED DECOMMISSIONING PLANNING
LR provided planning support, including building a deterministic schedule and project governance, for the decommissioning of a number of North Sea assets.

PLATFORM PREPARATION - SAFETY IN DECOMMISSIONING ACTIVITIES  1 d
- Topsides preparation:
  - Residual hydrocarbons removal in pipework, process and storage equipment (flushing, cleaning).
  - Modules separation and preparation for lifting.
- Risk related to process equipment decommissioning and preparation for lifting; associated safety procedures.
- Subsea preparation.
- Compliance with government and industry guidelines and standards.
- Ongoing operational verification of safety critical elements.
- Class and certification of innovative decommissioning.

Case study day 3: DECOMMISSIONING COST LIABILITY ESTIMATION
Learn more about the Brent Decommissioning Comparative Assessment Process and how this has been applied to the project.

WELL PLUGGING & ABANDONMENT (P&A)  1 d
- Well abandonment overview.
- Short term and long term well integrity.
- Types of well completions.
- Primary-cementing; preventing gas migration; fishing.
- Plugging and abandonment methods, procedures and technologies.
- Remedial squeeze cementing and cement-plug placement as permanent well-barrier elements.
- Conductor removal.

PLATFORM REMOVAL  0.5 d
- Transport barge and lifting capacity requirements.
- Topsides removal.
- Subsea structure (jacket) removal.
- Seabed removal (templates, pilings).

PIPELINE DECOMMISSIONING  0.25 d
- Pipeline decommissioning and burial procedure.

MATERIALS DISPOSAL & SITE CLEARANCE  0.25 d
- Platform materials disposal and recycling.
- Site clearance: pre/post decommissioning surveys, site clearance assessment (divers, ROV, test trawling).

Reference: PCONS/DISMGB
Contact: pl.rueil@ifptraining.com

Only available as an In-House course.
Subsea Production Systems (SPS)

Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUBSEA COMPONENTS &amp; FIELD ARCHITECTURE</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Typical field architectures: loop, single line, hybrid loop, separation…</td>
<td></td>
</tr>
<tr>
<td>Surface production and storage technologies: FPSO, TLP…</td>
<td></td>
</tr>
<tr>
<td>Subsea production systems: XT, jumper, manifold, production lines, risers, umbilicals.</td>
<td></td>
</tr>
<tr>
<td>Umbilical networks: electrical, hydraulic, chemicals…</td>
<td></td>
</tr>
<tr>
<td>Flowlines, risers and export systems.</td>
<td></td>
</tr>
<tr>
<td>Examples of offshore developments.</td>
<td></td>
</tr>
<tr>
<td>Pipeline and riser concept.</td>
<td></td>
</tr>
<tr>
<td>Materials (steel, corrosion resistant alloys, anti-corrosion coatings, thermal insulation…).</td>
<td></td>
</tr>
<tr>
<td>Pipeline installation.</td>
<td></td>
</tr>
<tr>
<td>New technologies under development (subsea separation, subsea processing, subsea pumping, subsea compression, heating, surface support…).</td>
<td></td>
</tr>
</tbody>
</table>

| **SUBSEA CONSTRUCTION & INTERVENTION** | 1.5 d |
| Construction and multi-purpose support vessels. |
| Surface and subsea positioning. |
| ROV/diving operations. |
| Description of main subsea interventions methods. |

| **INSPECTION, MAINTENANCE & REPAIR** | 1.5 d |
| Anomalies: physical/structural integrity issues; functional non-conformities integrity issues. |
| External and internal inspection, monitoring. |
| Maintenance: subsea interventions; operational pigging. |
| Clamps and spool repairs. |
| Constraints specific to deep water offshore production. |
| Environmental constraints (temperature, sea, seabed, access…). |
| Flow assurance issues: pressure, temperature, hydrates. |

| **OPERATION FROM PRODUCTION PLATFORMS** | 0.5 d |
| General description (subsea control devices, valve actuation process…). |
| Description of typical operations. |
| Description of specific operations. |

Ways & Means
- Numerous examples from ongoing projects.
- Trainers are specialized engineers, presently involved in deep-offshore projects.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

More info
This module is part of the course “Subsea Activities” (page 397).
Training “Subsea Activities” may be validated once both modules have been completed.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: SUB/SPSGB
Can be organized as an In-House course.
Contact: pl.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>16 September</td>
<td>20 September</td>
<td>€3,400</td>
</tr>
</tbody>
</table>

This course is also available in French: SUB/SPSFR. Please contact us for more information.

www.ifptraining.com
Subsea Pipelines

Course Content

<table>
<thead>
<tr>
<th>4 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIPELINE OPERATION: INTRODUCTION &amp; MAIN CONSTRAINTS 0.5 d</td>
</tr>
</tbody>
</table>

DESIGN OF RIGID PIPELINES & RISERS 0.5 d

FLEXIBLE PIPELINES DESIGN 0.25 d
Specificities of flexible pipeline design.

OFFSHORE PIPELINE CONSTRUCTION 0.5 d

SHORE APPROACH CONSTRUCTION 0.25 d
Shore approach construction and horizontal drilling.

TRENCHING & PROTECTION 0.25 d
Requirements for pipeline protection. Soil classification. Overview of protection methods.

SUBSEA TIE-IN METHODS 0.25 d

PRECOMMISSIONING & PIGGING 0.25 d

PIPELINE INTEGRITY 0.75 d

WORKSHOP 0.5 d
Worked example covering the main topics of the training.

Reference: SUB/PIPEGB  Can be organized as an In-House course. Contact: pl.rueil@ifptraining.com

<table>
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<th>Location</th>
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<td>26 September</td>
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This course is also available in French: SUB/PIPEFR. Please contact us for more information.
E&P Project Construction Certification

Course Content

**OVERVIEW OF OIL & GAS PRODUCTION & PROCESSING**
5 d

**STATIC EQUIPMENT TECHNOLOGY & SIZING**
5 d

**ROTATING EQUIPMENT TECHNOLOGY & SELECTION**
5 d

**SAFETY ENGINEERING**
10 d

**CONSTRUCTION TECHNIQUES**
5 d

**PRECOMMISSIONING, COMMISSIONING & START-UP**
5 d
Project presentation. Precommissioning; mechanical completion. Commissioning activities. Start-up.

**HSE IN CONSTRUCTION ACTIVITIES**
5 d

**SIMULTANEOUS OPERATIONS**
5 d

**PROJECT CONTROL**
5 d

**HSE MANAGEMENT OF CONTRACTORS**
5 d

**HSE MANAGEMENT OF LOGISTICS**
5 d
Land transportation. Marine and river transportation. Air transportation. Storage.

**NEGO T IAT ION SKILLS**
5 d
Methodology and application to projects. Arguments and searching for a compromise. Claim management. Influence games and group dynamics.

Reference: PCONS/CONENGGB  Only available as an In-House course.
Contact: pl.rueil@ifptraining.com

www.ifptraining.com
E&P Construction Superintendent Certification

**Course Content**

**60 days**

<table>
<thead>
<tr>
<th>Module</th>
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<tbody>
<tr>
<td><strong>OIL, WATER &amp; GAS PROCESSING</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>ADVANCED TREATMENTS</strong></td>
<td>5 d</td>
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<tr>
<td>Oil &amp; Gas sweetening. Liquefied Natural Gas, principles and liquefaction processes. Liquid Natural Gas treatments. Actual malfunctions of facilities and teamwork investigation.</td>
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<tr>
<td><strong>CONSTRUCTION TECHNIQUES</strong></td>
<td>15 d</td>
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<tr>
<td><strong>HSE MANAGEMENT &amp; SAFETY ENGINEERING</strong></td>
<td>15 d</td>
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<tr>
<td><strong>SHUTDOWNS: ORGANIZATION, COORDINATION &amp; MANAGEMENT</strong></td>
<td>5 d</td>
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<tr>
<td>Preparation of the works: Tasks. Integration of the actions followed by the superintendent. Schedule and organization charts of preparation works and of the realization works. Subcontracting level, HSE impact. Organization of the works: Analysis of the works: range of coordination, definition of the resources, duration, weather conditions, technical constraints or HSE specific requirements. Integration of the construction site constraints in calls for tender and documentation. Adaptation of the analysis to the role and to the capacity of preparation of the Company. Application: organization of a shut-down sequence with hot works. Book of shutdown works: role, constitution. Schedule: sequence, schedule with bars, margins, critical path, leveling of resources, general schedule, by company, by building trade, by device. Application: elaboration of a coordination schedule. Quality, pre-commissioning, commissioning, transfer to production. Reports.</td>
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<td><strong>MULTIDISCIPLINARY CONFERENCES</strong></td>
<td>5 d</td>
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<tr>
<td><strong>PROJECT CONTROL</strong></td>
<td>5 d</td>
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<tr>
<td><strong>WORK METHODS &amp; COMMUNICATION</strong></td>
<td>2 d</td>
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<tr>
<td>Work methods and team management. Written and oral communication.</td>
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<tr>
<td><strong>REVIEW &amp; FINAL ASSESSMENT</strong></td>
<td>3 d</td>
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</tbody>
</table>

**Audience**

Professionals with a significant experience in Oil & Gas surface production who are called upon to become a construction superintendent.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- understand all issues of the overall production process, from reservoir to offloading facilities,
- anticipate production and maintenance constraints on works,
- understand state-of-the-art Oil & Gas construction techniques,
- identify HSE management rules and individual responsibilities,
- apply methods and communication skills,
- anticipate anomalous events and react effectively,
- propose well-argued plans to improve construction activities.

**Ways & Means**

- Several applications and illustrations (videos, samples, tools…).
- Intensive teamwork.
- Use of dynamic training simulations.

**Learning Assessment**

Quiz at the end of each module.

**Prerequisites**

No prerequisites for this course.

**Why an IFP Training Certification?**

- An international recognition of your competencies.
- A Vocational Certificate delivered.
- An expertise confirmed in E&P Construction Superintendent.
- Ready-to-use skills.

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: PCONS/CONSINGB

Only available as an In-House course.

Contact: pl.rueil@ifptraining.com
### Operational HSE
- HSE in Drilling Operations ................................................................. p. 328
- Well Control - Level 2 ........................................................................ p. 329
- Well Control - Level 3 or 4 ................................................................. p. 330
- Well Intervention & Pressure Control - Level 2 ................................. p. 331
- Well Intervention & Pressure Control - Level 3 or 4 ......................... p. 332
- NEBOSH International Certificate in Oil & Gas Operational Safety ... p. 333
- HSE Superintendent Certification ...................................................... p. 334
- HSE in Surface Production Operations ............................................. p. 335
- Unconventional Resources: Safety Issues ....................................... p. 336
- Positive HSE Culture ......................................................................... p. 337
- HSE in Maintenance & Construction Activities ................................ p. 338
- Occupational Safety ......................................................................... p. 339
- Occupational Health ......................................................................... p. 340

### Process Safety & Safety Engineering
- Process Safety Engineer Certification ............................................... p. 341
- Fundamentals of Process Safety ....................................................... p. 342
- Process Safety Management ............................................................... p. 343
- Safety Engineering Certification ......................................................... p. 344
- Safety Engineering - Module 1 .......................................................... p. 345
- Safety Engineering - Module 2 .......................................................... p. 346
- Safety Engineering - Module 3 (Project) ........................................... p. 347
- Area Classification & Control of Ignition Sources ............................. p. 348

### Sustainable Development
- Environmental & Social Risk Management ..................................... p. 349
- Social Risk Management .................................................................. p. 350
- Environmental Management ............................................................. p. 351
- Unconventional Resources: Environmental Management Certification p. 352
- Gas Flaring Reduction: Operational & Environmental Stakes .......... p. 353
- Environmental Management of Water in E&P ................................. p. 354
- Environmental Pollution & Waste Management .............................. p. 355
- Oil Spill Management ........................................................................ p. 356

### HSE Management
- HSE Engineer Certification ............................................................... p. 357
- HSE Management ............................................................................. p. 358
- Emergency Response Planning ......................................................... p. 359
- Major Emergency Management - Initial Response Training ............ p. 360
- HSE Management of Contractors ..................................................... p. 361
- HSE Management of Logistics ......................................................... p. 362
- HSE for Support Personnel ............................................................... p. 363
- Upstream Project Construction HSE Management ............................ p. 364
HSE in Drilling Operations

Level: FOUNDATION

Purpose
This course provides a thorough understanding of risks associated to drilling operations and to reinforce the HSE culture of the workplace environment.

Audience
Young engineers and technicians involved or wishing to extend their knowledge in drilling operations.

Learning Objectives
Upon completion of the course, participants will be able to:
- ensure high HSE standard during drilling operations,
- identify specific hazards, their associated risks during drilling operations and to define prevention and mitigation measures to reduce risks,
- identify the certificates necessary to ensure the suitability of equipment and personnel,
- understand and apply typical HSE management practices on site (prevention, protection, emergency planning).

Ways & Means
- Several applications and illustrations.
- Several case studies and teamwork sessions.

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

GENERAL RISKS ASSOCIATED TO DRILLING OPERATIONS
- Risk of flammability: Explosive atmospheres (ATEX): flammable products, explosive limits and flash point.
- Ignition sources: naked flame, auto-ignition temperature, sparks and static electricity…
- Risks associated with chemical products/toxic gas (H₂S).
- Health and hygiene risks. Medical fitness to work certificates.

RISKS ASSOCIATED WITH RIG EQUIPMENT
Introduction to risks associated to derrick, rig floor, stabbing board, derrick board and crown block. Certificates.
- Risk of dropped objects.
- Works at height.
- Introduction to risks associated to drawworks, top drive, travelling block, winches and pipe handling system. Certificates. HSE management of lifting and rigging operations.

RISKS ASSOCIATED WITH DRILLING FLUIDS PROCESSING & CEMENTING OPERATIONS
- Risks associated to mud preparation, mud tanks and mud pumps.
- Confined space entry procedure.
- Risks associated to cuttings treatment units: shakers, degasser, desander, centrifuge…
- Risks associated to cementing units and cementing operations.
- HSE management of pressurized equipment.

RISKS ASSOCIATED WITH SUPPORT FACILITIES
- Engine rooms, power generation and air compressors.
- Risks at workshops: hand tools, compressed gas bottles.
- HSE management of storage areas.
- Introduction to HSE in logistics: materials and personnel transportation requirements.

SAFETY ENGINEERING APPLIED TO DRILLING OPERATIONS
General layout of drilling activities: safety distances.
- Fire & gas detection systems: certificate and testing requirements.

RISKS IN WELL INTERVENTION OPERATIONS
- Introduction to common well intervention equipment. Main risks.
- Well control equipment in well intervention.
- Risks in perforation and well abandonment.

ORGANISATIONAL FRAMEWORK
- Introduction to HSE management system.
- HSE management of contractors:
- HSE evaluation of contractor selection.
- Objectives and development of HSE Bridging Document: case study.
- Emergency response planning:
- Main elements and resources: blow out contingency plan, environmental contingency plan and medevac plan.
- Clinic requirements.
- Risks associated to simultaneous operations with production and construction activities.
- Management of change procedure.
- Undesired event reporting.

ENVIRONMENTAL MANAGEMENT OF DRILLING OPERATIONS
- Introduction to environmental impacts of drilling operations.
- Environmental impact assessment and environmental management plan.
- Waste management practices for drilling operations.
- Well testing environmental impacts.

Reference: OHSE/HSEF - Can be organized as an In-House course.

<table>
<thead>
<tr>
<th>Location</th>
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<tr>
<td>Pau</td>
<td>6 May</td>
<td>10 May</td>
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This course is also available in French: OHSE/HSEF. Please contact us for more information.
Well Control - Level 2
IWCF Certification: Introduction “Combined Surface/Subsea BOP” - Certified IWCF training center

Level: FOUNDATION

Purpose
This course aims to raise the awareness on well control issues and consequences of a blowout, to understand the outcome of a kick and learn the methods of well control.

Audience
All personnel concerned with drilling and completion operations (Operators and Services Companies) involved in operations linked to the detection of a kick and well control: drilling engineers, supervisors, tool pushers, drillers, assistant drillers, derrick men, mud testers, etc.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand the impact and consequences of a blowout.
- understand the causes of a kick.
- learn about well control equipment and how to secure the well in the event of a kick occurrence.
- know the well control methods (circulation and killing).
- obtain the IWCF level 2 certification.

Ways & Means
- Course material (PPT, PDF, Word).
- Exercise book.
- Demonstration on simulator (if available): taking a kick while drilling and how to circulate this influx out in a control manner.
- Certified IWCF instructor.

Learning Assessment
Paper assessments.

Prerequisites
- Basic technical knowledge of the petroleum industry.
- A period of 10 days minimum is prescribed by IWCF before any registration.

More info
The certification Level 2 is recommended for a first IWCF certification. Validity of Level 2 certificate is 5 years.

Expertise & Coordination
IFP Training trainer (permanent or contracted IWCF accredited) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: WEL/FPESME2
This course is also available in French: WEL/FPESMF2. Please contact us for more information.

Contact: fp.pau@ifptraining.com

Course Content
5 days

THE VARIOUS PRESSURES IN THE WELL
Hydrostatic pressure, pressure losses, gas law. Circulation with the well open and with the well shut in. Relationships between various pressures in the well. 0.75 d

DEFINITIONS OF PRESSURES
Pore pressure, frac pressure, overburden pressure (LOT and FIT). Necessity of a good casing cement job. 0.25 d

KICK DETECTION
Impact, consequences of a kick. Causes and signs of a kick, well shut-in methods, observation and evolution of pressures in the well. Precautions to avoid a kick, kick drills, exercises on trip sheet, kill sheet…). 0.75 d

PRINCIPLES OF WELL CONTROL METHODS
Principles and procedures. Drillers, wait and weight, volumetric methods. 0.5 d

EQUIPMENT & TESTING PROCEDURES
Barriers’ principle (NORSOK standards). BOP stack and BOP control unit. Auxiliary circuits: choke-manifold, mud-gas separator. Function test, pressure test, inflow test. 0.75 d

SUBSEA EQUIPMENT
Specific equipment of subsea BOP. Problems related to floating rigs. 0.5 d

SIMULATOR
Layout of the well control equipment used on rig floor. Demonstration: taking a kick while drilling and how to circulate this influx out in a control manner. 0.5 d

IWCF CERTIFICATION
Written test on principles and procedures. Written test on well control equipment. 1 d
Well Control - Level 3 or 4

IWCF Certification: "Combined Surface/Subsea BOP" - Certified IWCF training center

**Level: PROFICIENCY**

**Purpose**

This course raises the awareness of kick prevention and knowledge of well control methods and procedures.

**Audience**

All personnel concerned with drilling and completion operations involved in operations linked to the detection of a kick and well control: drilling engineers, mud engineers, supervisors, tool pushers, drillers, assistant drillers, etc.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- identify and calculate the various pressures in a well,
- understand the causes of the kicks,
- recognize/analyze the signs of a kick in order to shut in the well with the limited amount of gain,
- follow and apply shut in methods in order to secure the well after a kick occurrence,
- know the well control methods and demonstrate the ability to shut in the well (driller) and killing the well (supervisor),
- detect potential incidents during well control and take appropriate actions,
- obtain the level 3 or 4 IWCF certification on "Well Control".

**Ways & Means**

- PPT presentation.
- Course material (PPT, PDF, Word).
- Exercise book.
- Practice on simulator.
- Certified IWCF instructor.

**Learning Assessment**

- Paper assessments.
- Practical assessment on simulator.

**Prerequisites**

- The certification Level 2 is recommended for a first IWCF certification (page 195).
- A period of 10 days minimum is prescribed by IWCF before any registration.

**More info**

Validity of Level 3 or 4 certificate is 2 years.

**Expertise & Coordination**

IFP Training trainer (permanent or contracted IWCF accredited) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>INITIAL TEST ON WELL CONTROL</td>
<td>0.25 d</td>
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<tr>
<td>PRESSURE ANALYSIS &amp; KICK CONTROL</td>
<td>0.75 d</td>
</tr>
<tr>
<td>WELL CONTROL</td>
<td>1.75 d</td>
</tr>
<tr>
<td>PARTICULAR CASES</td>
<td>0.25 d</td>
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<tr>
<td>SURFACE WELL CONTROL EQUIPMENT</td>
<td>0.5 d</td>
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<td>EXERCISES</td>
<td>0.25 d</td>
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<td>SUBSEA SPECIFICITIES</td>
<td>0.25 d</td>
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<tr>
<td>IWCF CERTIFICATION</td>
<td>1 d</td>
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**WELL CONTROL**

Procedures to follow in case of a kick while drilling or tripping (surge and swab).

Well shut-in methods: hard and soft methods.

Observation and evolution of pressures after shut in and selection of the stabilized pressures.

Exercises on “Kill sheet”.

Well control methods to control a kick:

Driller’s method.

Wait and weight method.

Comparison/differences between each method (advantages and drawbacks).

**SURFACE WELL CONTROL EQUIPMENT**

BOP stack: types, annular BOP, BOP rams…

Diverter.

BOP control unit (“Koomey” unit).

Choke-manifold and remote choke control panel.

Mud-gas separator.

Function tests and pressure tests.

**EXERCISES**

Practice on a simulator, training for the IWCF certification.

Exercises on: principles and procedures, kill sheet and well control equipment.

**SUBSEA SPECIFICITIES**

Difference between a surface and a subsea BOP.

Specific equipment between seabed and rig.

Well control with a subsea BOP (friction losses in choke line).

Riser margin.

Subsea BOP control unit.

**IWCF CERTIFICATION**

Written test on principles & procedures.

Written test on equipment.

Practical assessment on simulator.

Reference: WEL/FPESME3-4. Can be organized as an In-House course.

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<td>Pau</td>
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<td>20 September</td>
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\* This course is also available in French: WEL/FPESMF3-4. Please contact us for more information.
Well Intervention & Pressure Control - Level 2

IWCF Certification: “Well Intervention & Pressure Control” - Certified IWCF training center

Level: FOUNDATION

Purpose

This course aims to raise the awareness of the negative impact and effect of a well control incident. To provide the required comprehensive knowledge and skills to carry out well intervention operations.

Audience

All personnel concerned with well intervention operations (wire-line, coiled tubing, snubbing, workover) involved in operations linked to the detection of a kick: engineers, supervisors and operators who have to supervise or carry out well intervention operations.

Learning Objectives

Upon completion of the course, participants will be able to:

- understand the impact and consequences of a blowout,
- know the safety barrier principles,
- understand the behavior of a producing well,
- learn the various tools used during well interventions and workovers,
- be aware of the methods used to control well pressure,
- learn procedures and equipment used in wireline, coiled tubing, snubbing, workover,
- obtain the level 2 IWCF certification on “Well Intervention”.

Ways & Means

- PPT presentation.
- Course material (PPT, PDF).
- Exercise book.
- Certified IWCF instructor.

Learning Assessment

Paper assessments.

Prerequisites

Basic technical knowledge of the petroleum industry.

More info

The certification Level 2 is mandatory for the first IWCF certification. A period of 10 days minimum is prescribed by IWCF before any registration. Validity of Level 2 certificate is 5 years.

Expertise & Coordination

IFP Training trainer (permanent or contracted IWCF accredited) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: WEL/WELINE2

Note: 1, 2 or 3 options has to be selected in addition to the compulsory tests.
Well Intervention & Pressure Control - Level 3 or 4
IWCF Certification: “Well Intervention & Pressure Control” - Certified IWCF training center

Level: PROFICIENCY

Purpose
This course aims to raise the awareness of the negative impact and effect of a well control incident, to provide an understanding of well intervention and pressure control techniques with the necessary skills to plan, supervise and carry out well intervention operations.

Audience
Personnel concerned with well intervention operations (wire-line, coiled tubing, snubbing, work-over): engineers, supervisors and operators who have to plan, supervise or carry out well intervention operations.

Learning Objectives
Upon completion of the course, participants will be able to:
- comply with the well integrity requirements,
- know the safety barrier principles,
- understand the behavior of a producing well,
- learn the equipment of a completion,
- apply the methods used to control well pressure,
- learn procedures and equipment used in wireline, coiled tubing, snubbing, work-over,
- obtain the level 3 or 4 IWCF certification on “Well Intervention”.

Ways & Means
- PPT presentation.
- Course material (PPT, PDF, Word).
- Exercise book.
- Certified IWCF instructor.

Learning Assessment
Paper assessments.

Prerequisites
- The Certification Level 2 is recommended for a first IWCF Certification (page 197).
- A period of minimum 10 days is prescribed by IWCF before any registration.

More info
Course duration can be expanded to 2 weeks for a tailor-made program. Validity of level 3 or level 4 certificate is 2 years.

Expertise & Coordination
IFP Training trainer (permanent or contracted IWCF accredited) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 5 days

BASIC PRINCIPLES & WELL FUNDAMENTALS 0.5 d
Type of well effluents (heavy oil, oil, gas).
Hydrostatic and hydrodynamic pressures.
Specific gravities, densities, pressure gradient.
Over-balance/under-balance.
Pore pressure, frac pressure.

PRESSURE CONTROL APPLIED TO COMPLETION & WELL INTERVENTION 1.5 d
Safety barriers, pressure tests.
Well calculation (pressure, volume, kill fluid, pumping time, balancing the pressure at the depth of the circulating device…).
Shut in procedures.
Kill methods (direct or reverse circulation, bull heading, lubricate and bleed…).
Specific problems linked to producing wells (losses, plugging, migration, hydrates, H₂S and CO₂…).
Responsibilities, decision making.

COMPLETION EQUIPMENT 0.5 d
Different types of completion.
Downhole equipment as: packers, safety valves SCSSSV, nipples, side pocket mandrels, tubing (sizes, grades and connections), Xmas tree…

DIFFERENT TYPES OF INTERVENTION WITH THEIR RESPECTIVE EQUIPMENT 2 d

Wire line intervention (optional)
Safety barriers and specific equipment.
Rigging up and pressure tests surface pressure control equipment.
Slick line: specific equipment (BOP, lubricator, stuffing box, cable cutter valve…).
Braided line, e-line: specific equipment (twin BOP, grease injection system, pack-off system, tool trap, tool catcher…).
Problems during the interventions, interpretation and decision (shut in).

Coiled tubing (optional)
Barriers and specific equipment (strippers, BOP…).
Rigging up and pressure tests surface pressure control equipment.
Problems during the interventions, interpretation and decision (shut in).

Snubbing (optional)
Barriers and specific equipment (strippers, BOP, stripping rams, safety rams…).
Rigging up and pressure tests surface pressure control equipment.
Problems during the interventions, interpretation and decision (shut in).

IWCF CERTIFICATION 0.5 d
Written test on Completion Operations (compulsory).
Written test on Completion Equipment (compulsory).
Written test on Wire Line operations (optional).
Written test on Coiled Tubing operations (optional).
Written test on Snubbing operations (optional).

Note: 1, 2 or 3 options have to be selected in addition to the compulsory tests.

Reference: WEL/WELINE3-4. Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees
Pau 20 May 24 May €3,580

This course is also available in French: WEL/WELINF3-4. Please contact us for more information.
NEBOSH Certification

NEBOSH International Certificate in Oil & Gas Operational Safety

Essential Health & Safety for those who work in O&G around the world

Level: PROFICIENCY

Purpose

This certifying training is designed to provide a sound breadth of underpinning knowledge that enables candidates to manage Oil & Gas operational risks effectively. It focuses on hydrocarbon process safety, enabling participants to effectively discharge workplace safety responsibilities both onshore and offshore.

Audience

Engineers, technicians and those who have responsibility for health & safety in the Oil & Gas industry.

Learning Objectives

Upon completion of the course, participants will be able to:

- understand the hazards inherent in the extraction, storage and processing of Oil & Gas.
- explain the main concepts of hydrocarbon process safety.
- know about fire protection and emergency response.
- identify the hazards associated with logistics and transport operations.

Ways & Means

- Numerous applications, case studies and illustrations from the Oil & Gas industry.
- Support documentation for recommended private study in addition to course attendance.

Learning Assessment

Final assessment test.

Prerequisites

Technician or engineer, or equivalent professional experience within the Oil & Gas industry.

Why an IFP Training Certification?

- An international recognition of your competencies.
- A NEBOSH Certification delivered.
- An experience confirmed in Oil & Gas Operational Safety.
- Ready-to-use skills.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

| 5 days |
|------------------|----------------|
| LEARNING FROM INCIDENTS | 0.5 d |
| HAZARDS INHERENT IN OIL & GAS | 0.25 d |
| RISK MANAGEMENT TECHNIQUES USED IN THE OIL & GAS INDUSTRIES | 0.5 d |
| ORGANIZATION’S DOCUMENTED EVIDENCE TO PROVIDE A CONVINCING & VALID ARGUMENT THAT A SYSTEM IS ADEQUATELY SAFE | 0.25 d |
| CONTRACTOR MANAGEMENT | 0.25 d |
| PROCESS SAFETY MANAGEMENT | 0.25 d |
| ROLE & PURPOSE OF A PERMIT TO WORK SYSTEM - KEY PRINCIPLES OF SAFE SHIFT HANDOVER | 0.25 d |
| PLANT OPERATIONS & MAINTENANCE - START UP & SHUTDOWN | 0.25 d |
| FAILURE MODES - SAFETY CRITICAL EQUIPMENT CONTROLS | 0.25 d |
| SAFE CONTAINMENT OF HYDROCARBONS - FURNACE & BOILER OPERATIONS | 0.5 d |
| FIRE HAZARDS, RISKS & CONTROLS | 0.25 d |
| FIRE PROTECTION | 0.25 d |
| EMERGENCY RESPONSE | 0.25 d |
| LOGISTICS & TRANSPORT OPERATIONS | 0.25 d |
| GENERAL REVIEW & PRIVATE STUDY SUPPORT | 0.5 d |

CERTIFICATION TEST

0.25 d

Certification?

Reference: OHSE/NEBOSH → Can be organized as an In-House course.  
Contact: exp.rueil@ifptraining.com  

Can be organized as an In-House course.

<table>
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<tr>
<th>Location</th>
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<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
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<td>17 June</td>
<td>21 June</td>
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<tr>
<td>Rueil</td>
<td>7 October</td>
<td>11 October</td>
<td>€2,800</td>
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</table>
LeveL: FOUNDATION

Purpose

This certifying HSE course provides participants with a greater and deeper knowledge in safety in operations, safety engineering, crisis management, environment, HSE management and leadership. It also develops and consolidates their competencies in field operations while developing their team management and communication capabilities.

Audience

Professionals with a significant experience in Oil & Gas surface production and HSE, called on to hold the position of HSE Superintendent.

