2020 TRAINING COURSES

EXPLORATION & PRODUCTION

www.ifptraining.com
A new management for new challenges

Last July, IFP Training changed its governance by setting up an Executive Board. Rémi Mouchel, Benoît Mourez and Loïc du Rusquec will lead the company throughout this challenging period of energy transition.

An integrated part of the IFP Group

In 2019, our Group celebrated the 100th anniversary of both the first oil training course held in France and the creation of the first French oil laboratory. A century later, IFP, now IFP Energies nouvelles (IFPEN), is internationally recognized as a major applied research and education player in the fields of energy, transport and environment. From research to industry, technological innovation is central to all its activities.

As an integrated part of the IFP Group, IFP Training benefits from its multidisciplinary innovative research projects as well as from the Group subsidiaries’ expertise, bringing together the know-how of its leading worldwide industrial players and the agility of its innovative startup companies.

To ensure tomorrow’s energy competencies

Today, energy companies operate in some of the most challenging and uncertain context and are looking hard for innovative solutions to improve their safety, efficiency and environmental sustainability. In these conditions, skilled workforce is the most powerful assets that companies have.

Based on its 45 years of international experience and in response to sector demand, IFP Training has developed a range of high added-value services and effective solutions for workforce competency development that can be customized to your organization’s needs.

IFP Training’s competency-based training solutions cover Exploration & Production, Refining & Petrochemicals, Powertrains, Energy Transition, Economics & Management. Our innovative and engaging teaching methodology is based on a unique scenarization of our sessions. Using simulation-based courses and immersive learning technologies allows professionals to visualize, understand in-depth industrial equipment details, and increase their knowledge retention. In addition to our face-to-face sessions, IFP Training provides online and blended learning.

Over the years, IFP Training has partnered with national & private energy companies, as well as international institutions to jointly run competency development services particularly through the accreditation process.

We invite you to browse our new 2020 offer in order to find a response to your organizational needs in workforce development. Our teams, especially our lecturers and associate experts, remain at your disposal to convince you that IFP Training’s competency development offer is a reliable solution to succeed in your today and tomorrow’s challenges.
<table>
<thead>
<tr>
<th>Course Title</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Introduction to Technical Topics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comprehensive Overview of E&amp;P Management Certification</td>
<td>60 days</td>
<td>11-15 May 14-18 September 7-11 December</td>
<td>In-house course</td>
<td>€3,690 €3,690 €3,690</td>
<td>GENP/PMGTGB</td>
<td>32</td>
</tr>
<tr>
<td>Exploration &amp; Production Overview</td>
<td>5 days</td>
<td>17-21 February 23-27 November</td>
<td>In-house course</td>
<td>€3,690 €3,690 €3,690</td>
<td>GENP/DECOVEP</td>
<td>33</td>
</tr>
<tr>
<td>Introduction to Petroleum Engineering</td>
<td>5 days</td>
<td>7-11 September 19-23 October</td>
<td>Pau Rueil-Malmaison</td>
<td>€3,690 €3,690</td>
<td>GENP/INPFGE</td>
<td>34</td>
</tr>
<tr>
<td>E&amp;P Jobs</td>
<td>2 days</td>
<td>7-11 September 19-23 October</td>
<td>In-house course</td>
<td>€3,690</td>
<td>GENP/EPMETIERGB</td>
<td>35</td>
</tr>
<tr>
<td>Fundamentals of Production</td>
<td>2 days</td>
<td>7-11 September 19-23 October</td>
<td>In-house course</td>
<td>€3,690</td>
<td>GENP/PRODCHAIN</td>
<td>36</td>
</tr>
<tr>
<td>Drilling Fundamentals</td>
<td>5 days</td>
<td>7-11 September 19-23 October</td>
<td>In-house course</td>
<td>€3,690 €3,690</td>
<td>GENP/PRODCHAIN</td>
<td>36</td>
</tr>
<tr>
<td><strong>Petroleum Engineering Certification</strong></td>
<td>100 days</td>
<td></td>
<td></td>
<td></td>
<td>GENP/PETROLENG</td>
<td>38</td>
</tr>
<tr>
<td><strong>NEW</strong> Carbon Capture, Utilization &amp; Storage (CCUS)</td>
<td>3 days</td>
<td></td>
<td></td>
<td></td>
<td>GENP/CCUS</td>
<td>39</td>
</tr>
<tr>
<td><strong>Digitalization &amp; Data Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petrotechnical Data Management - G &amp; G Data</td>
<td>5 days</td>
<td>8 June - 10 July</td>
<td>Rueil-Malmaison</td>
<td>€18,750</td>
<td>GENP/DAIM</td>
<td>40</td>
</tr>
<tr>
<td>Data Management for Oil &amp; Gas Engineers</td>
<td>25 days</td>
<td>15-19 June 22-26 June 20-24 April 27-30 April</td>
<td>In-house course</td>
<td>€2,610 €4,200</td>
<td>GENP/DAMAMOD</td>
<td>41</td>
</tr>
<tr>
<td>Data Management Fundamentals (DAMA)</td>
<td>5 days</td>
<td>8-11 September 15-18 December</td>
<td>Rueil-Malmaison</td>
<td>€2,840 €3,380</td>
<td>GENP/DAMADAMA</td>
<td>42</td>
</tr>
<tr>
<td>Data Management &amp; IT/IS - GIS</td>
<td>5 days</td>
<td>8-11 September 15-18 December</td>
<td>Rueil-Malmaison</td>
<td>€2,840 €3,380</td>
<td>GENP/DAMADAMIS</td>
<td>43</td>
</tr>
<tr>
<td><strong>NEW</strong> Introduction to Data Management for Operations</td>
<td>3 days</td>
<td>7-9 September 19-23 October</td>
<td>In-house course</td>
<td>€2,850</td>
<td>GENP/DCAM</td>
<td>44</td>
</tr>
<tr>
<td><strong>Upstream Economics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Oil Summit</td>
<td>1 days</td>
<td>16-16 April 19-19 November</td>
<td>Paris</td>
<td>€990 €990</td>
<td>GENP/IOS</td>
<td>45</td>
</tr>
<tr>
<td>International Gas &amp; Power Summit</td>
<td>1 days</td>
<td>16-16 April 19-19 November</td>
<td>Paris</td>
<td>€990 €990</td>
<td>GENP/IGS</td>
<td>46</td>
</tr>
<tr>
<td>Overview of Petroleum Economics</td>
<td>4 days</td>
<td>1-4 December</td>
<td>Rueil-Malmaison</td>
<td>€2,630</td>
<td>GENP/OPPEP</td>
<td>47</td>
</tr>
<tr>
<td>Overview of Natural Gas Economics</td>
<td>4 days</td>
<td>8-11 September 15-18 December</td>
<td>Rueil-Malmaison</td>
<td>€2,840 €3,380</td>
<td>GENP/OPEGE</td>
<td>49</td>
</tr>
<tr>
<td>Liquefied Natural Gas Economics</td>
<td>4 days</td>
<td>8-11 September 15-18 December</td>
<td>Rueil-Malmaison</td>
<td>€2,840 €3,380</td>
<td>GENP/OLGEGE</td>
<td>49</td>
</tr>
<tr>
<td>Strategic Management in International Oil &amp; Gas Business</td>
<td>5 days</td>
<td>22-26 June</td>
<td>Rueil-Malmaison</td>
<td>€2,890</td>
<td>GENP/SBIA</td>
<td>50</td>
</tr>
<tr>
<td>Natural Gas &amp; Electricity Trading</td>
<td>2 days</td>
<td>29-30 September</td>
<td>Rueil-Malmaison</td>
<td>€2,060</td>
<td>GENP/GET</td>
<td>51</td>
</tr>
<tr>
<td>Oil Markets &amp; Trading</td>
<td>3 days</td>
<td>27-29 May 16-16 April 19-19 November 22-24 April 27-30 April</td>
<td>Rueil-Malmaison</td>
<td>€2,430 €2,610 €4,200</td>
<td>GENP/OMT</td>
<td>52</td>
</tr>
<tr>
<td>Upstream Economics &amp; Management</td>
<td>15 days</td>
<td>22-24 April 27-30 April</td>
<td>Rueil-Malmaison</td>
<td>€2,610 €4,200</td>
<td>GENP/UIEM</td>
<td>53</td>
</tr>
<tr>
<td>Contractual Framework of Exploration &amp; Production</td>
<td>3 days</td>
<td>22-24 April 27-30 April</td>
<td>Rueil-Malmaison</td>
<td>€2,610 €4,200</td>
<td>GENP/CDEP</td>
<td>54</td>
</tr>
<tr>
<td>Production Sharing &amp; Joint Operating Agreements</td>
<td>3 days</td>
<td>22-24 April 27-30 April</td>
<td>Rueil-Malmaison</td>
<td>€2,610 €4,200</td>
<td>GENP/PSA</td>
<td>55</td>
</tr>
<tr>
<td>Economic Framework of Exploration - Production</td>
<td>5 days</td>
<td>20-24 April 27-30 April</td>
<td>Rueil-Malmaison</td>
<td>€3,780 €4,200</td>
<td>GENP/EFEP</td>
<td>56</td>
</tr>
<tr>
<td>Negotiation of Exploration - Production Contracts</td>
<td>4 days</td>
<td>20-24 April 27-30 April</td>
<td>Rueil-Malmaison</td>
<td>€3,780 €4,200</td>
<td>GENP/EPON</td>
<td>57</td>
</tr>
<tr>
<td>Economics &amp; Risk Analysis of Upstream Projects</td>
<td>5 days</td>
<td>12-16 October 15-18 December</td>
<td>Rueil-Malmaison</td>
<td>€3,900</td>
<td>GENP/EREA</td>
<td>58</td>
</tr>
<tr>
<td>Practice of Exploration - Production Contracts Economic Modeling</td>
<td>3 days</td>
<td>12-16 October 15-18 December</td>
<td>Rueil-Malmaison</td>
<td>€3,900</td>
<td>GENP/PCEM</td>
<td>59</td>
</tr>
<tr>
<td>Operating under “Local Content”</td>
<td>3 days</td>
<td>22-24 April 27-30 April</td>
<td>Rueil-Malmaison</td>
<td>€2,610 €4,200</td>
<td>GENP/OLC</td>
<td>60</td>
</tr>
<tr>
<td>Oil Fields Utilization</td>
<td>3 days</td>
<td>12-16 October 15-18 December</td>
<td>Rueil-Malmaison</td>
<td>€3,770</td>
<td>GENP/UNITZ</td>
<td>61</td>
</tr>
<tr>
<td><strong>Upstream Auditing Certification</strong></td>
<td>10 days</td>
<td></td>
<td></td>
<td></td>
<td>GENP/ADVDA</td>
<td>62</td>
</tr>
<tr>
<td><strong>Upstream Economics &amp; Management Certification</strong></td>
<td>60 days</td>
<td></td>
<td></td>
<td></td>
<td>GENP/UEMC</td>
<td>63</td>
</tr>
<tr>
<td>Investment Profitability Studies in the Oil &amp; Gas Industry</td>
<td>3 days</td>
<td>26-28 May 7-11 December</td>
<td>Rueil-Malmaison</td>
<td>€2,200 €3,770</td>
<td>GENP/IPS</td>
<td>64</td>
</tr>
<tr>
<td>Upstream Contracts Audit</td>
<td>5 days</td>
<td>7-11 December</td>
<td>Rueil-Malmaison</td>
<td>€3,770</td>
<td>GENP/UPA</td>
<td>65</td>
</tr>
<tr>
<td>Governance of an E&amp;P Company</td>
<td>5 days</td>
<td>7-11 December</td>
<td>Rueil-Malmaison</td>
<td>€3,770</td>
<td>GENP/GPSEG</td>
<td>66</td>
</tr>
</tbody>
</table>

**Competency Management & Training Engineering**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competency Management in E&amp;P</td>
<td>3 days</td>
<td>8-12 June 16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680 €3,680</td>
<td>CMGT/COM</td>
<td>67</td>
</tr>
<tr>
<td>Training Engineering in E&amp;P</td>
<td>5 days</td>
<td>8-12 June 16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680 €3,680</td>
<td>CMGT/ITME</td>
<td>68</td>
</tr>
<tr>
<td>Field/Site Trainers Accreditation</td>
<td>5 days</td>
<td>8-12 June 16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680 €3,680</td>
<td>CMGT/TRAING</td>
<td>69</td>
</tr>
<tr>
<td>Classroom Lecturers Accreditation</td>
<td>20 days</td>
<td>8-12 June 16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680 €3,680</td>
<td>CMGT/TRAING</td>
<td>70</td>
</tr>
<tr>
<td>Subject Matter Experts Accreditation</td>
<td>25 days</td>
<td>8-12 June 16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680 €3,680</td>
<td>CMGT/TRAING</td>
<td>71</td>
</tr>
<tr>
<td>Communication &amp; Behavioral Management</td>
<td>2 days</td>
<td>8-12 June 16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680 €3,680</td>
<td>CMGT/COM</td>
<td>72</td>
</tr>
<tr>
<td><strong>E&amp;P Project Management Certification</strong></td>
<td>5 days</td>
<td>8-12 June 16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680 €3,680</td>
<td>PIMP/PROM</td>
<td>73</td>
</tr>
<tr>
<td>E&amp;P Projects Value Management</td>
<td>5 days</td>
<td>8-12 June 16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680 €3,680</td>
<td>PIMP/PRD</td>
<td>74</td>
</tr>
<tr>
<td>E&amp;P Project Risk &amp; Decision Analysis Workshop</td>
<td>5 days</td>
<td>8-12 June 16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680 €3,680</td>
<td>PIMP/PRD</td>
<td>75</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fee excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Basin Exploration</td>
<td>5 days</td>
<td>31 August - 4 September</td>
<td>Rueil-Malmaison</td>
<td>€3,120</td>
<td>GEN/G/INFOBAS 77</td>
</tr>
<tr>
<td>Hunting for Oil: Exploration &amp; Upstream Overview</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>GEN/H/INFOBAS 78</td>
</tr>
<tr>
<td><strong>Methods &amp; Tools</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petroleum Geophysics</td>
<td>10 days</td>
<td>30 November - 11 December</td>
<td>Rueil-Malmaison</td>
<td>€6,180</td>
<td>METH/G/PHYSICS 79</td>
</tr>
<tr>
<td>Seismic Reflection Fundamentals</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>METH/G/PHYSICS 80</td>
</tr>
<tr>
<td>Petroleum Systems: Hydrocarbons from Source Rock to Reservoirs</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>METH/G/PHYSICS 81</td>
</tr>
<tr>
<td>Structural Geology, Basin Development &amp; Associated Traps</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>METH/STRUCT 82</td>
</tr>
<tr>
<td>Well Logging &amp; Basic Log Interpretation (BL)</td>
<td>32 h</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>METH/B/BL 83</td>
</tr>
<tr>
<td>Well Logging &amp; Qualitative Log Interpretation</td>
<td>5 days</td>
<td>14-18 September</td>
<td>Rueil-Malmaison</td>
<td>€3,120</td>
<td>METH/B/BL/Q 84</td>
</tr>
<tr>
<td>3D Seismic Interpretation Workshop</td>
<td>10 days</td>
<td>16-27 November</td>
<td>Rueil-Malmaison</td>
<td></td>
<td>METH/G/PHYSICS 85</td>
</tr>
<tr>
<td>Sedimentology &amp; Sequence Stratigraphy</td>
<td>5 days</td>
<td>15-19 June</td>
<td>Rueil-Malmaison</td>
<td></td>
<td>METH/SEQSTRA 86</td>
</tr>
<tr>
<td>Stratigraphic Modeling: Basin Architecture &amp; Sediment Distribution</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>METH/SEQSTRA 87</td>
</tr>
<tr>
<td>Basin Modeling: Thermicity, Maturation &amp; Migration</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>METH/SEQSTRA 88</td>
</tr>
<tr>
<td>Wellsite Geology</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>METH/WG 89</td>
</tr>
<tr>
<td><strong>From Basin to Prospect Evaluation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geosciences: from Basin Exploration to Discovery Certification</td>
<td>110 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>EVAL/BAMLONG 90</td>
</tr>
<tr>
<td>Basin Assessment &amp; Modeling Certification</td>
<td>65 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>EVAL/BAMLONG 91</td>
</tr>
<tr>
<td>Play Assessment &amp; Prospect Generation</td>
<td>5 days</td>
<td>22-26 June</td>
<td>Rueil-Malmaison</td>
<td>€3,260</td>
<td>EVAL/PROSP 92</td>
</tr>
<tr>
<td>From Prospect to Development: an Integrated Approach</td>
<td>10 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>EVAL/PROSP 93</td>
</tr>
<tr>
<td>Seismic &amp; Sequence Stratigraphy for Oil &amp; Gas Exploration</td>
<td>10 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>EVAL/SEQSTRA 94</td>
</tr>
<tr>
<td>Exploration Blocks Management</td>
<td>15 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>EVAL/SEQSTRA 95</td>
</tr>
<tr>
<td>E&amp;P Projects Value Management</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>EVAL/SEQSTRA 96</td>
</tr>
<tr>
<td>E&amp;P Project Risk &amp; Decision Analysis Workshop</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>EVAL/SEQSTRA 97</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><strong>Reservoir Characterization &amp; Modeling</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Reservoir Characterization</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 99</td>
</tr>
<tr>
<td>Integrated Petrophysics for Reservoir Characterization &amp; Modeling Certification</td>
<td>90 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 100</td>
</tr>
<tr>
<td>Reservoir Characterization &amp; Modeling Certification</td>
<td>58 days</td>
<td>7 September - 27 November</td>
<td>Rueil-Malmaison</td>
<td>€32,380</td>
<td>RCM/G/RCHCHAR 101</td>
</tr>
<tr>
<td>Quantitative Well Log Analysis</td>
<td>5 days</td>
<td>21-25 September</td>
<td>Rueil-Malmaison</td>
<td>€3,250</td>
<td>RCM/G/RCHCHAR 102</td>
</tr>
<tr>
<td>Fundamentals of Facies Analysis &amp; Rock-Typing</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 103</td>
</tr>
<tr>
<td>Seismic Interpretation &amp; Attributes Analysis Workshop: Qualitative &amp; Quantitative Methods</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 104</td>
</tr>
<tr>
<td>Petroleum Geostatistics</td>
<td>5 days</td>
<td>12-16 October</td>
<td>Rueil-Malmaison</td>
<td>€3,250</td>
<td>RCM/G/RCHCHAR 105</td>
</tr>
<tr>
<td>Geological Modeling Workshop for Integrated Reservoir Studies</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 106</td>
</tr>
<tr>
<td>Hydrocarbon Accumulations &amp; Uncertainties</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 107</td>
</tr>
<tr>
<td>Naturally - Fractured Reservoirs: Static &amp; Dynamic Modeling</td>
<td>5 days</td>
<td>2-6 November</td>
<td>Rueil-Malmaison</td>
<td>€3,425</td>
<td>RCM/G/RCHCHAR 108</td>
</tr>
<tr>
<td>Petrophysical Properties: Core, Log &amp; Test Data Integration for Reservoir Modeling</td>
<td>4 days</td>
<td>17-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,250</td>
<td>RCM/G/RCHCHAR 109</td>
</tr>
<tr>
<td>Upscaling: from Static to Dynamic Model</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 110</td>
</tr>
<tr>
<td>Borehole Imaging Interpretation Workshop with WellCad™</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 111</td>
</tr>
<tr>
<td>Fracture &amp; Fault Modeling Workshop with FracaFlow™</td>
<td>4 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 112</td>
</tr>
<tr>
<td>Tight Reservoir Petrophysics</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 113</td>
</tr>
<tr>
<td>Tight Reservoir Characterization &amp; Modeling</td>
<td>10 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>RCM/G/RCHCHAR 114</td>
</tr>
</tbody>
</table>