Learning Objectives

Upon completion of the course, participants will be able to:

► know state-of-the-art Oil & Gas production techniques and equipment technology;
► understand all details of HSE issues linked to production, as well as to construction and maintenance works;
► describe HSE management rules and individual responsibilities;
► contribute to building a HSE culture in their organization;
► participate efficiently to crisis management team;
► use efficient work methods and communication skills;
► carry out projects and actions ensuring the highest standards in safety and respect for the environment.

Ways & Means

► Numerous applications and illustrations.
► Several teamwork sessions.
► Practical sessions on firefighting and oil spill response.
► Development of soft skills and group management techniques.

Learning Assessment

► Continuous assessments all-along the program.
► Final assessment including a presentation in front of a jury.

Prerequisites

Significant experience within the Oil & Gas surface production field.

Why an IFP Training Certification?

► An international recognition of your competencies.
► A Vocational Certificate delivered.
► An expertise confirmed in HSE Superintendent.
► Ready-to-use skills.

More info

The training duration includes 2 days of written and oral competency evaluation. This training is organized together with the Production and Maintenance Superintendents training. The actual scheduling of the common and specific modules of the three sessions may imply a slightly different sequencing of the modules.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the IFP Training trainer (permanent or contracted) modules.

Production and Maintenance Superintendents and oral competency evaluation.

The training duration includes 2 days of written

More info

This course is also available in French: OHSE/SIHSE. Please contact us for more information.

HSE Superintendent Certification

Vocational Certificate

Course Content 58 days

INTRODUCTION

Welcome and program overview. Entry test. Units. Dimensions.

5 d

DOWNHOLE PRODUCTION - WELL PERFORMANCE - PRODUCTION FUNDAMENTALS


5 d

OIL, WATER & GAS PROCESSING

Oil processing: required specifications, stabilization, dehydration, desalting. Production and injection water treatment: water quality requirements and associated treatments. Gas processing: required specifications, dehydration, hydrates, consequences and treatments; Natural Gas Liquids recovery.

5 d

OFFSHORE DEVELOPMENTS, FLOW ASSURANCE


2 d

TERMINAL, FSO & FPSO

Overview of oil terminals. FSO & FPSO technologies. Metering of oil quantities.

1 d

BEHAVIORAL MANAGEMENT

Teamwork management, written and oral communication. Active listening and communication tools. Team cohesion and stress management. Problems analysis and investigation: tools and behaviors. How to better analyze and know oneself.

5 d

INSTRUMENTATION & PROCESS CONTROL - ELECTRICITY

Instrumentation and process control: functional blocks, symboldation; measurements, sensors, security equipment; control equipment, controllers and control loops; Distributed Control System (DCS); architecture, connections; Safety Instrumented Systems (SIS); HIS; ESD, EDP, FGS. Electricity: generation (turbines, alternators, monitoring, troubleshooting); distribution (HT-BT networks, stability, cabinets, batteries, isolation, protections).

5 d

ROTATING MACHINERY

Pumps: centrifugal pumps (types, technology, auxiliaries, performances); volumetric pumps. Compressors: centrifugal compressors: rotor, stator, bearings, shafts, seals balance; reciprocating compressors (frame, cylinders, pistons and rings, bearings, lubrication, cooling). Gas turbines: compression, combustion, expansion, performances, technology, HSE concerns.

5 d

CORROSION, INSPECTION & INTEGRITY

Corrosion mechanisms. Types of corrosions in the Oil & Gas industry. Corrosion prevention and monitoring, fundamentals of inspection.

2 d

HSE IN SURFACE PRODUCTION OPERATIONS


5 d

SAFETY ENGINEERING


5 d

HSE MANAGEMENT


5 d

CRISIS MANAGEMENT

Emergency response plan: response levels, crisis management teams. Rescue planning and resources, role and responsibilities. Training and information, emergency situations responses exercises. Fire protection and detection systems, strategies and typical scenarios. Firefighting equipment, passive, active, fixed, mobile.

5 d

ENVIRONMENTAL MANAGEMENT


5 d

FINAL ASSESSMENT

2 d

Reference: OHSE/HSE. Can be organized as an In-House course.

Contact: exp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location Start Date End Date</th>
<th>Tuition Fees</th>
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</thead>
<tbody>
<tr>
<td>Pau &amp; Rueil 11 September 4 December</td>
<td>€41,990</td>
</tr>
</tbody>
</table>

This course is also available in French: OHSE/SIHSE. Please contact us for more information.
HSE in Surface Production Operations

**Level:** FOUNDATION

**Purpose**
This course provides a thorough understanding of risks and safety measures related to products, equipment and different operations in Oil & Gas production facilities.

**Audience**
Engineers and staff involved in operating Oil & Gas field production facilities.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- deepen knowledge of hazards involved in routine operations, SIMOPS and shutdown/start-up operations,
- assess risks involved in different operations and adopt best industry practices,
- adopt the most appropriate safety measures in routine Oil & Gas processing operations and when faced with unforeseen events,
- explain key safety management rules leading to high HSE standards.

**Ways & Means**
Several applications and illustrations.
Several case studies and teamwork sessions.

**Learning Assessment**
Assessment by test at the end of the course.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

**OPERATIONS & HSE**
0.25 d
Hazards and risks incurred. Consequences.
Risk management means: equipment, organizational and human aspects.

**MAIN HAZARDS OF HYDROCARBON PROCESSING**
0.75 d
Flammability: flame ignition and propagation principles. Types of combustibles, oxidizers and most common ignition sources in process facilities.
Toxicity: exposure limits. Specific hazards associated to H,S. Use of Safety Data Sheet (SDS).
Fluid behavior and related hazards: vessel pressure, consequences of temperature variation (thermal expansion, vaporization, vacuum, water hammer).
Fundamentals of pressure relief equipment: pressure relief valves, rupture disks, vacuum protection, flame arrestors.

**RISK ASSESSMENT TOOLS - JOB SAFETY ANALYSIS**
0.5 d
Fundamentals of risk assessment process.
Job Safety Analysis (JSA) procedure and steps.
JSA exercise.

**RISK IN NORMAL PROCESS OPERATIONS**
0.5 d
Risks associated to static equipment.
Risks associated to rotating machinery.
Risks associated to the use of utilities: inert gases, liquid water, steam, air, diesel, fuel gas.

**SAFE ISOLATION OF PLANT & EQUIPMENT**
1 d
Management of isolations.
Steps of process isolations.
Valve types and issues.
Electrical lock-out.
Degassing-inerting: steam, nitrogen, water, vacuum, work permits…
Start-up: checks, accessibility and cleanliness, line up, deaeration, seal tests, oil in.
Personal Protective Equipment (PPE).

**HSE IN MAINTENANCE & CONSTRUCTION WORKS - PERMIT TO WORK SYSTEM**
0.75 d
Permit To Work (PTW) system. Objectives. Roles and responsibilities. Process.
Risks associated to construction and maintenance works:
Lifting and rigging operations.
Access and working in confined space. Ventilation and atmosphere analysis: oxygen content explosivity, toxicity.
Works at height: ladders, scaffolding, mobile elevated working platforms…
Safe use of tools.
Radioactive sources.

**ORGANIZATIONAL FRAMEWORK - HUMAN FACTORS**
0.75 d
Introduction to HSE management system.
SIMultaneous OPerations (SIMOPS) management.
Management of change.
Downgraded situations.
Learning from incidents and accidents: near misses, reporting and cause tree analysis.
Human factors in risk management, safe and unsafe habits, motivation, exemplarity, difficulties in improving safety results.

**ENVIRONMENTAL MANAGEMENT IN FIELD OPERATIONS**
0.5 d
Main concepts.
Tools to manage sustainability.
Potential environmental impacts in field operations.
Sustainability reporting. Introduction to regulatory framework.

---

Reference: OHSE/EXP/SAFOP
Contact: exp.pau@ifptraining.com

This course is also available in French: OHSE/EXP/SECOP. Please contact us for more information.
Unconventional Resources: Safety Issues

**Course Content**

**GENERAL RISKS ASSOCIATED TO OIL & GAS OPERATIONS**


- Risk of flammability:
  - Explosive atmospheres (ATEX): flammable products, explosive limits and flash point.
  - Ignition sources: naked flame, auto-ignition temperature, sparks and static electricity…
- Risks associated with chemical products, fracturing fluids and toxic gas (H2S).

**RISKS ASSOCIATED WITH DRILLING EQUIPMENT**

Introduction to risks associated to derrick, rig floor, stabbing board, derrick board and crown block. Certificates.

- Risk of dropped objects.
- Works at height.
- Introduction to risks associated to drawworks, top drive, travelling block, winches and pipe handling system. Certificates.
- HSE management of lifting and rigging operations.
- General layout of drilling activities: safety distances.

**RISKS ASSOCIATED WITH DRILLING OPERATIONS**

Risks associated to mud preparation, mud tanks and mud pumps.

- Risks associated to cuttings treatment units: shakers, degasser, desander, centrifuge…
- Risks associated to cementing units and cementing operations.
- Well control hazards and equipment.
- Testing requirements: functional and pressure tests.
- Inspection and certification of equipment and personnel with responsibilities in well control scenarios.

**RISKS ASSOCIATED WITH COMPLETION & WELL INTERVENTION OPERATIONS**

Risks associated with well completion and well testing operations. Main precautions.

- Risks during well interventions:
  - Perforation.
  - Hydraulic fracturing.
  - Coiled tubing.
- Particular HSE aspects of workover operations.

**RISKS OF LOGISTICS - LAND TRANSPORTATION**

- Vehicles fitness and drivers competency assurance.
- Journey management plan elements.
- Transportation of dangerous goods.

**MANAGEMENT OF SIMULTANEOUS PRODUCTION & WELL OPERATIONS**

Introduction to SIMultaneous OPerationS (SIMOPS) in shale Oil & Gas production operations.

- Main roles and responsibilities of the process.
- Definition of works specific dossiers.
- Development of interface document and matrix of permitted operations.
- Exercise of development of a compatibility matrix.
- Kick off meeting and induction of involved parties.
- Management system framework. HSE bridging document.
- SIMOPS management steering group. Meetings and activity planning.
- Use of interface matrix. Exercise.
- Communication systems.
- Emergency arrangements.
- Management of change and downgraded situations in SIMOPS.

**CASE STUDY - MANAGEMENT OF SIMOPS**

Case study of a shale gas production plant and drilling:

- Hazard identification and risk assessment.
- SIMOPS compatibility matrix development.

Reference: OHSE/SHALESAFOPGB

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: OHSE/SHALESAFOPFR. Please contact us for more information.
Positive HSE Culture

Level: FOUNDATION

Purpose
This course aims to integrate HSE in the decision making process of the participants.

Audience
Anyone working in the Oil & Gas industry.

Learning Objectives
Upon completion of the course, participants will be able to:

- describe the positive safety culture features and apply them to their decision making process,
- participate in a HSE observation visit,
- contribute to build a positive HSE culture in the organization.

Ways & Means
Several case studies.

Learning Assessment
Continuous assessments all-along the program.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

ELEMENTS OF POSITIVE HSE CULTURE
What is HSE culture. HSE culture assessment.
Elements of positive HSE culture: informed, reporting, learning, flexible and just.
Case studies.
Characteristics of positive HSE culture vs. negative HSE culture.
Importance and barriers for communication.

HSE LEADERSHIP
Elements defining HSE leadership in the organization.
Characteristics of HSE leaders.

HUMAN FACTORS & BEHAVIORS
Analysis of incidents. Underlying and root causes.
Human error. Modellisation of decision making process.
Analysis of behavior. Types of approaches to risk.
Observation of behavior. Participate in HSE observation visits.

Reference: OHSE/POSITCULTGB

Only available as an In-House course.
Contact: exp.paul@ifptraining.com

www.ifptraining.com
HSE in Maintenance & Construction Activities

**Level:** FOUNDATION

**Purpose**

This course provides a thorough understanding of risks related to products, equipment and different operations involved in the execution of construction/maintenance works.

**Audience**

Engineers, technicians and operators involved in the supervision of construction and maintenance of Oil & Gas field processing facilities.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- Identify the hazards and assess the risks associated to a construction/maintenance work,
- Describe the main elements and responsibilities of the Permit To Work (PTW) system,
- Identify the environmental impacts of the activity and to plan the appropriate mitigation measures,
- Identify the main HSE challenges associated with the management of contractors,
- Lead a team carrying out a safety audit of construction/maintenance works.

**Ways & Means**

- Several applications and illustrations.
- Several case studies and teamwork sessions.

**Learning Assessment**

Continuous assessments all-along the program.

**Prerequisites**

No prerequisites for this course.

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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**Course Content**

<table>
<thead>
<tr>
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<tr>
<td>OPERATIONS &amp; HSE</td>
<td>0.25 d</td>
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<tr>
<td>MAIN HAZARDS OF HYDROCARBON PROCESSING</td>
<td>0.5 d</td>
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<tr>
<td>RISK ASSESSMENT TOOLS - JOB SAFETY ANALYSIS</td>
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<tr>
<td>PERMIT TO WORK SYSTEM PROCEDURE</td>
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<td>HAZARD IDENTIFICATION &amp; RISK ASSESSMENT OF MAINTENANCE &amp; CONSTRUCTION WORKS</td>
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<td>ENVIRONMENTAL MANAGEMENT IN MAINTENANCE &amp; CONSTRUCTION OPERATIONS</td>
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<td>ORGANIZATIONAL FRAMEWORK - HUMAN FACTORS</td>
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<tr>
<td>HSE MANAGEMENT OF CONTRACTORS</td>
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<tr>
<td>AUDITS - MEANS OF IMPROVING THE HSE PERFORMANCE</td>
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</table>

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Reference: OHSE WORKGB

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: OHSE WORKFR. Please contact us for more information.
Occupational Safety

Level: FOUNDATION

Purpose
This course provides a thorough understanding of expectations and mandatory requirements regarding occupational safety. To give insight regarding operational implementation of a safe workplace within Oil & Gas facilities.

Audience
Safety officers, HSE supervisors, offshore installation managers, field managers.

Learning Objectives
Upon completion of the course, participants will be able to:
- deepen knowledge of codes and regulations relative to occupational health and safety,
- evaluate health and safety performance indicators,
- assess an activity in order to promote a safe workplace,
- audit health and safety elements in a workplace.

Ways & Means
- Several applications and illustrations.
- Several case studies and teamwork sessions.

Learning Assessment
Continuous assessments all-along the program.

Prerequisites
No prerequisites for this course.

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

**INTRODUCTION TO OCCUPATIONAL HEALTH & SAFETY** 0.5 d
Historical approach to occupational health and safety.
Introduction to safety culture.
Roles and responsibilities of the different elements of the organization.
Safety leadership characteristics. Roles of safety leaders. Communication and motivation. Safety communication examples.

**WORKPLACE ACCIDENTS & OCCUPATIONAL DISEASES** 0.5 d
Undesired events concepts. Undesired events classification. Unsafe acts and unsafe conditions concept.
Safety main Key Performance Indicators (KPI). Other HSE KPI. Leading and lagging indicators.
Learning from incidents and accidents: near misses, reporting and cause tree analysis.
Local legal requirements. Main sources of information. General development of a system to ensure legal requirements compliance.
International best practices and standards: national regulations becoming international best practices (API, NFPA,...), international organizations (IOGP, ISO...).

**OCCUPATIONAL SAFETY MANAGEMENT** 2 d
Occupational hazard identification and risk assessment in workplace.
Hazards related to products.
Fire and explosion risks.
Risks associated to machines, mechanical equipment and tools. Safe design of machinery.
Lifting and rigging operations.
Works at height.
Electrical risks.
Logistics safety. Road, air and marine transportation. Hazardous material transportation.
Safety in storage areas. Storage of hazardous material.
Personal protective equipment types and selection.
Emergency Evacuation Plan.

**OCCUPATIONAL HEALTH & HYGIENE MANAGEMENT** 1 d
Hygiene risk assessment.
Physical agents: noise, vibrations, temperature.
Chemical agents: risk assessment techniques; exposure limits; toxicology.
Ionizing radiation agents: risk management; typical ionizing equipment; NORM.
Health control of employees. Fitness to work procedure.
Health infrastructure requirements and emergency evacuation management.

**ERGONOMICS & HUMAN FACTORS** 0.5 d
Ergonomics and human factors assessment in workplace. Introduction to fatigue management.
Physical human factors: position, repetitive movements, lighting, temperature, noise.
Mental human factors: stress, monotony, repetitive tasks, workplace bullying, motivational aspects.
Human error. Analysis and improvement techniques.

**OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM - AUDIT** 0.5 d
Organizational model. Workplace risk assessment management.
System certification. BSI OHSAS 18001.
Induction and training to the workforce.
Audit of management system.
Communication and improvement plans.

Reference: OHSE/OCCSAFGB Only available as an In-House course.
Contact: exp.pau@ifptraining.com
This course is also available in French: OHSE/OCCSAFFR. Please contact us for more information.
Occupational Health

Level: FOUNDATION

Purpose
This course provides a thorough understanding of expectations and mandatory requirements regarding occupational health and hygiene.

Audience
Safety officers, HSE supervisors, human resources personnel, field managers.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify and assess the basic occupational health hazards in workplace,
- explain the relevant elements of fatigue management,
- identify the most important elements and possible impacts of ergonomics and psychosociology at workplace.

Ways & Means
- Several applications and illustrations.
- Several case studies and teamwork sessions.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

HEALTH & HYGIENE RISK ASSESSMENT
Basic concepts. Occupational disease concept.
Identification of health and hygiene hazards. Hazardous products and Hazcom.
Basic assessment of health risks.
Health risks basic prevention measures.
Medical fitness for work standards. Health surveillance benefits. Vaccination policies.
Food and water hygiene.

MEDICAL EMERGENCY RESPONSE
Medical emergency evacuation plan. Requirements for medical facilities.

ERGONOMICS & APPLIED PSYCHOSOCIOLOGY
Ergonomics concept.
Applied psychosociology elements.
Mental health at work. Concept of stress management.

FATIGUE MANAGEMENT
Concept and why it is relevant.
Fatigue risk assessment.

Reference: OHSE/OCCHEALTHGB
Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: OHSE/OCCHEALTHFR. Please contact us for more information.
Graduate Certificate
Process Safety Engineer Certification

Level: FOUNDATION

Purpose
To provide an in-depth knowledge of process safety management in Oil & Gas production activities.

Audience
Engineers called on to take the position of Process Safety Engineer.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe the overall production chain and explain main techniques and equipment used in the Oil & Gas facilities,
- detail process safety elements and purpose,
- describe process safety management roles and responsibilities,
- contribute to process hazard analysis studies, events analysis and investigation reporting and monitoring,
- develop leadership techniques to enhance safety culture in the organization.

Ways & Means
- Highly interactive training by industry specialist lecturers, with numerous teamwork sessions.
- Numerous application, case studies and experience feedback.

Learning Assessment
Assessment by test at the end of each module and a final oral assessment in front of a jury.

Prerequisites
No prerequisites for this course.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Process Safety Engineer.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OIL & GAS FIELD PROCESSING
Fundamentals of reservoir engineering, drilling, completion and well servicing.
Fundamentals of thermodynamics applied to effluent processing.
Crude oil treatment.
Production water treatment and injection.
Gas processing and conditioning.
Overview of static equipment. Piping, valves, thermal and storage equipment.
Overview of rotating equipment. Pumps, compressors and gas turbines.
Instrumentation and process control.
10 d

INTRODUCTION TO PROCESS SAFETY MANAGEMENT
Process safety management system. Documentation controls and applicable tools. Implementation.
Commitment to Process Safety:
Workforce involvement and process safety culture.
Workforce training.
Human factors in process control.
Process Safety Information.
Management of contractors.
Continuous improvement elements. Audits and inspections. Establishment of objectives and KPI.
Process safety management in project development.
5 d

SAFETY ENGINEERING
Process hazard analysis. HAZID studies, HAZOP studies. Consequence analysis methodology.
Major hazard assessment and bowtie diagrams analysis.
Quantitative risk assessment.
Layers of protection.
Safety instrumented systems.
Fire detection and protection systems.
10 d

HSE IN SURFACE PRODUCTION OPERATIONS
Safe isolation of plant and equipment (LOTO, degassing-inerting, ventilation…).
Permit to work system.
Introduction to operating procedures. Pre-startup safety review.
Safe work practices. Management of change.
Downgraded situations.
Simultaneous operations.
Environmental impact of production activities.
5 d

ASSET INTEGRITY
Introduction to Asset Integrity Management.
Criticality and risk assessment tools. FMECA, FTA.
Inspection and test.
Corrosion.
Maintenance and inspection based on failure risk.
Implementation and challenges.
5 d

EMERGENCY RESPONSE PLANNING
Introduction to emergency response management.
Scenario identification and development. Tier definition.
Definition of resources.
2 d

ACCIDENT INVESTIGATION WORKSHOP - ROOT CAUSE ANALYSIS
Introduction to undesired events reporting and investigation.
Initiating investigation process. Gathering of information.
Analysis of information. Root cause analysis.
Identification of risk control measure and definition of action plan.
Case study.
2 d

FINAL ORAL ASSESSMENT
1 d

Reference: PHSE/PSENG
Only available as an In-House course.
This course is also available in French: PHSE/INGPS. Please contact us for more information.
Fundamentals of Process Safety

Level: FOUNDATION

Purpose
To understand and describe the objectives of the elements of process safety management.

Audience
Engineers, technicians, involved in operating Oil & Gas field processing facilities or in designing Oil & Gas projects architecture.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe standards and participate in the deterministic methods of safety engineering in Oil & Gas processing,
- explain the different elements of process safety management and to identify strategies for implementation,
- explain the most relevant elements of asset integrity for the design of process plants,
- establish operating procedures for a safe operation.

Ways & Means
- Several applications and illustrations.
- Several case studies and teamwork sessions.

Learning Assessment
Continuous assessments all along the program

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

FUNDAMENTALS OF PROCESS SAFETY

PROCESS HAZARD ANALYSIS

ASSET INTEGRITY

OPERATING PROCEDURES

Reference: PHSE/PSGB  Only available as an In-House course.  Contact: exp.rueil@ifptraining.com

This course is also available in French: PHSE/PSFR. Please contact us for more information.

5 days
## Process Safety Management

### Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FUNDAMENTALS OF PROCESS SAFETY</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Concept of process safety. Historical approach.</td>
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<tr>
<td>Process safety roles and responsibilities.</td>
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<tr>
<td>Safe design principles. Introduction to inherently safer design.</td>
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<tr>
<td>Concept of loss of containment. Fundamentals of flammability and fluid behavior.</td>
<td></td>
</tr>
<tr>
<td>Major accident hazards. Introduction to bowtie diagram representation.</td>
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</tr>
<tr>
<td><strong>PROCESS SAFETY REGULATIONS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Identification and compliance with legislation and industry standards.</td>
<td></td>
</tr>
<tr>
<td>Best practices standards: OSHA, CCPS.</td>
<td></td>
</tr>
<tr>
<td>Relationship with other benchmarking standards: offshore safety case regulation, SEVESO III.</td>
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<tr>
<td><strong>PROCESS SAFETY CULTURE</strong></td>
<td>0.5 d</td>
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<tr>
<td>Safety leadership and commitment.</td>
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<tr>
<td>Safety culture.</td>
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<tr>
<td>Workforce involvement.</td>
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<tr>
<td>Stakeholders identification and communication.</td>
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<tr>
<td><strong>PROCESS HAZARD ANALYSIS</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Process safety information: products, technology, equipment and human intervention.</td>
<td></td>
</tr>
<tr>
<td>Hazards related to typical Oil &amp; Gas process.</td>
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<tr>
<td>Methodology for carrying out a HAZID.</td>
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<tr>
<td>HAZID application.</td>
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<tr>
<td>HAZOP register matrix. Group management.</td>
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<tr>
<td>Introduction to What-if methodology.</td>
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<tr>
<td>HAZOP exercise.</td>
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<tr>
<td>Introduction to Failure Mode and Equipment Analysis (FMEA study).</td>
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<tr>
<td>Introduction to fault tree analysis.</td>
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<tr>
<td>Plant layout.                    Introduction to consequence analysis.</td>
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<tr>
<td><strong>OPERATING PROCEDURES</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Definition of operating phase steps and limits.</td>
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<tr>
<td>Safe isolation of equipment.</td>
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<tr>
<td>Pre-startup safety review. Operational readiness.</td>
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<tr>
<td>Case study: Buncefield.</td>
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<tr>
<td><strong>ASSET INTEGRITY</strong></td>
<td>2 d</td>
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<tr>
<td>Safety critical equipment. Equipment deficiencies and quality assurance.</td>
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<tr>
<td>Definition and functions of safety systems.</td>
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<tr>
<td>Control of ignition sources. Electrical equipment regulations.</td>
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<tr>
<td>Control of hydrocarbon inventory. Flares and vents.</td>
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<tr>
<td>Introduction to safety instrumented systems.</td>
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<tr>
<td>Fire &amp; gas detection systems. Passive and active fire protection.</td>
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<tr>
<td>Maintenance procedures and training.</td>
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<tr>
<td>Introduction to corrosion.</td>
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<tr>
<td>Inspection and testing planning and execution.</td>
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<tr>
<td><strong>ORGANIZATIONAL ELEMENTS</strong></td>
<td>1.5 d</td>
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<tr>
<td>Safe work practices. Permit to work system.</td>
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<tr>
<td>Management of change.</td>
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<tr>
<td>Downgraded situations.</td>
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<tr>
<td>Emergency response planning. Escape, evacuation and rescue.</td>
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<tr>
<td>HSE management of contractors: evaluation and performance monitoring.</td>
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<tr>
<td>Workforce training. Training matrix development.</td>
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<tr>
<td>Human factors in process control. Alarm systems. Human error in process plants.</td>
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<tr>
<td>Case study: platform P-36.</td>
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<tr>
<td><strong>CONTINUOUS IMPROVEMENT ELEMENTS</strong></td>
<td>1.5 d</td>
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<tr>
<td>Undesired events reporting and investigation. Analysis strategies. Management system audit.</td>
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<tr>
<td>Process Safety Key Performance indicators. API RP 754.</td>
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<td>IOGP Process safety reporting scope.</td>
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<tr>
<td>Management review.</td>
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<tr>
<td>Case study: Piper Alpha.</td>
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</tbody>
</table>

Reference: PHSE/PSMGB. Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: PHSE/PSMFR. Please contact us for more information.

Ways & Means

- Several applications and illustrations.
- Several case studies and teamwork sessions.

Learning Assessment

Continuous assessments all-along the program.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

- IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Only available as an In-House course.
Advanced Certificate  

Safety Engineering Certification

Level: PROFICIENCY

Purpose
This course aims to achieve deeper knowledge to assess and mitigate risks, and apply industry-required safety codes and practices when designing, constructing and operating Oil & Gas processing facilities.

Audience
Engineers, technicians and staff, not familiar with the concepts of safety engineering, involved in operating Oil & Gas field processing facilities or in designing Oil & Gas projects architecture.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe risk assessment methods of safety engineering in Oil & Gas processing,
- identify the main advantages and constraints of safety engineering studies,
- identify the necessary safety engineering studies to be carried out during a project,
- interpret the contents of standard hazard studies, explain the safe design principles and propose mitigation measures,
- define, predict and measure possible outcomes and effects.

Ways & Means
- Several applications and illustrations.
- Several case studies and teamwork sessions.
- A mini project will be developed and presented during the last week as part of the certification process.

Learning Assessment
Assessment by test at the end of each module and group presentations.

Prerequisites
Engineering degree or equivalent experience within the Oil & Gas industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Safety Engineering.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

Module 1: FUNDAMENTALS (page 345)  
5 d
Fundamentals of safety engineering.
Preliminary hazard analysis. HAZID.
Hazard and operability. HAZOP.
Major hazard assessment.
Layer of protection.
Plot plan review.
Prevention of hydrocarbon ignition.
Prevention of fire escalation.
Engineering of emergency escape and evacuation resources.

Module 2: ADVANCED TECHNIQUES (page 346)  
5 d
Inherently safer plant design.
Consequence analysis methodology.
Quantitative Risk Assessment (QRA).
Safety Instrumented Systems (SIS).
Design of fire and gas detection systems.
Active and passive fire protection.
Human factors and human errors.

Module 3: PROJECT (page 347)  
5 d
Safety engineering mini-project for a specific surface production facility:
- Hazard identification: HAZID/HAZOP.
- Plant layout. QRA.
- Safety Instrumented Systems (SIS).
- Fire protection and emergency response.

Reference: PHSE/SAFENGGB  
Only available as an In-House course. Contact: exp.pau@ifptraining.com

This course is also available in French: PHSE/SAFENGFR. Please contact us for more information.
Course Content

FUNDAMENTALS OF SAFETY ENGINEERING
0.5 d
Aims of safety engineering.
Safety engineering throughout the life of a project and during operations.
Safe design principles.
Risk assessment. Probabilistic and deterministic methods.
Concept of loss of containment. Fundamentals of flammability.
Scenario definition. Concept of barriers.

“PRELIMINARY HAZARD ANALYSIS” - HAZID
0.5 d
Objectives of preliminary hazard identification during conceptual/feasibility studies.
Hazards related to typical Oil & Gas process.
Methodology for carrying out a HAZID.
HAZID application.

“HAZARD & OPERABILITY” - HAZOP
0.75 d
HAZOP register matrix.
HAZOP exercise.

MAJOR HAZARD ASSESSMENT
0.75 d
Major Accident Hazard (MAH) scenarios.
Scenario representation. Bowtie diagrams.
Risk reduction process. Risk matrices and ALARP principle.
Safety critical measures/elements.
Major accident hazards analysis. Tools Fault Tree Analysis (FTA) and Event Tree Analysis (ETA).

LAYERS OF PROTECTION
0.5 d
Layer of protection analysis concept.
Safety Instrumented Systems. Emergency shutdown system, blow-down system, introduction to HIPS systems.
Fundamentals of reliability. SIL level.

PLOT PLAN REVIEW
0.5 d
Fundamentals of consequence analysis for MAH scenarios.
Safety engineering approach to plant layout.
Plant layout exercise.

PREVENTION OF HYDROCARBON IGNITION
0.5 d
Hazardous area classifications methodology and examples. Electrical equipment and suitability with regard to hazardous area classification.
Overpressure protection and gaseous HC disposal: PSV’s and mechanical systems.
Flares/vents.

INTRODUCTION TO FIRE & GAS SYSTEM
0.25 d
Flammable gas detection systems. Technologies and suitability.

PREVENTION OF FIRE ESCALATION
0.5 d
Introduction to Fire Detection Systems.
Passive fire and blast protection.
Introduction to active firefighting systems. Main elements and applications.

ENGINEERING OF EMERGENCY ESCAPE & EVACUATION RESOURCES
0.25 d
Alarm system. Types of alarm.
Introduction to evacuation and escape resources.

Reference: PHSE/SAFENG1GB. Can be organized as an In-House course.
Contact: exp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>18 November</td>
<td>22 November</td>
<td>€3,570</td>
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This course is also available in French: PHSE/SAFENG1FR. Please contact us for more information.
Safety Engineering - Module 2
Major hazard assessment, QRA, F&G systems design, SIS design

Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Time</th>
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<tbody>
<tr>
<td>INHERENTLY SAFER PLANT DESIGN</td>
<td>0.25 d</td>
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<tr>
<td>Possible options for the elimination of a hazard.</td>
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<td>Provision or addition of control means.</td>
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<tr>
<td>Limitation of inventories of hazardous products.</td>
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<tr>
<td>CONSEQUENCE ANALYSIS METHODOLOGY</td>
<td>0.75 d</td>
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<tr>
<td>Examples of types of scenarios to be considered.</td>
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<tr>
<td>Consequence modeling e.g. blast overpressure, dispersion modeling…</td>
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<td>Criteria for impact assessment.</td>
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<td>Exercise.</td>
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<tr>
<td>QUANTITATIVE RISK ASSESSMENT (QRA)</td>
<td>1 d</td>
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<tr>
<td>Methodology to be used.</td>
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<tr>
<td>Systematic QRA approach (step by step).</td>
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<td>Assessment and improvement.</td>
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<td>Case studies and application.</td>
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<tr>
<td>SAFETY INSTRUMENTED SYSTEMS (SIS)</td>
<td>1 d</td>
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<tr>
<td>Examples of Safety Instrumented Systems &amp; performance targets.</td>
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<td>Typical architecture.</td>
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<tr>
<td>Safety Instrumented Function (SIF) and Safety Integrity Level (SIL).</td>
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<tr>
<td>Design of ESD systems, hierarchy of ESD and actions, causes and effects.</td>
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<tr>
<td>DESIGN OF FIRE &amp; GAS (F&amp;G) DETECTION SYSTEMS</td>
<td>1 d</td>
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<tr>
<td>Selection of F&amp;G detector types.</td>
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<tr>
<td>Positioning of F&amp;G detectors.</td>
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<tr>
<td>Logic associated with the activation of the F&amp;G detectors.</td>
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<tr>
<td>ACTIVE &amp; PASSIVE FIRE PROTECTION</td>
<td>0.5 d</td>
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<tr>
<td>Design of firewater network, calculations for firewater demand.</td>
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<td>Fire protection using water, foam, dry chemicals and inert gas.</td>
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<tr>
<td>Firewater systems, pump types and selection guidance.</td>
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<tr>
<td>Practical exercise.</td>
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<tr>
<td>HUMAN FACTORS &amp; HUMAN ERRORS</td>
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<tr>
<td>Human factors in process control. Alarm systems.</td>
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<tr>
<td>Human error in process plants. Downgraded situations.</td>
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<td>Emergency situations.</td>
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</table>

Ways & Means
- Highly interactive training by industry specialist lecturer.
- Numerous applications and illustrations.
- Several case studies and teamwork sessions.

Learning Assessment
- Assessment by test at the end of the course.

Prerequisites
- Fundamental knowledge of statistical analysis and hazard identification techniques is highly recommended.

Expertise & Coordination
- IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: PHSE/SAFENG2GB  
Can be organized as an In-House course. Contact: exp.rueil@ifptraining.com

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<td>25 November</td>
<td>29 November</td>
<td>€3,570</td>
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</table>

This course is also available in French: PHSE/SAFENG2FR. Please contact us for more information.
Safety Engineering - Module 3 (Project)

Course Content

SAFETY ENGINEERING MINI-PROJECT FOR A SPECIFIC SURFACE PRODUCTION FACILITY

Throughout the course, the participants will be guided in the development of safety engineering studies for a production facility. The various workshops performed throughout the week will thus enable the constitution of a safety dossier for a given production facility. Each workshop will comprise of a plenary training session, which will provide the theory required for the participants to then work on their case study. For this purpose, participants will be grouped in teams. Following each case study, debriefing sessions are organized, during which the results are presented by and discussed with the participants.

HAZARD IDENTIFICATION: HAZID/HAZOP

Plenary session (0.25 day)
HSE Fundamentals: definitions, hazard studies, risk assessment, environmental issues.
Risk analysis methodology: definitions, vocabulary, deterministic and probabilistic methods, preliminary hazard analysis.
Workshop (0.5 day)
HAZID exercise.
HAZID and operability (HAZOP) application.
Plenary session (0.25 day)
Workshop results, Day 1 debriefing, questions-answers.

MAJOR HAZARD ASSESSMENT - CONSEQUENCE ANALYSIS

Plenary session (0.25 day)
Major hazard assessment on process plants.
Consequence analysis methodology.
Workshop (0.5 day)
Major accident hazard representation. Bowtie diagram practice.
Consequences analysis: dispersions, explosions (VCE, BLEVE), bollover, jet fire, etc. Criteria for impact assessment.
Plenary session (0.25 day)
Workshop results, Day 2 debriefing, questions-answers.

PLANT LAYOUT - QRA

Plenary session (0.25 day)
Plot plan review: safety engineering approach to plant layout.
Workshop (0.5 day)
Plant layout (safety optimization), plant layout exercise and case study.
Quantitative Risk Assessment: systematic QRA approach (step by step). Assessment and improvement, applications.
Plenary session (0.25 day)
Workshop results, Day 3 debriefing, questions-answers.

SAFETY INSTRUMENTED SYSTEMS (SIS)

Plenary session (0.25 day)
Introduction to Safety Instrumented Systems (SIS).
Fire & Gas (F&G) detection system.
Emergency shutdown cause and effects matrix.
Workshop (0.5 day)
Determination of SIL level requirements.
F&G systems. Case study for layout and equipment selection.
ESD causes and effects matrix development exercise.
Plenary session (0.25 day)
Workshop results, Day 4 debriefing, questions-answers.

FIRE PROTECTION & EMERGENCY RESPONSE

Plenary session (0.25 day)
Passive fire protection.
Active fire protection.
Emergency escape, evacuation and rescue resources.
Workshop (0.5 day)
Active fire protection systems. Case study for layout design and equipment selection.
Emergency response. Historical incidents.
Plenary session (0.25 day)
Workshop results, Day 5 debriefing, questions-answers.

Reference: PHSE/SEWGB

Can be organized as an In-House course.

Contact: exp.rueil@ifptraining.com

Can be organized as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PHSE/SEWR. Please contact us for more information.
Area Classification & Control of Ignition Sources
Classified Areas Definition & Management

Level: FOUNDATION

Purpose
This course aims to explain the flammability hazards associated to production of Oil & Gas and to describe how to define a hazardous area and the applicable operating procedures.

Audience
Engineers, technicians and staff, not familiar with the concepts of safety engineering, involved in operating Oil & Gas field processing facilities or in designing Oil & Gas project architecture.

Learning Objectives
Upon completion of the course, participants will be able to:

► explain the flammability hazards associated with production facilities,
► describe a scenario of loss of containment and to identify the most common hydrocarbon release points,
► identify the regulatory framework of the hazardous area classification,
► carry out the process to establish the hazardous area classification distances,
► describe the management of hot works in a process area.

Ways & Means
► Several applications and illustrations.
► Several case studies and teamwork sessions.

Learning Assessment
Continuous assessments all-along the program.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
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<tbody>
<tr>
<td>FLAMMABILITY HAZARDS OF HYDROCARBON PROCESSING</td>
<td>0.75 d</td>
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<tr>
<td>PREVENTION OF HYDROCARBON IGNITION</td>
<td>1.25 d</td>
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<tr>
<td>CONTROL OF IGNITION SOURCES IN OPERATION</td>
<td>0.5 d</td>
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<tr>
<td>CASE STUDY</td>
<td>0.5 d</td>
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<tr>
<td>Group exercise for the definition of the classified areas of a plant in a drawing.</td>
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</tbody>
</table>

Reference: PHSE/AREACLASSGB
Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

This course is also available in French: PHSE/AREACLASSFR. Please contact us for more information.
Environmental & Social Risk Management

Level: PROFICIENCY

Purpose
This course provides a thorough and applied knowledge of best industry standards and practices for appraising environmental and social matters that need to be handled cautiously throughout the life cycle of an upstream project, from design to construction and operation of Oil & Gas processing facilities.

Audience
Managers, advisors, engineers and operations staff involved in oversight or management of environmental and social issues all along the lifetime of an upstream project.

Learning Objectives
Upon completion of the course, participants will be able to:
- Understand the global prevailing context for the Oil & Gas industry,
- Grasp legal requirements and standards with respect to impact on local environment and populations,
- Understand techniques and contents of environmental and social impact assessments,
- Identify mitigation measures, perform stakeholders’ mapping and build public consultation and disclosure plans,
- Select key performance indicators, and set up monitoring with environmental and social management plans.

Ways & Means
- Several applications and illustrations.
- Several case studies and teamwork sessions.

Learning Assessment
Continuous assessments all along the program.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

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<th>Course Content</th>
<th>Duration</th>
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<tr>
<td>ENVIROMENTAL ISSUES RELATED TO E&amp;P ACTIVITIES</td>
<td>0.25 d</td>
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<tr>
<td>Historical overview of impact awareness, management.</td>
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<td>Definitions: environmental impact, significance, accidental vs. operational</td>
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<td>discharges, discharge and pollution.</td>
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<td>THE STAKES</td>
<td>0.75 d</td>
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<tr>
<td>Environmental issues: local, regional, global.</td>
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<td>Air, water (availability, pollution), biodiversity, wastes.</td>
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<td>Kyoto protocol, carbon dioxide accounting, cap and trade, clean development</td>
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<td>mechanisms.</td>
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<td>TOXICITY, ECOXICITY.</td>
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<td>ENVIRONMENTAL RISK ASSESSMENT (ERA), LEGAL REQUIREMENTS/</td>
<td>0.25 d</td>
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<tr>
<td>LEGAL STANDARDS: NATIONAL, REGIONAL, INTERNATIONAL</td>
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<td>Environmental Risk Assessment (ERA).</td>
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<td>Legal standards: definition, standard determination, best available technology</td>
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<td>Environmental Quality Standards (EQS), discharge standards - Regional,</td>
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<td>international, conventions.</td>
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<tr>
<td>ENVIRONMENTAL IMPACT ASSESSMENT - PROJECTS</td>
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<tr>
<td>Environmental impact assessment activities throughout the life cycle of a</td>
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<td>field, tools used for impact prediction.</td>
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<td>The EIA process, scoping an EIA, ENVID (Environmental Hazard Identification),</td>
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<td>environmental management plan.</td>
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<td>Case study.</td>
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<tr>
<td>ENVIRONMENTAL RISK MANAGEMENT - PRODUCTION ACTIVITIES</td>
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<tr>
<td>HSE MS - EMS (ISO 14001), continuous improvement processes.</td>
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<td>Key environmental procedures: wastes management, chemical management,</td>
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<td>monitoring.</td>
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<td>Oil spill contingency planning.</td>
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<tr>
<td>MONITORING &amp; REPORTING</td>
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<td>Key performance indicators, industry performance - Trends.</td>
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<td>Environmental monitoring &amp; surveillance.</td>
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<td>Green house gases estimation and reporting.</td>
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<tr>
<td>ENVIRONMENTAL RISK MANAGEMENT - ABANDONMENT</td>
<td>0.25 d</td>
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<tr>
<td>SOCIAL ISSUES RELATED TO E&amp;P ACTIVITIES: THE RISKS, THE STAKES &amp; THE STRATEGIES</td>
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<tr>
<td>The risks and the stakes. Some high profile cases (human rights, NGOs</td>
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<td>activism, etc.).</td>
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<tr>
<td>Documentary viewing and discussion on social risks in E&amp;P activities.</td>
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<tr>
<td>How to change practices and image?</td>
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<tr>
<td>PARTICIPATIVE SOCIAL IMPACT ASSESSMENT AS A RISK MANAGEMENT TOOL</td>
<td>0.5 d</td>
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<tr>
<td>Participative social impact assessment: definition, business case and</td>
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<td>standards, process.</td>
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<tr>
<td>Social management plans and monitoring. Focus on special topics: involuntary</td>
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<td>resettlement, local communities, business in conflict zones.</td>
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<tr>
<td>STAKEHOLDER ENGAGEMENT</td>
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<tr>
<td>Stakeholder engagement: definition and business case.</td>
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<td>Public consultation and disclosure plan (steps and techniques).</td>
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<tr>
<td>Stakeholder mapping.</td>
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<tr>
<td>Stakeholder engagement: misleading assumptions and key success drivers.</td>
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<tr>
<td>CASE STUDY: SOCIAL SCREENING OF AN OIL &amp; GAS PROJECT</td>
<td>0.5 d</td>
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<tr>
<td>Based on a group work, participants should prepare a:</td>
<td></td>
</tr>
<tr>
<td>Stakeholder mapping.</td>
<td></td>
</tr>
<tr>
<td>Social impacts identification and mitigation plan.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: SUST/ENVE
This course can be organized as an In-House course.
Contact: exp.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>18 November</td>
<td>22 November</td>
<td>€3,570</td>
</tr>
</tbody>
</table>

This course is also available in French: SUST/ENVF. Please contact us for more information.

www.ifptraining.com
Social Risk Management

Level: PROFICIENCY

Purpose
This course aims to identify and understand social issues related to Oil & Gas activities.

Audience
Managers, advisors, engineers, and operations staff involved in oversight or management of operational, environmental and social issues throughout the lifetime of an upstream project.

Learning Objectives
Upon completion of the course, participants will be able to:
- Identify and understand what constitutes a social risk (non-technical risk), an impact assessment and management,
- Understand key concepts related to SIA and Social Impact Management Plans (SIMPs),
- Understand social management methodologies and their appropriate uses,
- Design and implement a stakeholder engagement strategy and plan,
- Understand the main components of a Social Impact Management Plan (RAP, local content, etc.), including design and implementation.

Ways & Means
The training will have an interactive format providing room for practice and discussion. It will involve multimedia presentations, case studies, quizzes and teamwork sessions.

Learning Assessment
Continuous assessments all along the program.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

SOCIAL ISSUES RELATED TO OIL & GAS ACTIVITIES: RISKS, STAKES & STRATEGIES
1 d
- Risk of overlooking non-technical risks.
- How to spot non-technical risks?
- How to identify and understand the underlying mechanisms?
- How to manage social risks?
- Oil & Gas industry reaction to underlying mechanisms.
- Why and how should they be managed as a risk and an opportunity?
- Key risks areas for Oil & Gas industry and developed standards: transparency and corruption, business and human rights, operations in areas of conflict, etc.

STAKEHOLDER ENGAGEMENT
1 d
- Social License to Operate (SLO).
- How to build this SLO?
- What is the Free Prior & Informed Consent (FPIC) principle?
- Stakeholders-business interactions analysis.
- How to design and implement a stakeholder engagement plan?
- How to design, implement and monitor a grievance mechanism?
- What are the do’s and don’ts in stakeholder engagement?

PARTICIPATIVE SOCIAL IMPACT ASSESSMENT AS A RISK MANAGEMENT TOOL
1 d
- Conceptual framework and techniques used for Social Impact Assessment.
- International standards.
- Definition of a social impact.
- Links between environmental and social impacts.
- Predict, analyze and assess the likely social impacts pathways and evaluate their significance.
- Develop a mitigation strategy for negative impacts and an enhancement strategy for the project-related opportunities.
- How to monitor social impacts?
- How to assess a SIA quality?
- How to achieve the full potential of a SIA?

SOCIAL IMPACT MANAGEMENT PLANS & MONITORING: TOOLS & PROCESSES
0.5 d
- Social Impact Management Plans (SIMP).
- The main components of a SIMP.
- How can a SIMP be operational?
- What are the organizational and institutional arrangements that need to be developed?
- The role for the project’s stakeholders in a SIMP?
- Implementation and results monitoring and reporting.

SOCIAL IMPACT MANAGEMENT PLANS & MONITORING: FOCUS ON SPECIAL TOPICS & ISSUES
1 d
- Depending on the audience’s needs and expectations, a focus can be put on specific social issues and how to manage them through specific social impact management plans: Resettlement Action Plan (RAP), Community Development Plan and Social investments, local content, etc.

CASE STUDY: SOCIAL SCREENING OF AN OIL & GAS PROJECT
0.5 d
Through a work in group, the participants will do a stakeholder mapping, a high level impact assessment with the use of a mind mapping and an identification of potential impacts and mitigation strategies.

Reference: SUST/SOCIALGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: SUST/SOCIALFR. Please contact us for more information.
Environmental Management

Level: PROFICIENCY

Purpose
This course provides a thorough and applied knowledge of best industry standards and practices for appraising environmental matters throughout the life cycle of a field development, to implement the management of impact and risks throughout the life cycle of a project from exploration up to abandonment.

Audience
Managers, advisors, engineers, and operations staff involved in management of environmental issues all along the lifetime of a field development.

Learning Objectives
Upon completion of the course, participants will be able to:
- explain the fundamentals of environmental management in terms of risks and impacts,
- describe techniques, fundamentals and contents of environmental impact assessments,
- identify mitigation measures,
- select key performance indicators, and set up environmental management plans,
- explain the content of an Oil Spill Contingency Plan.

Ways & Means
Several applications and illustrations.
Several case studies and teamwork sessions.

Learning Assessment
Continuous assessments all-along the program.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
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<tbody>
<tr>
<td>FUNDAMENTALS OF ENVIRONMENTAL MANAGEMENT</td>
<td>0.5 d</td>
</tr>
<tr>
<td>ENVIRONMENTAL, SOCIAL &amp; HEALTH IMPACT ASSESSMENT</td>
<td>1 d</td>
</tr>
<tr>
<td>ENVIRONMENTAL MANAGEMENT PLAN</td>
<td>0.75 d</td>
</tr>
<tr>
<td>Concept and elements. Control measures to reduce air emissions. Control measures to reduce water consumption and water pollution. Control measures to reduce land pollution and use.</td>
<td></td>
</tr>
<tr>
<td>MONITORING &amp; REPORTING</td>
<td>0.5 d</td>
</tr>
<tr>
<td>WASTE MANAGEMENT PLAN</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Strategy - Type of waste. Waste collection. Transport &amp; storages (primary, final...). Treatments options (biological, thermal desorption).</td>
<td></td>
</tr>
<tr>
<td>MANAGEMENT OF ENVIRONMENTAL EMERGENCIES</td>
<td>0.75 d</td>
</tr>
<tr>
<td>Identification of spill scenarios. Oil spill contingency planning strategies: onshore and offshore cases. Typical resources for oil spill contingency plans.</td>
<td></td>
</tr>
<tr>
<td>STAKEHOLDERS ENGAGEMENT</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Stakeholders identification. Engagement and information process. Stakeholders engagement plan review.</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL MANAGEMENT SYSTEM</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Elements of environmental management systems. Referentials and certification. ISO 14001. EMS as part of integrated management systems. Environmental culture and leadership in the organization.</td>
<td></td>
</tr>
<tr>
<td>ENERGY MANAGEMENT</td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

Reference: SUST/ENVMGTGB - Only available as an In-House course.
Contact: exp.pau@ifptraining.com

This course is also available in French: SUST/ENVMGTFR. Please contact us for more information.

www.ifptraining.com
Advanced Certificate

Unconventional Resources: Environmental Management Certification

Level: FOUNDATION

Purpose
This course provides a thorough and applied knowledge of the environmental stakes of an unconventional Oil & Gas development project, including key technical requirements and regulations and public perception. This training is focused on key straightforward arguments that resonate with the public.

Audience
Managers, engineers, and operations staff involved in the management of environmental issues of unconventional development.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe the global prevailing context for unconventional developments for environmental management at worldwide level,
- identify key issues and impacts of specific shale gas activities (exploration, fracking, production),
- identify key technical requirements and regulations in USA and Europe,
- describe and discuss specific contents of a shale gas Environmental Impact Assessment, mitigation (treatments), and how to develop communication (public participation).

Ways & Means
- Highly interactive training by an industry-specialist lecturer involved in several shale gas projects.
- Numerous case studies, applications and illustrations and teamwork sessions.
- Key internet references and videos (case studies).

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Unconventional Resources: Environmental Management.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content
5 days

THE STAKES: A CONTROVERSIAL ENERGY
0.25 d
Public perception and the industry point of view.

TECHNOLOGIES: KEY ENVIRONMENTAL ISSUES
0.5 d
Fracking and water.
Hazardous chemicals; proppant.
Waste (e.g. sans, NORM & metals).
Air emissions.
Induced seismicity.

ENVIRONMENTAL REGULATION & IMPACT ASSESSMENT
1 d
Environmental regulation overview.
Environmental impact assessment (what is specific: e.g. induced seismicity).
Mitigation and emissions treatment (aquifer protection, gas capture…).

WATER MANAGEMENT
1 d
Introduction to water management.
Produced water and water flowback. Monitoring.
Technologies of water treatment. Selection and monitoring.

SOCIO-ECONOMIC IMPACT & SUSTAINABLE DEVELOPMENT
1 d

CASE STUDIES (South Africa, Denmark, USA…)
0.75 d
Lessons learned.

THE INTERNATIONAL ENERGY AGENCY APPROACH (the golden rules)
& INTERNATIONAL OIL & GAS PRODUCERS ASSOCIATION
0.5 d
Proactive measures.

Reference: SUST/SHALEENVGB
Only available as an In-House course.
Contact: exp.pau@ifptraining.com
This course is also available in French: SUST/SHALEENVFR. Please contact us for more information.
## Gas Flaring Reduction: Operational & Environmental Stakes

**Level:** FOUNDATION

### Purpose

This course provides a thorough and applied knowledge of efficient techniques and best industry standards and practices for the recovery and valorization of associated gas and the reduction of flaring and venting.

### Audience

Managers, advisors, engineers, public environmental authorities and operations staff involved in the environmental management during the lifetime of a field development: from design to operation.

### Learning Objectives

Upon completion of the course, participants will be able to:

- identify the stakes for the Oil & Gas industry for associated gas flaring reduction,
- describe the recovery process of associated gas,
- describe the different treatments of gas processing,
- evaluate the alternatives to valorize the products from gas treatment.

### Ways & Means

- Highly interactive training by industry-specialists.
- Numerous applications and illustrations, case studies and teamwork sessions.

### Learning Assessment

Continuous assessments all-along the program.

### Prerequisites

No prerequisites for this course.

### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

<table>
<thead>
<tr>
<th>Session</th>
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<th>Duration</th>
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<tr>
<td>0.5 d</td>
<td>INTRODUCTION TO GAS FLARING REDUCTION</td>
<td>0.5 d</td>
</tr>
<tr>
<td>1.25 d</td>
<td>ASSOCIATED GAS RECOVERY &amp; TREATMENT PROCESS</td>
<td>1.25 d</td>
</tr>
<tr>
<td>0.75 d</td>
<td>ASSOCIATED GAS VALORIZATION STRATEGIES</td>
<td>0.75 d</td>
</tr>
<tr>
<td>0.5 d</td>
<td>CASE STUDY: EVALUATION OF DIFFERENT STRATEGIES</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

**ASSOCIATED GAS RECOVERY & TREATMENT PROCESS**

Oil stabilization process. Associated gas recovery elements.

**ASSOCIATED GAS VALORIZATION STRATEGIES**

Main indicators related to associated gas recovery and valorization.

**CASE STUDY: EVALUATION OF DIFFERENT STRATEGIES**

Case study with the objective of applying the different subjects presented during the course.
# Environmental Management of Water in E&P

**Level:** FOUNDATION

## Purpose

This course aims to acquire a detailed understanding of industrial water management and treatment involving Oil & Gas operations, as well as the technology of main evolved equipment and monitoring basics.

## Audience

Environmental engineers and chemists, looking for technical information and understanding of water management and treatment related issues in Oil & Gas operations.

## Learning Objectives

Upon completion of the course, participants will be able to:

- explain the environmental challenges associated with water management in conventional and unconventional fields,
- be aware of water reject standards and disposal specifications, as well as water injection quality requirements,
- detail the available process technologies allowing to respect discharge regulations and ensure water injection compatibility,
- describe the treatment options of waste water for drilling and domestic use.

## Ways & Means

Highly interactive training course delivered by industry experts and adapted to participants’ experience.

## Learning Assessment

Assessment by test at the end of the course.

## Prerequisites

No prerequisites for this course.

## Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Days</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO INDUSTRIAL WASTEWATER IN E&amp;P</strong></td>
<td>0.5</td>
<td>Sources of industrial wastewater. Environmental risks associated with industrial wastewater. Main impacts. Strategies for the management of industrial wastewater.</td>
</tr>
<tr>
<td><strong>INDUSTRIAL WASTEWATER REGULATIONS FRAMEWORK</strong></td>
<td>0.5</td>
<td>Historical approach: main incidents at the origin of regulations development. International standards and regulations. International conventions: OSPAR, Barcelona, etc. Main environmental quality standards for water. Case study: benchmarking in offshore regulations; OSPAR convention.</td>
</tr>
<tr>
<td><strong>INDUSTRIAL WASTEWATER FROM DRILLING OPERATIONS</strong></td>
<td>0.5</td>
<td>Sources of industrial wastewater from drilling operations. Water base mud. Onsite treatment options. Strategies for reutilization.</td>
</tr>
<tr>
<td><strong>DOMESTIC SEWAGE WATER MANAGEMENT</strong></td>
<td>0.5</td>
<td>Sources of domestic sewage water. Strategies for treatment.</td>
</tr>
<tr>
<td><strong>MONITORING &amp; REPORTING</strong></td>
<td>0.5</td>
<td>Main key performance indicators regarding water management. Reporting of quality standards.</td>
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<tr>
<td><strong>WATER MANAGEMENT IN UNCONVENTIONAL DEVELOPMENTS</strong></td>
<td>0.5</td>
<td>Fracking and water. Hazardous chemicals; proppant. Waste (e.g. sands, NORM &amp; metals).</td>
</tr>
<tr>
<td><strong>PRODUCED WATER &amp; WATER FLOWBACK</strong></td>
<td>0.5</td>
<td>Water compatibility as hydraulic fracturing fluid: Frac fluid compatibility. Water quality by shale plays. Introduction to water treatment for reuse and recycling programs. Water transport and storage. Production water treatment.</td>
</tr>
</tbody>
</table>

Reference: SUST/WATERMGT. Only available as an In-House course. Contact: exp.rueil@ifptraining.com

*This course is also available in French: SUST/MGTEAU. Please contact us for more information.*
Environmental Pollution & Waste Management

Course Content

INTRODUCTION TO WASTE & POLLUTION MANAGEMENT 0.25 d
- Environmental stakes of Oil & Gas companies and projects.
- Environmental mitigation measures principles.

ATMOSPHERIC POLLUTION & TREATMENT 1 d
- Air emission & pollutant inventory. Greenhouse gases.
- Flare emissions reduction techniques.
- Case study:
  - Gas injection and gas lift.
  - Gas valorization strategies.
- Process emissions reduction. Control of fugitive emissions.
- Reduction of emissions related to power generation:
  - Electrification.
- Energy efficiency strategies.
- Logistics management to reduce emissions.

WASTE EFFLUENT POLLUTION & TREATMENT 1.25 d
- Waste effluent inventory (production water, cooling water), pollutants.
- Production water treatment and disposal:
  - Primary: API tanks, plate separators.
  - Secondary: flotation, coalescent filters, hydrocyclones.
  - Tertiary: membranes, biological treatments.
  - Chemicals and chemical treatments.
  - Water injection.
  - Drilling fluids treatment:
    - Water base mud recovery and cuttings treatment.
    - Oil base mud recovery and cuttings treatment.
  - Domestic effluents treatment:
    - Isolated camps treatment options.
    - Permanent camps treatment options.

OIL SPILL RESPONSE AT SEA - TECHNOLOGIES 1 d
- Content of an oil spill contingency plan.
- Offshore spill treatment (dispersants, booms and recovery...).
- Onshore spill treatment (pumping, skimming, bioremediation, thermal desorption...).

SOLID WASTE TREATMENT TECHNOLOGIES 0.5 d
- Chemical treatments.
- Physical treatments.
- Disposal methods: advantages/drawbacks.

POLLUTION & REMEDIATION TECHNIQUES 0.75 d
- Treatment selection: in-situ, onsite, ex-situ.
- When and how applying technologies: physical, chemical, biological treatments.
- Case study.

MONITORING & REPORTING 0.25 d

Reference: SUST/POLLUTIONGB

Only available as an In-House course.

This course is also available in French: SUST/POLLUTIONFR. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
Oil Spill Management

Level: FOUNDATION

Purpose
This course provides a comprehensive and practical knowledge of oil spill management techniques.

Audience
HSE Engineers from Oil & Gas companies and regulation agencies.

Learning Objectives
Upon completion of the course, participants will be able to:
- decide the best way and solution to treat any kind of pollution,
- select the suitable oil spill equipment and operate it,
- manage oil spill events, work with oil spill software and oil spill mitigation maps.

Ways & Means
Several case studies and teamwork sessions.
Several videos of major oil spill incidents and oil spill combating equipment.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OIL SPILL RESPONSE
2 d
Source of oil spill.
Major oil spill incident - Case study: Exxon Valdez incident.
Impact of oil spill.
Oil spill behavior and mitigation.
Tier response.
Oil spill contingency plan:
- Introduction to the plan.
- Definitions.
- Objectives.
Oil spill response strategies:
- Natural dispersion.
- Mechanical removal.
- Chemical dispersion.
Granting standard approval for the use of dispersant.
Notification plan and reporting.

OIL SPILL CONTINGENCY PLAN
1 d
Crisis management team.
Training, awareness and drills.
Communication.
Control room.
Drills and exercises.

This course is also available in French: SUST/OILSPILL/FR. Please contact us for more information.

Reference: SUST/OILSPILLGB

Contact: exp.rueil@ifptraining.com

Only available as an In-House course.
Graduate Certificate
HSE Engineer Certification

Level: PROFICIENCY

Purpose
This course provides an in-depth knowledge of safety and environment issues in Oil & Gas production activities: from design to facilities operation.

Audience
Engineers (particularly field/project engineers) called on to take the position of HSE or safety engineer.