*Tuition fees include instruction and documentation as well as meals and beverage breaks*
<table>
<thead>
<tr>
<th>Course Name</th>
<th>Duration</th>
<th>Start Date</th>
<th>Location</th>
<th>Fees</th>
<th>Code</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Multivariate Geostatistics Certification</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/MGEOSTAT</td>
<td>115</td>
</tr>
<tr>
<td>Advanced Facies Analysis &amp; Rock-Typing Certification</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/ROCKTYPE</td>
<td>116</td>
</tr>
<tr>
<td>Seismic Reservoir Characterization: AVO &amp; Inversion Workshop Certification</td>
<td>10 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/SEISMIC</td>
<td>117</td>
</tr>
<tr>
<td>Geological Characterization &amp; Modeling - Integrated Workshop Certification</td>
<td>10 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/RGM</td>
<td>118</td>
</tr>
<tr>
<td>Tools for Seismic Reservoir Characterization: Pre-Stack Seismic Inversion</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/POSTSTACK</td>
<td>119</td>
</tr>
<tr>
<td>Tools for Seismic Reservoir Characterization: Post-Stack Seismic Inversion</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/BLSRC</td>
<td>120</td>
</tr>
<tr>
<td>SRC: Seismic Reservoir Characterization</td>
<td>24 h</td>
<td></td>
<td></td>
<td></td>
<td>RCM/CARBFT</td>
<td>121</td>
</tr>
<tr>
<td>Static Model Construction: Field Constraints &amp; Integration with Subsurface Data</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/RESGEOIL</td>
<td>122</td>
</tr>
<tr>
<td>Fundamentals of Reservoir Geology</td>
<td>15 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/SCALCAL</td>
<td>123</td>
</tr>
<tr>
<td>Core Analysis for Reservoir Characterization</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/SCAL</td>
<td>124</td>
</tr>
<tr>
<td>Special Core Analysis</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/SCAL</td>
<td>125</td>
</tr>
<tr>
<td>Geomechanics for Geoscientists</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RCM/SCAL</td>
<td>126</td>
</tr>
<tr>
<td>Reservoir Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Reservoir Engineering</td>
<td>5 days</td>
<td>14-18 September</td>
<td>Rueil-Malmaison</td>
<td>€3,120</td>
<td>RENG/INFORES</td>
<td>127</td>
</tr>
<tr>
<td>Reservoir Fluid Properties - PVT</td>
<td>5 days</td>
<td>5-9 October</td>
<td>Rueil-Malmaison</td>
<td>€3,250</td>
<td>RENG/PVT</td>
<td>128</td>
</tr>
<tr>
<td>Drilling &amp; Completion - Wellbore Interface &amp; Well Productivity</td>
<td>5 days</td>
<td>12-16 October</td>
<td>Rueil-Malmaison</td>
<td>€3,250</td>
<td>RENG/WELLPROD</td>
<td>129</td>
</tr>
<tr>
<td>Well Testing &amp; Well Test Analysis</td>
<td>5 days</td>
<td>19-23 October</td>
<td>Rueil-Malmaison</td>
<td>€3,250</td>
<td>RENG/WELLTEST</td>
<td>130</td>
</tr>
<tr>
<td>Drive Mechanisms - Enhanced Oil Recovery</td>
<td>10 days</td>
<td>26 October - 6 November</td>
<td>Rueil-Malmaison</td>
<td>€3,190</td>
<td>RENG/DVROROR</td>
<td>131</td>
</tr>
<tr>
<td>Dynamic Reservoir Simulation</td>
<td>10 days</td>
<td>26-27 November</td>
<td>Rueil-Malmaison</td>
<td>€8,850</td>
<td>RENG/SIMULRES</td>
<td>132</td>
</tr>
<tr>
<td>EOR Concepts &amp; Applications</td>
<td>5 days</td>
<td>28 September - 2 October</td>
<td>Pau</td>
<td>€3,340</td>
<td>RENG/EOR</td>
<td>133</td>
</tr>
<tr>
<td>Miscible Gas EOR Certification</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RENG/EOR-G</td>
<td>134</td>
</tr>
<tr>
<td>Chemical EOR Certification</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RENG/EOR-C</td>
<td>135</td>
</tr>
<tr>
<td>Advanced Dynamic Reservoir Simulation</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RENG/ADVSMULRES</td>
<td>136</td>
</tr>
<tr>
<td>Reservoir Simulation Workshop Certification</td>
<td>10 days</td>
<td></td>
<td></td>
<td></td>
<td>RENG/RESSIMU</td>
<td>137</td>
</tr>
<tr>
<td>Advanced Well Test Analysis Certification</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RENG/ADVWELLTEST</td>
<td>138</td>
</tr>
<tr>
<td>PVT Modeling</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RENG/PVTMOD</td>
<td>139</td>
</tr>
<tr>
<td>Decline Curves Analysis</td>
<td>3 days</td>
<td></td>
<td></td>
<td></td>
<td>RENG/DCA</td>
<td>140</td>
</tr>
<tr>
<td>Reservoir Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir Engineering Certification</td>
<td>64 days</td>
<td>14 September - 11 December</td>
<td>Rueil-Malmaison</td>
<td>€3,490</td>
<td>RMGT/RESENGIN</td>
<td>141</td>
</tr>
<tr>
<td>Reservoir Management Workshop</td>
<td>4 days</td>
<td>9-13 November</td>
<td>Rueil-Malmaison</td>
<td>€3,120</td>
<td>RMGT/RESGEO</td>
<td>142</td>
</tr>
<tr>
<td>Reserves Evaluation - Risks &amp; Uncertainties Certification</td>
<td>5 days</td>
<td>5-9 October</td>
<td>Pau</td>
<td>€3,550</td>
<td>RMGT/RISKUN</td>
<td>143</td>
</tr>
<tr>
<td>Mature Fields - Subsurface Issues</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>RMGT/MATFIELD</td>
<td>144</td>
</tr>
<tr>
<td>IRM - Integrated Reservoir Management</td>
<td>45 days</td>
<td></td>
<td></td>
<td></td>
<td>RMGT/IRM</td>
<td>145</td>
</tr>
<tr>
<td>Field Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Development Project &amp; Uncertainties</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>FOX/FEVP</td>
<td>146</td>
</tr>
<tr>
<td>Field Operations Engineer Certification</td>
<td>60 days</td>
<td>31 August - 20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,480</td>
<td>PROP/FEVDENG</td>
<td>147</td>
</tr>
<tr>
<td>Field Development Project</td>
<td>15 days</td>
<td>19 October - 6 November</td>
<td>Rueil-Malmaison</td>
<td>€9,840</td>
<td>PFD/FEVDEGB</td>
<td>148</td>
</tr>
<tr>
<td>E&amp;P Value Chain &amp; Front-End Development</td>
<td>5 days</td>
<td>19-23 October</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PIMP/PRIJAGFB</td>
<td>149</td>
</tr>
<tr>
<td>E&amp;P Project Risk &amp; Decision Analysis Workshop</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td>PIMP/PRAIMGB</td>
<td>150</td>
</tr>
<tr>
<td>E&amp;P Project Cost Estimation &amp; Control Certification</td>
<td>5 days</td>
<td>23-27 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCTR/COSTGB</td>
<td>151</td>
</tr>
</tbody>
</table>
## Course Index

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fee excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Drilling &amp; Completion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well Operations &amp; Completion Engineering Certification</td>
<td>40 days</td>
<td>27-12 November</td>
<td>Rueil-Malmaison</td>
<td>€3,690</td>
<td>GEND/CE</td>
<td>153</td>
</tr>
<tr>
<td>Supervisor Training on Drilling Simulator</td>
<td>5 days</td>
<td>3-7 February</td>
<td>Pau</td>
<td>€3,690</td>
<td>GEND/SSME</td>
<td>154</td>
</tr>
<tr>
<td>Drilling Fundamentals</td>
<td>5 days</td>
<td>9-13 March</td>
<td>Pau</td>
<td>€3,690</td>
<td>GEND/INFRE</td>
<td>155</td>
</tr>
<tr>
<td>Well Completion &amp; Servicing</td>
<td>5 days</td>
<td>27 January - 6 March</td>
<td>Pau</td>
<td>€3,690</td>
<td>GEND/NPFE</td>
<td>156</td>
</tr>
<tr>
<td>Drilling &amp; Completion Engineering Certification</td>
<td>98 days</td>
<td>27 January - 12 June</td>
<td>Pau</td>
<td>€50,420</td>
<td>GEND/FSPPE</td>
<td>157</td>
</tr>
<tr>
<td>Drilling Fundamentals</td>
<td>83 days</td>
<td>27 January - 14 February</td>
<td>Pau</td>
<td>€42,840</td>
<td>GEND/FSPPE</td>
<td>158</td>
</tr>
<tr>
<td>Completion Engineering</td>
<td>58 days</td>
<td>27 January - 6 March</td>
<td>Pau</td>
<td>€30,890</td>
<td>GEND/FSPPE</td>
<td>159</td>
</tr>
<tr>
<td><strong>Drilling</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical Aspects of Well Construction &amp; Planning</td>
<td>10 days</td>
<td>16-27 November</td>
<td>Rueil-Malmaison</td>
<td>€6,570</td>
<td>DRIL/MAPE</td>
<td>160</td>
</tr>
<tr>
<td>Geological Field Trip for Drillers</td>
<td>5 days</td>
<td>27-31 January</td>
<td>Pau</td>
<td>€3,690</td>
<td>DRIL/FTPE</td>
<td>161</td>
</tr>
<tr>
<td>Fundamentals of Drilling &amp; Completion</td>
<td>5 days</td>
<td>3-7 February</td>
<td>Pau</td>
<td>€3,690</td>
<td>DRIL/MAPE</td>
<td>162</td>
</tr>
<tr>
<td>Well Architecture &amp; Equipment</td>
<td>5 days</td>
<td>9-13 March</td>
<td>Pau</td>
<td>€3,690</td>
<td>DRIL/ANPE</td>
<td>163</td>
</tr>
<tr>
<td>Bit &amp; Drill String &amp; Fishing while Drilling</td>
<td>5 days</td>
<td>30 March - 3 April</td>
<td>Pau</td>
<td>€3,690</td>
<td>DRIL/BSPE</td>
<td>164</td>
</tr>
<tr>
<td>Rig, BOP’s &amp; Well Control Equipment</td>
<td>4 days</td>
<td>14-17 April</td>
<td>Pau</td>
<td>€3,690</td>
<td>DRIL/BRE</td>
<td>165</td>
</tr>
<tr>
<td>Data Acquisition during Drilling Operations</td>
<td>5 days</td>
<td>20-24 April</td>
<td>Pau</td>
<td>€3,690</td>
<td>DRIL/DOPE</td>
<td>166</td>
</tr>
<tr>
<td>HSE in Drilling Operations</td>
<td>4 days</td>
<td>4-7 March</td>
<td>Pau</td>
<td>€3,690</td>
<td>DRIL/HSPE</td>
<td>167</td>
</tr>
<tr>
<td>Directional &amp; Horizontal Drilling Certification</td>
<td>5 days</td>
<td>6-10 April</td>
<td>Pau</td>
<td>€3,690</td>
<td>DRIL/DTCE</td>
<td>168</td>
</tr>
<tr>
<td>Geomechanics for Drillers</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>DRIL/GEOME</td>
<td>169</td>
</tr>
<tr>
<td>Underbalanced &amp; Managed Pressure Drilling: Applications, Design &amp; Operations</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>DRIL/UM</td>
<td>170</td>
</tr>
<tr>
<td>Geosteering</td>
<td>3 days</td>
<td>30 November - 2 December</td>
<td>Rueil-Malmaison</td>
<td>€3,690</td>
<td>DRIL/GEOSTERE</td>
<td>171</td>
</tr>
<tr>
<td>Deepwater Drilling &amp; Development Certification</td>
<td>5 days</td>
<td>25-29 May</td>
<td>Pau</td>
<td>€3,690</td>
<td>DRIL/DDWE</td>
<td>172</td>
</tr>
<tr>
<td>Wellhead &amp; Blowout Preventers</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>DRIL/WBPE</td>
<td>173</td>
</tr>
<tr>
<td>Stuck Pipe Prevention</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>DRIL/SPPE</td>
<td>174</td>
</tr>
<tr>
<td>HPHT Drilling Design &amp; Operations</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>DRIL/HPDE</td>
<td>175</td>
</tr>
<tr>
<td><strong>Fluids</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drilling Fluids</td>
<td>5 days</td>
<td>16-20 March</td>
<td>Pau</td>
<td>€3,690</td>
<td>FLU/FLUE</td>
<td>176</td>
</tr>
<tr>
<td>Cementing Practices</td>
<td>5 days</td>
<td>23-27 March</td>
<td>Pau</td>
<td>€3,690</td>
<td>FLU/CMPE</td>
<td>177</td>
</tr>
<tr>
<td>Advanced Cementing Practices</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>FLU/CM2E</td>
<td>178</td>
</tr>
<tr>
<td><strong>Completion &amp; Well Operations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wellhead Selection &amp; Maintenance</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>COMP/WHMAINT</td>
<td>179</td>
</tr>
<tr>
<td>Well Productivity &amp; Reservoir - Wellbore Interface</td>
<td>5 days</td>
<td>10-14 February</td>
<td>Pau</td>
<td>€3,690</td>
<td>COMP/WPPLCTE</td>
<td>180</td>
</tr>
<tr>
<td>Well Test Operation</td>
<td>4 days</td>
<td>27-30 April</td>
<td>Pau</td>
<td>€3,690</td>
<td>COMP/WCEPE</td>
<td>181</td>
</tr>
<tr>
<td>Well - Completion Equipment &amp; Procedures for Flowing Wells</td>
<td>5 days</td>
<td>17-21 February</td>
<td>Pau</td>
<td>€3,690</td>
<td>COMP/ECFREE</td>
<td>182</td>
</tr>
<tr>
<td>Tubing Movement &amp; Forces</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>COMP/TUBMPE</td>
<td>183</td>
</tr>
<tr>
<td>Wellbore Treatments</td>
<td>5 days</td>
<td>24-28 February</td>
<td>Pau</td>
<td>€3,690</td>
<td>COMP/WTREAT</td>
<td>184</td>
</tr>
<tr>
<td>Matrix Acidizing</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>COMP/XADIC</td>
<td>185</td>
</tr>
<tr>
<td>Basic Hydraulic Fracturing</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>COMP/HFRACE</td>
<td>186</td>
</tr>
<tr>
<td>Artificial Lift &amp; Well Intervention Fundamentals</td>
<td>5 days</td>
<td>2-6 March</td>
<td>Pau</td>
<td>€3,690</td>
<td>COMP/ALWF</td>
<td>187</td>
</tr>
<tr>
<td>Artificial Lift: Gas Lift</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>COMP/GALFF</td>
<td>188</td>
</tr>
<tr>
<td>Artificial Lift: Pumping</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>COMP/ALWF</td>
<td>189</td>
</tr>
<tr>
<td>Coiled Tubing &amp; Nitrogen Operations in Completion &amp; Workover</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>COMP/CTAE</td>
<td>190</td>
</tr>
</tbody>
</table>

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

**Well Servicing & Workover**
- 5 days In-house course
- COMP/WSWOE

**Well Performance**
- 5 days In-house course
- COMP/WELLPERFE

**Advanced Well Performance**
- 10 days In-house course
- COMP/WELLPERF2E

**Well Production Integrity**
- 2 days In-house course
- COMP/WELINT

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

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

**Well Integrity Engineering Certification**
- 35 days In-house course
- COMP/WELINTERGENE

### Well Control

**Well Control - Level 2**
- 5 days In-house course
- WEL/FPESME2

**Well Control - Level 3 or 4**
- 5 days In-house course
- WEL/FPESME3-4

**Well Intervention & Pressure Control - Level 2**
- 5 days In-house course
- WEL/WEINE2

**Well Intervention & Pressure Control - Level 3 or 4**
- 5 days In-house course
- WEL/WEINE3-4

**Stripping**
- 3 days In-house course
- WELL/STRIPNE

### Production Engineering

#### Well Production

**Well Productivity & Reservoir - Wellbore Interface**
- 5 days 10-14 February Pau €3,690
- COMP/PPLCTE

**Wellbore Treatments**
- 5 days 24-28 February Pau €3,690
- COMP/TRAITE

**Artificial Lift & Well Intervention Fundamentals**
- 5 days 2-6 March Pau €3,690
- COMP/TAWOE

**Well Servicing & Workover**
- 5 days In-house course
- COMP/WSWOE

**Well Performance**
- 5 days In-house course
- COMP/WELLPERFE

**Advanced Well Performance**
- 10 days In-house course
- COMP/WELLPERF2E

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

**Well Equipment & Operation for Production Engineer**
- 5 days 19-23 October Rueil-Malmaison €3,690
- WPRO/WELLGB

#### Surface Production

**Production Engineering Certification**
- 60 days In-house course
- SPRO/PRODUCTIONGB

**Metering & Allocation**
- 5 days 26 September - 2 October Pau €3,930
- SPRO/METER

**Integrated Production Modeling - Module 1**
- 5 days In-house course
- SPRO/PRODPT1GB

**Integrated Production Modeling - Module 2 (Project)**
- 5 days In-house course
- SPRO/PRODPT2GB

**Gathering Network: Design Engineering**
- 5 days In-house course
- SPRO/NETWORKGB

**Pipeline Hydraulics & Multiphase Flow**
- 5 days In-house course
- SPRO/HYDRGB

**Pipeline Network Engineering & Operation Certification**
- 60 days In-house course
- SPRO/TRANSPORTGB

**Mature Fields - Surface Production Issues**
- 5 days In-house course
- SPRO/MATUREGB

**Heavy Oil Production & Processing**
- 5 days In-house course
- SPRO/HEAVYGB

**Chemicals used in Production Activities**
- 5 days In-house course
- PROP/CHEMICAL

**Gas Cycling: an Integrated Approach**
- 5 days In-house course
- NAT/GASCYCLGB

**Technical Standards for Surface Facilities Design**
- 5 days In-house course
- PENG/STANDGB

---

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

## Field Operations

<table>
<thead>
<tr>
<th>Production Operations</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil Terminals, FSO &amp; FPSO</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil &amp; Gas Field Processing</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Processing &amp; Surface Production Facilities</td>
<td>10 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil &amp; Gas Field Processing Troubleshooting</td>
<td>5 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparatory Course for Production Operator</td>
<td>25 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Operator Certification</td>
<td>185 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel Operator Certification</td>
<td>35 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Supervisor Certification</td>
<td>45 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Superintendent Certification</td>
<td>58 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Operations Engineer Certification</td>
<td>60 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well Operation &amp; Testing</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation of Gas Lift Wells</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemicals used in Production Activities</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas Processing &amp; Compression Operations</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Facilities Control Room Operation</td>
<td>10 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory Analyses for Oil &amp; Gas Production</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refresher Course for Production Operator</td>
<td>15 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pumps Operation</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressors Operation</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Production Excellence & Management

<table>
<thead>
<tr>
<th>Production Planning &amp; Monitoring</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production Accounting &amp; Material Balance</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asset Integrity Management</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Maintenance

<table>
<thead>
<tr>
<th>Instrumentation Maintenance</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnaround Management</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundamentals of Mechanical Maintenance</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump Maintenance Workshop</td>
<td>10 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressors Maintenance</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance &amp; Inspection of Rotating Machinery</td>
<td>10 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Management Certification</td>
<td>5 days</td>
<td>2-6 November</td>
<td>Pau</td>
<td>€3,680</td>
<td>MAI/MAINTMGT</td>
<td>253</td>
</tr>
<tr>
<td>Rotating Machinery Vibration Analysis</td>
<td>4 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upstream Maintenance Engineer Certification</td>
<td>60 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Supervisor Certification</td>
<td>35 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Superintendent Certification</td>
<td>58 days</td>
<td>9 September - 2 December</td>
<td>Pau, Rueil-Malmaison &amp; Martigues</td>
<td>€42,620</td>
<td>MAI/MAINSI</td>
<td>257</td>
</tr>
</tbody>
</table>

Tuition fees include instruction and documentation as well as meals and beverage breaks.
### Surface Facilities Engineering

<table>
<thead>
<tr>
<th>Process Engineering</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil &amp; Gas Process Engineering Certification</td>
<td>60 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>PENG/PROCESSENG</td>
<td>259</td>
</tr>
<tr>
<td>Advanced Oil &amp; Gas Process Engineering Certification</td>
<td>35 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>PENG/ADVPROCESSENG</td>
<td>260</td>
</tr>
<tr>
<td>Gas Production &amp; Processing Engineer Certification</td>
<td>70 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>PENG/GASENG</td>
<td>261</td>
</tr>
<tr>
<td>LNG Processing Engineer Certification</td>
<td>60 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>LNG/LNGENG</td>
<td>262</td>
</tr>
<tr>
<td>LNG Process Simulation</td>
<td>5 days</td>
<td>7-11 December</td>
<td>Rueil-Malmaison</td>
<td>€4,270</td>
<td>LNG/LNGSIMGB</td>
<td>263</td>
</tr>
<tr>
<td>Advanced Oil &amp; Gas Field Processing Certification</td>
<td>15 days</td>
<td>14-18 September</td>
<td>Rueil-Malmaison</td>
<td>€3,980</td>
<td>PENG/ADVGB</td>
<td>264</td>
</tr>
<tr>
<td>Module 1: Thermodynamics Applied to Well Effluent Processing</td>
<td>5 days</td>
<td></td>
<td>Rueil-Malmaison</td>
<td>€3,980</td>
<td>PENG/ADV1GB</td>
<td>265</td>
</tr>
<tr>
<td>Module 2: Oil &amp; Water Processing</td>
<td>5 days</td>
<td>21-25 September</td>
<td>Rueil-Malmaison</td>
<td>€3,980</td>
<td>PENG/ADV2GB</td>
<td>266</td>
</tr>
<tr>
<td>Module 3: Gas Processing &amp; Conditioning</td>
<td>5 days</td>
<td>28 September - 2 October</td>
<td>Rueil-Malmaison</td>
<td>€3,980</td>
<td>PENG/ADV3GB</td>
<td>267</td>
</tr>
<tr>
<td>Oil &amp; Gas Process Simulation</td>
<td>5 days</td>
<td>30 November - 4 December</td>
<td>Rueil-Malmaison</td>
<td>€3,980</td>
<td>PENG/ADV3GB</td>
<td>268</td>
</tr>
<tr>
<td>Schematization of Oil &amp; Gas Processes</td>
<td>3 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>PENG/SCHEMG</td>
<td>269</td>
</tr>
<tr>
<td>Gas Sweetening &amp; Sulfur Recovery</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>PENG/GASREGB</td>
<td>270</td>
</tr>
<tr>
<td>Fundamentals of Engineering Activities</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>PENG/FENGB</td>
<td>271</td>
</tr>
<tr>
<td>Technical Standards for Surface Facilities Design</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>PENG/TNGB</td>
<td>272</td>
</tr>
</tbody>
</table>