Learning Objectives
Upon completion of the course, participants will be able to:
► describe the overall production chain and explain main techniques and equipment used in the Oil & Gas facilities,
► detail HSE aspects regarding production operations, construction, maintenance works, projects/logistics,
► describe HSE management roles and responsibilities, set-up and implement HSE management system,
► contribute to safety engineering studies, incident analysis and investigation reporting, HSE monitoring.

Ways & Means
► Highly interactive training by industry specialist lecturers, with numerous teamwork sessions.
► Numerous applications, case studies and experience feedback.

Learning Assessment
► Continuous assessments all-along the program.
► Final assessment including a presentation in front of a jury.

Prerequisites
Engineering degree or equivalent experience within the Oil & Gas industry.

Why an IFP Training Certification?
► An international recognition of your competencies.
► A Graduate Certificate delivered.
► An expertise confirmed in HSE Engineer.
► Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

DOWNHOLE PRODUCTION
Fundamentals of reservoir engineering, drilling, completion and well servicing.

5 d

OIL & GAS FIELD PROCESSING
Fundamentals of reservoir engineering, drilling, completion and well servicing.
Fundamentals of thermodynamics applied to effluent processing.
Crude oil treatment.
Production water treatment and injection.
Gas processing and conditioning.
Overview of static equipment. Piping, valves, thermal and storage equipment.
Overview of rotating equipment. Pumps, compressors and gas turbines.
Instrumentation and process control.

10 d

HSE MANAGEMENT
HSE management system.
Occupational health and safety management.
Human factors and responsibilities - HSE culture and HSE leadership.
HSE management in projects.
HSE management of contractors.
HSE management of logistics.
Undesired events reporting and investigation.
HSE audits.

10 d

HSE IN PRODUCTION & MAINTENANCE ACTIVITIES
Hazard identification and risk assessment of surface processing operations: hazardous products, flammability, fluid behavior.
Utilities, flares & drains. Safe isolation of plant and equipment (LOTO, degassing-inerting, ventilation…).
Risk assessment of maintenance and construction works.
Permit to work system.
Emergency response. Strategies and crisis management.

10 d

SAFETY ENGINEERING
Process hazard analysis. HAZID studies, HAZOP studies. Consequence analysis methodology.
Major hazard assessment & quantitative risk assessment.
Safety instrumented systems.
Fire detection and protection systems.

10 d

ENVIRONMENTAL MANAGEMENT
Environmental management system.
Environmental and social impact assessment. Projects.
Applicable technologies for impact mitigation.
Waste management planning.
Oil spill contingency plan.

5 d

ASSET INTEGRITY
Introduction to Asset Integrity Management.
Criticality and Risk Assessment Tools. FMECA, FTA.
Inspection and test.
Corrosion.
Maintenance and inspection based on failure risk.
Implementation and challenges.

5 d

HSE IN DRILLING & WELL INTERVENTION OPERATIONS
Hazard identification and risk assessment of drilling operations.
HSE management of drilling, completion, rig move and well intervention operations.
HSE evaluation of drilling contractors.

4 d

FINAL ORAL ASSESSMENT

1 d

Reference: HMGT/HSEENG
Only available as an In-House course.
This course is also available in French: HMGT/HINGSE. Please contact us for more information.
HSE Management

Level: FOUNDATION

Purpose
This course provides the knowledge required to implement and follow-up a HSE management system, in order to ensure a higher level of safety and more environmentally-friendly business activities.

Audience
Engineers expected to assume a HSE engineer position, business managers seeking to acquire comprehensive HSE management knowledge.

Learning Objectives
Upon completion of the course, participants will be able to:
- suggest a relevant HSE organization in order to fulfill local needs,
- identify and explain the different elements of a general HSE management system based on a risk management approach,
- follow adequately local HSE rules and regulations, and contribute to their improvement,
- contribute to building an HSE culture within their organization, which will allow avoiding incidents and accidents,
- prepare HSE audits and be familiar with continuous improvement processes.

Ways & Means
- Several applications and illustrations.
- Several case studies and teamwork sessions.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OVERVIEW OF HSE MANAGEMENT SYSTEM

FUNDAMENTALS OF HSE MANAGEMENT SYSTEM

MANAGEMENT COMMITMENT & LEADERSHIP

RISK MANAGEMENT

HSE PLANNING & CRISIS MANAGEMENT

ELEMENTS FOR EXECUTION & CONTROL
Tools for risk assessment of execution activities:
- Permit to work system.
- Job safety analysis.
- Observation and HSE awareness programs.
- Pre-start up review.
Health and ergonomics management.
Logistics HSE management.

AUDITS & CONTINUOUS IMPROVEMENT

Reference: HMGT/HSEMGTGB

Can be organized as an In-House course.

Contact: exp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
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<tbody>
<tr>
<td>Pau</td>
<td>4 November</td>
<td>8 November</td>
<td>€3,570</td>
</tr>
</tbody>
</table>

This course is also available in French: HMGT/HSEMGTFR. Please contact us for more information.
# Emergency Response Planning

## Level: FOUNDATION

### Purpose

This course provides the necessary knowledge to assess and plan crisis management of major severity events at headquarters level, identifying the required technical and human resources.

### Audience

Engineers involved in the development crisis management plans for operators, national companies or public administrations, managers and support personnel who can be involved in the Crisis Management Team.

### Learning Objectives

Upon completion of the course, participants will be able to:
- identify and evaluate major severity scenarios and develop response strategies,
- provide a thorough understanding of a Crisis Management Plan at headquarters level,
- identify the roles and responsibilities applicable to crisis management team,
- identify the resources available for crisis management.

### Ways & Means

- Several applications and illustrations.
- Several case studies and teamwork sessions.

### Learning Assessment

Continuous assessments all-along the program.

### Prerequisites

No prerequisites for this course.

### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

### 3 days

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
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<tbody>
<tr>
<td><strong>INTRODUCTION TO MAJOR CRISIS MANAGEMENT</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>What is a crisis? Consequence of a catastrophic event.</td>
<td></td>
</tr>
<tr>
<td>Emergency response levels. Tier 3 emergency definition.</td>
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</tr>
<tr>
<td>Identification of catastrophic events through risk assessment tools.</td>
<td></td>
</tr>
<tr>
<td>Risk map.</td>
<td></td>
</tr>
<tr>
<td>Types of catastrophic events with historic examples:</td>
<td></td>
</tr>
<tr>
<td>Industrial accidents: blowout, industrial accident affecting public, major oil spills.</td>
<td></td>
</tr>
<tr>
<td>Social and political incidents.</td>
<td></td>
</tr>
<tr>
<td>Security incidents.</td>
<td></td>
</tr>
<tr>
<td>Examples from other industries.</td>
<td></td>
</tr>
<tr>
<td><strong>CRISIS MANAGEMENT PLAN</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Structure, roles and resources of crisis management plan at HQ level.</td>
<td></td>
</tr>
<tr>
<td>Responsibilities of top management.</td>
<td></td>
</tr>
<tr>
<td>Development of scenarios and identification of potential affected parties: relatives, partners, public, authorities, media…</td>
<td></td>
</tr>
<tr>
<td>Activation of Crisis Management Plan. Support for decision making.</td>
<td></td>
</tr>
<tr>
<td>Crisis Management Team members. Roles of decision makers (managers) and technical advisors.</td>
<td></td>
</tr>
<tr>
<td>Resources of a crisis management control center.</td>
<td></td>
</tr>
<tr>
<td>Information and communication means.</td>
<td></td>
</tr>
<tr>
<td>External resources for crisis management: blowout contingency, oil spill management, evacuation and rescue, external communication, legal advice.</td>
<td></td>
</tr>
<tr>
<td>Human factors in crisis situations.</td>
<td></td>
</tr>
<tr>
<td>Training requirements and emergency drills.</td>
<td></td>
</tr>
<tr>
<td><strong>EXERCISE</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>A specific event is proposed and participants will develop the crisis management plan scenario, defining roles, required resources and identifying the external elements affected.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: HMGT/EMERGENCYGB

Only available as an In-House course.

This course is also available in French: HMGT/EMERGENCYFR. Please contact us for more information.
Major Emergency Management - Initial Response Training

Level: FOUNDATION

Purpose
This course provides personnel with formal training in command, control, communications and stress-related factors in the management of major emergencies.

Audience
Personnel designated as being in charge of, are members of, or provide support to an emergency management team.

Learning Objectives
Upon completion of the course, participants will be able to:
- Identify the key factors associated with maintaining control throughout the development or escalation of an emergency situation.
- Describe how to manage communication, emergency-related information and put into place predetermined plans during emergency situations.
- Describe how stress can impact on performance during emergencies.
- Role-play as the emergency manager in a number of specific types of emergency scenarios.

Ways & Means
- Several applications and illustrations.
- On site exercise.

Learning Assessment
Continuous assessments all along the program.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

WHAT IS A MAJOR EMERGENCY

Local safety regulations.
Company rules.
Hazard study: escalation, consequences.
Emergency Response Plan (ERP).
Organization.
Resources required to face emergencies.
External parties:
- Headquarters.
- Authorities.
- Neighbors.
- Other companies.

EMERGENCY RESPONSE PLAN

Typical content.
Analysis of Emergency Response Plan.
How to use it?
Why is it an essential document?
Which parts are essential?

EMERGENCY RESPONSE TEAM

General organization.
Functions and responsibilities of ERT members.
Competencies and training.
To be permanently ready to face accidents: functions and roles, ERP, CRR and its equipment.
Frequency of drills.

EMERGENCY RESPONSE MANAGER

Function and responsibilities.
Competencies and training.
How to manage a team in emergencies situations:
- Difference between normal and emergency management.
- Leadership.
- Uncertainty.
- Importance of decision making.
- Stress: managing self and team stress.

CRISIS RESPONSE ROOM

Equipment:
- Communication means.
- Recording means.
- Plans and technical data.
- Ergonomics.

EMERGENCIES SPECIFIC TOOLS & METHODS

Time management: “time-out”.
How to communicate:
- With company staff.
- With authorities.
- With ERT.
Communication tools: radio, phone…
Analysis of initial situation:
- Evaluate quickly.
- Anticipate.
Specific tools:
- Reflex sheets.
- Guide sheets.
- Checklists.
How to record events, decisions and actions.

EXERCISE

Based on one of the ERP scenarios.

Ways & Means

Several applications and illustrations.
On site exercise.

Learning Assessment

Continuous assessments all along the program.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: HMGT/MEMIRGB

Can be organized as an In-House course.
Contact: exp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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<tr>
<td>Pau</td>
<td>28 October</td>
<td>30 October</td>
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</table>

This course is also available in French: HMGT/MEMIRFR. Please contact us for more information.
# HSE Management of Contractors

**Level:** FOUNDATION

**Purpose**
This course aims to describe the process and different elements taking part in the selection of suitable contractors and management of their performance from an HSE perspective.

**Audience**
Persons with responsibilities in HSE evaluation of contractors, Purchase & Contracts departments and anyone involved in the management of projects dealing with a big number of contracted activities.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- describe the contracting process and the relevant HSE inputs,
- identify the hazards of the contractor activities and to establish controls through plans and exhibits,
- establish the responsibilities of each part regarding HSE subjects,
- establish objectives and controls of the HSE performance of contractors.

**Ways & Means**
Several case studies sessions.

**Learning Assessment**
Assessment by test at the end of the course.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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## Course Content

<table>
<thead>
<tr>
<th>Component</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVERVIEW OF HSE ELEMENTS IN CONTRACTOR MANAGEMENT PROCESS</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Contractor management as a key element of HSE management system. Definition of elements for HSE contractor management from selection process to final performance evaluation. HSE risk assessment of contract scope. Definition of HSE critical contracts.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>TENDER PROCESS - ELEMENTS OF HSE EVALUATION</td>
<td>0.5 d</td>
</tr>
<tr>
<td>General tender process structure. Definition of HSE information to be evaluated. Definition of HSE evaluation matrix. HSE evaluation reporting.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Duration</th>
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<tbody>
<tr>
<td>CONTRACTUAL FRAMEWORK</td>
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</table>

<table>
<thead>
<tr>
<th>Component</th>
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</thead>
<tbody>
<tr>
<td>HSE MANAGEMENT DURING EXECUTION</td>
<td>0.5 d</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTRACTOR FINAL EVALUATION</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Importance of final evaluation. Aspects to retain.</td>
<td></td>
</tr>
</tbody>
</table>

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Reference: HMGT/HSECTRFRG  
Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: HMGT/HSECTRFR. Please contact us for more information.
# HSE Management of Logistics

**Level:** FOUNDATION

## Purpose

This course provides a thorough understanding of the risks associated with logistics operations.

## Audience

Personnel from logistics department, safety officers, HSE supervisors, project HSE coordinators.

## Learning Objectives

Upon completion of the course, participants will be able to:

- describe the HSE requirements applicable for land, sea, river and air transportation,
- participate in a risk assessment process for reviewing logistic management,
- check the safety condition of storage areas.

## Ways & Means

Several case studies and teamwork sessions.

## Learning Assessment

Assessment by test at the end of the course.

## Prerequisites

No prerequisites for this course.

## Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LAND TRANSPORTATION</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Main risks and impacts.</td>
<td>1 d</td>
</tr>
<tr>
<td>Vehicle and drivers fitness for purpose.</td>
<td>1 d</td>
</tr>
<tr>
<td>Journey management plan elements.</td>
<td>1 d</td>
</tr>
<tr>
<td>Transportation of dangerous goods.</td>
<td>1 d</td>
</tr>
<tr>
<td><strong>MARINE TRANSPORTATION</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Main risks and impacts.</td>
<td>1 d</td>
</tr>
<tr>
<td>Boat and vessel fitness review.</td>
<td>1 d</td>
</tr>
<tr>
<td>Basic evacuation features.</td>
<td>1 d</td>
</tr>
<tr>
<td>Marine and river transportation of dangerous goods.</td>
<td>1 d</td>
</tr>
<tr>
<td><strong>AIR TRANSPORTATION</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Main risks and impacts.</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Air transportation safety policy elements.</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Fixed wing features.</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Rotary wing features.</td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>STORAGE</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Basic safety storage features.</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Lifting operations and equipment.</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

This course is also available in French: HMGT/HSELOGFR. Please contact us for more information.

Reference: HMGT/HSELOGGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: HMGT/HSELOGFR. Please contact us for more information.
HSE for Support Personnel

Course Content

EXPLORATION & PRODUCTION OVERVIEW
5 d
Fundamentals of reservoir engineering, drilling, completion and well servicing. Notions of field operations and field development process.

HSE CULTURE & LEADERSHIP
5 d
Human factors. HSE leadership. HSE culture development.

OCCUPATIONAL HEALTH & SAFETY
10 d

HSE MANAGEMENT SYSTEMS
5 d
Structure of HSE management systems. HSE management of contractors. HSE performance evaluations.

RISK AWARENESS & EMERGENCY RESPONSE
5 d
Risk awareness in the workplace. Introduction to emergency response. Fire fighting training.

HSE IN LOGISTICS
5 d
Land transportation. Marine transportation. Air transportation selection.

ENVIRONMENTAL & SOCIAL MANAGEMENT
10 d

FINAL PROJECT EVALUATION
15 d
Group project. Jury.

Ways & Means

Highly interactive training by industry specialist lecturers, with numerous teamwork sessions.
Numerous applications, case studies and experience feedback.
3-week group project concluding the program and calling for all the topics devised in the program.

Learning Assessment

Continuous assessments all-along the program.
Final assessment including a presentation in front of a jury.

Prerequisites

No prerequisites for this course.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: HMGT/HSESUPPORTGB. Only available as an In-House course.

This course is also available in French: HMGT/HSESUPPORTFR. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
# Upstream Project Construction HSE Management

## Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SAFETY RISK MANAGEMENT ON THE FIELD</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>HSE prevention plan: definition and evaluation of risk, subcontractor organization and training. Preventive action plan.</td>
<td></td>
</tr>
<tr>
<td><strong>HSE MANAGEMENT</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td><strong>ON SITE HSE</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Surveillance: surveillance plan, field HSE audits, safety tour, behavioral observations, subcontractor HSE evaluation. Monitoring of SIMOPS activities.</td>
<td></td>
</tr>
<tr>
<td><strong>AUDITS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Objectives of an audit. Pre-audit preparations: boundaries, expectations, checklists, plans. Findings vs. expectations.</td>
<td></td>
</tr>
<tr>
<td><strong>HAZARD IDENTIFICATION &amp; RISK ASSESSMENT OF MAINTENANCE &amp; CONSTRUCTION WORKS</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td><strong>SECURITY</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Security management: definition, site management with regards to external events (robbery, kidnapping, data). Security control and technologies.</td>
<td></td>
</tr>
</tbody>
</table>
Natural Gas Chain

Natural Gas ................................................................. p. 366
Gas Cycling: an Integrated Approach ...................................................... p. 367
Natural Gas Storage ........................................................................ p. 368
Natural Gas Transport by Pipeline ......................................................... p. 369
From Gas to Energy ............................................................................... p. 370
Gas Production & Processing Engineer Certification ...................................... p. 371
Gas Sweetening & Sulfur Recovery ............................................................... p. 372
Gas Processing & Compression Operations ................................................ p. 373
Gas Flaring Reduction: Operational & Environmental Stakes ......................... p. 374
Laboratory Analyses for Oil & Gas Production ............................................... p. 375

LNG Chain

Liquefied Natural Gas (LNG) ................................................................. p. 376
LNG Processing Engineer Certification ...................................................... p. 377
LNG Process Simulation ........................................................................ p. 378
Natural Gas
Production - Treatments - Transport - End Uses

Level: FOUNDATION

Purpose
This course provides a comprehensive review of the techniques involved in natural gas production, processing and transport, complemented with an overview of natural gas valorization channels.

Audience
Professionals from all sectors, involved or interested in the natural gas industry.

Learning Objectives
Upon completion of the course, participants will be able to:

- explain fundamentals of natural gas composition, characteristics, production and field processing,
- understand technical issues and specific constraints of natural gas transport and storage,
- review the various end-user markets available for valorizing natural gas,
- grasp key natural gas chain economic issues.

Ways & Means
- Highly interactive training by industry-specialist lectures.
- Numerous applications and illustrations.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 5 days

NATURAL GAS: TYPES & PRODUCTION TECHNIQUES 0.75 d
Types and characteristics of natural gas fields. Production techniques.
Different types of natural gases (condensate, wet or dry gas) and characterization parameters.
Constitution of natural gas well effluent, properties and specific hazards.
Case of associated gases: recovery techniques, characteristics, composition, etc.

END USES OF NATURAL GAS - MAIN QUALITY REQUIREMENTS 0.25 d
End uses of natural gases: fuel (domestic and industrial uses), conversion into other energy types (electricity production and cogeneration), automotive fuel (Natural Gas for Vehicles (NGV) and conversion into liquid automotive fuels GTL), chemical valorization, etc.
Quality requirements for commercial natural gases and associated products (ethane, LPG, condensates). Examples of quality standards.

NATURAL GAS PROCESSING 2 d
Gas dehydration (drying) and hydrate formation inhibition:
System behavior. Moisture content of a saturated gas.
Applications: moisture content of different gases having various compositions.
Hydrate formation inhibition by injection of inhibitors: MeOH, MEG, DEG, LDHI, etc.
Gas dehydration: TEG units, Molecular Sieves, etc.
Application: summary design of TEG unit.
Gas sweetening: removal of acid components (H₂S and/or CO₂):
Different techniques applicable for gas sweetening:
- Chemical solvent processes. Amine units (MEA, DEA, DGA, MDEA, etc.).
- Physical solvent processes.
- Hybrid (physico-chemical) solvent processes.
- Overview of other techniques.
- Conversion of H₂S: sulfur production (CLAUS process) and tail gas processing.
Application: summary design of an amine unit.
Natural Gas Liquids (NGL) extraction (removal of heavy components):
External refrigeration loop.
Joule-Thomson expansion.
Turbo-Expander.
Application: calculation of cryogenic loop used for NGL extraction.
Examples of gas field development schemes:
- Gas fields development options: onshore or offshore processing, single-phase or multiphase export pipelines, “Wet” or “Dry” development.
- Other treatments: mercury removal, conversion or adsorption of mercaptans (RSH), etc.

TRANSPORT OF NATURAL GAS IN LIQUID PHASE - LNG OPTION 1 d
Liquefaction processes: principle, typical operating conditions, technology.
LNG tanks: single or double or full containment (self-standing, membrane). Hazards.
LNG transport: LNG carriers (MOSS spheres, membrane…), export and receiving terminals.
LNG regasification at the receiving terminals, options for refrigeration duty recovery.

TRANSPORT & STORAGE OF NATURAL GAS IN GAS PHASE 0.5 d
Gas pipes: technology, capacities, equipment, recompression units, operating conditions, etc.
Underground storage (old reservoirs, aquifers, salt domes, etc.). Required treatments at outlet.

NATURAL GAS ECONOMICS 0.5 d
Resources, production and markets.
Natural gas marketing: competition of other energy sources and consequences on gas contracts (prices and duration), cost of transport and its impact on the structure of the gas chain.
Future of the natural gas.

Reference: NATG/NATGAS
Can be organized as an In-House course.
Contact: exp.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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<tbody>
<tr>
<td>Rueil</td>
<td>7 October</td>
<td>11 October</td>
<td>£3,570</td>
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</table>

This course is also available in French: NATG/GAZNAT. Please contact us for more information.
Gas Cycling: an Integrated Approach

Level: FOUNDATION

Purpose
This course provides participants with an integrated approach of gas cycling, from the reservoir to the surface facilities.

Audience
Production or petroleum engineers involved in operating or designing Oil & Gas field processing facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
- List main characteristics of Oil & Gas well effluents,
- Identify key field and reservoir parameters, choose a gas cycling strategy,
- Evaluate reservoir performances and recovery factor,
- Specify quality and flowrate needed for gas re-injection,
- Assess key parameters for surface facilities design as needed for gas re-injection.

Ways & Means
- Highly interactive training with industry specialist lecturers.
- Methodology illustrated by multiple industrial case studies.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>GAS CYCLING</th>
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</thead>
<tbody>
<tr>
<td>Introduction.</td>
<td></td>
</tr>
<tr>
<td>The integrated gas cycle: elements, configuration, challenges.</td>
<td></td>
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<tr>
<td>Gas cycling for pressure maintenance.</td>
<td></td>
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<tr>
<td>Gas cycling for miscible gas displacement (EOR): sweeping and soaking, compositional effects.</td>
<td></td>
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<tr>
<td>Dry gas cycling in retrograde condensate reservoirs.</td>
<td></td>
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<tr>
<td>Cycling non-hydrocarbon gases.</td>
<td></td>
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<tr>
<td>Major issues and constraints: reservoir, wells, flow lines and surface facilities.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>WELL EFFLUENT BEHAVIOR</th>
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<tbody>
<tr>
<td>Different types of well effluent. Main characterization parameters.</td>
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<tr>
<td>Constituents that pose problems for storage and transport.</td>
<td></td>
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<tr>
<td>Gas composition: rich and lean gas, sweet and sour gas.</td>
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<tr>
<td>Gas PVT behavior.</td>
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<tr>
<td>PVT properties of pure components and mixtures.</td>
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<table>
<thead>
<tr>
<th>RESERVOIR FLUID BEHAVIOR &amp; NEEDS FOR GAS CYCLING</th>
<th>0.5 d</th>
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</thead>
<tbody>
<tr>
<td>Phase envelop, reservoir and surface PVT issues.</td>
<td></td>
</tr>
<tr>
<td>Ternary diagram, first contact miscibility, multiple contact miscibility: condensing drive and vaporizing drive, minimum miscibility pressure (MMP).</td>
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<tr>
<td>Specificities of condensate gas: retrograde region.</td>
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<table>
<thead>
<tr>
<th>RESERVOIR ASPECTS</th>
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<tbody>
<tr>
<td>Reservoir performance.</td>
<td></td>
</tr>
<tr>
<td>Drive mechanisms: gas reservoirs, gas cap, gravity drainage displacement, tertiary gas displacement, miscible gas displacement.</td>
<td></td>
</tr>
<tr>
<td>Requirements for gas quality for injection, flowrate, cycling rate and configuration of injection.</td>
<td></td>
</tr>
<tr>
<td>Field development: architecture and phasing.</td>
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<table>
<thead>
<tr>
<th>INTRODUCTION TO SURFACE FACILITIES DESIGN</th>
<th>0.25 d</th>
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<tbody>
<tr>
<td>Gas specifications to conform with gas cycling (dew point, sulfur removal &amp; valorization).</td>
<td></td>
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<tr>
<td>Field processing of gas effluents for gas cycling.</td>
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<table>
<thead>
<tr>
<th>GAS DEHYDRATION &amp; SWEETENING</th>
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</thead>
<tbody>
<tr>
<td>Moisture content of natural gas.</td>
<td></td>
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<tr>
<td>Gas dehydration processes.</td>
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<tr>
<td>Gas sweetening, acid gases disposal.</td>
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<table>
<thead>
<tr>
<th>CONDENSATE: RECOVERY, STABILIZATION &amp; MONETIZATION</th>
<th>0.5 d</th>
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<tbody>
<tr>
<td>Low-temperature separation techniques.</td>
<td></td>
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<tr>
<td>Condensate stabilization.</td>
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<tr>
<td>Monetization routes.</td>
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<table>
<thead>
<tr>
<th>GAS COMPRESSION</th>
<th>0.25 d</th>
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</thead>
<tbody>
<tr>
<td>Multistage compression: design criteria.</td>
<td></td>
</tr>
<tr>
<td>Gas compression versus field aging: effect on operating parameters, needs for booster station.</td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>COMPRESSORS &amp; DRIVERS</th>
<th>0.5 d</th>
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<tbody>
<tr>
<td>Compressors technology: choice criteria, effect of gas density evolution.</td>
<td></td>
</tr>
<tr>
<td>Compressor drivers.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>INJECTION NETWORK</th>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network architecture.</td>
<td></td>
</tr>
<tr>
<td>Network operations, backpressure management.</td>
<td></td>
</tr>
<tr>
<td>Well performance issues.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CASE STUDY: SYNTHESIS - WRAP UP</th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field monitoring, adaptation of surface facilities to field aging, re-injection rate versus surface production capacities and effect on recovery, re-injection rate versus gas sales and effects on reservoir monitoring.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: NATG/GASCYCLGB
Contact: exp.rueil@ifptraining.com

This course is also available in French: NATG/GASCYCLFR. Please contact us for more information.
## Natural Gas Storage

### Types - Technology - Operation - Economics

<table>
<thead>
<tr>
<th>Level: FOUNDATION</th>
</tr>
</thead>
</table>

### Purpose

This course provides an overview of the technical issues of various natural gas storage facilities.

### Audience

Professionals interested in natural gas storage.

### Learning Objectives

- Review features and operating conditions of natural gas storage facilities.
- Learn about gas storage equipment specificities: wells, manifolds, compression, auxiliary equipment, etc.
- Understand gas treatment techniques applied to extraction from storage in order to conform to specifications.
- Grasp fundamental issues of natural gas storage economics and third-party access.

### Ways & Means

- Highly interactive training by industry-specialist lecturers.
- Numerous applications and illustrations.

### Learning Assessment

Assessment by test at the end of the course.

### Prerequisites

No prerequisites for this course.

### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

#### NATURAL GAS: AS A STORABLE ENERGY

<table>
<thead>
<tr>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>How? Summary presentation of the different storage systems: depleted reservoirs, aquifers, salt domes.</td>
</tr>
<tr>
<td>LNG storage tanks, etc.</td>
</tr>
<tr>
<td>Where? History of underground gas storage, storage sites in Europe and worldwide. Maps and tables by types of storage, per country and stored volumes.</td>
</tr>
<tr>
<td>Gas storage and its environment: noise, exhaust, surface footprints, landscape integration, local taxes, workforce.</td>
</tr>
</tbody>
</table>

#### STORAGE TYPES

<table>
<thead>
<tr>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid flow in porous media. Reservoir modeling.</td>
</tr>
<tr>
<td>Depleted reservoirs, aquifers, salt domes, LNG storage tanks.</td>
</tr>
<tr>
<td>For each type of storage, presentation of development conditions, geological and structural characteristics, their specificities, the inherent hazards, the operational constraints, the repartition of sites throughout the world, etc.</td>
</tr>
</tbody>
</table>

#### STORAGE EQUIPMENT

<table>
<thead>
<tr>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wells: drilling specificities, downhole and surface equipment.</td>
</tr>
<tr>
<td>Gathering network.</td>
</tr>
<tr>
<td>Gas compression: why, when and how?</td>
</tr>
<tr>
<td>Extracted gas treatment: dehydration, sweetening, odorization.</td>
</tr>
<tr>
<td>Auxiliary equipment: manifolds, instrumentation and control system, safety, treatment of effluents.</td>
</tr>
<tr>
<td>Metering: primary meter, correctors, data processing.</td>
</tr>
</tbody>
</table>

#### COMPRESSION

<table>
<thead>
<tr>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics of compressors specific to natural gas storage sites: compression ratio, runtime frequency, environment related issues (exhaust gases, noise, etc.), power types.</td>
</tr>
<tr>
<td>Types of compressor units: driver type (engine, electrical motor, gas turbine, etc.), reciprocating or centrifugal compressor, etc.</td>
</tr>
<tr>
<td>Comparison between gas turbine and motor drivers, fuel gas and electricity power.</td>
</tr>
</tbody>
</table>

#### GAS TREATMENT

<table>
<thead>
<tr>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the wellhead: hydrate prevention by heating or methanol injection.</td>
</tr>
<tr>
<td>In the station: dehydration, sweetening, odorization.</td>
</tr>
<tr>
<td>For each treatment, presentation of the treatment target, risks, regulation aspects, treatment techniques, common processes used for gas treatment and product regeneration, effluent treatment.</td>
</tr>
</tbody>
</table>

#### ECONOMICAL ASPECT OF GAS STORAGE

<table>
<thead>
<tr>
<th>0.5 d</th>
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</thead>
<tbody>
<tr>
<td>Life cycle of a gas storage site.</td>
</tr>
<tr>
<td>Estimated values for CAPEX and OPEX for each storage type.</td>
</tr>
<tr>
<td>Pricing of access of third parties to storage facilities in France: analysis of the price breakdown, taking into account constraints and specificities of the storage.</td>
</tr>
<tr>
<td>Simulation of cost price per kWh, stored or delivered, for common site configurations.</td>
</tr>
</tbody>
</table>

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Reference: NATG/STOCKGB  
Only available as an In-House course.  
Contact: exp.rueil@ifptraining.com  
This course is also available in French: NATG/STOCKFR. Please contact us for more information.
Natural Gas Transport by Pipeline
Technology - Operation - Economics

Level: FOUNDATION

Purpose
This course provides an overview of the technical and economic issues of natural gas transport by pipeline.

Audience
Professionals interested in natural gas transport by pipeline, including equipment and services suppliers to gas transport companies.

Learning Objectives
Upon completion of the course, participants will be able to:
- gain an overview of the world map of natural gas pipeline networks,
- review marketed gas pipeline design: route, sizing, material, compression stations positioning and design, etc.,
- assess pipe laying organization, management, constraints, planning, and techniques,
- understand gas transportation network maintenance and daily operations within the framework of regulations,
- grasp fundamental issues of natural gas transport economics and third-party access.

Ways & Means
- Highly interactive training by industry-specialist lecturers.
- Numerous applications and illustrations.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

INTRODUCTION TO NATURAL GAS
0.25 d
From reservoir to end user.
Chemical composition and properties of natural gas. Comparison to other combustible gases.
World reserves.
Panorama of offer, demand and movements.

TRANSPORT NETWORK
0.25 d
Overview of worldwide networks.
Perspectives of the development of the European network.
Interaction with other blocks of the natural gas chain: storage, LNG terminals, compression stations, network interconnections, delivery to the client.
Economical and technical comparison between transport by pipeline and LNG carriers.

DESIGN & CONSTRUCTION OF A GAS PIPE
0.5 d
Design standards: pressure, length, volume, diameter.
Fundamentals of metallurgy welding techniques and coating materials.
Pipe laying:
- Different steps of pipe laying operations.
- Cost/duration of pipe laying and compression station construction.

COMPRESSION
0.25 d
Characteristics of compressors: compression ratio, run-time frequency, environment-related issues (exhaust gases, noise, etc.), power types.
Types of compressor units: driver type (engine, electrical motor, gas turbine, etc.), reciprocating or centrifugal compressor.
Comparison between gas turbine and motor drivers, fuel gas and electricity power.

OPERATION OF A NETWORK
0.5 d
Maintenance, monitoring and technical management, risk prevention, safety regulations (law of August 4, 2006), cathodic protection, equipment maintenance, monitoring and controls, metering.
Network operation management: planning, execution, allocations and accounts.

ECONOMICAL ASPECTS OF GAS TRANSPORT BY PIPELINE
0.25 d
Investment costs (CAPEX).
Lifetime of a gas pipe.
Operation costs (OPEX).
Pricing for access of third parties to the gas transport network: analysis of the price breakdown in France.
Simulations of cost price per kWh delivered, for some typical cases.

Reference: NATG/TRANSGB
This course is only available as an In-House course.
Contact: exp.rueil@ifptraining.com
This course is also available in French: NATG/TRANSFR. Please contact us for more information.

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From Gas to Energy

Course Content

NATURAL GAS PRODUCTION OVERVIEW
1.5 d
Types and characteristics of natural gas fields. Production techniques.
Different types of natural gases (condensate, wet or dry gas) and characterization parameters.
Natural gas processing:
- Gas dehydration (drying) and hydrate formation inhibition.
- Gas sweetening: removal of acid components (H₂S and/or CO₂).
- Natural Gas Liquids (NGL) extraction (removal of heavy components).
Examples of gas field development schemes.
Transport:
- Transport and storage of natural gas in gas phase.
- Transport of natural gas in liquid phase. LNG option and regasification.

ECONOMIC ASPECT
0.5 d
Gas markets: natural gas reserves and production, worldwide gas demands distribution, international natural gas trade.
Gas contracts, specificities of LNG contracts, pricing, shipping contracts.
Power supply markets trends and deployment over the world.

THERMAL POWER PLANT OVERVIEW
1 d
Introduction to Steam Power Plant (SPP).
Overview of characteristic equipment.
Characteristics of simple cycles associated to SPP:
- Carnot cycle.
- Rankine cycle.
- Overview of existing cycle.
Notion of energetic performance. Energy measurement:
- Energy balance.
- Energy efficiency.
Safety associated with this kind of installation.
Environment consideration.
Overview of existing plant P&ID.

TECHNOLOGY OF THERMAL POWER PLANT EQUIPMENT
1 d
Boilers:
- Boilers description and operating conditions.
- Combustion. Burners.
- Steam production.
- Boiler operation and safety in operation.
Steam turbines. Gas turbines:
- Turbine performance.
- Technology.
- Turbine control systems, operation and safety in operation.

OVERVIEW OF COMBINED POWER PLANT
0.5 d
Combined cycles: gas/steam.
CHP (Combined Heat and Power):
- Steam production.
- Steam end-uses.
- Gas turbines and waste heat recovery.

SOLAR & THERMAL POWER PLANT OVERVIEW
0.5 d
Concentrating solar power plant:
- Current technology: parabolic through, solar power tower, Fresnel reflectors.
- Efficiency and costs.
Deployment over the world. Overview of existing plant.

Reference: NATG/ENERGYGB. Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

This course is also available in French: NATG/ENERGYFR. Please contact us for more information.
Graduate Certificate
Gas Production & Processing Engineer Certification

Level: FOUNDATION

Purpose
This course aims to acquire comprehensive and practical knowledge of natural gas production, processing and transport engineering in order to quickly and efficiently adapt and contribute to a broad range of engineering positions within the gas industry.

Audience
Production engineers, field engineers, process engineers…, seeking to acquire comprehensive and solid engineering capabilities in gas production, from the reservoir to the transport network. This certification program is well suited for junior engineers and engineers in conversion. It can also be tailored to experienced engineers.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify key subsurface parameters impacting gas production.
- design gas processing plants and anticipate process performances by simulation.
- select appropriate technology of static/rotating equipment according to service and analyze key operating parameters/performances.
- identify main risks related to gas production facilities and participate to safety engineering studies.
- efficiently contribute to gas field development studies.

Ways & Means
- Highly interactive training course delivered by industry experts and adapted to participants' experience.
- Multiple teamwork sessions and industrial case studies.
- Hands-on activities on professional software: HYSYS™ or PRO/II™ for process simulation, PIPESIM™ and OLGA™ for gathering networks and flow assurance.
- Teamwork project on a real case study of gas field development.

Learning Assessment
- Continuous assessments all-along the program.
- Final assessment including a presentation in front of a jury.

Prerequisites
Engineering degree or equivalent professional experience within the petroleum industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- A graduate certificate delivered.
- An expertise confirmed in Gas Production & Processing Engineer.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content 70 days

FUNDAMENTALS OF GEOLOGY, RESERVOIR ENGINEERING & PRODUCTION MODES 5 d

FUNDAMENTALS OF DRILLING, WELL COMPLETION & WELL PERFORMANCE 5 d

GATHERING NETWORKS DESIGN & OPERATION - FLOW ASSURANCE ISSUES 5 d

THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING 5 d

GAS PROCESSING & CONDITIONING 5 d

PROCESS SIMULATION 5 d
Using HYSYS™ or PRO/II™, participants are coached throughout the week to build a complete gas plant model including: gas field treatment (primary separation, dehydration, compression); NGL recovery and fractionation: propane loop, distillation. Analysis of gas plant design and operating parameters.

NATURAL GAS STORAGE & TRANSPORT BY PIPELINE 5 d
Gas storage: storage types, storage equipment, compression. Gas transport by pipelines: transport network; design and construction of gas pipelines; compression; corrosion prevention, metering stations; operation of a network.

PIPING SYSTEMS & PROCESS EQUIPMENT: SIZING & OPERATION 5 d

ELECTRICAL SYSTEMS, INSTRUMENTATION, PROCESS CONTROL & SAFETY SYSTEMS 5 d

ROTATING MACHINERY: TECHNOLOGY, SELECTION & OPERATION 5 d
Operating principles, technology, selection criteria, performances and operating conditions of centrifugal and volumetric pumps; centrifugal and reciprocating compressors; gas turbines; turbo-expanders.

HSE & SAFETY ENGINEERING APPLIED TO GAS PLANTS 5 d
Main hazards in gas production facilities. Risk in normal production operations. Safe isolation of plant and equipment. Main safety engineering studies: HAZID/HAZOP workflow and application; plant layout case study; QRA - Consequence analysis methodology.

PROJECT MANAGEMENT & ECONOMICS 5 d

GAS FIELD DEVELOPMENT PROJECT & JURY 10 d
10-day teamwork on a real case study with deliverables to be presented on the last day (jury).

Reference: PENG/GASENG  
Only available as an In-House course.  
This course is also available in French: PENG/INGGAZ. Please contact us for more information.

Contact: exp.ru@ifptraining.com
Gas Sweetening & Sulfur Recovery

Course Content

OVERVIEW OF GAS SWEETENING PROCESSES
Nature, origins and compositions of the streams to be treated.
The properties of sulfur compounds and CO₂.
Reasons for removing acid gases, usual specifications.
Cost impact of gas sweetening and stakes.
Acid gas management, impact on the sweetening unit.
The different types of gas sweetening processes.

AMINE SWEETENING PROCESSES
General principles.
Generic processes and proprietary processes.
Typical process flow scheme.
Amine unit design: key design parameters.
Specific process arrangements.
Equipment review, process control.
Operational issues and troubleshooting.
Specificities of amine units.
Elgin-Franklin, an example of a versatile MDEA sweetening unit.
An example of successive revamping of an amine unit.
Acid gas enrichment.

OTHER GAS SWEETENING PROCESSES
Scavengers.
Solid bed processes.
Redox processes.
Other solvent processes: hot carbonate, physical solvents, hybrid solvents.
Permeation membranes.
Cryogenic distillation processes.
LPG sweetening.
Guidelines for process selection.

RECOVERING SULFUR FROM ACID GASES
Architecture of the sulfur recovery facilities.
Sulfur properties.
The sulfur market (sulfur uses).

SULFUR RECOVERY UNITS (Claus)
Chemical mechanisms & general process flow diagram.
Key parameters of the Claus process.
The thermal stage.
The catalytic stages.
Adapting the process to the acid gas quality (rich/lean acid gas).
Operational issues.

TAIL GAS TREATMENT
Types of TGT processes.
Direct oxidation processes.
Sub-dew point processes.
Wet sub-dew point process.
H₂S absorption processes.

SULFUR CONDITIONING & STORAGE
Liquid sulfur degassing.
Sulfur forming.
Sulfur storage.

Reference: PENG/ACIDGB  Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/ACIDFR. Please contact us for more information.
Gas Processing & Compression Operations

Level: PROFICIENCY

Purpose
This course provides technical and operational knowledge related to natural gas treatment and transportation. Particularly operating personnel (from operator to engineer) requiring a better understanding of the issues related to natural gas processing and transportation.

Audience
Any person wishing to improve her/his technical and operational knowledge on gas treatment and transportation.

Learning Objectives
Upon completion of the course, participants will be able to:
- understand the basic concepts and operational principle, know the specification (water content of gas and issues),
- analyze the operating conditions to detect problems more quickly at the production level, improve the existing processes performances,
- understand the operation and the detailed equipment technology of compressors,
- analyze the operating parameters associated to those rotating machines and their auxiliary circuits,
- operate compressors properly.

Ways & Means
- Highly interactive training by industry specialist lecturers.
- Feedback, case studies and illustrations (possibility to adapt according client assets specificities).

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

VAPOR-LIQUID EQUILIBRIUM, ELEMENTS OF DISTILLATION & ABSORPTION
Phase envelopes.
Well effluents behavior from pay zone to surface processing facilities.
Techniques applied to mixture separation: flash process, distillation process.
Absorption and stripping phenomena.

SPECIFICATIONS & WATER CONTENT OF GAS - HYDRATES
Constituents raising problems for storage, transport or end use of natural gas.
Different specifications and quality requirements for natural gas.
Necessary treatments to conform these specifications.
System behavior. Moisture content of a saturated gas.
Applications:
- Moisture content of different gases of various compositions.
- Hydrate formation inhibition by injection of inhibitors: MeOH, MEG, DEG, LDHI…

GAS DEHYDRATION: TEG ABSORPTION, MOLECULAR SIEVES
Gas dehydration process: conventional TEG process.
Case study of gas processing operations: TEG process troubleshooting.
Gas dehydration by physical adsorption (molecular sieves): technologies, performances and operating principles.

GAS TREATMENT: SWEETENING, CONDENSATE EXTRACTION & FRACTIONATION
Overview of the techniques dedicated to gas sweetening:
- Chemical solvent processes - Amine units (MEA, DEA, DGA, MDEA…).
- Physical solvent processes.
- Hybrid (physico-chemical) solvent processes.
- Overview of other techniques.
Conversion of H₂S, sulfur production (CLAUS process) and tail gas processing.
Natural Gas Liquids (NGL) extraction (removal of heavy components).
Low Temperature Separation processes (LTS):
- External refrigeration loop.
- Joule-Thomson expansion.
- Turbo-Expander.
NGL Fractionation Schemes (C₂/LPG/C₅+ recovery).

TECHNOLOGY & OPERATION OF CENTRIFUGAL & RECIPROCATING COMPRESSORS
Operating principle, flowrate tuning.
Technology: constitutive elements and their function.
Circuits auxiliaries: lubrication, sealing system, cooling, safety systems.
Compressors operation: routine surveillance, transient conditions.

COMPRESSORS OPERATION (case studies)
Start-up, shutdown and on-line monitoring.

FEEDBACK & CASE STUDIES - TROUBLESHOOTING SPECIFIC TO CLIENT ASSETS
Tailored workshops as per client requirements.
## Gas Flaring Reduction: Operational & Environmental Stakes

**Level:** FOUNDATION  

**Purpose**  
This course provides a thorough and applied knowledge of efficient techniques and best industry standards and practices for the recovery and valorization of associated gas and the reduction of flaring and venting.

**Audience**  
Managers, advisors, engineers, public environmental authorities and operations staff involved in the environmental management during the lifetime of a field development: from design to operation.

**Learning Objectives**  
Upon completion of the course, participants will be able to:

- Identify the stakes for the Oil & Gas industry for associated gas flaring reduction,
- Describe the recovery process of associated gas,
- Describe the different treatments of gas processing,
- Evaluate the alternatives to valorize the products from gas treatment.

**Ways & Means**  
Highly interactive training by industry-specialists.  
Numerous applications and illustrations, case studies and teamwork sessions.

**Learning Assessment**  
Continuous assessments all-along the program.

**Prerequisites**  
No prerequisites for this course.

**Expertise & Coordination**  
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

**INTRODUCTION TO GAS FLARING REDUCTION**  
0.5 d  
Environmental, operational and legislation factors involved in the recovery of associated gas and the flaring reduction. Air emissions and pollutant inventory. Green house gases.
Field development of an oil reservoir: from oil production to the use of associated gas.
Introduction to flares and vents. Recovery of gas from flare/vent network.
Preparation of flare management plans.

**ASSOCIATED GAS RECOVERY & TREATMENT PROCESS**  
1.25 d  
Oil stabilization process. Associated gas recovery elements.
Gas treatments:
- Gas dehydration: TEG units, molecular sieves.
- NGL recovery by Low Temperature Separation (LTS).
- Gas sweetening: amine units, hybrid solvent processes.
- Gas compression and injection.
Extraction to produce NGL, LPG.
Gas-To-Liquid (GTL) process.
Introduction to LNG process.

**ASSOCIATED GAS VALORIZATION STRATEGIES**  
0.75 d  
Main indicators related to associated gas recovery and valorization.
Introduction to liquefied gas logistics.
Relevant elements to evaluate strategies. Economic, environmental and social aspects.
Gas commercial conditioning strategy.
Strategies based on power generation: power generation for installation, local communities economic analysis and limits: examples.
NGL and LPG valorization. Economics and main constraints: examples.
GTL valorization. Economics and main constraints: examples.

**CASE STUDY: EVALUATION OF DIFFERENT STRATEGIES**  
0.5 d  
Case study with the objective of applying the different subjects presented during the course.

Reference: SUST/GASMGTGB  
Only available as an In-House course.  
Contact: exp.rueil@ifptraining.com  
This course is also available in French: SUST/GASMGTFR. Please contact us for more information.
# Laboratory Analyses for Oil & Gas Production

## Methodology - Results analysis - HSE

### Level: PROFICIENCY

### Purpose

This course provides a comprehensive knowledge and develops practical skills in conducting reliable and safe laboratory analyses for the Oil & Gas industry.

### Audience

Laboratory personnel, operational staff and other professionals interested in laboratory analyses dedicated to Oil & Gas operations.

### Learning Objectives

Upon completion of the course, participants will be able to:

- Grasp the physical and chemical concepts involved in various analyses,
- Comprehend issues requiring special attention in various analyses,
- Assess the results of an analysis and decide whether to carry out the analysis over again,
- Review main Occupational Health and Safety rules within the framework of laboratory activities.

### Ways & Means

- Several applications and illustrations.
- Lab visit.

### Learning Assessment

Assessment by test at the end of the course.

### Prerequisites

No prerequisites for this course.

### Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

### Role & Responsibilities of Laboratory Staff

- **Member of production staff.** Equipment yields controls/monitoring.
- **Final product quality controls/monitoring.** Recommendations to improve treatments.

### Analyzes Specific to Crude Oil

- **Specific gravity or density.**
- **Vapor Pressure (Reid VP).**
- **Water content:** Basic Sediment & Water (BSW), dean stark distillation.
- **Salt content:** chlorides content, conductimetry.
- **Acid components content:**
  - H₂S content (methylene blue).
  - H₂S and mercaptans by potentiometry.
- **Total Acid Number (TAN) of liquid hydrocarbons.**
- **Fluid rheology:** pour point, kinematic viscosity, wax content.

### Analyzes Specific to Gas

- **Gas characterization analyzes:**
  - Dew point (HC and water).
  - Gas composition by Gas Phase Chromatography (GPC).
- **Gas specific gravity estimate from composition.**
- **Acid components content:**
  - H₂S content (Dräger), H₂S and mercaptans content (potentiometry, iodometry).
  - CO₂ content (Dräger and acidimetry).

### Analyzes for the Follow-up of Effluent Treatment Operations

- **Demulsifiers evaluation and selection (bottle tests, field tests).**
- **Quality controls/monitoring of poor and rich Triethyleneglycol (TEG):**
  - Water content, pH.
  - Hydrocarbon content.
- **Follow-up of equipment performances:** water content, residual emulsion.

### Laboratory Visit

- **Equipment visualization.**
- **Discussions on practices, difficulties…**

### Analyzes Done to Optimize Anticorrosion Treatments

- **Deposits and scale analyzes.**
- **Chemical corrosion and bacterial corrosion appraisal.**
- **Recommendations for chemical additives and treatments.**

### HSE in Laboratory Activities

- **Laboratory facilities design and implementation.**
- **Chemicals management (storage, use…).**
- **Occupational health and safety behavior.**

## Reference

Reference: PROP/LABOGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/LABOFR. Please contact us for more information.
Liquefied Natural Gas (LNG)
Hazards - Technology - Operation - Economics

Level: FOUNDATION

Purpose
This course provides a comprehensive technical and economic review of the Liquefied Natural Gas industry.

Audience
Professionals involved or interested in the LNG industry: technical and managerial staff in the LNG industry, equipment providers, personnel from engineering companies, etc.

Learning Objectives
Upon completion of the course, participants will be able to:
- review the structure of an LNG chain and the world map of LNG plants,
- understand main LNG physical properties and specificities,
- assess LNG facilities’ hazards and HSE issues, along with risk mitigation and prevention techniques,
- grasp main liquefaction processes’ operating principles, conditions and constraints,
- gain an overview of the technology of equipment used in the LNG industry, grasp the essence of LNG markets and contracts.

Ways & Means
- Highly interactive training by industry-specialist lecturers.
- Numerous applications, illustrations and videos.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

THE LNG WORLD

LNG SPECIFIC PROPERTIES & ASSOCIATED HAZARDS
Physical properties: liquid-vapor equilibrium, density, ratio of vapor methane/LNG, heat of vaporization, heat of combustion… Safety aspects: flash point, fire point, auto-ignition point, minimum spark energy, flammability limits, deflagration. LNG vaporization, Rapid Phase Transition (RPT), radiation levels, stratification/roll-over, sloshing, LNG clouds ignition. Asphyxiation risks, cryogenic liquids jets, piping behavior. 0.5 d

LNG HAZARD PREVENTION & MITIGATION MEASURES
LNG spillage control at design stage and in operation. LNG clouds control in operation. LNG fires control at design stage and in operation. 0.5 d

LIQUEFACTION & REGASIFICATION PROCESSES
Feed pretreatment: sweetening, dehydration, NGL extraction, Hg and aromatics removal. Different liquefaction processes: pure component refrigerants, pure component(s) and mixed refrigerant(s), mixed refrigerants. Peak shaving simplified scheme. Regasification process. 0.75 d

LNG STORAGE, LOADING/OFFLOADING & TRANSPORT
LNG tanks: single or double or full containment (self-standing, membrane). Hazards. Jetty head, jetty trestle, harbor. LNG carriers: common features, technology, cargo operations, safety systems. 0.75 d

TECHNOLOGY OF LNG SPECIFIC EQUIPMENT
LNG cryogenic heat exchangers: spiral wound heat exchangers, aluminum brazed heat exchangers. Technology of the cryogenic compressors and their drivers (gas turbines). LNG Vaporizers: Open Rack Vaporizers (ORV), Submerged Combustion Vaporizers (SCV), etc. Safety and environmental aspects. Submerged LNG pumps: in-tank retractable pumps, cargo pumps, HP canned send out pumps, etc. Liquid cryogenic turbo-expanders, cryogenic valves. Cryogenic personnel protection items. 1 d

LNG PLANT OPERATION
Day to day activities in an LNG plant. Experience of some plants. 0.25 d

LNG TRENDS - RESEARCH & NEW DEVELOPMENTS
Latest LNG trends. Equipment and concept development. Future developments. 0.25 d

LNG ECONOMIC ASPECTS
Gas markets: natural gas reserves and production, worldwide gas demands distribution, international natural gas trade. LNG contracts: specificities of LNG contracts, pricing, shipping contracts. LNG markets trends. 0.5 d

Reference: LNG/LNG Can be organized as an In-House course. Contact: exp.rueil@ifptraining.com

<table>
<thead>
<tr>
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<th>Start Date</th>
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<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>4 November</td>
<td>8 November</td>
<td>€4,690</td>
</tr>
</tbody>
</table>

This course is also available in French: LNG/GNL. Please contact us for more information.
Graduate Certificate

LNG Processing Engineer Certification

Course Content

THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING 5 d

GAS PROCESSING & CONDITIONING 5 d

DYNAMIC SIMULATION OF GAS PROCESSING FACILITIES 5 d
During this week, case study and exercises are performed using HYSYS™ or PRO/II™ software in order to allow the participants to understand process dynamics. Hydrates detection and inhibition in gathering network. Gas processing. Gas dehydration: impact of operating conditions. Multistage gas compression and export; study of operating parameters.

LIQUEFIED NATURAL GAS 5 d

LNG PROCESS SIMULATION 5 d
During this week, case study and exercises are performed using HYSYS™ or PRO/II™ software in order to allow the participants to design and optimize liquefaction processes: gas field treatment (separators, dehydrator, compression); NGL fractionation and stabilization; simulation of a cascade liquefaction process, of a CSMR liquefaction process, or of a turbo-expander based liquefaction process: integration of the liquefaction processes with the NGL recovery/fractionation; comparison of the efficiency of the processes versus load and conditions.

PIPING SYSTEMS & PROCESS EQUIPMENT: TECHNOLOGY & SIZING 5 d

INSTRUMENTATION, PROCESS CONTROL & SCHEMATIZATION 5 d

PUMPS & COMPRESSORS 5 d
Fundamentals of hydraulic circuits and gas compression. Operating principles, technology, selection criteria, performances and operating conditions of centrifugal and volumetric pumps as well as centrifugal and reciprocating compressors.

GAS TURBINES - ELECTRICAL GENERATION 5 d
Upon customer request, this module can be tuned to team generation and team turbines operations. Gas turbines: equipment technology, operating conditions, performances, operation. Turbo-expander: technology, operation. Electrical power generation. Electrical power distribution network and equipment.

LNG - SPECIFIC SAFETY ENGINEERING 5 d
LNG specific hazards: stratification/roll-over, sloshing, LNG clouds ignition, asphyxiation risks, cryogenic liquids jets, piping behavior. LNG spillage control at design stage and in operation. LNG clouds control in operation. LNG fires control at design stage and in operation. Main safety engineering studies: HAZID and HAZOP workflow and application; plant layout case study, QRA - Consequence analysis methodology.

HSE IN OPERATIONS & MAINTENANCE WORKS 5 d

CASE STUDY BASED ON LNG PLANT P&IDs & JURY 5 d
During this week, participants will work in team to analyze LNG plant P&ID’s and present the results of their analysis to a jury: this 5-day teamwork project is a real case study based on actual data. Participants are coached throughout the project to produce the required deliverables, which are to be presented on the last day (jury): process operating parameters, process control loops and safety loops; operating philosophy; materials and equipment selection.

Ways & Means

Highly interactive training with industry-specialist lecturers.
Multiple teamwork sessions and industrial case studies.
Practice on dynamic simulator.
Numerous process simulation exercises using HYSYS™ or PRO/II™ software.

Learning Assessment

Continuous assessments all-along the program.
Final assessment including a presentation in front of a jury.

Prerequisites

Engineering degree or equivalent professional experience within the petroleum industry.

Why an IFP Training Certification?

An international recognition of your competencies.
A Graduate Certificate delivered.
An expertise in LNG Processing Engineer.
Ready-to-use skills.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Learning Objectives

Upon completion of the course, participants will be able to:
► explain the thermodynamics involved in natural gas treatment and liquefaction, especially cryogenic loops.
► explain natural gas processing & liquefaction process,
► analyze operating conditions and basic design of gas treatment and liquefaction plant,
► describe the technology of static equipment and rotating machinery used in LNG plants,
► identify the main risks related to gas treatment and liquefaction and efficiently contribute to safety engineering studies.

Level: FOUNDATION

Purpose

This course provides in-depth technical knowledge of natural gas treatment and liquefaction facilities design and operation necessary to hold rapidly, and very effectively, the position of process engineer, field engineer or technical service engineer.

Audience

Engineers (particularly recently graduated engineers or engineers in conversion) interested in specialization in gas treatment and liquefied natural gas processing.

Reference: LNG/LGEGN

 Only available as an In-House course.

Contact: exp.ruell@ifptraining.com

www.ifptraining.com

LNG Chain

Course Content

**NEED FOR GAS FIELD PROCESSING - QUALITY REQUIREMENTS**
0.25 d
Review of main concepts and products within the gas/condensate chain.
Undesired constituents for storage, transport, or end use of natural gas.
Different specifications and quality requirements for natural gas: sales gas specifications, reach/lean gas specifications.
Required treatments and overview of gas processing.
Examples of compositions of commercialized natural gases.

**STEADY-STATE PRO/II™ OR HYSYS™ SIMULATION CASE STUDIES**
0.75 d
Equations Of State (EOS); uses, examples, selection:
  - Reservoir fluids phase envelope.
  - Flash separation of multicomponent mixtures.
  - Phase envelope of gases versus composition.
  - GHV and WI calculation using PRO/II™ or HYSYS™.
  - Construction of simulation reports.

**CONDENSATE RECOVERY, FRACTIONATION & REFRIGERANT MAKE-UP**
0.5 d
Condensate fractionation: choice of the operating conditions.
Quality requirements for methane, ethane, propane and butane used for MR make-up.
Storage of methane, ethane, propane and butane for make-up.
Nitrogen requirements for make-up.

**SIMULATION OF CONDENSATE RECOVERY & FRACTIONATION USING PRO/II™ OR HYSYS™**
0.5 d
Selection of thermodynamics packages.
Simulation of a condensate fractionation and stabilization process.

**CASCADE PROCESS OPERATING CONDITIONS & SIMULATION**
0.5 d
Process diagram and operating parameters.
Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing.

**COMPARISON OF THE MAIN MIXED REFRIGERANTS LIQUEFACTION PROCESSES**
0.5 d
Fields of application of liquefaction processes.
Comparison with cascade process and turbo expander based process.

**LIQUEFACTION WITH C3 - MIXED REFRIGERANTS - OPERATING CONDITIONS & SIMULATION**
1 d
Process diagram and operating parameters.
Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing.
Optimization of MR composition.

**LIQUEFACTION WITH 2 MIXED REFRIGERANTS - OPERATING CONDITIONS & SIMULATION**
0.5 d
Process diagram and operating parameters.
Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing.
Optimization of MR composition.

**LIQUEFACTION PROCESSES PERFORMANCES COMPARISON**
0.5 d
Heat and mass balance for each process.
Comparison of power requirements for the different processes.

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Reference: LNG/LNGSIMGB
© Can be organized as an In-House course.
Contact: exp.rueil@ifptraining.com

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>9 December</td>
<td>13 December</td>
<td>€3,570</td>
</tr>
</tbody>
</table>

This course is also available in French: LNG/LNGSIM. Please contact us for more information.
Tight Sand & Shale Plays - In Unconventional Settings

Level: FOUNDATION

Purpose
This course provides a general introduction to unconventional hydrocarbon systems, mainly focused on geological and geochemical data interpretation to define potential producible Oil & Gas intervals. Emphasize is put on tight sand and shale plays.

Audience
This course provides a general introduction to unconventional hydrocarbon systems, mainly focused on geological and geochemical data interpretation to define potential producible Oil & Gas intervals. Emphasize is put on tight sand and shale plays.

Learning Objectives
At the end of the course, participants will be able to:
- integrate both geological and geochemical data to identify potential targets in unconventional petroleum systems,
- acquire a global knowledge of existing unconventional resources, mainly tight sands and shale plays,
- understand the exploration implications in this recent domain and future potential impacts.

Ways & Means
- Interactive courses and exercises.
- Examples with the most known unconventional reservoirs in the world.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

PETROLEUM SYSTEM CONCEPT OF UNCONVENTIONAL RESOURCES 1 d
Definition of petroleum systems: Conventional vs. Unconventional.
Characterization of these two systems in terms of elements, processes, timing, Oil & Gas composition.
Origin, composition, preservation and types of sedimentary organic matter: defining a typical source rock.
Oil & Gas generation, retention, expulsion and migration processes from source to reservoir rocks.
Introduction to Petroleum System Models: classical source rocks vs. unconventional source-reservoir rocks.

TIGHT SANDS 1.5 d
Tight sands at the basin scale: geological distribution and geochemical characterization.
Depositional settings, diagenesis and stratigraphy framework.
Definition of tight sand plays (tight gas) in a petroleum system perspective.
Characteristics: regional extent, diffuse boundaries, heterogeneities, low matrix permeability.
Porosity networks and their impact on fluid flow.