### Static Equipment

<table>
<thead>
<tr>
<th>Afternoon and Maintenance Engineering</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Equipment Engineering</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>STAT/PROCDESIGNGB</td>
<td>273</td>
</tr>
<tr>
<td>Flare Network Design Engineering</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>STAT/FLARE</td>
<td>274</td>
</tr>
<tr>
<td>Rotating Machinery Technology</td>
<td>5 days</td>
<td>12-16 October</td>
<td>Pau</td>
<td>€3,680</td>
<td>ROT/EQUIP2</td>
<td>275</td>
</tr>
<tr>
<td>Mechanical Design Engineering</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>ROT/MACHDESIGNGB</td>
<td>276</td>
</tr>
<tr>
<td>Gas Turbines</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>ROT/GT</td>
<td>277</td>
</tr>
</tbody>
</table>

### Electricity & Instrumentation

<table>
<thead>
<tr>
<th>Electrical &amp; Instrumentation for Oil &amp; Gas Facilities</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E&amp;I Technology for Oil &amp; Gas Facilities</td>
<td>5 days</td>
<td>5-9 October</td>
<td>Pau</td>
<td>€3,680</td>
<td>E&amp;I/E&amp;I1GB</td>
<td>278</td>
</tr>
<tr>
<td>Instrumentation, Process Control &amp; Safety Instrumented Systems</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>E&amp;I/INST1GB</td>
<td>279</td>
</tr>
<tr>
<td>Instrumentation Maintenance</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>MA/INSTMNTGB</td>
<td>280</td>
</tr>
<tr>
<td>Fundamentals of Electrical Power Generation &amp; Distribution Equipment</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>E&amp;I/ELEC1GB</td>
<td>281</td>
</tr>
<tr>
<td>Electrical Equipment &amp; Power Distribution Network (Advanced)</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>E&amp;I/ELEC2GB</td>
<td>282</td>
</tr>
</tbody>
</table>

### Maintenance & Inspection

<table>
<thead>
<tr>
<th>Maintenance &amp; Inspection</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Integrity Management</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>PMGT/INTEGRITYGB</td>
<td>283</td>
</tr>
<tr>
<td>Turnaround Management</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>MA/TURMAINTGB</td>
<td>284</td>
</tr>
<tr>
<td>Fundamentals of Mechanical Maintenance</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>MA/GENMAINTGB</td>
<td>285</td>
</tr>
<tr>
<td>Pump Maintenance Workshop</td>
<td>10 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>MA/PUMPMNTGB</td>
<td>286</td>
</tr>
<tr>
<td>Compressors Maintenance</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>MA/COMPMAINTGB</td>
<td>287</td>
</tr>
<tr>
<td>Maintenance &amp; Inspection of Rotating Machinery</td>
<td>10 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>MA/MAINTMNT</td>
<td>288</td>
</tr>
<tr>
<td>Maintenance Management Certification</td>
<td>5 days</td>
<td>2-6 November</td>
<td>Pau</td>
<td>€3,680</td>
<td>MA/MANMNT</td>
<td>289</td>
</tr>
<tr>
<td>Rotating Machinery Vibration Analysis</td>
<td>4 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>MTM/VRA - E</td>
<td>290</td>
</tr>
<tr>
<td>Maintenance Engineer Certificate</td>
<td>60 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>MA/MAINTENG</td>
<td>291</td>
</tr>
<tr>
<td>Corrosion Prevention in Oil &amp; Gas Production</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>INS/CORGB</td>
<td>292</td>
</tr>
<tr>
<td>Maintenance &amp; Inspection of Static Equipment</td>
<td>20 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>INS/SPMNT</td>
<td>293</td>
</tr>
<tr>
<td>Subsea Integrity Management (I) - Inspection, Monitoring &amp; Testing</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>INS/SPUB1</td>
<td>294</td>
</tr>
<tr>
<td>Subsea Integrity Management (II) - Non Conformity Management</td>
<td>5 days</td>
<td></td>
<td>In-house course</td>
<td></td>
<td>INS/SPUB2</td>
<td>295</td>
</tr>
</tbody>
</table>
# Project Management

## Project Implementation

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>E&amp;P Project Management Certification</td>
<td>5 days</td>
<td>8-12 June</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PIMP/PROJGB</td>
<td>297</td>
</tr>
<tr>
<td>Upstream Project Management Certification</td>
<td>65 days</td>
<td>16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PIMP/UIPMSGB</td>
<td>298</td>
</tr>
<tr>
<td>E&amp;P Value Chain &amp; Front-End Development</td>
<td>5 days</td>
<td>19-23 October</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PIMP/PROJAFGB</td>
<td>299</td>
</tr>
<tr>
<td>E&amp;P Projects Value Management</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PIMP/PVMBGB</td>
<td>300</td>
</tr>
<tr>
<td>E&amp;P Project Risk &amp; Decision Analysis Workshop</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PIMP/PRDAWGB</td>
<td>301</td>
</tr>
<tr>
<td>E&amp;P Project Quality &amp; Risk Management</td>
<td>3 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PIMP/QACGB</td>
<td>302</td>
</tr>
<tr>
<td>Offshore E&amp;P Project Management</td>
<td>3 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PIMP/OPPMGB</td>
<td>303</td>
</tr>
<tr>
<td>Building a Project Management Office (PMO)</td>
<td>3 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PIMP/PMOGB</td>
<td>304</td>
</tr>
<tr>
<td>E&amp;P Project Logistics Management</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PIMP/LOGGB</td>
<td>305</td>
</tr>
<tr>
<td>E&amp;P Project Control Tools</td>
<td>5 days</td>
<td>12-16 October</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCTR/PCGB</td>
<td>306</td>
</tr>
<tr>
<td>E&amp;P Technical Service Contracts</td>
<td>5 days</td>
<td>19-23 October</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCTR/CPG</td>
<td>307</td>
</tr>
<tr>
<td>E&amp;P Technical Contract Negotiation</td>
<td>4 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCTR/NEGOG</td>
<td>308</td>
</tr>
<tr>
<td>E&amp;P Project Cost Estimation &amp; Control Certification</td>
<td>5 days</td>
<td>23-27 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCTR/COSTGB</td>
<td>309</td>
</tr>
<tr>
<td>E&amp;P Project Operating Expenses Optimization</td>
<td>2 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCTR/OPXGB</td>
<td>310</td>
</tr>
<tr>
<td>E&amp;P Project Planning &amp; Scheduling Workshop</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCTR/PSPCGB</td>
<td>311</td>
</tr>
</tbody>
</table>

## Project Control

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstream Project Construction Techniques</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCONS/CONST1GB</td>
</tr>
<tr>
<td>Upstream Project Construction Site Administration</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCONS/CONST3GB</td>
</tr>
<tr>
<td>Upstream Project Construction HSE Management</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCONS/CONST3GB</td>
</tr>
<tr>
<td>Offshore Oil &amp; Gas Project Installation</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCONS/CONST4GB</td>
</tr>
<tr>
<td>Upstream Project Construction Works Supervision</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCONS/CONSUG</td>
</tr>
<tr>
<td>Upstream Project Precommissioning, Commissioning &amp; Start-Up</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCONS/PECOMGB</td>
</tr>
<tr>
<td>Upstream Project Abandonment Operations</td>
<td>5 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCONS/BSMGB</td>
</tr>
<tr>
<td>Subsea Production Systems (SPS)</td>
<td>5 days</td>
<td>14-18 September</td>
<td>Rueil-Malmaison</td>
<td>€3,510</td>
<td>SUB/SPSSGB</td>
</tr>
<tr>
<td>Subsea Pipelines</td>
<td>4 days</td>
<td>21-24 September</td>
<td>Rueil-Malmaison</td>
<td>€2,750</td>
<td>SUB/SPPEG</td>
</tr>
<tr>
<td>E&amp;P Project Construction Certification</td>
<td>60 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCONS/CONGB</td>
</tr>
<tr>
<td>E&amp;P Construction Superintendent Certification</td>
<td>60 days</td>
<td>In-house course</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>PCONS/CONSUG</td>
</tr>
</tbody>
</table>

*Tuition fees include instruction and documentation as well as meals and beverage breaks*
## Course index

<table>
<thead>
<tr>
<th><strong>HSE</strong></th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fees excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational HSE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSE in Drilling Operations</td>
<td>5 days</td>
<td>4-7 May</td>
<td>Pau</td>
<td>€3,690</td>
<td>OHSE/HSEE</td>
<td>324</td>
</tr>
<tr>
<td>Well Control - Level 2</td>
<td>5 days</td>
<td>9-13 March 11-15 May 14-18 September</td>
<td>Pau</td>
<td>€2,490</td>
<td>WEL/FPESME2</td>
<td>325</td>
</tr>
<tr>
<td>Well Control - Level 3 or 4</td>
<td>5 days</td>
<td>25-29 May</td>
<td>Pau</td>
<td>€3,580</td>
<td>WEL/WEINE3-4</td>
<td>326</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 2</td>
<td>5 days</td>
<td>9 September - 2 December</td>
<td>Pau &amp; Rueil</td>
<td>€42,620</td>
<td>OHSE/HESEI</td>
<td>327</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 3 or 4</td>
<td>5 days</td>
<td>28 September - 2 October</td>
<td>Pau</td>
<td>€3,680</td>
<td>OHSE/EXPSAFOP</td>
<td>328</td>
</tr>
<tr>
<td>HSE Superintendent Certification</td>
<td>58 days</td>
<td>9 September - 2 December</td>
<td>Pau &amp; Rueil</td>
<td>€42,620</td>
<td>OHSE/HSEEI</td>
<td>329</td>
</tr>
<tr>
<td>HSE in Surface Production Operations</td>
<td>5 days</td>
<td>28 September - 2 October</td>
<td>Pau</td>
<td>€3,690</td>
<td>OHSE/HSEEI</td>
<td>330</td>
</tr>
<tr>
<td>Unconventional Resources: Safety Issues</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>OHSE/SHALESAFOPGB</td>
<td>331</td>
</tr>
<tr>
<td>Positive HSE Culture</td>
<td>2 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>OHSE/POSTICULTGB</td>
<td>332</td>
</tr>
<tr>
<td>HSE in Maintenance &amp; Construction Activities</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>OHSE/WORKGB</td>
<td>333</td>
</tr>
<tr>
<td>Occupational Safety</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>OHSE/OCCSAFGB</td>
<td>334</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>OHSE/OCCHEALTHGB</td>
<td>335</td>
</tr>
<tr>
<td><strong>Process Safety &amp; Safety Engineering</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Safety Engineer Certification</td>
<td>40 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>PHSE/PSENG</td>
<td>336</td>
</tr>
<tr>
<td>Fundamentals of Process Safety</td>
<td>5 days</td>
<td>2-9 November</td>
<td>Pau</td>
<td>€3,680</td>
<td>PHSE/PSGB</td>
<td>337</td>
</tr>
<tr>
<td>Process Safety Management</td>
<td>10 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>PHSE/PSMG</td>
<td>338</td>
</tr>
<tr>
<td>Safety Engineering Certification</td>
<td>15 days</td>
<td>16 November - 4 December</td>
<td>Pau</td>
<td>€9,850</td>
<td>PHSE/SAFENGGB</td>
<td>339</td>
</tr>
<tr>
<td>Safety Engineering - Module 1</td>
<td>5 days</td>
<td>16-20 November</td>
<td>Pau</td>
<td>€3,680</td>
<td>PHSE/SAFENG1GB</td>
<td>340</td>
</tr>
<tr>
<td>Safety Engineering - Module 2</td>
<td>5 days</td>
<td>23-27 November</td>
<td>Pau</td>
<td>€3,680</td>
<td>PHSE/SAFENG2GB</td>
<td>341</td>
</tr>
<tr>
<td>Safety Engineering - Module 3 (Project)</td>
<td>5 days</td>
<td>30 November - 4 December</td>
<td>Pau</td>
<td>€3,680</td>
<td>PHSE/SEWGB</td>
<td>342</td>
</tr>
<tr>
<td>Area Classification &amp; Control of Ignition Sources</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>PHSE/AREACLASSGB</td>
<td>343</td>
</tr>
<tr>
<td><strong>Sustainable Development</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental &amp; Social Risk Management</td>
<td>5 days</td>
<td>16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>SUST/ENVGB</td>
<td>344</td>
</tr>
<tr>
<td>Social Risk Management</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>SUST/5CDALGB</td>
<td>345</td>
</tr>
<tr>
<td>Environmental Management</td>
<td>5 days</td>
<td>19-23 October</td>
<td>Pau</td>
<td>€3,680</td>
<td>SUST/ENVGB</td>
<td>346</td>
</tr>
<tr>
<td>Unconventional Resources: Environmental Management Certification</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>SUST/SHALEENVGB</td>
<td>347</td>
</tr>
<tr>
<td>Gas Flaring Reduction: Operational &amp; Environmental Stakes</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>SUST/GASMGTGB</td>
<td>348</td>
</tr>
<tr>
<td>Environmental Management of Water in E&amp;P</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>SUST/WATERMGT</td>
<td>349</td>
</tr>
<tr>
<td>Environmental Pollution &amp; Waste Management</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>SUST/POLLUTIONGB</td>
<td>350</td>
</tr>
<tr>
<td>Oil Spill Management</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>SUST/OILSPILLGB</td>
<td>351</td>
</tr>
<tr>
<td><strong>HSE Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSE Engineer Certification</td>
<td>60 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>HMGT/HSEENG</td>
<td>352</td>
</tr>
<tr>
<td>HSE Management</td>
<td>5 days</td>
<td>2-6 November</td>
<td>Pau</td>
<td>€3,680</td>
<td>HMGT/HSEMG</td>
<td>353</td>
</tr>
<tr>
<td>Emergency Response Planning</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>HMGT/EMERGENCYGB</td>
<td>354</td>
</tr>
<tr>
<td>Major Emergency Management - Initial Response Training</td>
<td>3 days</td>
<td>26-28 October</td>
<td>Pau</td>
<td>€2,220</td>
<td>HMGT/EMERG</td>
<td>355</td>
</tr>
<tr>
<td>HSE Management of Contractors</td>
<td>2 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>HMGT/HSECTRGB</td>
<td>356</td>
</tr>
<tr>
<td>HSE Management of Logistics</td>
<td>3 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>HMGT/HSELOGGB</td>
<td>357</td>
</tr>
<tr>
<td>HSE for Support Personnel</td>
<td>60 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>HMGT/HSESupportGB</td>
<td>358</td>
</tr>
<tr>
<td>Upstream Project Construction HSE Management</td>
<td>5 days</td>
<td>In-house course</td>
<td></td>
<td></td>
<td>PCCONS/CONST3GB</td>
<td>359</td>
</tr>
</tbody>
</table>

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

### Gas

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fee excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas Chain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>5 days</td>
<td>5-9 October</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>NATG/NATGAS</td>
<td>361</td>
</tr>
<tr>
<td>Gas Cycling: an Integrated Approach</td>
<td>5 days</td>
<td>In-house course</td>
<td>NATG/GASCYCLGB</td>
<td></td>
<td>362</td>
<td></td>
</tr>
<tr>
<td>Natural Gas Storage</td>
<td>2 days</td>
<td>In-house course</td>
<td>NATG/STOCKGB</td>
<td></td>
<td>363</td>
<td></td>
</tr>
<tr>
<td>Natural Gas Transport by Pipeline</td>
<td>2 days</td>
<td>In-house course</td>
<td>NATG/TRANSGB</td>
<td></td>
<td>364</td>
<td></td>
</tr>
<tr>
<td>From Gas to Energy</td>
<td>5 days</td>
<td>In-house course</td>
<td>NATG/ENERGYGB</td>
<td></td>
<td>365</td>
<td></td>
</tr>
<tr>
<td>Gas Production &amp; Processing Engineer Certification</td>
<td>70 days</td>
<td>In-house course</td>
<td>PENG/GASENG</td>
<td></td>
<td>366</td>
<td></td>
</tr>
<tr>
<td>Gas Sweetening &amp; Sulfur Recovery</td>
<td>5 days</td>
<td>In-house course</td>
<td>PENG/ACIDGB</td>
<td></td>
<td>367</td>
<td></td>
</tr>
<tr>
<td>Gas Processing &amp; Compression Operations</td>
<td>5 days</td>
<td>In-house course</td>
<td>PROPS/GASCHANGBG</td>
<td></td>
<td>368</td>
<td></td>
</tr>
<tr>
<td>Gas Flaring Reduction: Operational &amp; Environmental Stakes</td>
<td>3 days</td>
<td>In-house course</td>
<td>SUST/GASMFGB</td>
<td></td>
<td>369</td>
<td></td>
</tr>
<tr>
<td>Laboratory Analyses for Oil &amp; Gas Production</td>
<td>5 days</td>
<td>In-house course</td>
<td>PROPS/LABOGB</td>
<td></td>
<td>370</td>
<td></td>
</tr>
</tbody>
</table>

### LNG Chain

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fee excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquefied Natural Gas (LNG)</td>
<td>5 days</td>
<td>2-6 November</td>
<td>Rueil-Malmaison</td>
<td>€4,840</td>
<td>LNG/LNG</td>
<td>371</td>
</tr>
<tr>
<td>LNG Processing Engineer Certification</td>
<td>60 days</td>
<td>In-house course</td>
<td>LNG/LNGENG</td>
<td></td>
<td>372</td>
<td></td>
</tr>
<tr>
<td>NEW Natural Gas Liquids Extraction</td>
<td>3 days</td>
<td>21-23 April</td>
<td>Rueil-Malmaison</td>
<td>€3,200</td>
<td>LNG/NGL</td>
<td>373</td>
</tr>
<tr>
<td>LNG Process Simulation</td>
<td>5 days</td>
<td>7-11 December</td>
<td>Rueil-Malmaison</td>
<td>€4,270</td>
<td>LNG/LNGSIMGB</td>
<td>374</td>
</tr>
</tbody>
</table>

### Unconventional

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fee excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<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>
<td></td>
<td>376</td>
<td></td>
</tr>
<tr>
<td>Hydrocarbons in Unconventional Settings</td>
<td>3 days</td>
<td>In-house course</td>
<td>UNCO/UNCON</td>
<td></td>
<td>377</td>
<td></td>
</tr>
<tr>
<td>Unconventional Resources - Shale Gas Fundamentals</td>
<td>5 days</td>
<td>In-house course</td>
<td>UNCO/UNCONAV</td>
<td></td>
<td>378</td>
<td></td>
</tr>
<tr>
<td>Unconventional Resources - “Tight &amp; Shales Gas: an Integrated Subsurface to Surface Approach”</td>
<td>50 days</td>
<td>In-house course</td>
<td>UNCO/UNCONVFIELD</td>
<td></td>
<td>379</td>
<td></td>
</tr>
<tr>
<td>Unconventional Resources - Shale Gas Characterization, Modeling &amp; Engineering</td>
<td>10 days</td>
<td>In-house course</td>
<td>UNCO/SHALE</td>
<td></td>
<td>380</td>
<td></td>
</tr>
<tr>
<td>Well Architecture &amp; Directional Drilling in Unconventional Wells</td>
<td>5 days</td>
<td>In-house course</td>
<td>UNCO/UNPARDEDE</td>
<td></td>
<td>381</td>
<td></td>
</tr>
<tr>
<td>Unconventional Reservoirs Completion &amp; Stimulation</td>
<td>5 days</td>
<td>In-house course</td>
<td>UNCO/UNCURCS</td>
<td></td>
<td>382</td>
<td></td>
</tr>
<tr>
<td>Well Performance: Shale Gas Wells</td>
<td>5 days</td>
<td>In-house course</td>
<td>UNCO/UNML/PEEPSIE</td>
<td></td>
<td>383</td>
<td></td>
</tr>
<tr>
<td>Unconventional Resources: Safety Issues</td>
<td>5 days</td>
<td>In-house course</td>
<td>DHSE/SHALESAFOPGB</td>
<td></td>
<td>384</td>
<td></td>
</tr>
<tr>
<td>Unconventional Resources: Environmental Management Certification</td>
<td>5 days</td>
<td>In-house course</td>
<td>SUST/SHALEENVMGB</td>
<td></td>
<td>385</td>
<td></td>
</tr>
</tbody>
</table>

### Offshore

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fee excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore Field Architecture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deepwater Drilling &amp; Development Certification</td>
<td>5 days</td>
<td>25-29 May</td>
<td>Pau</td>
<td>€3,690</td>
<td>DRIL/DFDWE</td>
<td>387</td>
</tr>
<tr>
<td>HPHT Drilling Design &amp; Operations</td>
<td>5 days</td>
<td>16-20 November</td>
<td>Rueil-Malmaison</td>
<td>€3,690</td>
<td>DRIL/HPHTE</td>
<td>388</td>
</tr>
<tr>
<td>Offshore Field Development - Pipelines &amp; Flow Assurance</td>
<td>5 days</td>
<td>19-23 October</td>
<td>Rueil-Malmaison</td>
<td>€3,680</td>
<td>ODEV/OFPSHGB</td>
<td>389</td>
</tr>
<tr>
<td>Offshore Field Development Engineering Certification</td>
<td>65 days</td>
<td>In-house course</td>
<td>ODEV/OFSHDEVGB</td>
<td></td>
<td>390</td>
<td></td>
</tr>
</tbody>
</table>

### Subsea

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Duration</th>
<th>Dates</th>
<th>Location</th>
<th>Tuition Fee excl. VAT</th>
<th>Reference</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gathering Network: Design Engineering</td>
<td>5 days</td>
<td>In-house course</td>
<td>SPR/NETWORKGB</td>
<td></td>
<td>391</td>
<td></td>
</tr>
<tr>
<td>Pipeline Hydraulics &amp; Multiphase Flow</td>
<td>5 days</td>
<td>In-house course</td>
<td>SPR/HYDROGB</td>
<td></td>
<td>392</td>
<td></td>
</tr>
<tr>
<td>Subsea Activities</td>
<td>9 days</td>
<td>In-house course</td>
<td>SUB/OFFGB</td>
<td></td>
<td>393</td>
<td></td>
</tr>
<tr>
<td>Subsea Production Systems (SPS)</td>
<td>5 days</td>
<td>14-18 September</td>
<td>Rueil-Malmaison</td>
<td>€3,510</td>
<td>SUB/SPSB</td>
<td>394</td>
</tr>
<tr>
<td>Subsea Pipelines</td>
<td>4 days</td>
<td>21-24 September</td>
<td>Rueil-Malmaison</td>
<td>€2,750</td>
<td>SUB/PEEPGB</td>
<td>395</td>
</tr>
<tr>
<td>Subsea Integrity Management (I) - Inspection, Monitoring &amp; Testing</td>
<td>5 days</td>
<td>In-house course</td>
<td>INSP/SUBINT1</td>
<td></td>
<td>396</td>
<td></td>
</tr>
<tr>
<td>Subsea Integrity Management (II) - Non Conformity Management</td>
<td>5 days</td>
<td>In-house course</td>
<td>INSP/SUBINT2</td>
<td></td>
<td>397</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Title of the course</th>
<th>Location</th>
<th>Duration</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E&amp;P Chain</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Introduction to Technical Topics</td>
<td>Rueil</td>
<td>5 d</td>
<td>11</td>
<td>16</td>
<td>20</td>
<td>23</td>
<td>27</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>33</td>
</tr>
<tr>
<td>Exploration &amp; Production Overview</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td>17</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>Introduction to Petroleum Engineering</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td>07</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Drilling Fundamentals</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td>07</td>
<td>11</td>
<td>15</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digitalization &amp; Data Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEW Data Management for Oil &amp; Gas Engineers</td>
<td>Rueil</td>
<td>25 d</td>
<td>03</td>
<td>10</td>
<td>17</td>
<td>19</td>
<td>22</td>
<td>31</td>
<td>20</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>41</td>
</tr>
<tr>
<td>NEW Data Management Fundamentals (DAMA)</td>
<td>Rueil</td>
<td>5 d</td>
<td>16</td>
<td>19</td>
<td>27</td>
<td>34</td>
<td>38</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>NEW Data Management &amp; IT/IS-GIS</td>
<td>Rueil</td>
<td>5 d</td>
<td>03</td>
<td>11</td>
<td>15</td>
<td>18</td>
<td>20</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>43</td>
</tr>
<tr>
<td>NEW Introduction to Data Management for Operations</td>
<td>Rueil</td>
<td>3 d</td>
<td>07</td>
<td>09</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>44</td>
</tr>
<tr>
<td><strong>Upstream Economics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Oil Summit</td>
<td>Paris</td>
<td>1 d</td>
<td>16</td>
<td>18</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>International Gas &amp; Power Summit</td>
<td>Paris</td>
<td>1 d</td>
<td>16</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>Overview of Petroleum Economics</td>
<td>Rueil</td>
<td>4 d</td>
<td>01</td>
<td>04</td>
<td>08</td>
<td>11</td>
<td>15</td>
<td>18</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>Overview of Natural Gas Economics</td>
<td>Rueil</td>
<td>4 d</td>
<td>08</td>
<td>11</td>
<td>15</td>
<td>18</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>Liquefied Natural Gas Economics</td>
<td>Rueil</td>
<td>4 d</td>
<td>08</td>
<td>11</td>
<td>15</td>
<td>18</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>49</td>
</tr>
<tr>
<td>Natural Gas &amp; Electricity Trading</td>
<td>Rueil</td>
<td>2 d</td>
<td>20</td>
<td>23</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>51</td>
</tr>
<tr>
<td>Oil Markets &amp; Trading</td>
<td>Rueil</td>
<td>3 d</td>
<td>27</td>
<td>29</td>
<td>32</td>
<td>35</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>Contractual Framework of Exploration &amp; Production</td>
<td>Rueil</td>
<td>3 d</td>
<td>23</td>
<td>24</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>54</td>
</tr>
<tr>
<td>Economic Framework of Exploration-Production</td>
<td>Rueil</td>
<td>5 d</td>
<td>20</td>
<td>24</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>56</td>
</tr>
<tr>
<td>Negotiation of Exploration-Production Contracts</td>
<td>Rueil</td>
<td>4 d</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>Economics &amp; Risk Analysis of Upstream Projects</td>
<td>Rueil</td>
<td>5 d</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td>36</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>58</td>
</tr>
<tr>
<td>Investment Profitability Studies in the Oil &amp; Gas Industry</td>
<td>Rueil</td>
<td>3 d</td>
<td>26</td>
<td>29</td>
<td>32</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Upstream Contracts Audit</td>
<td>Rueil</td>
<td>5 d</td>
<td>26</td>
<td>29</td>
<td>32</td>
<td>35</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>65</td>
</tr>
<tr>
<td><strong>Competency Management &amp; Training Engineering</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E&amp;P Project Management Certification</td>
<td>Rueil</td>
<td>5 d</td>
<td>09</td>
<td>12</td>
<td>16</td>
<td>19</td>
<td>22</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>73</td>
</tr>
<tr>
<td><strong>Exploration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Basin Exploration</td>
<td>Rueil</td>
<td>5 d</td>
<td>31</td>
<td>04</td>
<td>07</td>
<td>11</td>
<td>15</td>
<td>18</td>
<td>21</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>77</td>
</tr>
<tr>
<td><strong>Methods &amp; Tools</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petroleum Geophysics</td>
<td>Rueil</td>
<td>10 d</td>
<td>31</td>
<td>04</td>
<td>07</td>
<td>11</td>
<td>15</td>
<td>18</td>
<td>21</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>79</td>
</tr>
<tr>
<td>Well Logging &amp; Qualitative Log Interpretation</td>
<td>Rueil</td>
<td>5 d</td>
<td>14</td>
<td>18</td>
<td>21</td>
<td>24</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>84</td>
</tr>
<tr>
<td>3D Seismic Interpretation Workshop</td>
<td>Rueil</td>
<td>10 d</td>
<td>14</td>
<td>18</td>
<td></td>
<td>21</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>85</td>
</tr>
<tr>
<td>Sedimentology &amp; Sequence Stratigraphy</td>
<td>Rueil</td>
<td>5 d</td>
<td>15</td>
<td>19</td>
<td>22</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>86</td>
</tr>
<tr>
<td><strong>From Basin to Prospect Evaluation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Play Assessment &amp; Prospect Generation</td>
<td>Rueil</td>
<td>5 d</td>
<td>22</td>
<td>26</td>
<td>29</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>92</td>
</tr>
</tbody>
</table>
### Course calendar

<table>
<thead>
<tr>
<th>Title of the course</th>
<th>Location</th>
<th>Duration</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reservoir &amp; Field Development</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir Characterization &amp; Modeling</td>
<td>Rueil</td>
<td>58 d</td>
<td>07 ► 27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>101</td>
</tr>
<tr>
<td>Reservoir Characterization &amp; Modeling Certification</td>
<td>Rueil</td>
<td>5 d</td>
<td>21 ► 25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>102</td>
</tr>
<tr>
<td>Quantitative Well Log Analysis</td>
<td>Rueil</td>
<td>5 d</td>
<td>12 ► 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>105</td>
</tr>
<tr>
<td>Petroleum Geostatistics</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>02 ► 06</td>
<td></td>
<td></td>
<td></td>
<td>108</td>
</tr>
<tr>
<td>Naturally-Fractured Reservoirs: Static &amp; Dynamic Modeling</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>07 ► 22</td>
<td></td>
<td></td>
<td></td>
<td>109</td>
</tr>
<tr>
<td>Petrophysical Properties: Core, Log &amp; Test Data Integration for Reservoir Modeling</td>
<td>Rueil</td>
<td>4 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11 ► 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reservoir Engineering</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Reservoir Engineering</td>
<td>Rueil</td>
<td>5 d</td>
<td>14 ► 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>127</td>
</tr>
<tr>
<td>Reservoir Fluid Properties - PVT</td>
<td>Rueil</td>
<td>5 d</td>
<td>09 ► 09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>128</td>
</tr>
<tr>
<td>Drilling &amp; Completion - Wellbore Interface &amp; Well Productivity</td>
<td>Rueil</td>
<td>5 d</td>
<td>12 ► 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>129</td>
</tr>
<tr>
<td>Well Testing &amp; Well Test Analysis</td>
<td>Rueil</td>
<td>5 d</td>
<td>19 ► 23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>130</td>
</tr>
<tr>
<td>Drive Mechanisms - Enhanced Oil Recovery</td>
<td>Rueil</td>
<td>8 d</td>
<td>24 ► 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>131</td>
</tr>
<tr>
<td>Dynamic Reservoir Simulation</td>
<td>Rueil</td>
<td>10 d</td>
<td>16 ► 27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>132</td>
</tr>
<tr>
<td>EOR Concepts &amp; Applications</td>
<td>Pau</td>
<td>5 d</td>
<td>28 ► 02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>133</td>
</tr>
<tr>
<td><strong>Reservoir Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir Engineering Certification</td>
<td>Rueil</td>
<td>64 d</td>
<td>14 ► 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>141</td>
</tr>
<tr>
<td>Reservoir Management Workshop</td>
<td>Rueil</td>
<td>4 d</td>
<td>05 ► 09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>142</td>
</tr>
<tr>
<td>Reserves Evaluation - Risks &amp; Uncertainties Certification</td>
<td>Pau</td>
<td>5 d</td>
<td>05 ► 09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>143</td>
</tr>
<tr>
<td><strong>Field Development</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Operations Engineer Certification</td>
<td>Rueil</td>
<td>60 d</td>
<td>21 ► 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>147</td>
</tr>
<tr>
<td>Field Development Project</td>
<td>Rueil</td>
<td>15 d</td>
<td>19 ► 06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>148</td>
</tr>
<tr>
<td>E&amp;P Value Chain &amp; Front-End Development</td>
<td>Rueil</td>
<td>5 d</td>
<td>19 ► 23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>149</td>
</tr>
<tr>
<td>E&amp;P Project Cost Estimation &amp; Control Certification</td>
<td>Rueil</td>
<td>5 d</td>
<td>23 ► 27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>151</td>
</tr>
<tr>
<td>Title of the course</td>
<td>Location</td>
<td>Duration</td>
<td>January</td>
<td>February</td>
<td>March</td>
<td>April</td>
<td>May</td>
<td>June</td>
<td>July</td>
<td>August</td>
<td>September</td>
<td>October</td>
<td>November</td>
<td>December</td>
<td>Page</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>----------</td>
<td>----------</td>
<td>---------</td>
<td>----------</td>
<td>-------</td>
<td>-------</td>
<td>-----</td>
<td>------</td>
<td>------</td>
<td>--------</td>
<td>-----------</td>
<td>---------</td>
<td>----------</td>
<td>----------</td>
<td>------</td>
</tr>
<tr>
<td>Drilling &amp; Completion Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drilling Fundamentals</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>155</td>
</tr>
<tr>
<td>Rueil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well Completion &amp; Servicing</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>156</td>
</tr>
<tr>
<td>Drilling &amp; Completion Engineering Certification</td>
<td>Pau</td>
<td>98 d</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td></td>
<td></td>
<td>157</td>
</tr>
<tr>
<td>Drilling Engineering</td>
<td>Pau</td>
<td>83 d</td>
<td>27</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td></td>
<td></td>
<td>158</td>
</tr>
<tr>
<td>Completion Engineering</td>
<td>Pau</td>
<td>58 d</td>
<td>27</td>
<td>11</td>
<td>06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>09</td>
<td></td>
<td></td>
<td>159</td>
</tr>
<tr>
<td>Drilling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical Aspects of Well Construction &amp; Planning</td>
<td>Rueil</td>
<td>10 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>160</td>
</tr>
<tr>
<td>Geological Field Trip for Drillers</td>
<td>Pau</td>
<td>5 d</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td></td>
<td></td>
<td>161</td>
</tr>
<tr>
<td>Fundamentals of Drilling &amp; Completion</td>
<td>Pau</td>
<td>5 d</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>07</td>
<td></td>
<td></td>
<td>162</td>
</tr>
<tr>
<td>Well Architecture &amp; Equipment</td>
<td>Pau</td>
<td>5 d</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>07</td>
<td></td>
<td></td>
<td>163</td>
</tr>
<tr>
<td>Bit &amp; Drill String &amp; Fishing while Drilling</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td></td>
<td></td>
<td>164</td>
</tr>
<tr>
<td>Rig, BOP’s &amp; Well Control Equipment</td>
<td>Pau</td>
<td>4 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td></td>
<td></td>
<td>165</td>
</tr>
<tr>
<td>Data Acquisition during Drilling Operations</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22</td>
<td></td>
<td></td>
<td>166</td>
</tr>
<tr>
<td>HSE in Drilling Operations</td>
<td>Pau</td>
<td>4 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31</td>
<td></td>
<td></td>
<td>167</td>
</tr>
<tr>
<td>Directional &amp; Horizontal Drilling Certification</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>01</td>
<td></td>
<td></td>
<td>168</td>
</tr>
<tr>
<td>Geosteering</td>
<td>Rueil</td>
<td>3 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td></td>
<td></td>
<td>171</td>
</tr>
<tr>
<td>Deepwater Drilling &amp; Development Certification</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23</td>
<td></td>
<td></td>
<td>172</td>
</tr>
<tr>
<td>Fluids</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drilling Fluids</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td>176</td>
</tr>
<tr>
<td>Cementing Practices</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>03</td>
<td></td>
<td></td>
<td>177</td>
</tr>
<tr>
<td>Completion &amp; Well Operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well Productivity &amp; Reservoir - Wellbore Interface</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td>180</td>
</tr>
<tr>
<td>Well Test Operation</td>
<td>Pau</td>
<td>4 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td></td>
<td></td>
<td>181</td>
</tr>
<tr>
<td>Well-Completion Equipment &amp; Procedures for Flowing Wells</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27</td>
<td></td>
<td></td>
<td>182</td>
</tr>
<tr>
<td>Wellbore Treatments</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>24</td>
<td></td>
<td></td>
<td>184</td>
</tr>
<tr>
<td>Artificial Lift &amp; Well Intervention Fundamentals</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>34</td>
<td></td>
<td></td>
<td>187</td>
</tr>
<tr>
<td>Well Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well Control - Level 3 or 4</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>08</td>
<td></td>
<td></td>
<td>199</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 3 or 4</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>08</td>
<td></td>
<td></td>
<td>201</td>
</tr>
</tbody>
</table>
## Course calendar

<table>
<thead>
<tr>
<th>Title of the course</th>
<th>Location</th>
<th>Duration</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production Engineering</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Well Production</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well Productivity &amp; Reservoir - Wellbore Interface</td>
<td>Pau</td>
<td>5 d</td>
<td>13–14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>204</td>
</tr>
<tr>
<td>Wellbore Treatments</td>
<td>Pau</td>
<td>5 d</td>
<td>24–28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>205</td>
</tr>
<tr>
<td>Artificial Lift &amp; Well Intervention Fundamentals</td>
<td>Pau</td>
<td>5 d</td>
<td>02–06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>206</td>
</tr>
<tr>
<td>Well Equipment &amp; Operation for Production Engineer</td>
<td>Rueil</td>
<td>5 d</td>
<td>02–06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>211</td>
</tr>
<tr>
<td><strong>Surface Production</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metering &amp; Allocation</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>213</td>
</tr>
<tr>
<td><strong>Field Operations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Production Operations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil &amp; Gas Field Processing</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>226</td>
</tr>
<tr>
<td>Field Processing &amp; Surface Production Facilities</td>
<td>Rueil</td>
<td>10 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>227</td>
</tr>
<tr>
<td>Production Superintendent Certification</td>
<td>Pau &amp; Rueil</td>
<td>58 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>233</td>
</tr>
<tr>
<td>Field Operations Engineer Certification</td>
<td>Rueil</td>
<td>60 d</td>
<td>31–32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>234</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Management Certification</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>253</td>
</tr>
<tr>
<td>Maintenance Superintendent Certification</td>
<td>Pau, Rueil, Martigues</td>
<td>58 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>257</td>
</tr>
<tr>
<td><strong>Surface Facilities Engineering</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Process Engineering</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNG Process Simulation</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>263</td>
</tr>
<tr>
<td>Module 1: Thermodynamics Applied to Well Effluent Processing</td>
<td>Rueil</td>
<td>5 d</td>
<td>14–16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>265</td>
</tr>
<tr>
<td>Module 2: Oil &amp; Water Processing</td>
<td>Rueil</td>
<td>5 d</td>
<td>21–23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>266</td>
</tr>
<tr>
<td>Module 3: Gas Processing &amp; Conditioning</td>
<td>Rueil</td>
<td>5 d</td>
<td>28–30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>267</td>
</tr>
<tr>
<td>Oil &amp; Gas Process Simulation</td>
<td>Rueil</td>
<td>5 d</td>
<td>28–30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>268</td>
</tr>
<tr>
<td><strong>Rotating Machinery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotating Machinery Technology</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>275</td>
</tr>
<tr>
<td><strong>Electricity &amp; Instrumentation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E&amp;I Technology for Oil &amp; Gas Facilities</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>278</td>
</tr>
<tr>
<td><strong>Maintenance &amp; Inspection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Management Certification</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>289</td>
</tr>
</tbody>
</table>
## Course calendar

<table>
<thead>
<tr>
<th>Title of the course</th>
<th>Location</th>
<th>Duration</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Implementation</td>
<td>Rueil 5 d</td>
<td>5 d</td>
<td>08&gt;12</td>
<td>16&gt;20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>297</td>
</tr>
<tr>
<td>E&amp;P Project Management Certification</td>
<td>Rueil 5 d</td>
<td>5 d</td>
<td></td>
<td>19&gt;23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>299</td>
</tr>
<tr>
<td>E&amp;P Value Chain &amp; Front-End Development</td>
<td>Rueil 5 d</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E&amp;P Project Control Tools</td>
<td>Rueil 5 d</td>
<td>5 d</td>
<td></td>
<td>12&gt;16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>306</td>
</tr>
<tr>
<td>E&amp;P Technical Service Contracts</td>
<td>Rueil 5 d</td>
<td>5 d</td>
<td></td>
<td>19&gt;23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>307</td>
</tr>
<tr>
<td>E&amp;P Project Cost Estimation &amp; Control Certification</td>
<td>Rueil 5 d</td>
<td>5 d</td>
<td></td>
<td>23&gt;27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>309</td>
</tr>
<tr>
<td><strong>Project Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsea Production Systems (SFS)</td>
<td>Rueil 5 d</td>
<td>5 d</td>
<td></td>
<td>14&gt;18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>319</td>
</tr>
<tr>
<td>Subsea Pipelines</td>
<td>Rueil 4 d</td>
<td>4 d</td>
<td></td>
<td>21&gt;24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>320</td>
</tr>
<tr>
<td><strong>HSE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational HSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSE in Drilling Operations</td>
<td>Pau 5 d</td>
<td>5 d</td>
<td>04&gt;07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>324</td>
</tr>
<tr>
<td>Well Control - Level 3 or 4</td>
<td>Pau 5 d</td>
<td>5 d</td>
<td>08&gt;13</td>
<td>11&gt;15</td>
<td>14&gt;18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>326</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 3 or 4</td>
<td>Pau 5 d</td>
<td>5 d</td>
<td>23&gt;29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>328</td>
</tr>
<tr>
<td>HSE Superintendent Certification</td>
<td>Pau &amp; Rueil 58 d</td>
<td>58 d</td>
<td>09&gt;02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>329</td>
</tr>
<tr>
<td>HSE in Surface Production Operations</td>
<td>Pau 5 d</td>
<td>5 d</td>
<td>29&gt;02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>330</td>
</tr>
<tr>
<td>Process Safety &amp; Safety Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundamentals of Process Safety</td>
<td>Pau 5 d</td>
<td>5 d</td>
<td></td>
<td>02&gt;06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>337</td>
</tr>
<tr>
<td>Safety Engineering Certification</td>
<td>Pau 15 d</td>
<td>15 d</td>
<td></td>
<td>16&gt;04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>339</td>
</tr>
<tr>
<td>Safety Engineering - Module 1</td>
<td>Pau 5 d</td>
<td>5 d</td>
<td></td>
<td>16&gt;20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>340</td>
</tr>
<tr>
<td>Safety Engineering - Module 2</td>
<td>Pau 5 d</td>
<td>5 d</td>
<td></td>
<td>23&gt;27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>341</td>
</tr>
<tr>
<td>Safety Engineering - Module 3 (Project)</td>
<td>Pau 5 d</td>
<td>5 d</td>
<td></td>
<td>30&gt;04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>342</td>
</tr>
<tr>
<td>Sustainable Development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental &amp; Social Risk Management</td>
<td>Rueil 5 d</td>
<td>5 d</td>
<td></td>
<td>16&gt;20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>344</td>
</tr>
<tr>
<td>Environmental Management</td>
<td>Pau 5 d</td>
<td>5 d</td>
<td></td>
<td>19&gt;23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>346</td>
</tr>
<tr>
<td><strong>HSE Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSE Management</td>
<td>Pau 5 d</td>
<td>5 d</td>
<td></td>
<td>02&gt;06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>353</td>
</tr>
<tr>
<td>Major Emergency Management - Initial Response Training</td>
<td>Pau 3 d</td>
<td>3 d</td>
<td></td>
<td>02&gt;05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>355</td>
</tr>
</tbody>
</table>
# Course calendar