SHALE PLAYS 2 d
Definition of shale plays (shale gas, condensate, oil) in a petroleum system perspective.
Key geological parameters.
Integration of applied geochemical data (organic richness, Rock-Eval pyrolysis, estimating original TOC, vitrinite reflectance measurements, biomarkers, isotopes) and basin models (input, calibration and output) as a tool for defining “sweet spots” in existing plays (lecture, discussion and exercises).
Porosity system (organic and inorganic porosity) and impact on fluid flow.
Types of shale plays (tight, hybrid, fractured), impact on production (lecture and exercises).

RESOURCE APPLICATIONS: CASE STUDY 0.5 d
Other potential worldwide plays: Vaca Muerta, Bazhenov, North Africa, Posidonia.

Reference: UNCO/TIGHTSHALE  Only available as an In-House course.
Contact: gra.rueil@ifptraining.com
Hydrocarbons in Unconventional Settings
The geology perspective

Level: FOUNDATION

Purpose
This course provides a general introduction to various non-conventional hydrocarbons, focused solely on a consistent geological rationale to the different potentially producing objectives, through a "petroleum system" approach.

Audience
Geologists, geophysicists, engineers, managers, E&P professionals in charge of basin exploration and prospect evaluation. E&P professionals involved in production of unconventional hydrocarbons.

Learning Objectives
Upon completion of the course, participants will be able to:

▸ understand the geological rationale of unconventional resources as an extension of the petroleum system concept,
▸ acquire a general knowledge of all unconventional resources,
▸ understand what is at stake in this recent domain and future potential impacts.

Ways & Means
▸ Examples from all over the world commented by an expert.
▸ Interactive discussions.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

More info
Kindly refer to complementary courses which might be of interest: “Unconventional Resources - Shale Gas Fundamentals” (page 382), “Unconventional Reservoirs Completion and Stimulation” (page 386).

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

PETROLEUM SYSTEM CONCEPT (Reminder) 0.5 d

UNCONVENTIONAL RESOURCES (Part 1) 1 d
Oil shales.
Heavy oils, extra heavy oils, tar sands.
Geological biogenic gases (ex-early diagenesis, ex-oil biodegradation).
Gas hydrates.
“Clean Coal” (coal bed methane, coal mine methane, underground coal gasification).

UNCONVENTIONAL RESOURCES (Part 2) 1 d
Shale plays (shale gas, shale oil).
Tight gas in basin centered gas system.

UNCONVENTIONAL RESOURCES FROM AN EXTENDED PETROLEUM PERSPECTIVE 0.5 d
Burial and thermal history - Source rock maturation.
Kinetic parameter determination, kerogen expulsion and cracking.
Migration of hydrocarbons and pressure regime.

Reference: UNCO/UNCON. Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Unconventional Resources - Shale Gas Fundamentals

Level: PROFICIENCY

Purpose
This course provides an overview of unconventional hydrocarbons resources, highlighting main technical, economic and environmental issues of shale gas exploration and production.

Audience
Geoscientists, reservoir engineers, petroleum engineers and managers interested in shale gas resources.

Learning Objectives
Upon completion of the course, participants will be able to:
- discuss the fundamentals of gas shale formation evaluation,
- discuss about assessment and improvement of unconventional developments productivity,
- discuss about economic and environmental issues of unconventional developments.

Ways & Means
Interactive courses and exercises.

Learning Assessment
Knowledge assessment with multiple choice questions and open explanatory questions.

Prerequisites
No prerequisites for this course.

More info
Kindly refer also to the complementary courses which might be of interest: “Unconventional Field Development Program - Hydrocarbons in Unconventional Settings” (page 386), “Unconventional Reservoirs Completion and Stimulation” (page 386).

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORLD ENERGY DEMAND &amp; SHALE GAS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Introduction, definitions, world data resources.</td>
<td></td>
</tr>
<tr>
<td>HYDROCARBONS IN UNCONVENTIONAL SETTINGS</td>
<td>1 d</td>
</tr>
<tr>
<td>Exploration aspects: geology and geochemistry.</td>
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</tr>
<tr>
<td>SHALE GAS STIMULATION</td>
<td>1 d</td>
</tr>
<tr>
<td>Hydraulic fracturing, micro-seismicity interpretation, stress and mapping of fractures. Status on fracturing technologies. Completion design, well orientation, spacing, re-fracturing, fracture load recovery, tracers.</td>
<td></td>
</tr>
<tr>
<td>SHALE GAS PETROPHYSICS</td>
<td>0.5 d</td>
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<tr>
<td>Status of petrophysical evaluation of shale gas accumulations.</td>
<td></td>
</tr>
<tr>
<td>SHALE GAS RESOURCES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Evaluation of resources (in place and technically recoverable). Methodology.</td>
<td></td>
</tr>
<tr>
<td>PRODUCTIVITY &amp; FIELD DEVELOPMENT</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Well productivity assessment. Field development case study:</td>
<td></td>
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<tr>
<td>Establish well pattern.</td>
<td></td>
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<tr>
<td>Estimate the plateau rate and duration.</td>
<td></td>
</tr>
<tr>
<td>Build field development spread-sheet.</td>
<td></td>
</tr>
<tr>
<td>ECONOMICS</td>
<td>0.5 d</td>
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<tr>
<td>Economics of development of shale gas - Production costs.</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL IMPACT</td>
<td>0.5 d</td>
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<tr>
<td>Discussions around controversial issues:</td>
<td></td>
</tr>
</tbody>
</table>

Reference: UNCO/UNCONV  
Only available as an In-House course.  
Contact: gre.rueil@ifptraining.com
Unconventional Resources - “Tight & Shale Gas: an Integrated Subsurface to Surface Approach”

Level: PROFICIENCY

Purpose
This course provides a practical understanding of exploration, drilling & completion, and production techniques & procedures in an unconventional hydrocarbon context.

Audience
Geoscientists, reservoir engineers and petroleum engineers involved in exploring, developing and producing unconventional fields.

Learning Objectives
Upon completion of the course, participants will be able to:
- assess the unconventional hydrocarbon potential of a basin,
- define a completion program, assist in and manage on-site operations and design the completion methods of shale gas wells,
- demonstrate the stimulation techniques (hydraulic fracturing) in shale gas wells,
- select the relevant characteristics of a shale gas system and related fluid properties to optimize well performance,
- propose adapted field architecture options and take into account safety aspects,
- adopt emerging best practices regarding environmental issues and set-up appropriate water management plan,
- assess risks associated with unconventional field operations and implement appropriate mitigation measures.

Ways & Means
- Highly interactive training by industry’s specialist lecturers.
- Numerous hands-on and workshop practical activities based on real data sets and practice of dedicated state-of-the-art software.
- Teamwork sessions to develop team-building and stimulate debates and communication between the participants.

Learning Assessment
- Initial and final evaluation will be organized in order to assess participants’ learning curve and knowledge acquisition.
- Knowledge assessments with multiple choice questions and open explanatory questions will be organized at the end of each unit.

Prerequisites
Engineering degree or equivalent experience in the E&P industry.

Expertise & Coordination
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: UNCO/UNCONVFIELD

Only available as an In-House course.

Ways & Means
Highly interactive training by industry’s specialist lecturers. Numerous hands-on and workshop practical activities based on real data sets and practice of dedicated state-of-the-art software. Teamwork sessions to develop team-building and stimulate debates and communication between the participants.

Reference: www.ifptraining.com
Unconventional Resources - “Tight & Shale Gas: an Integrated Subsurface to Surface Approach”

Level: PROFICIENCY

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- assess the unconventional hydrocarbon potential of a basin,
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- assess risks associated with unconventional field operations and implement appropriate mitigation measures.

Ways & Means
Highly interactive training by industry’s specialist lecturers. Numerous hands-on and workshop practical activities based on real data sets and practice of dedicated state-of-the-art software. Teamwork sessions to develop team-building and stimulate debates and communication between the participants.

Reference: UNCO/UNCONVFIELD

Only available as an In-House course.

Ways & Means
Highly interactive training by industry’s specialist lecturers. Numerous hands-on and workshop practical activities based on real data sets and practice of dedicated state-of-the-art software. Teamwork sessions to develop team-building and stimulate debates and communication between the participants.

Reference: UNCO/UNCONVFIELD

Only available as an In-House course.
# Unconventional Resources -
**Shale Gas Characterization, Modeling & Engineering**

*Organized in collaboration with GO GEO Engineering*

**Level:** PROFICIENCY

**Purpose**
This course provides information about handling the major data requirements and modeling issues associated with unconventional reservoirs in general as well as how to set up rational exploitation programs for these reservoirs.

**Audience**
This course is intended for geoscientists, reservoir engineers, petroleum engineers and production engineers interested in the characterization, modeling, engineering and exploitation of unconventional reservoirs.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- Discuss the characteristics of unconventional reservoirs,
- Discuss all geological, geomechanical and seismic aspects related to unconventional reservoirs modeling,
- Integrate geology, geophysics, geomechanics and reservoir engineering concepts for building a reservoir model,
- Identify natural fractures and model their density and orientation,
- Simulate the Fracs propagation and their interaction with fractures,
- Calculate the Stimulated Reservoir Volume (SRV) generated by the Fracs,
- Recognize productive zones and design wells with optimum Fracs stages,
- Create fracture porosity and permeability models for reservoir simulation,
- Estimate the recovery and design the optimum FDP.

**Ways & Means**
- Interactive courses and exercises with a real case studies data set.
- Videos and examples with the most known unconventional reservoirs in the world.
- Hands-on practice using dedicated software allowing to generate actual reservoir models from real data sets.

**Learning Assessment**
Knowledge assessment with multiple choice questions and open explanatory questions.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainers (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

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## Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Days</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO UNCONVENTIONAL RESOURCES</strong></td>
<td>1 d</td>
<td>Introduction to unconventional reservoirs. Production from unconventional reservoirs in the world. Petrophysics of unconventional reservoirs.</td>
</tr>
<tr>
<td><strong>HYDRAULIC FRACKING FOR UNCONVENTIONAL RESERVOIRS</strong></td>
<td>1 d</td>
<td>Modeling the propagation of the hydraulic fractures and their interaction with natural fractures. Optimum Frac stages placement and design. Hands-on application on various unconventional wells data sets.</td>
</tr>
<tr>
<td><strong>RESERVOIR ENGINEERING FOR UNCONVENTIONAL RESERVOIRS</strong></td>
<td>2 d</td>
<td>Predicting and imaging production spots. Well interference effect. Fracs stages in the dynamic model. Unconventional well performance study. Reservoir simulation for unconventional wells. Predicting production and development problems by type of reservoirs. Completion optimization while drilling in unconventional reservoirs. Hands-on application using dedicated software on two real unconventional reservoir data sets.</td>
</tr>
<tr>
<td><strong>INTEGRATED WORKFLOW FOR MODELING UNCONVENTIONAL RESERVOIRS</strong></td>
<td>2 d</td>
<td>Integrated workflow for unconventional reservoirs: from the raw data to the engineering study. Hands-on application using dedicated software on two real unconventional reservoir data sets.</td>
</tr>
</tbody>
</table>

Reference: UNCO/SHALE. Only available as an In-House course.

Contact: gre.rueil@ifptraining.com
Well Architecture & Directional Drilling in Unconventional Wells

Level: FOUNDATION

Purpose
This course provides a comprehensive information to successfully prepare and achieve a directional well, including the architecture.

Audience
Drilling supervisors, tool pushers, engineers and other professionals involved or interested in well architecture and directional drilling.

Learning Objectives
Upon completion of the course, participants will be able to:
- calculate different casing strings using the Drilling Data Handbook,
- select the right position of casing shoes,
- calculate the stress applied to the casing pipes,
- choose the right wellhead with regards to the casings used,
- know the equipment needed for directional drilling,
- design a directional well,
- calculate the trajectories of a deviated well in 2D,
- design the drill stem adapted to the well's profiles to reach a target.

Ways & Means
- Exercises.
- Movies.
- Work in groups, teamwork.
- Computer use for the design of a personal spreadsheet program.

Learning Assessment
Exercises, quiz, written exam.

Prerequisites
No prerequisites for this course but some notions of well control will help.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Module</th>
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<tbody>
<tr>
<td><strong>DRILLING &amp; CASING PROGRAM</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>CHARACTERISTICS OF CASINGS</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Geometric, physical and mechanical properties of pipes and connections. Use of Drilling Data Handbook.</td>
<td></td>
</tr>
<tr>
<td><strong>SHOE POSITIONING</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Hypotheses to be considered, casing point - Kick tolerance. Examples and exercises.</td>
<td></td>
</tr>
<tr>
<td><strong>CASING STRING CALCULATION</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td><strong>CALCULATION EXAMPLES</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Case studies and writing of a spreadsheet in order to determine the casing point, the kick margin, the pressure max…</td>
<td></td>
</tr>
<tr>
<td><strong>DIRECTIONAL DRILLING EQUIPMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Specific drilling equipment: downhole motors, rotary steerable system. Measuring equipment: MWD.</td>
<td></td>
</tr>
<tr>
<td><strong>DRILLING ENGINEERING</strong></td>
<td>1 d</td>
</tr>
<tr>
<td><strong>HORIZONTAL &amp; ERD</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>ERD, multilateral and short radius.</td>
<td></td>
</tr>
<tr>
<td><strong>CASE STUDIES</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Writing of a spreadsheet in order to determine the trajectory of a 2D well according to the needs.</td>
<td></td>
</tr>
<tr>
<td><strong>KNOWLEDGE ASSESSMENT</strong></td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

Reference: UNCO/UARCDDE. Only available as an In-House course.

Contact: fp.pau@ifptraining.com

www.ifptraining.com
Unconventional Reservoirs Completion & Stimulation

Level: FOUNDATION

Purpose
This course provides a complete overview of the techniques, achievements, challenges of well completion and stimulation of shale gas wells.

Audience
Professionals within the Petroleum and Energy Industry, who need a knowledge and understanding of the Oil & Gas unconventional production and development techniques.

Learning Objectives
Upon completion of the course, participants will be able to:
- recognize the specificities of the unconventional reservoirs, the techniques and challenges of their development and their production,
- distinguish the completion methods of shale gas wells,
- demonstrate the stimulation techniques of shale gas wells,
- identify the impact of fracturing parameters on well productivity,
- assess and measure the success of these operations.

Ways & Means
- Interactive animations.
- Use of several illustrations: videos, field cases.
- Numerious exercises.

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRILLING &amp; CASING PROGRAM FOR DIRECTIONAL &amp; HORIZONTAL WELLS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>COMPLETION DESIGN</td>
<td>0.5 d</td>
</tr>
<tr>
<td>INPUT &amp; FRACTURE DESIGN</td>
<td>1.75 d</td>
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<tr>
<td>FRACTURING FLUIDS, PROPPANTS &amp; FRACTURE CONDUCTIVITY</td>
<td>1 d</td>
</tr>
<tr>
<td>EQUIPMENT &amp; PLACEMENT TECHNIQUES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>FRACTURE MAPPING &amp; POST-JOB ANALYSIS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>KNOWLEDGE ASSESSMENT</td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

Reference: UNCO/URCS

Only available as an In-House course.

Contact: fp.pau@ifptraining.com
Well Performance: Shale Gas Wells

Course Content

**INTRODUCTION TO PRODUCTION SYSTEM**

- Introduction to well performance nodal analysis: inflow x outflow.
- Overview of PROSPER™ software workflow:
  - PROSPER™: building initial well system file.

**PVT DATA/PVT MODELING**

- Gas PVT properties.
  - PROSPER™: building PVT model for shale gas well.

**SHALE GAS PLAYS PROPERTIES & WELLBORE INTERFACE**

- Shale gas systems characterization- dual porosity, stress dependent permeability, gas desorption.
- Shale gas completion stimulation (hydraulic fracturing).
- Introduction to well performance analysis of unconventional gas reservoirs.
  - Effect of productivity parameters for horizontal wells (length, wellbore radius, permeability “anisotropy”, thickness vs. position “Well Eccentricity”, drainage area, formation damage “Skin”).
  - Derivation of analytical solutions.

**INFLOW PERFORMANCE/IPR MODELING**

- Inflow Performance Relationship (IPR).
  - Back pressure equation for gas wells.
  - Transient gas model for horizontal wells completed and stimulated with multiple transverse fractures.
  - IPRs for horizontal wells:
    - PROSPER™: IPR modeling exercise.
  - IPR of horizontal drains: shale gas well exercise:
    - PROSPER™: fractured horizontal well modeling.

**WELLBORE FLOW, OUTFLOW PERFORMANCE/VLP MODELING**

- Minimum flow rate/gas well loading (pressure drop through a horizontal well for gas flow, effect of the well geometry TOE up, TOE down).
- Pressure gradient and Vertical Lift Performance (VLP) curves.
  - Tubing head pressure, tubing ID impacts:
    - PROSPER™: tubing correlations, VLP modeling of shale gas well.
  - Flow in a choke.

**WELL PERFORMANCE**

- Well deliverability nodal analysis: inflow x outflow on shale gas well:
  - PROSPER™: IPR + VLP well performance modeling, prediction, analysis and diagnosis.
  - Sensitivity study.
  - Effect of compaction permeability reduction.
  - Effect of well geometry.

**KNOWLEDGE ASSESSMENT**

- Quiz.

Ways & Means

- Use of the software program PROSPER™ (training license provided for the duration of the course).
- Short lectures alternating with hands-on sessions.
- Course ends with a 2-day integrated case study.

Learning Assessment

- Quiz.

Prerequisites

- No prerequisites for this course.

Expertise & Coordination

- IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: UNCO/UWELLPERFSGE. Only available as an In-House course.

Contact: fp.pau@ifptraining.com

www.ifptraining.com
Unconventional Resources: Safety Issues

Course Content

5 days

GENERAL RISKS ASSOCIATED TO OIL & GAS OPERATIONS
Risk of flammability: 
Explosive atmospheres (ATEX): flammable products, explosive limits and flash point. 
Ignition sources: naked flame, auto-ignition temperature, sparks and static electricity… 
Risks associated with chemical products, fracturing fluids and toxic gas (H2S). 
Health and hygiene risks associated with hydraulic fracturing operations. Medical fitness to work certificates. 
Electrical risks. Area classification requirements. Certificates. 
Personal Protective Equipment (PPE).  
0.75 d

RISKS ASSOCIATED WITH DRILLING EQUIPMENT
Introduction to risks associated to derrick, rig floor, stabbing board, derrick board and crown block. Certificates. 
Risk of dropped objects. 
Works at height. 
Introduction to risks associated to drawworks, top drive, travelling block, winches and pipe handling system. 
Certificates. 
HSE management of lifting and rigging operations. 
General layout of drilling activities: safety distances. 
0.75 d

RISKS ASSOCIATED WITH DRILLING OPERATIONS
Risks associated to mud preparation, mud tanks and mud pumps. 
Risks associated to cuttings treatment units: shakers, degasser, desander, centrifuge… 
Risks associated to cementing units and cementing operations. 
Well control hazards and equipment. 
Testing requirements: functional and pressure tests. 
Inspection and certification of equipment and personnel with responsibilities in well control scenarios. 
0.5 d

RISKS ASSOCIATED WITH COMPLETION & WELL INTERVENTION OPERATIONS
Risks associated with well completion and well testing operations. Main precautions. 
Risks during well interventions: 
Perforation. 
Hydraulic fracturing. 
Coiled tubing. 
Particular HSE aspects of workover operations. 
0.5 d

RISKS OF LOGISTICS - LAND TRANSPORTATION
Vehicles fitness and drivers competency assurance. 
Journey management plan elements. 
Transportation of dangerous goods. 
0.5 d

MANAGEMENT OF SIMULTANEOUS PRODUCTION & WELL OPERATIONS
Introduction to SIMultaneous OPerationS (SIMOPS) in shale Oil & Gas production operations. 
Main roles and responsibilities of the process. 
Definition of works specific dossiers. 
Hazard identification and risk assessment of specified works. Exercise. 
Development of interface document and matrix of permitted operations. 
Exercise of development of a compatibility matrix. 
Kick off meeting and induction of involved parties. 
Management system framework. HSE bridging document. 
SIMOPS management steering group. Meetings and activity planning. 
Use of interface matrix. Exercise. 
Communication systems. 
Emergency arrangements. 
Management of change and downgraded situations in SIMOPS. 
1.5 d

CASE STUDY - MANAGEMENT OF SIMOPS
Case study of a shale gas production plant and drilling: 
Hazard identification and risk assessment. 
SIMOPS compatibility matrix development. 
0.5 d

Reference: OHSE/SHALESAFOPGB  ❗️ Only available as an In-House course.  
Contact: exp.pau@ifptraining.com  
This course is also available in French: OHSE/SHALESAFOPFR. Please contact us for more information.
Advanced Certificate

Unconventional Resources: Environmental Management Certification

Level: **FOUNDATION**

**Purpose**

This course provides a thorough and applied knowledge of the environmental stakes of an unconventional Oil & Gas development project, including key technical requirements and regulations and public perception. This training is focused on key straightforward arguments that resonate with the public.

**Audience**

Managers, engineers, and operations staff involved in the management of environmental issues of unconventional development.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- **THE STAKES: A CONTROVERSIAL ENERGY**
  Public perception and the industry point of view.
- **TECHNOLOGIES: KEY ENVIRONMENTAL ISSUES**
  Fracking and water.
  Hazardous chemicals; proppant.
  Waste (e.g. sands, NORM & metals).
  Air emissions.
  Induced seismicity.
- **ENVIRONMENTAL REGULATION & IMPACT ASSESSMENT**
  Environmental regulation overview.
  Environmental impact assessment (what is specific: e.g. induced seismicity).
  Mitigation and emissions treatment (aquifer protection, gas capture...).
- **WATER MANAGEMENT**
  Introduction to water management.
  Produced water and water flowback. Monitoring.
  Technologies of water treatment. Selection and monitoring.
- **SOCIO-ECONOMIC IMPACT & SUSTAINABLE DEVELOPMENT**
  Lessons learned.
- **THE INTERNATIONAL ENERGY AGENCY APPROACH (the golden rules)**
  Proactive measures.
- **CASE STUDIES (South Africa, Denmark, USA...)**

**Ways & Means**

- Highly interactive training by an industry-specialist lecturer involved in several shale gas projects.
- Numerous case studies, applications and illustrations and teamwork sessions.
- Key Internet references and videos (case studies).

**Learning Assessment**

Assessment by test at the end of the course.

**Prerequisites**

No prerequisites for this course.

**Why an IFP Training Certification?**

- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Unconventional Resources: Environmental Management.
- Ready-to-use skills.

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Reference: SUST/SHALEENVGB  Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: SUST/SHALEENVFR. Please contact us for more information.

www.ifptraining.com
Offshore Field Architecture

Deepwater Drilling & Development Certification ................................................................. p. 391
HPHT Drilling Design & Operations ..................................................................................... p. 392
Offshore Field Development - Pipelines & Flow Assurance .................................................. p. 393
Offshore Field Development Engineering Certification ...................................................... p. 394

Subsea

Gathering Network: Design Engineering ................................................................................ p. 395
Pipeline Hydraulics & Multiphase Flow ................................................................................ p. 396
Subsea Activities ................................................................................................................ p. 397
Subsea Production Systems (SPS) ....................................................................................... p. 398
Subsea Pipelines ................................................................................................................ p. 399
Subsea Integrity Management (I) - Inspection, Monitoring & Testing ........................................ p. 400
Subsea Integrity Management (II) - Non Conformity Management .......................................... p. 401
Advanced Certificate
Deepwater Drilling & Development Certification

Level: PROFICIENCY

Purpose
This course provides an in-depth, practical understanding of offshore drilling techniques, operations, equipment and procedures.

Audience
Young engineers and supervisors, tool pushers with some experience in drilling.

Learning Objectives
Upon completion of the course, participants will:
- know about different offshore rigs,
- know about equipment specific to offshore drilling operations,
- understand the process of a subsea development.

Ways & Means
- Videos, animations.
- Exercises.
- Application to a real case (project) for the participants in the “Drilling and Completion Engineering” training course (page 154).

Learning Assessment
Exercises, quiz, written exam.

Prerequisites
Engineering degree or equivalent experience within the petroleum industry.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Deepwater Drilling & Development.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

OFFSHORE SPECIFICITIES
3 d
Offshore rig description: jack up, anchored and dynamic positioning floating platforms.
Limits of use of the rigs.
Specific equipment for floating platforms.
Mud line suspension.
Subsea well head and equipment.
BOP, BOP closing unit, risers, positioning.
Subsea Xmas tree and equipment:
  - General overview.
  - Different types: vertical, horizontal.
  - Comparison.
  - Running procedures.
  - Examples.

SUBSEA FIELD DEVELOPMENT
1.5 d
Chronology of operations with the different types of rigs.
Typical subsea development schematic:
- Tie back.
- Deepwater stand-alone development.
- Subsea field layout.
- Production control system.
Well architecture for deep-water well:
- Typical drilling.
- Casing programs.

KNOWLEDGE ASSESSMENT
0.5 d

Reference: DRIL/OFDWE
Can be organized as an In-House course.
Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees
Pau 20 May 24 May €3,580

This course is also available in French: DRIL/OFDFMF. Please contact us for more information.
HPHT Drilling Design & Operations

Course Content

| Level: ADVANCED |
| Purpose |
This course aims to provide a comprehensive knowledge on how to design and execute an HPHT well in an exploration or development context.

| Audience |
Drilling engineers, drilling supervisors, drilling superintendents.

| Learning Objectives |
Upon completion of the course, participants will be able to:
▸ understand the design concepts related to an HPHT well,
▸ learn about required operational preparedness aspects of HPHT drilling operations,
▸ assimilate the key aspects for executing successful operations in HPHT drilling.

| Ways & Means |
▸ Presentations.
▸ Exercises.
▸ Application to real cases.

| Learning Assessment |
Exercises, quiz, written exam.

| Prerequisites |
Familiarity with conventional drilling and completion operations and 3+ years seniority.

| expertise & Coordination |
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

| GENERALITIES | 0.5 d |
Applications, terms and definitions.
PPFG aspects of HPHT reservoirs (effect of depletion, geomechanics).
Well architecture specificities of HPHT wells.

| BASIC DESIGN ENGINEERING | 1 d |
Casing design specific to HPHT (thermal simulations/introduction to limit-state and reliability based design/survival loads).
OCTG choice (material grade, SSC, qualification).
OCTG connector choice (test and qualification).
Well equipment (liner, wellheads, casing hangers…).
Annulus management systems (N2 cushion, burst discs, crushable foams…).
Subsea HPHT specificities (wellhead fatigue, X-Mas tree choice, APB).

| ADVANCED HPHT WELL ENGINEERING | 1.5 d |
Casing wear (modeling, measurement, remedial).
Wellhead growth (modeling and impacts, heat island effect).
Fluids & cement aspects of HT environments.
Kick tolerance modeling (dispersed modeling w/drip bench or equivalent, limitations of single bubble in HPHT).
Hydraulic modeling in HPHT operations.
Logging (current HT limitations on MWD tooling).
Introduction to MPD.
In-field drilling (depletion and stress caging…).

| OPERATIONAL PREPARATION | 0.75 d |
Rig inspection program for HPHT operations.
Equipment specific to HPHT (mud coolers, kick assembly, early-kick-detection…).
Hydrates (formation mechanisms, prevention).
HPHT checklists.
HPHT procedures (pit management and discipline, breaking circulation, connections, flow checks, tripping procedures, pump out of hole).
HPHT coring and wireline logging.

| OPERATIONAL EXECUTION | 1.25 d |
ECD management.
Wellbore breathing (breathing vs. kick, loss-gain scenarios, supercharging mechanisms, fracture…).
Well control aspects.
(E)LOT/FIT in HPHT.
Mud weight management.
Fingerprinting (dummy) connections, swab & surge, compressibility test, drain back/flow volume…).
Case studies (HPHT train wrecks, database analysis of exploration and development wells).

Reference: DRIL/HPHTE   Only available as an In-House course. Contact: fp.pau@ifptraining.com
Offshore Field Development - Pipelines & Flow Assurance

**Course Content**

<table>
<thead>
<tr>
<th>5 days</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OVERVIEW OF OFFSHORE DEVELOPMENTS</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td><strong>FIXED &amp; FLOATING PRODUCTION STRUCTURES</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Offshore production structures: jacket, semi-submersible, SPAR, TLP, FPSO…</td>
<td>Selection criteria. Limitations.</td>
</tr>
<tr>
<td>Terminology: shallow water, deep offshore, ultra-deep offshore.</td>
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</tr>
<tr>
<td><strong>CONSTRUCTION &amp; INSTALLATION OF PLATFORMS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Platform technology. Platform installation techniques.</td>
<td></td>
</tr>
<tr>
<td>Examples of shallow water developments.</td>
<td></td>
</tr>
<tr>
<td><strong>DEEP OFFSHORE DEVELOPMENTS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Typical subsea architecture: subsea wellheads, well jumpers, production manifolds, production lines, production risers, preservation lines, umbilicals.</td>
<td></td>
</tr>
<tr>
<td>Role and technology of each piece of equipment.</td>
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</tr>
<tr>
<td>Examples of deep offshore developments.</td>
<td></td>
</tr>
<tr>
<td><strong>FPSO/FSO TECHNOLOGY</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Technology of floating (production), storage and offloading vessels.</td>
<td></td>
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<tr>
<td>Ballast tanks. Atmosphere control.</td>
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</tr>
<tr>
<td>Oil, methanol… Storage tanks. Blanketing system.</td>
<td></td>
</tr>
<tr>
<td>Storage tanks start-up procedures. Incidents.</td>
<td></td>
</tr>
<tr>
<td>Technology and operation of FSO/FPSO offloading (tanker loading) buoy.</td>
<td></td>
</tr>
<tr>
<td><strong>OPERATION OF TERMINALS</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Technology of tankers and loading/offloading equipment.</td>
<td></td>
</tr>
<tr>
<td>Marine operations of reception and exports.</td>
<td></td>
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<tr>
<td>Terminal constraints: storage capacity, scheduling.</td>
<td></td>
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<tr>
<td><strong>NEW DEEP WATER TECHNOLOGIES</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Overview of new deep water technologies that are in R&amp;D or pilot stages.</td>
<td></td>
</tr>
<tr>
<td><strong>FLOW ASSURANCE 1/2: PREVENTION OF DEPOSITS IN FLOWLINES</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Main flow assurance problems: hydrates, paraffins, sulfates, sand, salt, naphtenates…</td>
<td></td>
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<tr>
<td>Main technical solutions and preservation operations. Intervention techniques.</td>
<td></td>
</tr>
<tr>
<td><strong>FLOW ASSURANCE 2/2: MONITORING OF MULTI-PHASE FLOW THROUGH FLOWLINES</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Multi-phase flow patterns. Application to Oil &amp; Gas upstream activities.</td>
<td></td>
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<tr>
<td>Gas dominated systems: dry versus wet scheme, flowline and slug catcher design.</td>
<td></td>
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<tr>
<td>Oil dominated systems: hydrodynamic slug flow, examples.</td>
<td></td>
</tr>
<tr>
<td><strong>PIPELINES: TECHNOLOGY, LAYING &amp; OPERATION</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Technology of pipelines: standards, material grades, insulation techniques.</td>
<td></td>
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<tr>
<td>Pipeline laying techniques (offshore and shore approach). Illustrations.</td>
<td></td>
</tr>
<tr>
<td>Pipeline operation and maintenance:</td>
<td></td>
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<tr>
<td>Main flow assurance problems. Main available technical solutions.</td>
<td></td>
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<tr>
<td>Pipe corrosion monitoring and prevention. Cathodic protection.</td>
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<tr>
<td>Pipeline maintenance/maintenance management.</td>
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</tbody>
</table>

**Reference:** ODEV/0FFSHGB  Can be organized as an In-House course.  Contact: exp.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil</td>
<td>21 October</td>
<td>25 October</td>
<td>€3,570</td>
</tr>
</tbody>
</table>

This course is also available in French: ODEV/0FFSHFR. Please contact us for more information.

www.ifptraining.com
Graduate Certificate

Offshore Field Development Engineering Certification

Level: FOUNDATION

Purpose

This program aims to provide a comprehensive knowledge of offshore field development best practices in order for them to efficiently contribute to offshore field development studies and/or projects.