<table>
<thead>
<tr>
<th>Title of the course</th>
<th>Location</th>
<th>Duration</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gas</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Gas Chain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>361</td>
</tr>
<tr>
<td>LNG Chain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquefied Natural Gas (LNG)</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>371</td>
</tr>
<tr>
<td>NEW Natural Gas Liquids Extraction</td>
<td>Rueil</td>
<td>3 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>373</td>
</tr>
<tr>
<td>LNG Process Simulation</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>374</td>
</tr>
<tr>
<td><strong>Offshore</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offshore Field Architecture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deepwater Drilling &amp; Development Certification</td>
<td>Pau</td>
<td>5 d</td>
<td></td>
<td>23</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>367</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPHT Drilling Design &amp; Operations</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offshore Field Development - Pipelines &amp; Flow Assurance</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subsea</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subsea Production Systems (SPS)</td>
<td>Rueil</td>
<td>5 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>384</td>
</tr>
<tr>
<td>Subsea Pipelines</td>
<td>Rueil</td>
<td>4 d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>385</td>
</tr>
</tbody>
</table>
Geosciences Reservoir Engineering
Career Path

Digitalization & Data Management

Conventional Exploration

Unconventional Exploration

Unconventional Production

DIGITALIZATION & DATA MANAGEMENT

<table>
<thead>
<tr>
<th>Session</th>
<th>Duration</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrotechnical Data Management - G &amp; G Data</td>
<td>5 days</td>
<td>DATA/DATAMNGT</td>
</tr>
<tr>
<td>Data Management for Oil &amp; Gas Engineers</td>
<td>25 days</td>
<td>DATA/DAMAMOD</td>
</tr>
<tr>
<td>Data Management Fundamentals (DAMA)</td>
<td>5 days</td>
<td>DATA/DAMINTDAMA</td>
</tr>
<tr>
<td>Data Management &amp; IT/IS - GIS</td>
<td>5 days</td>
<td>DATA/DAMAPGIS</td>
</tr>
<tr>
<td>Introduction to Data Management for Operations</td>
<td>3 days</td>
<td>DATA/DAMAPFOPE</td>
</tr>
</tbody>
</table>

UNCONVENTIONAL

EXPLORATION: From Unconventional Play to Geological Sweet Spot

Tight Sand & Shale Plays - In Unconventional Settings                  | 5 days   | UNCO/TIGHTSHALE  |
Hydrocarbons in Unconventional Settings - The Geology Perspective      | 3 days   | UNCO/UNCON      |
Unconventional Resources - Shale gas Fundamentals                      | 5 days   | UNCO/UNCON      |
Tight Reservoir Petrophysics                                           | 5 days   | RCM/TIGHTPETRO   |

UNCONVENTIONAL PRODUCTION

Unconventional Resources - Shale Gas Characterization, Modeling & Engineering | 10 days  | UNCO/SHALE      |
Tight Reservoir Characterization & Modeling                            | 10 days  | RCM/TIGHTMOD     |
Well Architecture & Directional Drilling in Unconventional Wells*       | 5 days   | UNCO/UNCON      |
Unconventional Reservoirs Completion & Stimulation*                     | 5 days   | UNCO/URCS       |
Well Performance: Shale Gas Wells*                                     | 5 days   | UNCO/UNWELLPERFGSE |
Unconventional Resources: Safety Issues*                               | 5 days   | OSIG/SHALESAFOPGB |
Unconventional Resources - Environmental Management Certification*      | 5 days   | SUST/SHALEENVGB  |
Unconventional Resources - “Tight & Shale Gas: an Integrated Subsurface to Surface Approach | 50 days  | UNCO/UNCONFIELD |

CONVENTIONAL - EXPLORATION

GENERAL

Introduction to Basin Exploration                                       | 5 days   | GENGV/INFOBAS   |
Hunting for Oil: Exploration & Upstream Overview                        | 5 days   | GENGV/FPO       |

METHODS & TOOLS

Petroleum Geophysics                                                    | 10 days  | METH/GPHYSICS   |
Seismic Reflection Fundamentals                                         | 5 days   | METH/SEISREF    |
Petroleum Systems: Hydrocarbons from Source Rock to Reservoirs         | 5 days   | METH/GEOCHIM    |
Structural Geology, Basin Development & Associated Traps               | 5 days   | METH/STRUCT    |
Well Logging & Basic Log Interpretation (Blended Learning)             | 32 h/11 wks | METH/BWLU          |
Well Logging & Qualitative Log Interpretation                           | 5 days   | METH/VLOGBASIC  |
3D Seismic Interpretation Workshop                                    | 10 days  | METH/SEINTEREP  |
Sedimentology & Sequence Stratigraphy (Workshop)                       | 5 days   | METH/SEDSTRATI  |
Stratigraphic Modeling: Basin Architecture & Sediment Distribution     | 5 days   | METH/CONSINDIS  |
Basin Modeling: Thermicity, Maturation & Migration                     | 5 days   | METH/TEMIS     |
Wellsite Geology                                                        | 5 days   | METH/WSGEO      |

FROM BASIN TO PROSPECT EVALUATION

Geosciences: from Basin Exploration to Discovery Certification          | 110 days | EVAL/BAMLONG    |
Basin Assessment & Modeling Certification                              | 65 days  | EVAL/BAM       |
Play Assessment & Prospect Generation                                  | 5 days   | EVAL/PLAY      |
From Prospect to Development: an Integrated Approach                   | 10 days  | EVAL/PROSPECT   |
Seismic & Sequence Stratigraphy for Oil & Gas Exploration              | 40 days  | EVAL/STRATAV      |
Exploration Blocks Management                                          | 15 days  | EVAL/BLOC   |

* Belongs to another EP discipline (Drilling/Production) - See referenced listing
<table>
<thead>
<tr>
<th>Sessions</th>
<th>Duration</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RESERVOIR CHARACTERIZATION &amp; MODELING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Reservoir Characterization</td>
<td>5 days</td>
<td>RCM/INFOGEOL</td>
</tr>
<tr>
<td>Integrated Petrophysics for Reservoir Characterization &amp; Modeling</td>
<td>90 days</td>
<td>RCM/PETRORES</td>
</tr>
<tr>
<td>Reservoir Characterization &amp; Modeling</td>
<td>58 days</td>
<td>RCM/RCM</td>
</tr>
<tr>
<td>Quantitative Well Log Analysis</td>
<td>5 days</td>
<td>RCM/LISADAV</td>
</tr>
<tr>
<td>Fundamentals of Facies Analysis &amp; Rock Typing</td>
<td>5 days</td>
<td>RCM/RODSTYPP</td>
</tr>
<tr>
<td>Seismic Interpretation &amp; Attributes Analysis Workshop: Qualitative &amp; Quantitative Methods</td>
<td>5 days</td>
<td>RCM/SEISATRIB</td>
</tr>
<tr>
<td>Petroleum Geostatistics</td>
<td>5 days</td>
<td>RCM/GEOSTAT</td>
</tr>
<tr>
<td>Geological Modeling Workshop for Integrated Studies</td>
<td>5 days</td>
<td>RCM/GEOMODEL</td>
</tr>
<tr>
<td>Hydrocarbons Accumulations, Reserves Estimation, Risk Analysis &amp; Uncertainties</td>
<td>5 days</td>
<td>RCM/COIP</td>
</tr>
<tr>
<td>Naturally-Fractured Reservoirs: Static &amp; Dynamic Modeling</td>
<td>5 days</td>
<td>RCM/FRACMOD</td>
</tr>
<tr>
<td>Petrophysical Properties: Core, Log &amp; Test Data Integration for Reservoir Modeling</td>
<td>4 days</td>
<td>RCM/PETRODATA</td>
</tr>
<tr>
<td>Upscaling: from Static to Dynamic Model</td>
<td>3 days</td>
<td>RCM/UPSCALE</td>
</tr>
<tr>
<td>Borehole Imaging Interpretation Workshop With WellCad™</td>
<td>5 days</td>
<td>RCM/BHI</td>
</tr>
<tr>
<td>Fracture &amp; Fault Modeling Workshop with Fracawflow™</td>
<td>4 days</td>
<td>RCM/FRACF</td>
</tr>
<tr>
<td>Advanced Multivariate Geostatistics Certification</td>
<td>5 days</td>
<td>RCM/MGEOSTAT</td>
</tr>
<tr>
<td>Advanced Facies Analysis &amp; Rock-Typing Certification</td>
<td>5 days</td>
<td>RCM/ROCKTYPE</td>
</tr>
<tr>
<td>Seismic Reservoir Characterization: AVO &amp; Inversion Workshop Certification</td>
<td>10 days</td>
<td>RCM/SEISMIC</td>
</tr>
<tr>
<td>Geological Characterization &amp; Modeling - Integrated Workshop Certification</td>
<td>10 days</td>
<td>RCM/RCM</td>
</tr>
<tr>
<td>Tools for Seismic Reservoir Characterization: Pre-Stack Seismic Inversion</td>
<td>5 days</td>
<td>RCM/PRESTACK</td>
</tr>
<tr>
<td>Tools for Seismic Reservoir Characterization: Post-Stack Seismic Inversion</td>
<td>5 days</td>
<td>RCM/POSTSTACK</td>
</tr>
<tr>
<td>SRC: Seismic Reservoir Characterization (Blended Learning)</td>
<td>24/h weeks</td>
<td>RCM/BLSRC</td>
</tr>
<tr>
<td>Static Model Construction: Field Constraints &amp; Integration with Subsurface Data</td>
<td>5 days</td>
<td>RCM/CARBITF</td>
</tr>
<tr>
<td>Fundamentals of Reservoir Geology</td>
<td>15 days</td>
<td>RCM/RESGEOL</td>
</tr>
<tr>
<td>Core Analysis for Reservoir Characterization</td>
<td>5 days</td>
<td>RCM/CONCAL</td>
</tr>
<tr>
<td>Special Core Analysis</td>
<td>5 days</td>
<td>RCM/SCAL</td>
</tr>
<tr>
<td>Geomechanics for Geoscientists</td>
<td>5 days</td>
<td>RCM/GEOM</td>
</tr>
<tr>
<td><strong>RESERVOIR ENGINEERING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction to Reservoir Engineering</td>
<td>5 days</td>
<td>RENG/INFORES</td>
</tr>
<tr>
<td>Reservoir Fluid Properties - PVT</td>
<td>5 days</td>
<td>RENG/PVT</td>
</tr>
<tr>
<td>Drilling &amp; Completion - Wellbore Interface &amp; Well Productivity</td>
<td>5 days</td>
<td>RENG/WELLPROD</td>
</tr>
<tr>
<td>Well Testing &amp; Well Test Analysis</td>
<td>5 days</td>
<td>RENG/WELSTTEST</td>
</tr>
<tr>
<td>Drive Mechanisms - EOR</td>
<td>8 days</td>
<td>RENG/DRIVEOR</td>
</tr>
<tr>
<td>Dynamic Reservoir Simulation</td>
<td>10 days</td>
<td>RENG/DRESIMULRES</td>
</tr>
<tr>
<td>EOR Concepts &amp; Application</td>
<td>5 days</td>
<td>RENG/EOR</td>
</tr>
<tr>
<td>Miscible Gas Injection EOR Certification</td>
<td>5 days</td>
<td>RENG/EOR-G</td>
</tr>
<tr>
<td>Chemical EOR Certification</td>
<td>5 days</td>
<td>RENG/EOR-C</td>
</tr>
<tr>
<td>Advanced Dynamic Reservoir Simulation</td>
<td>5 days</td>
<td>RENG/ADVSIMULRES</td>
</tr>
<tr>
<td>Reservoir Simulation Workshop Certification</td>
<td>10 days</td>
<td>RENG/RSSIMUL</td>
</tr>
<tr>
<td>Advanced Well Test Analysis Certification</td>
<td>5 days</td>
<td>RENG/ADVWELSTTEST</td>
</tr>
<tr>
<td>PVT Modeling</td>
<td>5 days</td>
<td>RENG/PVTMOD</td>
</tr>
<tr>
<td>Decline Curves Analysis</td>
<td>3 days</td>
<td>RENG/DCA</td>
</tr>
<tr>
<td><strong>RESERVOIR MANAGEMENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reservoir Engineering Certification</td>
<td>64 days</td>
<td>RMGT/RESENGEN</td>
</tr>
<tr>
<td>Reservoir Management Workshop</td>
<td>4 days</td>
<td>RMGET/RMNGT</td>
</tr>
<tr>
<td>Reserves Evaluation - Risk &amp; Uncertainties Certification</td>
<td>5 days</td>
<td>RMGET/RISKUN</td>
</tr>
<tr>
<td>Mature Fields - Subsurface Issues</td>
<td>5 days</td>
<td>RMGT/MATUREFIELD</td>
</tr>
<tr>
<td>Integrated Reservoir Management Certification</td>
<td>45 days</td>
<td>RMGT/RIM</td>
</tr>
<tr>
<td><strong>FIELD DEVELOPMENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Development Project &amp; Uncertainties</td>
<td>5 days</td>
<td>FDV/FDP</td>
</tr>
</tbody>
</table>
# Drilling Supervisor Career Path

## Initial Training
- Drilling Fundamentals: 5 days (GEND/INFORE)
- Well Completion & Servicing: 5 days (GEND/INPFE)

**On an Onshore Rig, as a Member of a Drilling Contractor Team**
- Roughneck Floorman: Estimated 2 months
- Derrickman Course: 10 days
- Assistant Driller Course: Estimated 4 months

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

## Junior Supervisor (night)
- Supervisor Training on Drilling Simulator: 5 days (GEND/FOSIME)
- Advanced Cementing Practices: 5 days (FLUC/CMZ)
- Stuck Pipe Prevention: 5 days (DRIL/STUCKPIPE)
- Stripping: 3 days (WEL/STRIPE)
- Well Test Operation: 5 days (COMP/WELPE)
- Matrix Acidizing: 5 days (COMP/ACIDIFE)
- Coiled Tubing & Nitrogen Operations in Completion & Workover: 5 days (COMP/CTAE)

**Well Intervention & Pressure Control (IWCF certification)**: 5 days (WEL/WELINE3 & WEL/WELINE3-4)

## Drilling Supervisor
- Well Production Integrity: 2 days (COMP/WELINT)
- Introduction to Reservoir Engineering: 5 days (RENG/INFORES)
- Well Performance: 5 days (COMP/WELLPERFE)
- Artificial Lift: Gas Lift: 5 days (COMP/GLIFTE)
- Artificial Lift: Pumping: 5 days (COMP/APOMPE

---

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Duration</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INITIAL TRAINING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drilling Fundamentals</td>
<td>5 days</td>
<td>GEND/INFORE</td>
</tr>
<tr>
<td>Well Completion &amp; Servicing</td>
<td>5 days</td>
<td>GEND/INPFE</td>
</tr>
<tr>
<td><strong>ROUGHNECK FLOORMAN</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Derrickman Course</td>
<td>10 days</td>
<td></td>
</tr>
<tr>
<td><strong>DERICKMAN</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assistant Driller Course</td>
<td>Estimated 4 months</td>
<td></td>
</tr>
<tr>
<td><strong>ASSISTANT DRILLER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Estimated 4 months</td>
<td></td>
</tr>
<tr>
<td><strong>LONG PROFESSIONALIZING TRAINING COURSE DRILLING &amp; COMPLETION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drilling &amp; Completion Engineering Certification (including HSE module &amp; IWCF certification)</td>
<td>98 days</td>
<td>GEND/FOFPE</td>
</tr>
<tr>
<td><strong>ADVANCED COURSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervisor Training on Drilling Simulator</td>
<td>5 days</td>
<td>GEND/FOSIME</td>
</tr>
<tr>
<td>Advanced Cementing Practices</td>
<td>5 days</td>
<td>FLUC/CMZ</td>
</tr>
<tr>
<td>Stuck Pipe Prevention</td>
<td>5 days</td>
<td>DRIL/STUCKPIPE</td>
</tr>
<tr>
<td>Stripping</td>
<td>3 days</td>
<td>WEL/STRIPE</td>
</tr>
<tr>
<td>Well Test Operation</td>
<td>5 days</td>
<td>COMP/WELPE</td>
</tr>
<tr>
<td>Matrix Acidizing</td>
<td>5 days</td>
<td>COMP/ACIDIFE</td>
</tr>
<tr>
<td>Coiled Tubing &amp; Nitrogen Operations in Completion &amp; Workover</td>
<td>5 days</td>
<td>COMP/CTAE</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control (IWCF certification)</td>
<td>5 days</td>
<td>WEL/WELINE3 &amp; WEL/WELINE3-4</td>
</tr>
<tr>
<td>Well Production Integrity</td>
<td>2 days</td>
<td>COMP/WELINT</td>
</tr>
<tr>
<td>Introduction to Reservoir Engineering</td>
<td>5 days</td>
<td>RENG/INFORES</td>
</tr>
<tr>
<td>Well Performance</td>
<td>5 days</td>
<td>COMP/WELLPERFE</td>
</tr>
<tr>
<td>Artificial Lift: Gas Lift</td>
<td>5 days</td>
<td>COMP/GLIFTE</td>
</tr>
<tr>
<td>Artificial Lift: Pumping</td>
<td>5 days</td>
<td>COMP/APOMPE</td>
</tr>
</tbody>
</table>
## Well Intervention Supervisor Career Path

### Initial Training

### Long Professionalizing Training Course

Well Operations & Completion Engineering

### Junior Supervisor (night)

### Well Supervisor

### WELL INTERVENTION SUPERVISOR

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Duration</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INITIAL TRAINING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well Completion &amp; Servicing</td>
<td>5 days</td>
<td>GEND/INPFE</td>
</tr>
<tr>
<td><strong>AT THE RIG SITE OR RIG SCHOOL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Induction - Rig</td>
<td>Variable</td>
<td></td>
</tr>
<tr>
<td>Practical Training on Rig School</td>
<td>5 days</td>
<td></td>
</tr>
<tr>
<td>Sea Survival, Firefighting, First Aid</td>
<td>Variable</td>
<td></td>
</tr>
<tr>
<td><strong>LONG PROFESSIONALIZING TRAINING COURSE DRILLING &amp; COMPLETION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well Operations &amp; Completion Engineering (including IWCF certification)</td>
<td>40 days</td>
<td>GEND/CE</td>
</tr>
<tr>
<td><strong>ADVANCED COURSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervisor Training on Drilling Simulator</td>
<td>5 days</td>
<td>GEND/FSIME</td>
</tr>
<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>
</tr>
<tr>
<td>Coiled Tubing &amp; Nitrogen Operations in Completion &amp; Workover</td>
<td>5 days</td>
<td>COMP/CTAE</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control (IWCF certification)</td>
<td>5 days</td>
<td>WEL/WELINE2 &amp; WEL/WELINE3-4</td>
</tr>
<tr>
<td>HSE Management</td>
<td>5 days</td>
<td>HMGT/HSEMGTGB</td>
</tr>
<tr>
<td>Introduction to Reservoir Engineering</td>
<td>5 days</td>
<td>RENG/INFORES</td>
</tr>
<tr>
<td>Advanced Well Performance</td>
<td>10 days</td>
<td>COMP/WELLPERF2E</td>
</tr>
<tr>
<td>Artificial Lift: Gas Lift</td>
<td>5 days</td>
<td>COMP/GLIFTE</td>
</tr>
<tr>
<td>Artificial Lift: Pumping</td>
<td>5 days</td>
<td>COMP/PAPOMPE</td>
</tr>
<tr>
<td>Well Production Integrity Management</td>
<td>5 days</td>
<td>COMP/WELINTMA</td>
</tr>
</tbody>
</table>
## Drilling Engineer Career Path

### Initial Training

**Drilling Engineer**

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Duration</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INITIAL TRAINING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drilling Fundamentals</td>
<td>5 days</td>
<td>GEND/INFONE</td>
</tr>
<tr>
<td>Well Completion &amp; Servicing</td>
<td>5 days</td>
<td>GEND/INPFE</td>
</tr>
<tr>
<td><strong>ON AN ONSHORE RIG, AS A MEMBER OF A DRILLING CONTRACTOR TEAM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Induction - Rig</td>
<td>Variable</td>
<td></td>
</tr>
<tr>
<td>Slips &amp; Tongs (Rig school)</td>
<td>5 days</td>
<td></td>
</tr>
<tr>
<td>Sea Survival, Firefighting, First Aid</td>
<td>Variable</td>
<td></td>
</tr>
<tr>
<td><strong>LONG PROFESSIONALIZING TRAINING COURSE DRILLING &amp; COMPLETION</strong></td>
<td>98 days</td>
<td>GEND/FOPSPE</td>
</tr>
<tr>
<td>Drilling &amp; Completion Engineering Certification (including HSE module &amp; IWCF certification)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ADVANCED COURSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervisor Training on Drilling Simulator</td>
<td>5 days</td>
<td>GEND/FOSIME</td>
</tr>
<tr>
<td>Underbalanced &amp; Managed Pressure Drilling: Applications, Design &amp; Operations</td>
<td>5 days</td>
<td>DRIL/UBDE</td>
</tr>
<tr>
<td>HPHT Drilling Design &amp; Operations</td>
<td>5 days</td>
<td>DRIL/HPHTE</td>
</tr>
<tr>
<td>Stripping</td>
<td>3 days</td>
<td>WEL/STRIPE</td>
</tr>
<tr>
<td>Advanced Cementing Practices</td>
<td>5 days</td>
<td>FLU/CIM2E</td>
</tr>
<tr>
<td>Stuck Pipe Prevention</td>
<td>5 days</td>
<td>DRIL/STUCKPIPE</td>
</tr>
<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/AXIDPE</td>
</tr>
<tr>
<td>Coiled Tubing &amp; Nitrogen Operations in Completion &amp; Workover</td>
<td>5 days</td>
<td>COMP/CTAG</td>
</tr>
<tr>
<td><strong>Well Intervention &amp; Pressure Control (IWCF certification)</strong></td>
<td>5 days</td>
<td>WEL/WELINEZ &amp; WEL/WELINEZ-4</td>
</tr>
<tr>
<td>HSE Management</td>
<td>5 days</td>
<td>RMGT/HEMTGB</td>
</tr>
<tr>
<td>Introduction to Reservoir Engineering</td>
<td>5 days</td>
<td>RENG/INFORES</td>
</tr>
<tr>
<td>Advanced Well Performance</td>
<td>10 days</td>
<td>COMP/WEL/PERF2E</td>
</tr>
<tr>
<td>Artificial Lift: Gas Lift</td>
<td>5 days</td>
<td>COMP/GLIFTE</td>
</tr>
<tr>
<td>Artificial Lift: Pumping</td>
<td>5 days</td>
<td>COMP/APOMPE</td>
</tr>
<tr>
<td>Well Production Integrity Management</td>
<td>5 days</td>
<td>COMP/WELINTMA</td>
</tr>
</tbody>
</table>

### Junior Supervisor (night)

**Drilling Engineer**

### Drilling Engineer
Production/Maintenance Technician Career Path

**PRODUCTION/MAINTENANCE TECHNICIAN**

<table>
<thead>
<tr>
<th>Session</th>
<th>Duration</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPERATOR/TECHNICIAN</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Operator Certification</td>
<td>37 weeks</td>
<td>PROP/BDA0GB</td>
</tr>
<tr>
<td>HSE in Surface Production Operations</td>
<td>5 days</td>
<td>OHSE/EIIAPP0GB</td>
</tr>
<tr>
<td>Refresher Course for Production Operator</td>
<td>15 days</td>
<td>PROP/REFRESH0PGB</td>
</tr>
<tr>
<td>Well Operation &amp; Testing</td>
<td>3 days</td>
<td>PROP/WELLOPGB</td>
</tr>
<tr>
<td>Operation of Gas Lift Wells</td>
<td>3 days</td>
<td>PROP/GASLIFTGB</td>
</tr>
<tr>
<td>Pumps Operation</td>
<td>5 days</td>
<td>PROP/PUMPOPGB</td>
</tr>
<tr>
<td>Compressors Operation</td>
<td>5 days</td>
<td>PROP/COMPOPGB</td>
</tr>
<tr>
<td>Gas Processing &amp; Compression Operations</td>
<td>5 days</td>
<td>PROP/GASPCH0GB</td>
</tr>
<tr>
<td>Instrumentation, Process Control &amp; Safety Instrumented Systems</td>
<td>5 days</td>
<td>E&amp;I/INST1GB</td>
</tr>
<tr>
<td>Instrumentation Maintenance</td>
<td>5 days</td>
<td>MAI/INSTMAINTGB</td>
</tr>
<tr>
<td>Fundamentals of Electrical Power Generation &amp; Distribution Equipment</td>
<td>5 days</td>
<td>E&amp;I/ELECT1GB</td>
</tr>
<tr>
<td>Fundamentals of Mechanical Maintenance</td>
<td>5 days</td>
<td>MAI/MCHNNMAINTGB</td>
</tr>
<tr>
<td>Pumps Maintenance Workshop</td>
<td>10 days</td>
<td>MAI/PUMPMAINTGB</td>
</tr>
<tr>
<td>Compressors Maintenance</td>
<td>5 days</td>
<td>MAI/COMPMAMINTGB</td>
</tr>
<tr>
<td><strong>PANEL OPERATOR</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panel Operator Certification</td>
<td>7 weeks</td>
<td>PROP/PANLO0GGB</td>
</tr>
<tr>
<td>Production Facilities Control Room Operation</td>
<td>10 days</td>
<td>PROP/ADVCC0GGB</td>
</tr>
<tr>
<td><strong>SUPERVISOR</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Supervisor Certification</td>
<td>9 weeks</td>
<td>PROP/PRODSUP</td>
</tr>
<tr>
<td>Maintenance Supervisor Certification</td>
<td>7 weeks</td>
<td>MAI/MAINTSUPGB</td>
</tr>
<tr>
<td><strong>SUPERINTENDENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Superintendent Certification</td>
<td>12 weeks</td>
<td>PROP/PRODSUP</td>
</tr>
<tr>
<td>HSE Superintendent Certification</td>
<td>12 weeks</td>
<td>OHSE/HSESI</td>
</tr>
<tr>
<td>Maintenance Superintendent Certification</td>
<td>12 weeks</td>
<td>MAI/MAINSI</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Session</th>
<th>Duration</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LONG PROFESSIONALIZING TRAINING COURSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petroleum Engineering Certification</td>
<td>100 days</td>
<td>GENP/PETROLENG</td>
</tr>
<tr>
<td><strong>ACCELERATED DEVELOPMENT PROGRAMS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Engineering Certification</td>
<td>60 days</td>
<td>SPRO/PRODUCTING</td>
</tr>
<tr>
<td>Oil &amp; Gas Process Engineering Certification</td>
<td>60 days</td>
<td>PENG/PROCESSINGNG</td>
</tr>
<tr>
<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/TRANSPORTING</td>
</tr>
<tr>
<td>Gas Production &amp; Processing Engineer Certification</td>
<td>70 days</td>
<td>PENG/GASENG</td>
</tr>
<tr>
<td>LNG Processing Engineer Certification</td>
<td>60 days</td>
<td>LNG/LNGEN</td>
</tr>
<tr>
<td>Field Operations Engineer Certification</td>
<td>60 days</td>
<td>PROP/FIELDENG</td>
</tr>
<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>MAU/MAIMTENG</td>
</tr>
<tr>
<td>HSE Engineer Certification</td>
<td>60 days</td>
<td>HMGT/HSEEING</td>
</tr>
<tr>
<td>Process Safety Engineer Certification</td>
<td>40 days</td>
<td>PHSE/PSENG</td>
</tr>
<tr>
<td><strong>ADVANCED COURSES</strong></td>
<td></td>
<td></td>
</tr>
<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/SAFENGB</td>
</tr>
<tr>
<td>Maintenance Management Certification</td>
<td>5 days</td>
<td>MAU/MINTGMB</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>MAU/TURAROUNDING</td>
</tr>
<tr>
<td><strong>EXECUTIVE CERTIFICATE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comprehensive Overview of E&amp;P Management Certification</td>
<td>60 days</td>
<td>GENP/EPMGTG</td>
</tr>
</tbody>
</table>
Oil Production Chain
Career Path

TRAINING COURSES SPANNING THROUGH THE ENTIRE OIL PRODUCTION CHAIN

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Duration</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LONG PROFESSIONALIZING TRAINING COURSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petroleum Engineering Certification</td>
<td>100 days</td>
<td>GENP/PETROLENG</td>
</tr>
<tr>
<td><strong>ACCELERATED DEVELOPMENT PROGRAMS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Engineering Certification</td>
<td>60 days</td>
<td>SPRD/PRODUCTIONGB</td>
</tr>
<tr>
<td>Oil &amp; Gas Process Engineering Certification</td>
<td>60 days</td>
<td>PENG/PROCESSING</td>
</tr>
<tr>
<td>Advanced Oil &amp; Gas Process Engineering Certification</td>
<td>35 days</td>
<td>PENGADV/PENGBGB</td>
</tr>
<tr>
<td>Field Operations Engineer Certification</td>
<td>60 days</td>
<td>PROP/FIELDENG</td>
</tr>
<tr>
<td><strong>ADVANCED COURSES</strong></td>
<td></td>
<td></td>
</tr>
<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>SPRD/PRODOPT1GB</td>
</tr>
<tr>
<td>Integrated Production Modeling - Module 2 (Project)</td>
<td>5 days</td>
<td>SPRD/PRODOPT2GB</td>
</tr>
<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>SUBG/SPSGB</td>
</tr>
<tr>
<td>Oil &amp; Gas Process Simulation</td>
<td>5 days</td>
<td>PENG/SIMULGB</td>
</tr>
<tr>
<td>Chemicals used in Production Activities</td>
<td>5 days</td>
<td>PROP/CHEMICAL</td>
</tr>
<tr>
<td>Oil &amp; Gas Field Processing Troubleshooting</td>
<td>5 days</td>
<td>PROP/TROUBLEGB</td>
</tr>
<tr>
<td>Mature Fields - Surface Production Issues</td>
<td>5 days</td>
<td>SPRG/MATUREGB</td>
</tr>
<tr>
<td>Heavy Oil Production &amp; Processing</td>
<td>5 days</td>
<td>SPRG/HEAVYGB</td>
</tr>
<tr>
<td>Metering &amp; Allocation</td>
<td>5 days</td>
<td>SPRD/METER</td>
</tr>
<tr>
<td>Oil Terminals, FSO &amp; FPSO</td>
<td>5 days</td>
<td>PROP/TERMGB</td>
</tr>
<tr>
<td>Production Accounting &amp; Material Balance</td>
<td>3 days</td>
<td>PMGT/MASS</td>
</tr>
<tr>
<td>Production Planning &amp; Monitoring</td>
<td>5 days</td>
<td>PMGT/PLANNING</td>
</tr>
</tbody>
</table>
## Natural Gas Value Chain Career Path

![Natural Gas Value Chain Diagram](image)

### Training Courses Spanning Through the Entire Natural Gas Value Chain

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

<table>
<thead>
<tr>
<th>Sessions</th>
<th>Duration</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACCELERATED DEVELOPMENT PROGRAMS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSE Engineer Certification</td>
<td>80 days</td>
<td>HMGT/HSEEENG</td>
</tr>
<tr>
<td>Process Safety Engineer Certification</td>
<td>40 days</td>
<td>PHSE/PSENG</td>
</tr>
<tr>
<td><strong>ADVANCED COURSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety Engineering Certification</td>
<td>15 days</td>
<td>PHSE/SAFENGGB</td>
</tr>
<tr>
<td>HSE Management</td>
<td>5 days</td>
<td>HMGT/HSEMGST</td>
</tr>
<tr>
<td>Process Safety Management</td>
<td>10 days</td>
<td>PHSE/PSMGST</td>
</tr>
<tr>
<td>Environmental Management</td>
<td>5 days</td>
<td>SUST/ENVMGSTGB</td>
</tr>
<tr>
<td>Environmental Management of Water in E&amp;P</td>
<td>5 days</td>
<td>SUST/WATERMGST</td>
</tr>
<tr>
<td>Environmental Pollution &amp; Waste Management</td>
<td>5 days</td>
<td>SUST/POLLUTIONGB</td>
</tr>
<tr>
<td>Oil Spill Management</td>
<td>3 days</td>
<td>SUST/OILSPILLGB</td>
</tr>
<tr>
<td>Major Emergency Management - Initial Response Training</td>
<td>3 days</td>
<td>HMGT/MEMRIGB</td>
</tr>
<tr>
<td>Area Classification &amp; Control of Ignition Sources</td>
<td>3 days</td>
<td>PHSE/AREACLASSGB</td>
</tr>
<tr>
<td>HSE in Drilling Operations</td>
<td>5 days</td>
<td>OHSE/HSEE</td>
</tr>
<tr>
<td>Well Control - Level 2</td>
<td>5 days</td>
<td>WEL/FPESME2</td>
</tr>
<tr>
<td>Well Control - Level 3 or 4</td>
<td>5 days</td>
<td>WEL/FPESME3-4</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 2</td>
<td>5 days</td>
<td>WEL/WELINE2</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 3 or 4</td>
<td>5 days</td>
<td>WEL/WELINE3-4</td>
</tr>
<tr>
<td>HSE in Surface Production Operations</td>
<td>5 days</td>
<td>OHSE/EPSAFOF</td>
</tr>
<tr>
<td>HSE in Maintenance &amp; Construction Activities</td>
<td>5 days</td>
<td>OHSE/WORKRGB</td>
</tr>
<tr>
<td>Unconventional Resources: Environmental Management</td>
<td>5 days</td>
<td>SUST/SHALEEENG</td>
</tr>
<tr>
<td>Unconventional Resources: Safety issues</td>
<td>5 days</td>
<td>OHSE/SHALESAFOF</td>
</tr>
<tr>
<td>Positive HSE Culture</td>
<td>2 days</td>
<td>OHSE/POSITCULTGB</td>
</tr>
<tr>
<td>HSE Management of Contractors</td>
<td>2 days</td>
<td>HMGT/HSECTRGB</td>
</tr>
<tr>
<td>HSE Management of Logistics</td>
<td>3 days</td>
<td>HMGT/HSELOGGB</td>
</tr>
</tbody>
</table>
Project Management
Career Path

- Coordination/Reporting
- Contracts/Procedures
- Quality Management

- Planning/Safety/Logistics
- Procurement/Cost & Quality
- Commissioning

- Cost/Planning
- Risks
- Contracts/Claims

- Coordination
- Engineering Disciplines
- Contractual Aspects

- Value Management
- Contracts/HSE/Quality
- HR/Negotiation/Conflicts

<table>
<thead>
<tr>
<th>PROJECT MANAGEMENT</th>
<th>Duration</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>SESSIONS</td>
<td>PROJECT IMPLEMENTATION</td>
<td>E&amp;P Project Management Certification</td>
</tr>
<tr>
<td></td>
<td>Upstream Project Management Certification</td>
<td>65 days</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Value Chain &amp; Front-End Development</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Project Risk &amp; Decision Analysis Workshop</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Project Quality &amp; Risk Management</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>Offshore E&amp;P Project Management</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>Building a Project Management Office (PMO)</td>
<td>3 days</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Project Logistics Management</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>PROJECT CONTROL</td>
<td>E&amp;P Project Control Tools</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Technical Service Contracts</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Technical Contract Negotiation</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Project Cost Estimation &amp; Control Certification</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Project Operating Expenses Optimization</td>
<td>2 days</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Project Planning &amp; Scheduling Workshop</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>PROJECT CONSTRUCTION</td>
<td>Upstream Project Construction Techniques</td>
</tr>
<tr>
<td></td>
<td>Upstream Project Construction Site Administration</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>Upstream Project Construction HSE Management</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>Offshore Oil &amp; Gas Project Installation</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>Upstream Project Construction Works Supervision</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>Upstream Project Precommissioning, Commissioning &amp; Start-Up</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>Upstream Project Abandonment Operations</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>Subsea Production Systems (SPS)</td>
<td>5 days</td>
</tr>
<tr>
<td></td>
<td>Subsea Pipelines</td>
<td>4 days</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Project Construction Certification</td>
<td>60 days</td>
</tr>
<tr>
<td></td>
<td>E&amp;P Construction Superintendent Certification</td>
<td>60 days</td>
</tr>
</tbody>
</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
- Carbon Capture, Utilization & Storage (CCUS) ............................................................................................... p. 39

Digitalization & Data Management

- Petrotechnical Data Management - G & G Data ............................................................................................ p. 40
- Data Management for Oil & Gas Engineers .................................................................................................. p. 41
- Data Management Fundamentals (DAMA) .................................................................................................... p. 42
- Data Management & IT/IS-GIS ....................................................................................................................... p. 43
- Introduction to Data Management for Operations ....................................................................................... p. 44

Upstream Economics

- International Oil Summit .................................................................................................................................. p. 45
- International Gas & Power Summit ................................................................................................................ p. 46
- Overview of Petroleum Economics .............................................................................................................. p. 47
- Overview of Natural Gas Economics ........................................................................................................... p. 48
- Liquefied Natural Gas Economics ................................................................................................................ p. 49
- Strategic Management in International Oil & Gas Business ..................................................................... p. 50
- Natural Gas & Electricity Trading ................................................................................................................ p. 51
- Oil Markets & Trading ..................................................................................................................................... p. 52
- Upstream Economics & Management .......................................................................................................... p. 53
- Contractual Framework of Exploration & Production ............................................................................... p. 54
- Production Sharing & Joint Operating Agreements ................................................................................... p. 55
- Economic Framework of Exploration-Production ...................................................................................... p. 56
- Negotiation of Exploration-Production Contracts ................................................................................... p. 57
- Economics & Risk Analysis of Upstream Projects .................................................................................... p. 58
- Practice of Exploration-Production Contracts Economic Modeling ..................................................... p. 59
- Operating under “Local Content” ................................................................................................................ p. 60
- Oil Fields Unitization ....................................................................................................................................... p. 61
- Upstream Auditing Certification .................................................................................................................. p. 62
- Upstream Economics & Management Certification .................................................................................. p. 63
- Investment Profitability Studies in the Oil & Gas Industry ........................................................................ p. 64
- Upstream Contracts Audit ............................................................................................................................. p. 65
- Governance of an E&P Company ................................................................................................................ p. 66

Competency Management & Training Engineering

- Competency Management in E&P ................................................................................................................ p. 67
- Training Engineering in E&P .......................................................................................................................... p. 68
- Field/Site Trainers Accreditation ................................................................................................................... p. 69
- Classroom Lecturers Accreditation .............................................................................................................. p. 70
- Subject Matter Experts Accreditation ........................................................................................................ p. 71
- Communication & Behavioral Management ................................................................................................. p. 72
- E&P Project Management Certification ....................................................................................................... p. 73
- E&P Projects Value Management ................................................................................................................ p. 74
- E&P Project Risk & Decision Analysis Workshop ....................................................................................... p. 75
## 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.
- A Executive Certificate delivered.
- An expertise confirmed in Comprehensive Overview of E&P Management Certification.
- Ready-to-use skills.

### 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

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.

GEO SCIENCES & RESERVOIR ENGINEERING

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:
- Field development planning.
- Drainage mechanisms: introduction to EOR.
- Different types of reservoir effluents and their behavior.

FIELD OPERATIONS & DEVELOPMENT

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.
- 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

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.
- Technical service contracts.
- Project control:
  - Scheduling and planning control.
  - Cost estimation and control.
  - Decommissioning.

SERIOUS GAME: OIL FIELD DEVELOPMENT CYCLE

Reference: GEND/DECOUVEP | 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>11 May</td>
<td>15 May</td>
<td>€3,690</td>
</tr>
<tr>
<td>Rueil-Malmaison</td>
<td>14 September</td>
<td>18 September</td>
<td>€3,690</td>
</tr>
<tr>
<td>Rueil-Malmaison</td>
<td>7 December</td>
<td>11 December</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

*This course is also available in French: GEND/DECOUVERTE. Please contact us for more information.*
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”;
- “Drilling Fundamentals”; “Well Completion & Servicing”; “Oil & Gas Field Processing”.

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
1 d
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
2.25 d
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
1.75 d
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: GEND/INFPGE  
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>17 February</td>
<td>21 February</td>
<td>€3,690</td>
</tr>
<tr>
<td>Rueil-Malmaison</td>
<td>23 November</td>
<td>27 November</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

* This course is also available in French: GEND/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 non-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

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/EPMETIERGB Only available as an In-House course.
This course is also available in French: GENP/EPMETIERFR. Please contact us for more information.
Contact: exp.rueil@ifptraining.com

www.ifptraining.com
# 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.

---

## Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>THE OIL &amp; GAS CHAIN: PRODUCTION POSITION</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Positioning of the production in the value E&amp;P chain.</td>
<td></td>
</tr>
<tr>
<td>World primary production.</td>
<td></td>
</tr>
<tr>
<td>Issues and technical constraints:</td>
<td></td>
</tr>
<tr>
<td>Conventional resources.</td>
<td></td>
</tr>
<tr>
<td>Unconventional resources.</td>
<td></td>
</tr>
<tr>
<td>Job descriptions and skills for production activities.</td>
<td></td>
</tr>
</tbody>
</table>

| **ONSHORE & OFFSHORE PRODUCTION**                                    | 0.5 d    |
| 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… |          |

| **FROM WELL TO EXPORT POINT**                                        | 1 d      |
| 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.   |          |

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

Course Content

ORGANIZATION OF DRILLING OPERATIONS  0.5 d
Drilling principles.
Cost, duration of a drilling job.
Different people involved, types of contracts.
Safety.

DRILLING PRINCIPLES - EQUIPMENT  1.5 d
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.

WELL ARCHITECTURE  0.5 d
Reservoir notions.
Functions of different casings.
Parameters to be taken into account to determine well architecture.
Examples of architectures.

SPECIAL OPERATIONS  1.25 d
Cementing operations.
Wellhead.
Directional drilling.
Well control.
Fishing jobs.
Wireline logging, well test (DST).

DRILLING ON A SIMULATOR (Pau)  0.25 d
Use of a well control simulator to show the drilling operations (tripping, drilling, running of casings).

OFFSHORE DRILLING OPERATIONS  0.25 d
Different types of rigs.
Problems related to their use.

WELL COMPLETION  0.25 d
Reservoir-wellbore interface.
Equipment for flowing wells.
Well intervention.

VISIT OF A DRILLING SITE*  0.5 d

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”, “Well Completion & Servicing”, “Oil & Gas Field Processing”.

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.