Audience

Production engineers, field engineers, project engineers… seeking to acquire practical knowledge of offshore field development projects, spanning from field development operations, to facilities engineering, through to HSE, economics and project management considerations.

This certification program is well suited for Junior Engineers and Engineers in conversion. It can also be tailored to experienced Engineers.

Learning Objectives

Upon completion of the course, participants will be able to:

- adopt industry best practices for offshore drilling and well control,
- propose most adapted field architecture scenario,
- contribute to subsea production systems and pipelines design, taking into account flow assurance issues,
- assess hazards specific to offshore developments and participate in safety engineering and environmental impact assessment studies,
- efficiently contribute to offshore field development studies taking into account economics, project management and offshore installation aspects.

Ways & Means

- Highly interactive course delivered by experts of the E&P industry.
- Numerous examples and feedbacks from the industry.
- Multiple teamwork sessions on industrial case studies.
- Final group project on a real offshore field development case study.

Learning Assessment

- Continuous assessments all-along the program.
- Final assessment including a presentation in front of a jury.

Prerequisites

No prerequisites for this course.

Why an IFP Training Certification?

- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Offshore Field Development Engineering.
- Ready-to-use skills.

Expertise & Coordination

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competences are kept up-to-date.

Course Content

<table>
<thead>
<tr>
<th>Subject</th>
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<tbody>
<tr>
<td><strong>FUNDAMENTALS OF GEOSCIENCES &amp; RESERVOIR ENGINEERING</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>OFFSHORE DRILLING</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Offshore rig descriptions. Limits of use of the rigs. Specific equipment for various rigs (jack-up, semi-submersible, drillship): Mud line suspensions. Riser tensioner, passive and active heave compensator. BOP, BOP closing unit, risers, positioning. Typical drilling program for each type of rig (fixed and floating).</td>
<td></td>
</tr>
<tr>
<td><strong>WELL CONTROL</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>OFFSHORE FIELD ARCHITECTURE &amp; PRODUCTION STRUCTURE</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Constraints specific to offshore production. Offshore production structures: jacket, semi-submersible, SPAR, TLP, FPSO. Technology, selection criteria, limitations; focus on FPSO technology. Offshore field architecture (study of various options, feedback from industry, selection criteria): surface/subsea wells, natural gas field developments, crude oil field developments.</td>
<td></td>
</tr>
<tr>
<td><strong>SUBSEA WELL ARCHITECTURE, COMPLETION &amp; ACTIVATION</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Casing program design, implementation and procedures. Well productivity of horizontal and multilaterals wells. Well completion design, and well completion equipment. New completion trends: Intelligent completion.</td>
<td></td>
</tr>
<tr>
<td><strong>OFFSHORE PIPELINES &amp; FLOW ASSURANCE ISSUES</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Pipelines technology: design of subsea pipelines and risers, flexible pipelines design; offshore pipeline construction, shore approach construction, subsea tie-in; pipeline operation and integrity. Study of flow assurance issues using PIPESIM™ software: fundamentals of fluid mechanics, multiphase flow, flow assurance issues (flow stability, erosion, deposits, hydrates, heat transfer issues); study of wet gas streams. Study of crude oil streams.</td>
<td></td>
</tr>
<tr>
<td><strong>SUBSEA PRODUCTION SYSTEM (SPS)</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>SAFETY ENGINEERING APPLIED TO OFFSHORE DEVELOPMENTS</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>ENVIRONMENTAL IMPACT MANAGEMENT OF OFFSHORE DEVELOPMENT PROJECTS</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>PETROLEUM ECONOMICS - PROJECT MANAGEMENT &amp; OFFSHORE INSTALLATION</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Project profitability evaluation - Risk analysis of Exploration &amp; Production projects. Project management: project cost estimation and control contract, management offshore installation: preparation, installation operations, construction vessels, works management.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: ODEV/OFFSHDEVGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: ODEV/OFFSHDEVFR. Please contact us for more information.

394
Gathering Network: Design Engineering

**Conceptual Design - Architecture - Tie-In**

**Level: FOUNDATION**

**Purpose**

This module aims to provide a practical understanding of gathering network conceptual design and tie-in assessment.

**Audience**

Engineers looking to acquire best practices of Oil & Gas gathering network design and simulation using PIPESIM™.

**Learning Objectives**

Upon completion of the course, participants will be able to:

- explain operational constraints of single and multi-phase flow lines,
- describe multiphase flow patterns and main disturbing factors,
- assess the implications of different gathering network architectures,
- study actual network configurations and the impact of adding tie-ins using the software PIPESIM™,
- explain the different phases of the construction of a gathering network.

**Ways & Means**

- Highly interactive training with industry specialist lecturers.
- Methodology illustrated by multiple industrial case studies.
- Numerous design simulation using PIPESIM™.

**Learning Assessment**

Assessment by test at the end of the course.

**Prerequisites**

Understanding of well effluent behavior/thermodynamics, of well performance and activation methods, and of surface production facilities.

**Expertise & Coordination**

IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

### Course Content

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<tr>
<td><strong>FUNDAMENTALS OF FLUID MECHANICS</strong></td>
<td>0.5 d</td>
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<tr>
<td>Total energy of a fluid; Bernoulli law.</td>
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<tr>
<td>Real fluid flow: viscosity, friction coefficient.</td>
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<tr>
<td>Flow regimes: laminar and turbulent flows.</td>
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<tr>
<td>Application: evaluation of pressure drop in a pumping station.</td>
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<tr>
<td><strong>MULTIPHASE FLOW</strong></td>
<td>0.5 d</td>
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<tr>
<td>Definition of multi-phase flow, main terminology.</td>
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<tr>
<td>Flow patterns, main considerations.</td>
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<tr>
<td>Basic understanding of different modeling approaches.</td>
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<tr>
<td><strong>GATHERING SYSTEMS DESIGN &amp; ARCHITECTURE SELECTION</strong></td>
<td>0.5 d</td>
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<tr>
<td>Types of gathering systems, a review of common architectures.</td>
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<tr>
<td>Backpressure &amp; well productivity.</td>
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<tr>
<td>Design practices and guidelines.</td>
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<tr>
<td>Main considerations: pressure drop, erosion velocities.</td>
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<tr>
<td>Design of pipelines, sizing criteria and sizing methodology.</td>
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<tr>
<td>Application: sizing of an oil/gas condensate production line.</td>
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<tr>
<td><strong>OIL/GAS GATHERING NETWORK PROJECTS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Project planning; route selection; jurisdiction, permitting and rights of way.</td>
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<tr>
<td>Surface considerations; alignment; surveying and mapping.</td>
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<tr>
<td>Construction; inspection and testing.</td>
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<tr>
<td>Operation and maintenance.</td>
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<tr>
<td><strong>GATHERING NETWORK DESIGN &amp; OPTIMIZATION USING PIPESIM™</strong></td>
<td>2 d</td>
</tr>
<tr>
<td>Introduction to PIPESIM™ software: building models, main considerations and recommendations.</td>
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<tr>
<td>PIPESIM™ will be used to study both gas production networks and crude oil production networks.</td>
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<tr>
<td>For each type of system, the production network will be analyzed in detail:</td>
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<tr>
<td>Well performance vs. back-pressure.</td>
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<tr>
<td>Multiphase flow modeling (flow regimes, liquid holdup, slug characteristics and pressure loss analysis) across the production network.</td>
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<tr>
<td>Comparison of different gathering network configurations.</td>
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<tr>
<td>Determination of optimal locations for pumps and compressors.</td>
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<tr>
<td>Identification of locations most prone to flow assurance issues (erosion, corrosion, hydrate formation, deposits).</td>
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<tr>
<td>Analysis of heat transfer across the production network and associated flow assurance issues.</td>
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<tr>
<td>Identification of bottlenecks and optimization opportunities.</td>
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<tr>
<td><strong>TIE-IN ASSESSMENT USING PIPESIM™</strong></td>
<td>1 d</td>
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<tr>
<td>Tie-ins and their impact on existing networks.</td>
<td></td>
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<tr>
<td>Implementation strategies, design and operation considerations.</td>
<td></td>
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<tr>
<td>Introduction to gathering network simulation using PIPESIM™.</td>
<td></td>
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<tr>
<td>Tie-ins case studies using PIPESIM™.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: SPRO/NETWORKGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: SPRO/NETWORKFR. Please contact us for more information.

www.ifptraining.com
Pipeline Hydraulics & Multiphase Flow
Simulation using OLGA™ & Multiflash™

Level: PROFICIENCY

Purpose
This course provides a practical understanding of pipeline hydraulics, flow simulation and pipe friction loss calculations.

Audience
Engineers involved in designing, constructing or operating Oil & Gas production facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
- assess friction losses in a pipeline and fittings for a single-phase flow,
- understand multiphase flow patterns and main perturbing factors,
- grasp multiphase flow hydrodynamics for wet gas streams and crude oil streams,
- understand operational constraints of single and multiphase flow lines,
- deal with pipeline flow assurance issues, simulate a pipeline using the software program OLGA™.

Ways & Means
- Highly interactive training by industry-specialist lecturers.
- Several applications and illustrations.
- Use of simulation software programs OLGA™ and Multiflash™.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
At ease with process simulation.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

FUNDAMENTALS OF FLUID MECHANICS FRICTION LOSSES IN SINGLE-PHASE FLOW
1.5 d
Total energy of a fluid. Bernoulli law.
Real fluid flow: viscosity, friction coefficient.
Flow regimes: laminar and turbulent (eddy) flows. Reynolds number.
Calculation of friction loss through pipes: Moody chart, AFTP charts (Lefevre).
Calculation of friction loss through fittings:
  Method 1: resistance coefficient.
  Method 2: equivalent straight pipe length.
Case of compressible fluids (gas) - Main empirical equations.
Several exercises.

MULTIPHASE FLOW IN OIL & GAS PRODUCTION
0.5 d
Incentives and stakes.
Definition of multiphase flow.
Main terminology.
Basic understanding of different modeling approaches.
Historical methods to study steady-state two-phase flow.
Example of multiphase dynamic flow simulator OLGA™.
Future with multiphase flow modeling.

FLOW ASSURANCE
1 d
Main flow assurance issues.
Flow stability: flow pattern (horizontal and vertical); slugging.
Erosion constraints, wax, hydrates.
Heat transfer: main heat transfer phenomenon, OHTC, cold spot issue.
Fluid modeling (example with Multiflash™).
Phase envelope, hydrate dissociation curve, emulsion, viscosity.

WELL GAS STREAMS
1 d
Natural gas field development:
  “Dry” scheme versus “Wet” scheme.
  “Wet” scheme simulations.
Operating envelope.
Geometry impacts.
Example of slug-catcher design.

CRUDE OIL STREAMS
1 d
Crude oil field development:
  Deep water constraints.
  Typical field preservation.
  Classical loops versus alternative development architectures.
  Subsea processing.
Crude oil stream:
  Severe slugging.
  Hydrodynamic slug flow. Slug-catcher design.
  Thermal constraints during production/transient (cool down).

Reference: SPRO/HYDRGB
Only available as an In-House course.
Contact: exp.rueil@ifptraining.com
This course is also available in French: SPRO/HYDRFR. Please contact us for more information.
# Subsea Activities

**Application to Oil & Gas Upstream Projects**

**Level:** PROFIENCY

## Purpose
This course provides technical knowledge on Oil & Gas subsea production systems.

## Audience
Engineers and technicians whose activity is related to the design, construction and/or operation of Oil & Gas subsea production systems.

## Learning Objectives
Upon completion of the course, participants will be able to:
- select the technology with the right criteria for the different equipment used for subsea production systems,
- select through typical subsea architecture and in particular in deep offshore,
- check installation techniques (with ROV, etc.),
- manage main problems of flow assurance and prevention techniques.

## Ways & Means
- Lectures carry numerous examples from ongoing upstream projects.
- Each step of the course is illustrated by numerous examples taken from actual Oil & Gas construction activities.

## Learning Assessment
Assessment by test at the end of the course.

## Prerequisites
No prerequisites for this course.

## More info
The modules are independent and may be done separately. Please refer to the training description for more details. This training may be validated once both modules have been completed.

## Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

### Module 1: SUBSEA PRODUCTION SYSTEMS (page 398)
- Subsea components and field architecture.
- Subsea construction and intervention.
- Inspection, maintenance and repair.
- Operation from production platforms.

### Module 2: SUBSEA PIPELINES (page 399)
- Pipeline operation: main constraints.
- Design of rigid pipelines and risers.
- Flexible pipelines design.
- Offshore pipeline construction.
- Shore approach construction.
- Trenching and protection.
- Subsea tie-in methods.
- Precommissioning and pigging.
- Pipeline integrity.
- Workshop.

**Reference:** SUB/0FGB

Contact: exp.rueil@ifptraining.com

**Reference only available as an In-House course.**
Subsea Production Systems (SPS)

Level: PROFICIENCY

Purpose
This course provides an in-depth technical knowledge of Oil & Gas subsea production systems.

Audience
Engineers and technicians involved in the design, construction or operation of Oil & Gas subsea production systems.

Learning Objectives
Upon completion of the course, participants will be able to:
- select the technology with the right criteria for the different equipment used for subsea production systems,
- select through typical subsea architecture and in particular in deep offshore,
- check installation techniques (with ROV, etc.),
- deal with the main problems of flow assurance and prevention techniques.

Ways & Means
- Numerous examples from ongoing projects.
- Trainers are specialized engineers, presently involved in deep-offshore projects.

Learning Assessment
Assessment by test at the end of the course.

Prerequisites
No prerequisites for this course.

More info
This module is part of the course “Subsea Activities” (page 397). Training “Subsea Activities” may be validated once both modules have been completed.

Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

SUBSEA COMPONENTS & FIELD ARCHITECTURE
Typical field architectures: loop, single line, hybrid loop, separation…
Surface production and storage technologies: FPSO, TLP…
Subsea production systems: XT, jumper, manifold, production lines, risers, umbilicals.
Umbilical networks: electrical, hydraulic, chemicals…
Flowlines, risers and export systems.
Examples of offshore developments.
Materials (steel, corrosion resistant alloys, anti-corrosion coatings, thermal insulation…).
Pipline installation.
New technologies under development (subsea separation, subsea processing, subsea pumping, subsea compression, heating, surface support…).

SUBSEA CONSTRUCTION & INTERVENTION
Construction and multi-purpose support vessels.
Surface and subsea positioning.
ROV/diving operations.
Description of main subsea interventions methods.

INSPECTION, MAINTENANCE & REPAIR
Anomalies: physical/structural integrity issues; functional non-conformities integrity issues.
External and internal inspection, monitoring.
Maintenance: subsea interventions; operational pigging.
Clamps and spool repairs.
Constraints specific to deep water offshore production.
Environmental constraints (temperature, sea, seabed, access…).
Flow assurance issues: pressure, temperature, hydrates.

OPERATION FROM PRODUCTION PLATFORMS
General description (subsea control devices, valve actuation process…).
Description of typical operations.
Description of specific operations.

Reference: SUB/SPSGlobal
Can be organized as an In-House course.

<table>
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<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
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<td>Rueil</td>
<td>16 September</td>
<td>20 September</td>
<td>€3,400</td>
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This course is also available in French: SUB/SPSFRA. Please contact us for more information.
# Subsea Pipelines

**Level:** PROFICIENCY

## Purpose
This course provides an in-depth technical knowledge of Oil & Gas subsea pipelines.

## Audience
Engineers and technicians involved in the design, construction or operation of Oil & Gas subsea pipelines and risers.

## Learning Objectives
Upon completion of the course, participants will be able to:
- understand the fundamental concepts for designing subsea pipelines,
- comprehend the construction methods and laying techniques, including subsea tie-in and shore approach,
- manage pipeline integrity, inspection and repairs.

## Ways & Means
- Lectures carry numerous examples from ongoing projects.
- Trainers are specialized engineers, currently involved in deep-offshore projects.

## Learning Assessment
Assessment by test at the end of the course.

## Prerequisites
No prerequisites for this course.

## More info
This module is part of the course “Subsea Activities” (page 397). Training “Subsea Activities” may be validated once both modules have been completed.

## Expertise & Coordination
IFP Training trainer (permanent or contracted) having a good expertise and/ or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

## Course Content

### PIPELINE OPERATION: INTRODUCTION & MAIN CONSTRAINTS
0.5 d
Definitions. Architecture of Oil & Gas production facilities.
Pipeline concepts.
Riser concepts.
Fabrication of carbon steel line pipe.
Constraints associated to subsea environment.
Flow regimes and instabilities.
Maintaining the flow in pipelines: management of deposits.
Preservation during shutdown, restart.
Production monitoring and control from surface.
Impact of operational constraints on architecture and design.

### DESIGN OF RIGID PIPELINES & RISERS
0.5 d
Overview of pipeline design phases.
Survey techniques and route selection.
Thermal performance design.
Mechanical design.
Internal & external corrosion.
Materials.
Stability.
Spans.
Expansion and buckling.
Risers design specificities.
Limit state design.

### FLEXIBLE PIPELINES DESIGN
0.25 d
Specificities of flexible pipeline design.

### OFFSHORE PIPELINE CONSTRUCTION
0.5 d
Pipe lay methods (S, J, reel, tow).
Initiation/abandonment, installation of in-line structures.
Pipe lay vessels & equipment.
Welding and NDT.
Comparison of installation methods.

### SHORE APPROACH CONSTRUCTION
0.25 d
Shore approach construction and horizontal drilling.

### TRENCHING & PROTECTION
0.25 d
Requirements for pipeline protection.
Soil classification.
Overview of protection methods.

### SUBSEA TIE-IN METHODS
0.25 d
Conventional tie-ins including hyperbaric welding.
Deep water tie-ins.
Thermal insulation of tie-ins.

### PRECOMMISSIONING & PIGGING
0.25 d
Introduction to pipeline pigging.
Pipeline precommissioning.
Operational pigging.
Intelligent pigging.

### PIPELINE INTEGRITY
0.75 d
Pipeline failures.
Management of integrity.
Inspection and maintenance.

### WORKSHOP
0.5 d
Worked example covering the main topics of the training.

---

Reference: SUB/PIPEGB Can be organized as an In-House course.
Contact: pl.rueil@ifptraining.com

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<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
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<td>Rueil</td>
<td>23 September</td>
<td>26 September</td>
<td>€2,670</td>
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This course is also available in French: SUB/PIPEFR. Please contact us for more information.
Subsea Integrity Management (I) - Inspection, Monitoring & Testing

**Level:** PROFICIENCY

**Purpose**
This course provides technical knowledge pertaining to the integrity management of subsea systems.

**Audience**
Engineers and technicians whose activity is related to the operation of Oil & Gas subsea facilities.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- fix objectives for inspection campaigns,
- write specifications for the inspection of installation (with ROV, etc.).

**Ways & Means**
- Lectures carry numerous examples from ongoing projects.
- Trainers are specialized engineers currently involved in deep offshore projects.

**Learning Assessment**
Written test upon training course completion.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

---

**Course Content**

5 days

**INSPECTIONS & THEIR OBJECTIVES**
By contractor (with operator follow-up).
By operator.

**DEEP WATER SYSTEMS INSPECTION ACTIVITIES**
“Standard” types.
Means, constraints, limitations.
Visual indications specific to deep subsea conditions.
Main challenges.

**INSPECTION PLAN/INTERVALS**
Regulatory requirements, RBI approach…
Inspection plan.
Inspection zones, inspection mean times.
Inspection plan revision.

**GENERIC SUPPORT DOCUMENTS**

**SPECIFIC SUPPORT DOCUMENTS**

**INSPECTION MANAGEMENT DATABASE**
Objectives and functionalities.
Contents and structure.
Inputs and outputs.

**KEYS FOR THE SUCCESSFUL IMPLEMENTATION OF AN INSPECTION DATABASE**
Usability.
Portability.

**“INITIAL STATUS” REFERENCES**
Technical specifications, manufacturing dossiers.
Inspections reports.
Installation/commissioning reports.

**SPECIFIC INSPECTIONS**
Flowlines intelligent pigging.
Occurrence/anomaly follow-up.

**MONITORING**
Adequate response to commands.
Adequate operating parameters.
Sand production monitoring.
Sand erosion monitoring.
Flexible risers/IPBs.
Riser towers/risers.

**TESTING**
Valves testing.
“Safety valves” testing.
Others.
Control fluid consumption.
Downhole chemical injection flow test.

Reference: INSP/SUBINT1  
Only available as an In-House course.

Contact: exp.pau@ifptraining.com
Subsea Integrity Management (II) - Non Conformity Management

**Level:** PROFICIENCY

**Purpose**
This course provides technical knowledge pertaining to the integrity management of subsea systems.

**Audience**
Engineers and technicians whose activity is related to the operation of Oil & Gas subsea facilities.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- determine integrity characteristics,
- evaluate consequences of failures,
- plan repairs.

**Ways & Means**
- Lectures carry numerous examples from ongoing projects.
- Trainers are specialized engineers currently involved in deep offshore projects.

**Learning Assessment**
Written test upon training course completion.

**Prerequisites**
No prerequisites for this course.

**Expertise & Coordination**
IFP Training trainer (permanent or contracted) having a good expertise and/or experience of the related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

**Course Content**

**PHYSICAL & STRUCTURAL INTEGRITY ISSUES & THEIR MAIN CONSEQUENCES**
- Stress and fatigue.
- External corrosion, internal erosion/corrosion.
- Hydrogen induced stress cracking.
- External event.
- Thermal Insulation, heat loss.
- Case studies, prevention & remediation.

**“FUNCTIONAL” INTEGRITY ISSUES & THEIR MAIN CONSEQUENCES**
- Defective subsea retrievable modules.
- “Internal” leakages (passing valves, passing non-return valves...).
- Leaks to environment.
- Electrical lines/conductors defects.
- Monitoring sensors signal loss.
- Hydraulic locks.
- Chemical lines blockages.

**NON CONFORMITY MANAGEMENT**
- Objective.
- Non conformity.
- Non conformity “dossiers”.
- Non-conformity register/database.

**MAINTENANCE & REPAIR**
- Planned events.
- Unplanned events.

Reference: INSP/SUBINT2 Only available as an In-House course.
Contact: exp.pau@ifptraining.com

www.ifptraining.com
Keywords List

Critical: 246, 287
Critical micelle concentration (CMC): 132
Cross-plots technique: 99
Cross-plot technique: 81
Crude oil: 48
Crude stabilization: 266
Cutting: 86

Downstream: 43
Drill stem test: 177
Drill string: 161
Driller: 166
Drilling: 33, 34, 38, 154, 159
Drilling & completion: 126, 383
Drilling equipment: 126
Drilling fluid: 126
Drilling fluids: 172
Drilling fundamentals: 37, 152
Drilling parameter: 86
Drilling principle: 37, 152
Drilling program: 157
Drilling simulator: 151
Drilling time: 157
Drive mechanism: 128
DST: 177
Dual porosity: 387
Dual porosity dual permeability reservoirs: 133
Dynamic positioning floating: 168, 391
Dynamic reservoir simulation: 129, 138
Dynamic uncertainty: 140

E

E&P: 51
E&P job: 35
E&P management certification: 32, 70
E-learning: 118
E-learning with remote personal coaching: 80
EasyTrace™: 103, 115
eclipse™: 107
Economic: 368, 369
Economical criteria: 139, 141
Economical evaluation: 124, 143
Economics of an exploration project: 92
EEDI: 49
Effluent processing: 231
Electric motor: 113
Electricity: 38, 47, 280, 281
Electrical equipment: 285, 286
Electrical safety: 285
Electricity: 38, 47, 280, 281
Electro-magnetometry: 76
Electrofacies: 100, 113
Emergency response: 333, 347, 359, 360
Emergency situation: 333, 347, 359, 360
Emulsion: 268
Endoscopic: 279
Energy: 370
Energy management plan: 351
Environmental regulation: 352, 389
Environmental risk assessment: 349
Environmental, social & health impact assessment: 351
EOR monitoring: 130
EOR project planning: 130
EOR projects workflow: 128
Equation of state: 125
Equipment obsolescence: 234
Equity: 53, 56, 61
Ergonomics: 340
Ergonomics & human factors: 339
ESP: 185
Estimate OHIP: 89
Estimation of reserves: 90
Eustasy: 91
Evaluation of special rock properties: 122
Expected monetary value: 92, 146, 303
Expected profitability index: 92
Experimental design: 143
Expertise: 68
Exploration: 91, 383
Exploration asset: 89
Exploration geology: 75
Exploration method: 74
Exploration methodology: 90
Exploration risk: 92
Exploration risked rate of return: 92
Exploration strategies: 89
Exploration strategy: 92
Exploration-Production: 33
Export: 223
Expulsion: 380
Extensional context: 79
Exploration overview: 33

F

Facies analysis: 100, 113, 115
Facilities: 33, 34
Failure: 252, 292
Fall off testing: 135
Fault modeling: 109
Fault picking: 82
FCPA: 63
Fetkovich decline curves analysis: 137
Field: 38, 141
Field development: 90, 134, 142, 144, 233
Field development project: 90, 143, 145
Field development projects studies: 38
Field development workflow: 139
Field operations engineer: 144, 233
Field operator certification: 226
Field treatment: 270
Field trip: 158
Field/site trainers accreditation: 66
Financial: 50, 60
Financial markets: 47
Financial markets (futures): 43
Financing: 61
Fire & Gas (F&G) detection systems: 346
Fire protection: 333, 347
First contact miscibility: 131
Fiscal: 46, 51, 55
Fiscal framework: 92
Fiscal regime: 51
Fishing: 161
Flammability: 348
Flare management: 353, 374
Flare network: 276
Keywords List

Flaring: 353, 374
Flexible: 324, 399
Flow assurance: 238, 259, 293, 303, 306
Flow regime: 127
Fluid flow: 380
Fluid modeling: 125
Fluid properties: 138
Fluid sampling: 81
FMECA: 253, 293
Force major: 50, 52
Formation damage: 181
Forward: 43, 44, 48
Forwards: 47
FPSO: 223, 393
FracFlow™: 109
Fracs propagation: 384
Fractional flow theory: 131, 133
Gathering network: 214, 261, 371, 395
Gathering: 210, 259
Gas while drilling: 86
Gathering: 210, 259
Gathering network: 214, 261, 371, 395
Generation: 285, 286
Genetic sequence: 83
Geo-referenced data: 39
Geochemical technique: 78
Geodynamic: 74
Geological: 55
Geological characterization: 115
Geological modeling: 103
Geological risk: 90, 92
Geological risk analysis: 74
Geological uncertainty: 140
Geology: 120, 158
Geomechanic: 123, 166
Geometric tolerances: 249, 289
Geometry: 84
Geomodeling workflow: 120
Geosciences: 33, 87
Geoscientist: 123
Geostatistical simulation: 102, 112
Fundamentals of reservoir geology: 120
Fundamentals of engineering: 345
Future: 47
Futures markets: 48
Futures trading: 48

G

Game: 46
GAP™: 212
Gas: 261, 264, 279, 370, 371
Gas chain: 44
Gas contract: 44
Gas cycling: 220, 367
Gas flaring: 353, 374
Gas hydrate: 381
Gas lift: 184, 236
Gas market: 44
Gas price formula: 44
Gas processing: 225, 238, 267, 373
Gas production: 371
Gas recovery: 353, 374
Gas shale formation evaluation: 382
Gas show: 86
Gas shut-off: 180, 202
Gas sweetening: 272, 372
Gas transport: 369
Gas turbine: 262, 279, 377
Gas valorization: 353, 374
Gas well deliverability: 135
Gas Wells deliverability: 135
Gas valorization: 353, 374
Gas turbine: 262, 379
Gas: 261, 264, 279, 370, 371
GAP™: 212
Gas: 261, 264, 279, 370, 371
Gathering network: 214, 261, 371, 395
Generation: 285, 286
Genetic sequence: 83
Geo-referenced data: 39
Geochemical technique: 78