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

Location Start Date End Date Tuition Fees excl. VAT
Pau 7 September 11 September €3,690
Rueil-Malmaison 19 October 23 October €3,690

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

5 days
## Petroleum Engineering Certification

### 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 teamwork 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 Certification.
- 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>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO PETROLEUM GEOSCIENCES</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Elements &amp; processes of petroleum systems. Exploration tools (seismic &amp; well data). Prospect evaluation.</td>
<td></td>
</tr>
<tr>
<td><strong>INTRODUCTION TO RESERVOIR CHARACTERIZATION</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>INTRODUCTION TO RESERVOIR ENGINEERING</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>WELL PRODUCTIVITY &amp; RESERVOIR - WELLBORE INTERFACE</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Well productivity. Reservoir wellbore interface implementation.</td>
<td></td>
</tr>
<tr>
<td><strong>ARTIFICIAL LIFT &amp; WELL INTERVENTION FUNDAMENTALS</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Artificial lift; gas lift, ESP. Types and means of intervention on producing wells. General procedure of a workover. Case study.</td>
<td></td>
</tr>
<tr>
<td><strong>WELL CONTROL</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Introduction to well control methods. Equipment, Wireline, coiled tubing, snubbing.</td>
<td></td>
</tr>
<tr>
<td><strong>THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>OIL &amp; WATER TREATMENT</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>GAS PROCESSING &amp; CONDITIONING</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Gas processing: dehydration, sweetening. NGL recovery. Fundamentals of Liquefied Natural Gas (LNG) chain.</td>
<td></td>
</tr>
<tr>
<td><strong>STATIC EQUIPMENT &amp; SCHEMATIZATION</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>ELECTRICITY &amp; INSTRUMENTATION</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Electrical power generation and distribution network. Instrumentation and process control. Safety Instrumented Systems.</td>
<td></td>
</tr>
<tr>
<td><strong>METERING - MATERIAL BALANCE - ALLOCATION</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>ROTATING MACHINERY</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>OFFSHORE FIELD DEVELOPMENT - FLOW ASSURANCE</strong></td>
<td>5 d</td>
</tr>
<tr>
<td><strong>SAFETY &amp; ENVIRONMENT IN SURFACE PROCESSING FACILITIES</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Hazards and risks in production operations. Safety in production operations and during construction or maintenance works. HSE management.</td>
<td></td>
</tr>
<tr>
<td><strong>SAFETY ENGINEERING</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>HAZID application. HAZOP exercise. Plant layout exercise. QRA and consequence analysis methodology. SIS and relief systems design.</td>
<td></td>
</tr>
<tr>
<td><strong>PETROLEUM ECONOMICS &amp; PROJECT MANAGEMENT</strong></td>
<td>5 d</td>
</tr>
</tbody>
</table>

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

Reference: GENP/PETROLENG. Only available as an In-House course.

Contact: exp.reuil@ifptraining.com
# Carbon Capture, Utilization & Storage (CCUS)

**Level:** FOUNDATION

**Purpose**

The purpose of this training course is to give to the participants a better understanding of the CCUS technology various aspects from CO₂ capture to storage and monitoring.

- What is CCUS chain?
- How does CCUS impact the global climate change?
- How E&P industry can participate in CCUS?

**Audience**

This training is designed for technicians/engineers and decision makers working in industries that target CO₂ emissions reduction and CCUS in their road map.

**Learning Objectives**

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

- discuss the CCUS chain,
- participate in CCUS activities within their company,
- describe the various steps of CCUS process and its bottlenecks.

**Ways & Means**

- Interactive lectures and exercises.
- Field case studies.

**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>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHAT IS CCUS?</td>
<td>0.25 d</td>
</tr>
<tr>
<td>CCS technology overview: past, present and future.</td>
<td></td>
</tr>
<tr>
<td>Energy scenarios: the potential environmental impact of CCS within the IEA 2 degrees scenario.</td>
<td></td>
</tr>
<tr>
<td>CO₂ properties.</td>
<td></td>
</tr>
<tr>
<td>THE BASIS FOR CO₂ CAPTURE</td>
<td>0.25 d</td>
</tr>
<tr>
<td>CO₂ capture systems:</td>
<td></td>
</tr>
<tr>
<td>Industrial process capture system.</td>
<td></td>
</tr>
<tr>
<td>Post-combustion.</td>
<td></td>
</tr>
<tr>
<td>Pre-combustion.</td>
<td></td>
</tr>
<tr>
<td>Oxy-fuel.</td>
<td></td>
</tr>
<tr>
<td>New technologies.</td>
<td></td>
</tr>
<tr>
<td>CO₂ capture technologies:</td>
<td></td>
</tr>
<tr>
<td>Separation with absorbent.</td>
<td></td>
</tr>
<tr>
<td>Separation with membranes.</td>
<td></td>
</tr>
<tr>
<td>CO₂ TRANSPORT TECHNOLOGIES</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Pipeline.</td>
<td></td>
</tr>
<tr>
<td>Ships.</td>
<td></td>
</tr>
<tr>
<td>HSE problems.</td>
<td></td>
</tr>
<tr>
<td>CO₂ GEOLOGICAL STORAGE TECHNOLOGIES</td>
<td>2 d</td>
</tr>
<tr>
<td>Storage mechanisms and security.</td>
<td></td>
</tr>
<tr>
<td>CO₂ Storage Resources Management System (SRMS).</td>
<td></td>
</tr>
<tr>
<td>Geological characterization.</td>
<td></td>
</tr>
<tr>
<td>Performance prediction.</td>
<td></td>
</tr>
<tr>
<td>Integrity.</td>
<td></td>
</tr>
<tr>
<td>Measurement, Monitoring and Verification (MMV).</td>
<td></td>
</tr>
<tr>
<td>CCUS: GAPS &amp; KNOWLEDGES</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Worldwide CCUS case studies.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: GENP/CCUS  
Only available as an In-House course.

Contact: gre.rueil@ifptraining.com

www.ifptraining.com
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 architecture: modeling, technology and tools.
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.
Data Management for Oil & Gas Engineers

Level: PROFICIENCY

Purpose

Whatever the Oil & Gas discipline, data is taking a more and more important role in all business decision processes. Therefore, the role of the data manager which was mainly seen as a data custodian is now perceived as a major shareholder in all discipline. The purpose of this module is to train Oil & Gas technicians and engineers to understand all the aspects and underlyings of value creation based on data. The following topics will be covered:

- the data as an asset,
- what are the main data types used in the E&P industry,
- the functions of Data Management as described by DAMA,
- geographic information systems,
- earth modeling,
- data science.
The last week of training will be dedicate to a data management project where the student will be able to practice their acquired knowledge on a real data project.

Audience

This training has been designed for all Oil & Gas technicians and engineers who plan to have responsibilities in the data management domain.

Learning Objectives

Upon completion of the course, participants will:

- learn the main concepts of data management,
- be able to elaborate a detailed data governance plan,
- be able to interact effectively with IT and software engineer to define the data management resources,
- be able to specify a GIS project,
- understand what is Earth Modeling from a data point of view,
- understand the main concepts and tools of data-science.

Ways & Means

Daily lecture, exercises, hands-on practice and a one week project.

Prerequisites

No prerequisite are necessary to attend this training except a solid interest to data!

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

**E&P DISCIPLINES & DATA**

Introduction: Why data is an important Oil & Gas asset?

Seismic data and formats.

Well-related data. Reading a log header in a PDF, a LAS or a JSON format.

Production-related data. What is important for the asset.

Metering, real-time data, Prodml communication.

Construction and engineering data, document management.

Maintenance data to optimize the production.

Reservoir data. The value of data integration.

The data life cycle.

Physical data management.

**DATA MANAGEMENT FUNDAMENTALS**

Introduction to data management.

Data quality management.

Master and reference data management.

Data modelling.

Data warehousing, business intelligence and data analytics.

Data risk and security.

Metadata management.

Data governance.

Data lifecycle management.

Data operations management.

Document records and content management.

Data integration and interoperability.

This module is ended by DAMA certification assessment.

**THE IT & IS ASPECTS OF DATA MANAGEMENT**

Storing data on tapes, disc and cloud. Data virtualization.

Element of SQL language.

No SQL DB.

My first line of Python to manipulate data.

**GEOGRAPHIC INFORMATION SYSTEM**

What is a GIS?

ArcGIS basics.

Creating a map with data, sharing data.

**THE EARTH MODELING, INTEGRATION OF DATA & KNOWLEDGE**

Earth model in the petroleum industry.

Creating surfaces and 3D meshes from seismic and well data.

Knowledge formalization. Building up ontologies.

Introduction to RESQML.

**DATA SCIENCE & MACHINE LEARNING**

Automatical training.

Supervised training and deep learning.

Models evaluation.

This module review the parameters which can be used to evaluate a data model. In this module, the student will learn how to compute the precision, recall factor or the confusion matrix to describe the accuracy and behavior (bias) of the data model.

Working with text data.

Data are not only numerical measurements but also text. This model will detail how to process the text data in order to make possible their modelization.

**FINAL PROJECT**

Working in group focused on data management of a real data set.

Reference: DATA/DAMAM03

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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>8 June</td>
<td>10 July</td>
<td>€18,750</td>
</tr>
</tbody>
</table>
New Data Management Fundamentals (DAMA)

<table>
<thead>
<tr>
<th>Course Content</th>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO DATA MANAGEMENT</strong></td>
<td>0.2 d</td>
</tr>
<tr>
<td>What is data management and why is it critical.</td>
<td></td>
</tr>
<tr>
<td>What are the different disciplines of data management.</td>
<td></td>
</tr>
<tr>
<td>DAMA &amp; the DMBoK 2.0, and its relationship with other frameworks (TOGAF/COBIT…).</td>
<td></td>
</tr>
<tr>
<td>Overview of available professional certifications focusing on DAMA CDMP.</td>
<td></td>
</tr>
<tr>
<td><strong>DATA QUALITY MANAGEMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>The different facets of data quality, and why validity is often confused with quality.</td>
<td></td>
</tr>
<tr>
<td>The policies, procedures, metrics, technology and resources for ensuring data quality.</td>
<td></td>
</tr>
<tr>
<td>A data quality reference model and how to apply it.</td>
<td></td>
</tr>
<tr>
<td>Why data quality management and data governance are interconnected and case studies.</td>
<td></td>
</tr>
<tr>
<td><strong>MASTER &amp; REFERENCE DATA MANAGEMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>The differences between reference and master data.</td>
<td></td>
</tr>
<tr>
<td>Identification and management of master data across the enterprise.</td>
<td></td>
</tr>
<tr>
<td>4 generic MDM architectures and their suitability in different cases.</td>
<td></td>
</tr>
<tr>
<td>How to incrementally implement MDM to align with business priorities.</td>
<td></td>
</tr>
<tr>
<td>StatOil (Equinor) case study.</td>
<td></td>
</tr>
<tr>
<td><strong>DATA MODELING</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Types of data models, their use and how they interrelate.</td>
<td></td>
</tr>
<tr>
<td>The development and exploitation of data models, ranging from enterprise, through conceptual to logical, physical and dimensional.</td>
<td></td>
</tr>
<tr>
<td>Maturity assessment to consider the way in which models are utilized in the enterprise and their integration in the System Development Life Cycle (SDLC).</td>
<td></td>
</tr>
<tr>
<td>Data modeling and big data.</td>
<td></td>
</tr>
<tr>
<td>Why data modeling plays a critical part in data governance and BP case study.</td>
<td></td>
</tr>
<tr>
<td><strong>DATA WAREHOUSING, BUSINESS INTELLIGENCE &amp; DATA ANALYTICS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>What is data warehousing and business intelligence and why do we need it.</td>
<td></td>
</tr>
<tr>
<td>The major data warehouse architectures (Inmon &amp; Kimball).</td>
<td></td>
</tr>
<tr>
<td>Introduction to dimensional data modeling.</td>
<td></td>
</tr>
<tr>
<td>Why master data management fails without adequate data governance.</td>
<td></td>
</tr>
<tr>
<td>Data analytics and machine learning and data visualization.</td>
<td></td>
</tr>
<tr>
<td><strong>DATA RISK &amp; SECURITY</strong></td>
<td>0.2 d</td>
</tr>
<tr>
<td>Identification of threats and the adoption of defenses to prevent unauthorized access, use or loss of data and particularly abuse of personal data.</td>
<td></td>
</tr>
<tr>
<td>Identification of risks (not just security) to data and its use.</td>
<td></td>
</tr>
<tr>
<td>Data management considerations for different regulations, e.g. GDPR, BCBS239.</td>
<td></td>
</tr>
<tr>
<td>The role of data governance in data security management.</td>
<td></td>
</tr>
<tr>
<td><strong>METADATA MANAGEMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>What is metadata and why it is important.</td>
<td></td>
</tr>
<tr>
<td>Types of metadata, their uses and their sources.</td>
<td></td>
</tr>
<tr>
<td>Metadata and business glossaries. What’s the connection?</td>
<td></td>
</tr>
<tr>
<td>How metadata provides the essential glue for data governance and metadata standards.</td>
<td></td>
</tr>
<tr>
<td><strong>DATA GOVERNANCE</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>A typical data governance reference model.</td>
<td></td>
</tr>
<tr>
<td>The main data governance roles: owner, steward, custodian.</td>
<td></td>
</tr>
<tr>
<td>The role of the Data Governance Office (DGO) and its relationship with the PMO.</td>
<td></td>
</tr>
<tr>
<td>How to get started with data governance and sustaining and building data governance.</td>
<td></td>
</tr>
<tr>
<td><strong>DATA LIFECYCLE MANAGEMENT</strong></td>
<td>0.2 d</td>
</tr>
<tr>
<td>Proactive planning for the management of data across its lifecycle.</td>
<td></td>
</tr>
<tr>
<td>Differences between data life cycle and a Systems Development LifeCycle (SDLC).</td>
<td></td>
</tr>
<tr>
<td>Data governance touch points throughout the data lifecycle.</td>
<td></td>
</tr>
<tr>
<td><strong>DATA OPERATIONS MANAGEMENT</strong></td>
<td>0.2 d</td>
</tr>
<tr>
<td>Core roles and considerations for data operations.</td>
<td></td>
</tr>
<tr>
<td>Good data operations practices.</td>
<td></td>
</tr>
<tr>
<td><strong>DOCUMENT RECORDS &amp; CONTENT MANAGEMENT</strong></td>
<td>0.2 d</td>
</tr>
<tr>
<td>Why document and records management is important.</td>
<td></td>
</tr>
<tr>
<td>Taxonomy vs. ontology… what’s the difference.</td>
<td></td>
</tr>
<tr>
<td>Legal and regulatory considerations impacting records and content management.</td>
<td></td>
</tr>
<tr>
<td><strong>DATA INTEGRATION &amp; INTEROPERABILITY</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>What are the business (and technology) issues that data integration is seeking to address?</td>
<td></td>
</tr>
<tr>
<td>Data integration and data interoperability - What’s the difference?</td>
<td></td>
</tr>
<tr>
<td>Different styles of data integration and interoperability, their applicability and implications.</td>
<td></td>
</tr>
<tr>
<td>The approaches and guidelines for provision of data integration and access.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: DATA/INTRODAMA - 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>15 June</td>
<td>19 June</td>
<td>€3,890</td>
</tr>
</tbody>
</table>
Data Management & IT/IS-GIS

Level: FOUNDATION

Purpose
Whatever the Oil & Gas discipline, data is taking a more and more important role in all business decision processes. Therefore, the role of the data manager which was mainly seen as a data custodian is now perceived as a major shareholder in all discipline. The purpose of this module is to train Oil & Gas technicians and engineers to understand all the IT and Geographic Information System (GIS) aspects and underlyings of value creation based on data. The following topics will be covered:
- the data as an asset,
- what are the main data types used in the E&P industry,
- the IT and IS aspects of the data management,
- geographic information systems.

Audience
This training has been designed for all Oil & Gas technicians and engineers who plan to have responsibilities in the data management domain.

Learning Objectives
Upon completion of the course, participants will:
- learn the main concepts of IT and IS in data management (SQL, SQL DB…),
- be able familiar with programming language in data management (Python),
- be able to interact effectively with IT and software engineer to define the data management resources,
- be able to specify a GIS project.

Ways & Means
Daily lecture, exercises, hands-on practice and a one week project.

Prerequisites
No prerequisites are necessary to attend this training except a solid interest to data!

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

THE IT & IS ASPECTS OF DATA MANAGEMENT
- Storing data on tapes, disc and cloud. Data virtualization.
- Element of SQL language.
  During this module, the trainees will practice SQL to build a geoscience DB and retrieve it. The Codd rules will be detailed.
- No SQL DB.
  Relational DB have some limitations when dealing with large amount of data. What are the alternatives?
  My first line of Python to manipulate data.
  Python is an easy to learn programming language to manipulate data. This module will help the trainees to produce they first line of Python through practical exercises.

GEOGRAPHIC INFORMATION SYSTEM
- What is a GIS?
  This module details what is a GIS, what are its components and how it can be used.
  ArcGIS basics.
  After having installed ArcGIS, the trainees will the GIS data change the properties of GIS layers to change map displays. The notion of coordinates and projection will be explained and that knowledge will be applied to run geo-processing tools.
  Creating a map with data, sharing data.
  Using ArcGIS and data available on the net, the trainees will create complete maps with proper symbology and discuss how to export the result according to the project needs.

Reference: DATA/DAMAITGIS
Can be organized as an In-House course.
Contact: exp.rueil@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 22 June 26 June €3,890
Introduction to Data Management for Operations

Course Content

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>0.25 d</td>
</tr>
<tr>
<td>The value of a data asset.</td>
<td></td>
</tr>
<tr>
<td>The asset life cycle/the data life cycle.</td>
<td></td>
</tr>
<tr>
<td>The data shareholder, role and responsibility.</td>
<td></td>
</tr>
<tr>
<td>The data management function as seen by DAMA.</td>
<td></td>
</tr>
<tr>
<td>DATA GOVERNANCE</td>
<td>0.25 d</td>
</tr>
<tr>
<td>What is data governance, why it matters.</td>
<td></td>
</tr>
<tr>
<td>The data related to construction, production and maintenance.</td>
<td></td>
</tr>
<tr>
<td>The role of the data stewards.</td>
<td></td>
</tr>
<tr>
<td>DATA ARCHITECTURE MANAGEMENT USING THE DATE RELATED TO THE WELL DESCRIPTION</td>
<td>0.25 d</td>
</tr>
<tr>
<td>What is a well (using the PPDM guideline), the importance of using a common vocabulary/semantic. The Zachman enterprise framework applied to the well related data.</td>
<td></td>
</tr>
<tr>
<td>DATA DEVELOPMENT</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Develop and maintain logical and physical data models for the production data.</td>
<td></td>
</tr>
<tr>
<td>The example of PRODML</td>
<td></td>
</tr>
<tr>
<td>DATA OPERATION MANAGEMENT</td>
<td>0.25 d</td>
</tr>
<tr>
<td>The notion of SLA.</td>
<td></td>
</tr>
<tr>
<td>Backups and archives.</td>
<td></td>
</tr>
<tr>
<td>Data visualization.</td>
<td></td>
</tr>
<tr>
<td>DATA SECURITY MANAGEMENT</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Manage users (role, privileges…), monitor users authentication.</td>
<td></td>
</tr>
<tr>
<td>The Information confidentiality classification.</td>
<td></td>
</tr>
<tr>
<td>Data security audit, introduction to ISO 27001.</td>
<td></td>
</tr>
<tr>
<td>REFERENCE &amp; MASTER DATA MANAGEMENT</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Definition of both terms:</td>
<td></td>
</tr>
<tr>
<td>Reference data: used taxonomy, semantic definition of the drilling data. Standards used by TOTAL (e.g.: API).</td>
<td></td>
</tr>
<tr>
<td>Master data: drilling data values.</td>
<td></td>
</tr>
<tr>
<td>Well data integration: the well UWI.</td>
<td></td>
</tr>
<tr>
<td>DATA WAREHOUSING</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Descriptive (content description) and transactional data.</td>
<td></td>
</tr>
<tr>
<td>SAP-PM and SAP-MM, how to use them.</td>
<td></td>
</tr>
<tr>
<td>DOCUMENT &amp; CONTENT MANAGEMENT</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Unstructured data (e.g.: the installation PIDs).</td>
<td></td>
</tr>
<tr>
<td>Implementing a document management system.</td>
<td></td>
</tr>
<tr>
<td>Retention and disposition of document.</td>
<td></td>
</tr>
<tr>
<td>MANAGEMENT OF THE META-DATA</td>
<td>0.25 d</td>
</tr>
<tr>
<td>The metadata found in the installation PIDs.</td>
<td></td>
</tr>
<tr>
<td>DATA QUALITY MANAGEMENT</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Lean and 6-sigma methodologies. Define data quality metrics, measure and control the data quality.</td>
<td></td>
</tr>
<tr>
<td>PROFESSIONAL DEVELOPMENT OF DATA MANAGERS</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Data management as a recognized discipline.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: DATA/DAMAOPE. Can be organized as an In-House course. Contact: gre.ruell@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>7 September</td>
<td>9 September</td>
<td>€2,850</td>
</tr>
</tbody>
</table>
International Oil Summit
Jointly organized with IFP Énergies nouvelles & Petrostrategies

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.

Reference: PEH10S
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>Paris</td>
<td>16 April</td>
<td>16 April</td>
<td>€990</td>
</tr>
</tbody>
</table>

www.ifptraining.com
International Gas & Power Summit
Jointly organized with IFP Énergies nouvelles & Petrostrategies

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.