<table>
<thead>
<tr>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerogen type: 85</td>
</tr>
<tr>
<td>Kick: 195, 196, 197, 329, 330, 331</td>
</tr>
<tr>
<td>Kinetic parameter: 85</td>
</tr>
<tr>
<td>Kriging: 102, 112</td>
</tr>
<tr>
<td>Laboratory: 122</td>
</tr>
<tr>
<td>Laboratory analyses: 240, 375</td>
</tr>
<tr>
<td>Land transportation: 362</td>
</tr>
<tr>
<td>Law: 51</td>
</tr>
<tr>
<td>Laycan: 49</td>
</tr>
<tr>
<td>Layers of protection: 345</td>
</tr>
<tr>
<td>Laytime: 49</td>
</tr>
<tr>
<td>LCC: 253, 293</td>
</tr>
<tr>
<td>Legal: 52, 54</td>
</tr>
<tr>
<td>Legal aspect: 49</td>
</tr>
<tr>
<td>Leverage: 53</td>
</tr>
<tr>
<td>Liberalization: 44</td>
</tr>
<tr>
<td>Liquefaction: 45, 376</td>
</tr>
<tr>
<td>Lithology: 81</td>
</tr>
<tr>
<td>Lithofacies: 110</td>
</tr>
<tr>
<td>Litho-facies analysis: 96</td>
</tr>
<tr>
<td>Log quality control: 80</td>
</tr>
<tr>
<td>Log interpretation: 97, 98, 106, 120, 163</td>
</tr>
<tr>
<td>Log interpretation in clean formation: 80</td>
</tr>
<tr>
<td>Log quality control: 80</td>
</tr>
<tr>
<td>Logging: 163</td>
</tr>
<tr>
<td>Logging operation: 86</td>
</tr>
<tr>
<td>Logging tool principle: 80</td>
</tr>
<tr>
<td>Logging while drilling: 163</td>
</tr>
<tr>
<td>Logistic: 309, 362</td>
</tr>
<tr>
<td>Long term: 48</td>
</tr>
<tr>
<td>Long-term: 46</td>
</tr>
<tr>
<td>Long-term contract: 44</td>
</tr>
<tr>
<td>Low matrix permeability: 380</td>
</tr>
<tr>
<td>Low NOx: 279</td>
</tr>
<tr>
<td>Lowstand: 91</td>
</tr>
<tr>
<td>LPG shipping market: 49</td>
</tr>
<tr>
<td>Lubricating: 199</td>
</tr>
<tr>
<td>Lubricating: 199</td>
</tr>
<tr>
<td>LWD: 81</td>
</tr>
<tr>
<td>Machine: 252, 278, 292</td>
</tr>
<tr>
<td>Machine learning: 253, 293</td>
</tr>
<tr>
<td>Machinery: 252, 277, 292</td>
</tr>
<tr>
<td>Maintenance &amp; inspection of static equipment: 297</td>
</tr>
<tr>
<td>Maintenance certification: 253, 255, 293, 295</td>
</tr>
<tr>
<td>Management of change: 151, 342</td>
</tr>
<tr>
<td>Mapping: 82</td>
</tr>
<tr>
<td>Marine lubricants market: 49</td>
</tr>
<tr>
<td>Marine transportation: 362</td>
</tr>
<tr>
<td>Maritime transportation &quot;contract&quot;: 49</td>
</tr>
<tr>
<td>Market risk: 47</td>
</tr>
<tr>
<td>MARPOL: 49</td>
</tr>
<tr>
<td>Material balance: 128, 245</td>
</tr>
<tr>
<td>Maturation: 85</td>
</tr>
<tr>
<td>Mature field: 141, 217, 234</td>
</tr>
<tr>
<td>Maturity parameter: 78</td>
</tr>
<tr>
<td>Max: 50, 55</td>
</tr>
<tr>
<td>Maximum flooding surface: 91</td>
</tr>
<tr>
<td>MBAL™: 212</td>
</tr>
<tr>
<td>Mechanical: 249, 278, 289</td>
</tr>
<tr>
<td>Mechanical completion: 321</td>
</tr>
<tr>
<td>Mechanical maintenance: 249, 256, 289</td>
</tr>
<tr>
<td>Medical: 340</td>
</tr>
<tr>
<td>Medical fitness for work: 340</td>
</tr>
<tr>
<td>Mental health: 340</td>
</tr>
<tr>
<td>Metallurgy: 297</td>
</tr>
<tr>
<td>Metering: 38, 211, 223, 245</td>
</tr>
<tr>
<td>Method: 66</td>
</tr>
<tr>
<td>Methodology: 65, 145, 219, 226, 237</td>
</tr>
<tr>
<td>Midstream: 43</td>
</tr>
<tr>
<td>Migration: 85, 89, 380</td>
</tr>
<tr>
<td>Migration processes: 85</td>
</tr>
<tr>
<td>Min: 50, 55</td>
</tr>
<tr>
<td>Mineralogy: 110</td>
</tr>
<tr>
<td>Mini frac (DFIT): 135</td>
</tr>
<tr>
<td>Minimum Miscibility Pressure (MMP): 130, 131</td>
</tr>
<tr>
<td>Miscible gas EOR: 130, 131</td>
</tr>
<tr>
<td>Mixed refrigerant: 263, 378</td>
</tr>
<tr>
<td>Mobility ratio: 131, 132</td>
</tr>
<tr>
<td>Mode: 50, 55</td>
</tr>
<tr>
<td>Model: 50, 133</td>
</tr>
<tr>
<td>Modeling: 56, 115, 120, 384</td>
</tr>
<tr>
<td>Modeling workflow: 96, 115, 138</td>
</tr>
<tr>
<td>Modified isochronal test: 127</td>
</tr>
<tr>
<td>Monitoring: 235, 244, 298, 400</td>
</tr>
<tr>
<td>Monte Carlo: 47</td>
</tr>
<tr>
<td>Mud: 172</td>
</tr>
<tr>
<td>Mud cap: 167</td>
</tr>
<tr>
<td>Mud logging: 163</td>
</tr>
<tr>
<td>Multi-mineral model: 99</td>
</tr>
<tr>
<td>Multidisciplinary or asset teams: 75</td>
</tr>
<tr>
<td>Multidisciplinary team: 142</td>
</tr>
<tr>
<td>Multiphase: 215, 396</td>
</tr>
<tr>
<td>Multiphase metering: 211</td>
</tr>
</tbody>
</table>

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### Keywords List

<table>
<thead>
<tr>
<th>T</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-or-pay: 44</td>
<td>Uncertainties: 50, 89, 90, 104, 120, 124, 138, 140, 143</td>
</tr>
<tr>
<td>Tank: 223</td>
<td>Uncertainty: 56, 61</td>
</tr>
<tr>
<td>Tanker chartering market: 49</td>
<td>Unconventional: 33, 385, 386</td>
</tr>
<tr>
<td>Tar sand: 381</td>
<td>Unconventional developments productivity: 382</td>
</tr>
<tr>
<td>Tariff: 44</td>
<td>Unconventional hydrocarbon: 380, 381, 383</td>
</tr>
<tr>
<td>Taxation: 50, 56</td>
<td>Unconventional reservoirs: 111, 384</td>
</tr>
<tr>
<td>Team management: 260</td>
<td>Unconventional reservoirs modeling: 384</td>
</tr>
<tr>
<td>Technical service contracts: 70, 301, 311, 312</td>
<td>Unconventional setting: 381</td>
</tr>
<tr>
<td>Technical standard: 221, 274</td>
<td>Unconventional source-reservoir rock: 380</td>
</tr>
<tr>
<td></td>
<td>Undesired event investigation: 363</td>
</tr>
<tr>
<td>TEG: 267</td>
<td>Unitization: 58</td>
</tr>
<tr>
<td>TemisFlow™: 85</td>
<td>Up-layering: 107</td>
</tr>
<tr>
<td>Tendering: 57</td>
<td>Upgrader: 218</td>
</tr>
<tr>
<td>Terminal: 223</td>
<td>Upscaling: 107</td>
</tr>
<tr>
<td>Ternary diagram: 131</td>
<td>Upscaling method: 107</td>
</tr>
<tr>
<td>Test design methodology: 135</td>
<td>Upside opportunity: 141</td>
</tr>
<tr>
<td>Testing: 235, 297, 298, 400</td>
<td>Upstream: 43, 46</td>
</tr>
<tr>
<td>Thermal EOR: 130</td>
<td>Upstream petroleum: 75</td>
</tr>
<tr>
<td>Thermicity: 85</td>
<td>Upstream sector: 43</td>
</tr>
<tr>
<td>Thermodynamic: 125, 264</td>
<td>Vaca Muerta: 380</td>
</tr>
<tr>
<td>Thermodynamics applied: 265</td>
<td>Validate engineering: 260</td>
</tr>
<tr>
<td>Third-party access: 45</td>
<td>Valuation: 55</td>
</tr>
<tr>
<td>Thrust belt: 79</td>
<td>Value: 71, 93, 199</td>
</tr>
<tr>
<td>Tie-in: 214, 324, 395, 399</td>
<td>Value analysis: 310</td>
</tr>
<tr>
<td>Tight gas: 380, 381</td>
<td>Value at risk: 47</td>
</tr>
</tbody>
</table>
| Tight plays potential: 111 | Well |(
| Tight reservoir: 111 | 126 |
| Tight reservoir petrophysic: 110 | Water |(
| Tight sand: 380 | injection: 128, 193, 205, 206, 213, 225, 397 |
| Time slice: 82 | Water management: 352, 389 |
| Time superposition: 127 | Water processing: 266, 268 |
| Time-to-depth conversion: 82 | Water shut-off: 181 |
| TMSA: 49 | Water treatment: 225 |
| TOC: 380, 110 | Wave propagation: 77 |
| TOC estimation: 111 | Welding: 297 |
| Tolling: 45 | Well |(
| Tools: 74 | 185, 196, 329, 330 |
| TPM: 253, 293 | Well control: 195, 196, 329, 330 |
| Trade: 46 | Well control equipment: 162 |
| Trading: 45, 47, 48, 60 | Well design: 126 |
| Training assessment: 65 | Well equipment: 209 |
| Training courses: 67 | Well head integrity: 194 |
| Training engineering: 65 | Well integrity: 175, 191, 192, 194, 208 |
| Training plan: 65 | Well integrity maintenance: 191, 192, 208 |
| Training program: 68 | Well intervention: 150, 183, 187, 197, 198, 203, 204, 331, 332, 357 |
| Training system: 65 | Well kick-off: 187, 204 |
| Trajectory: 165 | Well log: 91 |
| Transactional: 211 | Well log acquisition: 80 |
| Transfer: 68 | Well log analysis: 74, 87 |
| Transgressive: 91 | Well logging: 81 |
| Transient thermal regime: 85 | Well operation: 150, 235, 336, 388 |
| Transport of hydrocarbons: 49 | Well plugging: 322 |
| Transport of oil products: 49 | Well pressure: 159 |
| Transportation: 44, 224 | Well production optimization: 190, 207 |
| Treatment: 44, 38 | Well productivity: 126, 153, 176, 201 |
| Troubleshooting methodology: 135 | Well surveillance: 194 |
| Tubing: 178 | Well test: 106, 177 |
| Tubing calculations: 156 | Well test analysis: 127, 135 |
| Tubing movement: 179 | Well test design: 127 |
| Turbine: 277, 279, 370 | Well test interpretation: 138 |
| Turnaround: 248, 288 | Well testing: 127, 138 |
| Two-porosity reservoir: 135 | Well-completion: 178 |
| Types of flow regime: 135 | Well-to-seismic calibration: 116, 117 |
| | Wellbore interface: 126 |
| | Wellbore storage: 127, 135 |
| | Wellbore treatment: 180, 202 |
| | WellCAD™: 108 |
| | Wellhead: 169, 175 |
| | Wells productivity: 126 |
| | Wells representation: 133 |
| | Wellsite control: 86 |
| | Wellsite geology: 86 |
| | Wireline: 153 |
| | Wireline logging operation: 80, 81 |
| | Workover: 150, 153, 187, 204 |
| | Workover program: 183, 203 |
| | Workshop: 46, 347, 250, 290 |
| | X-mas tree: 175 |
Registration

Identify on the course program the course reference, the price, the location and the dates you are interested in; as well as the contact name for registration.

So that your registration is done in the best conditions, please follow the procedure below:

- **3 weeks minimum** before the beginning of the course → register preferably on our website:
  
  https://www.ifptraining.com

  or send the fully completed **registration form** (downloadable on our website or available from one of our secretarial departments).

- **2 weeks minimum** before the beginning of the course → Please make the full payment
  
  - By check payable to IFP Training, 232 avenue Napoléon Bonaparte – 92852 RUEIL MALMAISON CEDEX
  
  - By bank transfer to IFP Training
    
    NATIXIS n° 30007 99999 04165583000 12
    
    IBAN: FR76 3000 7999 9904 1655 8300 012 – NATXFRPPXXX

  Should a sponsoring organization (like OPCA in France) pay for the course, please specify it on the registration form.

  Do not hesitate to contact us for a late registration.

  **Tuition fee includes instruction, documentation as well as meals and beverage breaks.**

  **IFP Training will send to the authorized person indicated on the registration form:**
  
  - a written confirmation by mail
  
  - one or several invitations for the participants
  
  - useful information about the training course (access to the training center, training hours, etc.).

**Who should you send your registration form to?**

The registration form can be sent by **email**, mail or fax.

It should be sent to the entity organizing the course you have chosen. This entity appears at the bottom of the course program.

All enrolments are considered as accepted orders as soon as the enrolment confirmation issued by IFP Training has been received and implies the client’s full commitment to these Terms & Conditions which prevail over all other Client documents, including general purchasing conditions.
# Your Contacts

## Exploration & Production

### Rueil-Malmaison
- **Geosciences & Reservoir Engineering**
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  Secretarial Department
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## IC Engines & Lubricants

###  

### Economics & Management

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  Tel. +973 17 21 01 38

### IFP Training Congo
  
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  Tel. +242 (0)6 655 43 43
  Tel. + 33 (0)1 41 39 12 12

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General Contact Information: Tel. + 33 (0)1 41 39 12 12 - contact@ifptraining.com
General Terms of Sale

1. Purpose and scope
The purpose of these General Conditions of Sale (hereinafter referred to as the “GTC”) is to define, both in France and internationally:
- on the one hand, the organization and implementation of in-house training sessions by IFP Training on behalf of the Client (hereinafter the “Client”), signatory of the Training Order defined below;
- on the other hand, the general conditions for participation in the Public training sessions organized by IFP Training.

2. Order provisions
Every request is placed on the basis of an IFP Training commercial proposal (serving as the special terms for the present GTC), particularly setting specific conditions for training services to be provided, the price and the payment terms (hereafter the “Training Order”).

► For In-house training sessions
Unless indicated otherwise, IFP Training commercial proposals are valid for a three-month (3) period from the date of dispatch of the IFP Training commercial proposal to the client.
The Training Order shall be submitted by the Client at least five (5) weeks before the starting date of the first requested session. IFP Training reserves the right to refuse late orders.
The Training Order will be binding upon IFP Training once IFP Training has received the following documents:
- the IFP Training commercial proposal initiated on each page, with the last page containing the handwritten indication “Accepted and Agreed”, as well as the Client’s signature and commercial stamp, if any;
- these GTC with initials on each page;
- contact details of the invoice’s recipient, and all information to be contained in the invoice.
As such, the Training Order is made up of the following documents, in decreasing order of priority:
1. IFP Training commercial proposal;
2. IFP Training GTC;
3. all other documents referred to in the IFP Training commercial proposal.
Client’s acceptance of the IFP Training commercial proposal constitutes its firm and definitive commitment to the Training Order and implies the non-applicability of its own general terms of purchase, even if mentioned in the Client purchase request.

► For Public training sessions
All inscriptions to training sessions shall be carried out three (3) weeks prior to the session start date. IFP Training reserves itself the right to accept late enrolment. The number of participants per session is limited.
Enrolment will be confirmed once the organization center receives a fully complete enrolment form via email, fax or mail. Incomplete enrolment forms will not be accepted. Enrolment will be final once payment has been received in full or once an acceptance certificate from a sponsoring organization has been received.
All enrolments are considered as accepted orders as soon as the enrolment confirmation issued by IFP Training has been received and implies the client’s full commitment to these Terms & Conditions which prevail over all other Client documents, including general purchasing conditions.
If the entire cost of the session is not paid two (2) weeks before the training session begins, IFP Training reserves itself the right to reopen registration the places booked by the Client, after having informed them. If full payment is received IFP Training will, at least two (2) weeks prior to the start of the session, send a letter to the Client designated on the form to confirm their enrolment. A personal invitation will be attached to the letter and which provides all practical information about the session (schedule, directions, etc.).

3. Invoicing and payment
3.1. Price
► For In-house training sessions
Invoicing and payment schedule is defined in the commercial proposal. Unless indicated otherwise in said proposal, quoted prices are in Euros and exclusive of taxes; VAT at the applicable rate and/or any possible duties and/or taxes withheld at the source according to the applicable legislation shall be added. Prices are firm and not subject to revision.

► For Public training sessions
Enrolment fees cover training (teaching, practical activities, simulators and other IT tools, documentation, supplies) as well as break-time related costs (refreshments). And do not cover transport and accommodation. The price on the order form is indicated in Euros, tax not included. VAT at the current rate will be added to the indicated price plus any other withholding taxes. All training sessions, once started, have to be paid in full. Upon request, IFP Training may decide to apply reduced enrolment fees for job seekers.

3.2. Payment
Payment will be made by bank transfer to the beneficiary IFP Training: NATIXIS account No. 30007 99999 04165583000 12 IBAN: FR76 3000 7999 9904 1655 8300 012 – BIC: NATXFRPPXX
► Payment by a third party organization (such as accredited collecting funds for training): if Client makes a third party pay for the training, it must so inform IFP Training at the time of the Training Order. In this case, IFP Training will make its reasonable efforts to provide the documents requested by the Client (possible translation at the Client’s expense). The Client will ensure that payment is made by that third party. In case of non-payment or partial payment by said third party for any reason whatsoever, all sums not received by IFP Training on the due date will be borne by the Client.

► For Public training sessions, the training session will only be accessible to the Client once that IFP Training has been paid in full. By check to the order of:
IFP Training - 232, Avenue Napoléon Bonaparte F-92852 Rueil-Malmaison Cedex
Via bank transfer to IFP Training above mentioned account.
A duplicate is available provided that the Client requested it on the enrolment form.
If the Client wishes to pay using a sponsoring organization, the following procedures should be followed:
- before the start of the session, a request for direct billing should be issued and accepted;
- this shall be indicated explicitly on the enrolment form;
- the Client ensures the completion of payment by the designated organization.
IFP Training will provide the Client with all documents needed to make a sponsoring request.
If the sponsoring organization only bears part of the training cost, the remaining amount will be charged to the Client. Only payments by sponsoring organizations before the first day of training will ensure enrolment and access to the training.
If, for whatever reason, the sponsoring organization doesn’t pay, the Client will be charged the full training amount. At the end of the session IFP Training will send the sponsoring organization an invoice along with a copy of the certificate of attendance signed by the participant.

3.3 Late payment
Pursuant to the provisions of article L441-6 of the French Commercial code, all sums not paid on their due date will require Client to pay late payment penalties equal to three (3) times the French legal interest rate.
General Terms of Sale

These penalties are due until full payment. In the event of late payment, the Client will also owe to IFP Training a fixed compensation of forty (€40) Euros for collection costs. Should collection costs be higher than such fixed compensation, IFP Training can demand additional compensation from the Client by providing supporting proof.

IFP Training also reserves the right to interrupt the performance of the services if an invoice is not paid on or before the due date, without prejudice to any other recourse.

4. Cancellation and deferral - Modification of services

4.1 Cancellation and deferral conditions

► For In-house training sessions

By the Client: Any request for cancellation or deferral of all or part of the Training Order by Client shall be notified to IFP Training in writing, with acknowledgment of receipt, no later than three (3) weeks before the session date. This three (3) week delay is counted from the date of reception by IFP Training of said request.

(i) In case of deferral:

Any deferral requested less than three (3) weeks before the session date will be considered by IFP Training as a session cancellation. The provisions of (ii) or (iii) below will then apply.

(ii) In case of partial cancellation of the Training Order (i.e. cancellation of one or more sessions):

For any Training Order or part thereof cancelled while giving the required three-weeks prior written notice, the Client will only pay the expenses already incurred by IFP Training (including internal preparation costs) that cannot be deferred.

For any session cancelled between one and three (3) weeks before the session date, the Client will have to pay 60% of the price of the cancelled session.

For any session cancelled with a notice given less than one (1) week before the session date, the Client will have to pay 100% of the cancelled session’s price.

Full payment is required for every session performed, however partial. The Training Order will remain valid for all non-cancelled sessions.

(iii) In case of the Training Order’s total cancellation:

The provisions of (i) will be applicable to the entirely cancelled Training Order and to the total price of the Training Order.

By IFP Training: IFP Training reserves the right to cancel or defer any session providing a three-(3) week prior written notice, by e-mail, fax or letter. No compensation will be paid to the Client but IFP Training undertakes to agree with Client on a new session date within four (4) months.

► For Public training sessions

By the Client: Cancellation by the Client shall be sent in writing to IFP Training. In the eventuality of a cancellation, even due to force majeure, less than 14 calendar days before the beginning to the session, 50% of the enrolment fee will be charged by IFP Training, except if a participant from the same company takes the participant’s place. Such a replacement must be communicated to IFP Training and confirmed by sending a new enrolment form.

In case of non-cancelled enrolments (including absenteeism or dropout), 100% of the enrolment fee will be charged by IFP Training. In case of an unforeseen departure, justified by the Client, the participant may be authorized to take part in a later session with the prior consent of IFP Training.

By IFP Training: IFP Training reserves itself the right to cancel or postpone a session, especially if there are an insufficient number of participants. The Client will be notified by telephone at least 2 weeks before the session was due to begin. The cancellation will be confirmed in writing. The payments received will be fully refunded. No compensation on behalf of IFP Training will be given to the Client due to cancellation or postponement of a session.

4.2 Modification of services

Any modification of the training services requires an amendment to the Training Order.

IFP Training must be given prior written notification of any change of the number of session participants, such changes being subject to the following conditions:

- Any downward adjustment of the number of the Client’s session participants can be considered by IFP Training as a partial cancellation of the session in question and will thereby be managed according to the rules listed in article 4.1 (i) that will be applied to the unit cost per participant indicated in the commercial proposal (or, failing that, by dividing the total Training Order amount by the number of Client’s participants).

- Any additional participant will be subject to prior approval of IFP Training and to an additional commercial proposal.

- Any request for a change of the number of participants must be submitted to IFP Training no later than one (1) week before the concerned session date. Client can replace a participant with another, after notifying IFP Training.

5. Conditions for performance of the services

To fulfill the Training Order, IFP Training will perform the services proposed at the commercial proposal accepted by Client through qualified trainers.

► Performance site:

The site where the training services will be performed is indicated in the Training Order. Should the training be provided outside of an IFP Training site, the Client will ensure the access of IFP Training and its trainers to the premises where the sessions will be held, and will provide them with all material and equipment (i.e. computer, projector, screen…) needed for the performance of the services on the site in accordance with IFP Training specifications.

► Client’s information required for the performance of the services:

Client will provide IFP Training with the information and data specified in IFP Training commercial proposal, as well as all information needed to facilitate the services’ performance.

In case of late delivery of said needed information, IFP Training may decide to defer the concerned sessions and shall so inform the Client. In this case, IFP Training and the Client will jointly agree on new dates for these sessions.

All data and information provided by the Client will be kept confidential by IFP Training. At the Client’s written request, such data and information can be returned to the latter at the end of the Training Order.

The Client bears sole responsibility for the data and information that it provides to IFP Training for the performance of services. The data and information provided by the Client remain its property.
General Terms of Sale

6. Information technology and freedoms
Information of a personal nature provided by the Client to IFP Training for the performance of the session may be communicated to the contractual partners of IFP Training and to the trainers for the purposes of the services. Pursuant to the provisions of French law No. 78-17 of January 8th 1978, the persons in question can at any time exercise their rights to access, oppose and rectify said information within the IFP Training files.

7. Property rights to the pedagogical documents
Parties shall be bound by an obligation of confidentiality with regard to all documents and information specified as confidential during the training session, whatever their format. The Parties undertake to ensure compliance with this obligation by all their personnel and, more generally, by any person put in contact with the other Party by one Party during the training session.

8. Advertising
Any use by Client of the “IFP Training” name for promotional or advertising purposes must have received the prior written approval of IFP Training. IFP Training reserves the right to mention the Client as being one of its contractual partners and/or trainers and their use, disclosure or copy is prohibited unless prior written agreement has been obtained from the disclosing Party.

9. Undeclared labor - Subcontracting
IFP Training fully complies with French labor, fiscal and social laws pertaining to its trainers.
IFP Training may subcontract the performance of part of the training services to qualified partners, who shall also comply with French labor, fiscal and social laws pertaining to their trainers. In no way does subcontracting release IFP Training from its obligations and liabilities pursuant to the present General Terms of Sale.

10. Force majeure
For the purposes of this GTC, the term force majeure (hereinafter referred to as “Force Majeure”) shall have the definition provided for in Article 1218 paragraph 1 of the Civil Code.

This Force Majeure event shall result in the suspension for the prevented Party and/or any other Party which is directly impacted by said event of its obligations under the Training Order. Therefore, no Party shall be held liable for the delay in the execution, or for the inexecution of all or part of its obligations under the Training Order is this delay or this inexecution is due to the occurrence of a Force Majeure event.

The Party having invoked the Force Majeure event shall:
- make its best efforts in order to limit and/or mitigate as much as possible its consequences in order to timely resume the execution of the Training Order;
- continue the execution of the contractual obligations that are not affected by the Force Majeure event;
- inform the other Party(ies) in writing of its termination.

The suspended obligations shall be executed again as soon as the Force Majeure event has ceased. The contractual deadlines shall be extended by the duration of said event. Should the effects of the Force Majeure event continue beyond a thirty (30) working days period from its occurrence, the Parties shall seek to reach agreement in order to decide on the further course of action for the execution of the Training Order.

11. Termination
The Training Order may be terminated by either of the Parties in the event of non-performance by the other Party of one or more of its obligations in accordance with the Training Order. Termination shall only become effective one (1) months after the dispatching by the Party claiming non-performance of a registered letter with an acknowledgement of receipt unless the breaching Party has cured its non-performance.

12. Liability - Insurance
Except in case of willful misconduct, IFP Training and the Client will respectively deal with the consequences of accidents that may occur during the performance of the Training Order and involving their own personnel, including the session participants that they directly or indirectly employ as well as their property or any property in their custody, irrespective of the author of the damages.

Accordingly, each party waives any recourse against the other for any damages caused to persons and property, except in case of willful misconduct.

Each Party shall be solely liable for any loss, damage or injury to third parties resulting from the performance of the said Party’s obligations by it or on its behalf under the Training Order.
Moreover, under no circumstances can IFP Training be held liable for any financial, commercial or other damage directly or indirectly caused by the use of any information provided by IFP Training within the framework of the training sessions.
General Terms of Sale

In all other cases, Client acknowledges that the liability of IFP Training is strictly limited, for direct damages, to the price of the Training Order and excludes any indirect damages.

In view of the above provisions, IFP Training and the Client shall ensure that their respective insurers waive any subrogation rights against the Parties. Should IFP Training or Client fail to ensure this waiver, the defaulting party will bear the financial consequences.

Client undertakes to obtain and maintain, for the duration of the session and at its own expenses, the validity of all insurance policies needed in order to cover the risks, liabilities, direct or indirect damages and illnesses that could be suffered by the participant(s), its personnel or its property, obtained from duly solvent insurance companies.

At its expenses, IFP Training undertakes to subscribe and maintain the validity of the insurance needed for the coverage of its liabilities under the Training Order.

13. Personal data
As the person responsible for processing its personnel file, the Customer undertakes to inform each employee (hereinafter referred to as the User) that:
- personal data concerning him/her are collected and processed by IFP Training for the purposes of conducting and monitoring training and prospecting and promotion;
- the connection, the training path and the follow-up of the Users’ knowledge are data accessible to its services and in particular to the staff;
- in accordance with the provisions of the French Data Protection Act of 6 January 1978 in its version in force at the time of the Order, as well as the provisions of the General Data Protection Regulation (EU Regulation 2016/679 of the European Parliament and of the Council of 27 April 2016 applicable as from 25 May 2018), the User has a right to access, modify, rectify and delete his personal data (hereinafter “Rights”) concerning him and that for this purpose, an online request specifying the identity and e-mail address of the applicant can be addressed to IFP Training.

The Rights provided for in the preceding paragraph may be exercised by contacting customer service at the following email address: rgpd@ifptraining.com or by writing to IFP Training Service Marketing 232 avenue Napoléon Bonaparte, 92852 Rueil-Malmaison Cedex - France. The Client is responsible for the conservation and confidentiality of all personal data concerning the User to which he has had access. The personal data collected by IFP Training are necessary for the execution of the training referred to in the GTC and may be used for prospecting and promotion purposes. They are kept as long as the User has an Account not closed and within three months following the closing date. IFP Training nevertheless reserves the right to archive any personal data it may have collected in execution of the Order, for the duration of the limitation of liability actions. In this case, IFP Training will ensure the security and confidentiality of the archived data storage to which only IFP Training will be able to access for the exclusive purpose of a possible litigation whose resolution requires the judicial communication of said data.

14. Miscellaneous provisions - Litigation
14.1 The fact that a Party does not invoke the benefit of a clause of the Order does not entail a waiver by it of the benefit of that clause.
If one or more of the provisions hereof were to prove null and void under an applicable law or decree or a final judicial decision, it (they) would then be deemed unwritten. However, the other provisions would remain in full force and effect.

A notification by registered letter with acknowledgement of receipt shall be deemed to have been sent on the date appearing on the stamp affixed by the postal services.

Upon completion of the training session and/or in the event of early termination of the Order for any reason whatsoever, the provisions of Articles 6, 7, 8, 12 and 13 shall remain in effect.

The present General Terms of Sale are subject to French law. Any dispute, not resolved amicably between the Parties within one (1) month, and relating to the validity, performance or interpretation of these General Terms of Sale shall be subject to the jurisdiction of the Commercial Court of Nanterre, including in cases of multiple defendants.

14.2 Fight against corruption
IFP Training and the Client undertake to fight against corruption in all its forms, public or private, active or passive both vis-à-vis their suppliers or subcontractors and vis-à-vis their principals.

In this respect, the Client undertakes to comply with French anti-corruption legislation, similar legislation applicable at the place of execution of the Order when all or part of the Order is carried out outside France, as well as IFP Training’s charter of good conduct, which can be accessed on its website at the following address: www.ifptraining.com
For all matters relating to the Order, the Parties state and guarantee that they do not and will not give or offer to give, directly or indirectly, any sum of money or any other pecuniary or non-pecuniary benefit to anyone for the purpose of obtaining the Order or facilitating its execution.

The Parties undertake to keep all accounting documents and other evidence of payments made or received and expenses incurred by them in connection with the Order during its term and at least three (3) years from the date of expiry or termination of the Order. Each Party or a third party appointed by it shall have the opportunity to audit such documents, subject to reasonable notice to ensure compliance by the other Party with the provisions of this clause.

In case of violation of this clause by one of the Parties, the other Party reserves the right to suspend, for a period not exceeding three (3) months; and/or terminate the Order automatically, without any formality, and at the sole discretion of the said Party.