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paris</td>
<td>19 November</td>
<td>19 November</td>
<td>€990</td>
</tr>
</tbody>
</table>

Reference: PEH/IGS
Contact: em.contact@ifptraining.com
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: eco.rueil@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT

Rueil-Malmaison 1 December 4 December €2,630

This course is also available in French: TRT/EPE. Please contact us for more information.
Overview of Natural Gas Economics

Level: FOUNDATION

Purpose
This training provides an overview of the economic and contractual aspects of the natural gas value chain, all the way from production and transport to marketing.

Audience
This training is designed for professionals with experience in the oil industry who now need to broaden their understanding and knowledge of the natural gas business. Professionals from other sectors, such as banking or government, who require an understanding of the natural gas business to better assist their clients are also welcome to attend.

Learning Objectives
Upon completion of the course, participants will be able to:
- evaluate the importance of natural gas in the world energy balance, and the strategies of the main industry actors,
- identify the outlets of natural gas and the new trends in gas industry,
- identify the main technical, economic and contractual features of the natural gas value chain, from the production well to the final consumer,
- explain the framework of liberalization of natural gas markets and its impact on gas contracts and prices.

Ways & Means
- Quizzes.
- Exercises on the costs of gas infrastructures.
- Examples of contracts and 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.

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.

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.

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.

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.

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.

Reference: GER/ONE
Can be organized as an In-House course.

Contact: eco.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>8 September</td>
<td>11 September</td>
<td>€2,840</td>
</tr>
</tbody>
</table>

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
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
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 CONTRACTS
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: eco.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>15 December</td>
<td>18 December</td>
<td>€3,380</td>
</tr>
</tbody>
</table>

This course is also available in French: GER/EGL. Please contact us for more information.
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 projects,
- 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, IOC, INOC, 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: eco.rueil@ifptraining.com
Natural Gas & Electricity Trading
Market Risks & their Operational Management

Level: PROFICIENCY

Purpose
This training provides participants a global and synthetic view on the risk management of the various trading activities of gas and electricity.

Audience
All managers who need to learn the ways of managing risk in the market of natural gas and electricity.

Learning Objectives
Upon completion of the course, participants will be able to:
- assess the risks associated with each phase of the gas trading and electricity,
- understand the different hedging tools of the financial markets and assess their efficiency and limits,
- put in place means of detecting, measuring and controlling the risks through a proper trading organization (procedures, segregation of duties),
- implement control measures, including market risk and credit risk.

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.

Course Content

MARKETS
Main features of gas and electricity markets.

RISK MANAGEMENT
Basic statistics.
Risk typologies:
- Credit risk.
- Market risk.
- Operational risk.
Value at risk.

HEDGING & MODELING
Nature.
Products:
- Futures, forwards, swaps, options.

CASE STUDIES
Compute sensitivities on a gas procurement contract.
Compute the V@R of the contract using Monte Carlo and parametric methods.

Reference: GER/GET
Can be organized as an In-House course.
Contact: eco.rueil@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 29 September 30 September €2,060
Oil Markets & 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.

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.

Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIL SUPPLY &amp; DEMAND FUNDAMENTALS</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Energy resources.</td>
<td></td>
</tr>
<tr>
<td>Energy demand and supply.</td>
<td></td>
</tr>
<tr>
<td>Oil producing countries, OPEC, consuming countries, international oil companies: constraints and strategies.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHIPPING</td>
<td>0.25 d</td>
</tr>
<tr>
<td>General features.</td>
<td></td>
</tr>
<tr>
<td>The market and its players-fixing of the freight rate (Worldscale).</td>
<td></td>
</tr>
<tr>
<td>Chartering contracts.</td>
<td></td>
</tr>
<tr>
<td>Risk control and environmental protection.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRUDE &amp; PETROLEUM PRODUCTS PHYSICAL TRADING</td>
<td>1 d</td>
</tr>
<tr>
<td>What is the value of a crude oil? The refiner’s point of view.</td>
<td></td>
</tr>
<tr>
<td>Different types of contracts: long term, spot and forward.</td>
<td></td>
</tr>
<tr>
<td>Main oil markets and their features.</td>
<td></td>
</tr>
<tr>
<td>Key benchmark crudes.</td>
<td></td>
</tr>
<tr>
<td>The role of the PRAs (price reporting agencies).</td>
<td></td>
</tr>
<tr>
<td>Links between Trading and Shipping.</td>
<td></td>
</tr>
<tr>
<td>Products trading.</td>
<td></td>
</tr>
<tr>
<td>Main provisions of a sale/purchase contract.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXCHANGES &amp; FUTURES TRADING</td>
<td>1 d</td>
</tr>
<tr>
<td>The concept of volatility</td>
<td></td>
</tr>
<tr>
<td>Definition of a contract: the cases of WTI and Brent.</td>
<td></td>
</tr>
<tr>
<td>Exchanges and their organization: the cases of NYMEX and ICE.</td>
<td></td>
</tr>
<tr>
<td>Main Futures Markets.</td>
<td></td>
</tr>
<tr>
<td>Hedging principles.</td>
<td></td>
</tr>
<tr>
<td>Hedging imperfections, basis risk.</td>
<td></td>
</tr>
<tr>
<td>Market structure (contango, backwardation).</td>
<td></td>
</tr>
<tr>
<td>Case studies.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>DERIVATIVES</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Options: principles, basics and characteristics.</td>
<td></td>
</tr>
<tr>
<td>Interests and limits of options.</td>
<td></td>
</tr>
<tr>
<td>Swaps: principles, basics and characteristics.</td>
<td></td>
</tr>
<tr>
<td>Interests and limits of swaps.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEDGING STRATEGIES - VARIOUS CASE STUDIES ON HEDGING</td>
<td>0.25 d</td>
</tr>
<tr>
<td>For a refiner.</td>
<td></td>
</tr>
<tr>
<td>For a crude oil producer.</td>
<td></td>
</tr>
<tr>
<td>For a marketer.</td>
<td></td>
</tr>
<tr>
<td>For an industrial consumer.</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>27 May</td>
<td>29 May</td>
<td>€2,430</td>
</tr>
</tbody>
</table>

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

Level: FOUNDATION

Purpose
This training aims to provide participants with a clear view of the contractual and economic framework of Exploration & Production in order to apprehend the tools for decision making, financial management and auditing.

Audience
This course is designed for managers from the upstream sector who require a global picture of all the economic and contractual aspects of exploration and production activities.

Learning Objectives
Upon completion of this course, participants working in the upstream sector will be able to:
- evaluate all aspects of taxation and the contracts used;
- build advanced economic models for the economic evaluation of projects;
- analyze the economic results and conduct sensitivity analysis;
- incorporate the geological risks and uncertainties in the economic evaluation of projects;
- analyze the main corporate financial statements (profit/loss and balance sheets) issued by oil companies.

Ways & Means
- Case studies simulated on computers.
- Development of an oil field (under concession and production sharing agreements).
- Acceleration of a production project with or without EOR.
- 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 block.
- Analysis and construction of balance sheets, income statements and key financial statements of an Oil & Gas company.
- Examples of petroleum laws & fiscal regimes around the world (Northwestern Europe, North Africa, West Africa, Middle East, Asia-Pacific, etc.).

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

Prerequisites
Participants need to be comfortable with Microsoft Excel.

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

Course Content 15 days

Module 1: UPSTREAM ECONOMIC & CONTRACTUAL FRAMEWORK (5 days)

UPSTREAM ECONOMIC ENVIRONMENT 1 d
- Economic development of the upstream sector.
- Various actors in Exploration-Production and their strategies. Oil markets and prices.
- Current exploration and production activities.
- Levels of investment.
- Examples of finding, development and production costs.

CONTRACTUAL & FISCAL FRAMEWORK OF UPSTREAM PROJECTS 4 d
- Concession and production-sharing contracts: principles, examples of tax regimes and case studies.
- Risk-service contracts and technical assistance contracts.
- Objectives of a flexible and progressive tax system, flexible taxation terms.
- 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 (5 days)

ECONOMIC ANALYSIS OF E&P PROJECTS 4 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 & Production: shadow interest.
- Equity profitability analysis.

RISK ANALYSIS OF E&P PROJECTS 1 d
- 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.
- Impact of “ringfencing” and the state participation in the decision-making process.

Module 3: UPSTREAM ACCOUNTING & FINANCE (5 days)

UPSTREAM ACCOUNTING & FINANCE 5 d
- 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.
- Norms: asset amortization, asset retirement obligations, value impairment test, etc.
- Reporting: purpose, obligations, financial communication.
- Analytical accounting. Cost management and control.
- Audit: general, fiscal, partners.
- Tax audit: recoverable costs, common costs, sole costs.

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

Contact: eco.rueil@ifptraining.com
Contractual Framework of Exploration & Production

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 evolutions in contractual relationships.
Concessions contracts: principles, State’s revenues, examples of tax regimes and case studies.
Production-sharing contracts: principles, examples, of tax regimes and case studies.
Risk-service contracts and technical assistance contracts.
Fiscal and non-fiscal constraints.
Objectives of a flexible and progressive tax system.
Exercise: comparison of concession and production sharing contracts.
Case study: comparative reading between a HC law and an E&P contract.

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.

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.

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

Level: PROFICIENCY

Purpose
To provide participants with an in-depth understanding of the concepts, mechanisms and articles of Production Sharing and Joint Operating Agreement.

Audience
Exploration and production professionals, legal personnel entering the E&P scene, service companies managers and government employees.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify the main concepts, principles and articles of a Production Sharing Agreement which contractually binds petroleum companies with a ministry and/or a state oil company;
- evaluate the management of Petroleum Exploration and Production partnerships to successfully find and produce hydrocarbons;
- discuss the practical aspect of contracts: identifying key issues, understanding constraints and deadlines, getting familiar with the document.

Ways & Means
- Case studies.
- Exercises on Production Sharing Contracts.
- Analysis of Joint Operating Agreements.
- Examples of petroleum laws and fiscal regimes around the world.

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 legal framework of exploration-production activities.

Course Content

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: eco.rueil@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.

Reference: EAM/EFEP  
Can be organized as an In-House course.  
Contact: eco.rueil@ifptraining.com

Rueil-Malmaison  
20 April 24 April  
€3,780

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

Reference: EAM/EPCN
Can be organized as an In-House course.

Contact: eco.reu@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 27 April 30 April €4,200

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

**Course Content**

**ECONOMIC & CONTRACTUAL FRAMEWORK OF E&P**
- 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**
- 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**
- 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**
- 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.
- Introduction to risk analysis and risk discount rate: sensitivity analysis, Spider and Tornado diagrams.
- Case study: development of an oil field (under concession and production sharing agreements).

**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.
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 all 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

CONTRACTUAL & FISCAL FRAMEWORK OF EXPLORATION-PRODUCTION 0.5 d
- Overview of E&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.

OIL CONTRACT MODELING 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).
- Equity profitability analysis.
  Case studies: LNG project and gas pipeline project with specific financing.

RISK ANALYSIS OF EXPLORATION-PRODUCTION PROJECTS 0.5 d
- Introduction to risk analysis and risk discount rate: sensitivity analysis, Spider and Tornado diagrams.
- Probability of success, methodology of decision tree analysis.
- Analysis of economic risk in exploration.
- Typical problems with uncertainties:
  - Impact of ringfencing and State participation on the exploration decision process.
  - Farm in/farm out, cost and value of information.
  - Portfolio management for E&P projects.

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.
Operating under "Local Content"

Course Content 3 days

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.

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.
Oil Fields Unitization

Level: PROFICIENCY

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

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

Contact: eco.rueil@ifptraining.com

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

www.ifptraining.com 61
Advanced Certificate

Upstream Auditing Certification

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

Course Content

10 days

CONTRACTUAL & ACCOUNTING FRAMEWORK OF E&P OPERATIONS 2.5 d
Petroleum contracts fundamentals.
Accounting principles of upstream operations.

UPSTREAM AUDITING CONTEXT 2 d
Typology: petroleum contracts auditing - JOAs auditing - Petroleum aspects of internal auditing.
Auditor qualifications and professional conduct rules.
Auditing norms.
Tools and techniques.

UPSTREAM COST AUDITING (recoverable or shared) 2 d
Cost items analysis.
Cost accounting exercises.

SPECIFICITIES OF PETROLEUM CONTRACT AUDITING 0.5 d

SPECIFICITIES OF JOA AUDITING 0.5 d

AUDIT MANAGEMENT 1 d
Preparation, roll-out and follow-up.

GOVERNANCE & FINANCIAL SECURITY 0.5 d

JURY 1 d

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 Certification.
- 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.
Graduate Certificate
Upstream Economics & Management Certification

Level: FOUNDATION

Purpose
This certifying training is part of a professional carrier 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,
- prepare and conduct a contractual audit,
- 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 Certification.
- 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

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.

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/UEMC
Contact: eco.rueil@ifptraining.com

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

www.ifptraining.com

63
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.

ECONOMIC EVALUATION CRITERIA
0.5 d
Corporate finance, capital costs and discount rate of the company.
Construction of project cash flows schedule.
Economic criteria for project evaluation: net present value (NPV), internal rate of return (IRR), payback period, etc.
Case studies: development of an oil field under concession.

GLOBAL PROFITABILITY ANALYSIS
1 d
Methodology for assessing the global profitability of capital invested.
Impact of taxation and inflation in profitability investment studies.
Choosing an investment program with a limited budget, scarcity cost of capital.
Case studies: accelerating production project (EOR) project of upgrading a refinery (Hydrocracking unit).

ECONOMIC COST ANALYSIS
0.5 d
Accounting cost vs. economic cost, after-tax cash outflows.
Total discounted cost, annual economic cost.
Economic depreciation, unit economic cost, optimal economic lifetime.
Cases studies: issues related to purchasing of equipment and definition of an optimal economic lifetime.

EQUITY PROFITABILITY ANALYSIS
0.5 d
Financing Oil & Gas projects, project finance and B.O.T. structures.
Various financing plans and debt repayment.
Analysis of equity cash flows, return on equity capital, financial leverage.
Case studies: construction of LNG plant and gas pipeline projects with specific financing.

RISK ANALYSIS
0.5 d
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 bloc.

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/IPPS
Can be organized as an In-House course.
Contact: eco.reuil@ifptraining.com

Location  Start Date  End Date  Tuition Fees excl. VAT
Rueil-Malmaison  26 May  28 May  €2,200

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 the 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

<table>
<thead>
<tr>
<th>Contractual Accounting</th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Operating Agreements and accounting appendix.</td>
<td></td>
</tr>
<tr>
<td>Upstream tax issues.</td>
<td></td>
</tr>
<tr>
<td>Production Sharing Contracts (PSC) and accounting procedures.</td>
<td></td>
</tr>
<tr>
<td>Joint costs and recoverable costs.</td>
<td></td>
</tr>
<tr>
<td>At cost principle and implementation.</td>
<td></td>
</tr>
<tr>
<td>Bases of operator's cost accounting.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specificities of Joint Venture Audit</th>
<th>1.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audit rights.</td>
<td></td>
</tr>
<tr>
<td>Organization of the audit: partners, operator.</td>
<td></td>
</tr>
<tr>
<td>Auditing respect of at cost principle.</td>
<td></td>
</tr>
<tr>
<td>Exercises.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specificities of State Audit</th>
<th>1.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audit rights.</td>
<td></td>
</tr>
<tr>
<td>Organization of the State audit, auditors qualification.</td>
<td></td>
</tr>
<tr>
<td>Articulation between joint-venture audit and State audit.</td>
<td></td>
</tr>
<tr>
<td>Key elements of contract and accounting procedure.</td>
<td></td>
</tr>
<tr>
<td>Case study.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conducting a Contract Audit</th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audit preparation.</td>
<td></td>
</tr>
<tr>
<td>During the audit.</td>
<td></td>
</tr>
<tr>
<td>Conclusion of the audit.</td>
<td></td>
</tr>
<tr>
<td>Audit supervisor role.</td>
<td></td>
</tr>
<tr>
<td>Audit report and follow-up.</td>
<td></td>
</tr>
</tbody>
</table>

### Course Content

<table>
<thead>
<tr>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTRACTUAL ACCOUNTING</td>
</tr>
<tr>
<td>1 d</td>
</tr>
<tr>
<td>SPECIFICITIES OF JOINT VENTURE AUDIT</td>
</tr>
<tr>
<td>1.5 d</td>
</tr>
<tr>
<td>SPECIFICITIES OF STATE AUDIT</td>
</tr>
<tr>
<td>1.5 d</td>
</tr>
<tr>
<td>CONDUCTING A CONTRACT AUDIT</td>
</tr>
<tr>
<td>1 d</td>
</tr>
</tbody>
</table>

### Reference:

GIP/UCA

Can be organized as an In-House course.

Contact: eco.rueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>7 December</td>
<td>11 December</td>
<td>€3,770</td>
</tr>
</tbody>
</table>

This course is also available in French: GIP/AEPF. 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.

Course Content

GOVERNANCE OF COMPANIES
1.5 d
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
2 d
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
0.5 d
FCPA compliance.
New reporting requirements for listed companies.
Reserves, payments to States, emission certificates.

BEST PRACTICES STUDY
1 d
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: eco.rueil@ifptraining.com

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.

Ways & Means

- Project teams are put together at the start of the training course. A real or fictitious E&P project is then allocated to each team.
- This project team will be required to put into practice the concepts acquired during the training course, based on the case that they represent. Oral summaries will be delivered to the whole group for each production, giving rise to interactive question-and-answer sessions.

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.

Reference: CMGT/CMSGB

Only available as an In-House course.

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

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.
## Training Engineering in E&P

### Level: FOUNDATION

### 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
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
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
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
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
Trainees’ assessment before, during and after the course completion.
Feedback from the trainer and the pedagogical team.
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.reui@ifptraining.com  
This course is also available in French: CMGT/TRAINENSFR. Please contact us for more information.
Field/Site Trainers Accreditation

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.
This course is also available in French: CMGT/TRAINERACC1FR. Please contact us for more information.
Classroom Lecturers Accreditation

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.

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 20 days

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.

Reference: CMGT/TRAINERACC2GB
Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

This course is also available in French: CMGT/TRAINERACC2FR. Please contact us for more information.
Subject Matter Experts Accreditation

Level: FOUNDATION

Purpose
The purpose of this accreditation is to develop the pedagogical knowledge 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.

Audience
SME’s of the E&P industry, counting with a high technical expertise and who may be required to perform classroom training roles for advanced technical training programs.

Learning Objectives
Obtaining the accreditation will validate the SME’s expertise in:
- delivering technical training courses,
- creating pedagogical material, adapted to the training level, for her/his use or for others,
- 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,
- make use of her/his expertise to support the competence management process of her/his company.

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.

Course Content 25 days

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 looked at 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 & KNOWLEDGE TRANSFER
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, 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…).

Once the material created, the SME should be able to transfer the training material she/he is responsible for to other trainers, to enable them to deliver the training at the same level of quality.
This part will consist of a personalized coaching on communication methods and adaptation skills needed for the SME to transfer the pedagogical supports and methods to be applied.
A real-life situation is organized.
Accreditation assessment: candidates will be assessed on their ability to adapt and on the quality of the pedagogical material that they produce.

Part 4 - COMPETENCE MANAGEMENT FUNDAMENTALS
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.
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.
This phase is not subject to an accreditation assessment, but it is essential to link the technical careers with the trainings to be implemented.

Part 5 - 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 test their own methods, using advice given to them by the expert.
The second phase involves autonomously running one of the course’s modules, in real-life conditions.
The theme of the module must correspond to the candidate’s area of expertise so that she/he can focus on the pedagogical methods.
Accreditation assessment: assessment of the training performance.
Communication & Behavioral Management

Course Content

OVERCOMING ONE’S FEAR & EXPRESSING ONESELF 1d

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 1d

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.
Contact: exp.rueil@ifptraining.com

This course is also available in French: CMGT/COMFR. Please contact us for more information.
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,
- any 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 Certification.
- 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>
</tr>
</thead>
<tbody>
<tr>
<td>E&amp;P CHAIN VALUE MANAGEMENT</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Project evaluation and choices throughout the exploration and production value chain.</td>
<td></td>
</tr>
<tr>
<td>INTEGRATION &amp; SCOPE MANAGEMENT</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Preliminary, conceptual and pre-project studies and their deliverables.</td>
<td></td>
</tr>
<tr>
<td>EPC phase objectives and project execution plan.</td>
<td></td>
</tr>
<tr>
<td>Local content and sustainable development.</td>
<td></td>
</tr>
<tr>
<td>TECHNICAL SERVICE CONTRACTS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Contracting strategy (project breakdown into contracts).</td>
<td></td>
</tr>
<tr>
<td>Types and comparison of technical contracts.</td>
<td></td>
</tr>
<tr>
<td>Endorsements and assignments.</td>
<td></td>
</tr>
<tr>
<td>Tendering process.</td>
<td></td>
</tr>
<tr>
<td>PROJECT ORGANIZATION</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Interface management.</td>
<td></td>
</tr>
<tr>
<td>Management of human resources, organization charts, project manager's role.</td>
<td></td>
</tr>
<tr>
<td>Stakeholder management.</td>
<td></td>
</tr>
<tr>
<td>Communication management.</td>
<td></td>
</tr>
<tr>
<td>HSE, QUALITY &amp; RISK MANAGEMENT</td>
<td>1 d</td>
</tr>
<tr>
<td>HSE: tools and techniques for safety and environment design, project reviews, safety concept and safety dossier.</td>
<td></td>
</tr>
<tr>
<td>HSE during construction phase, HSE indicators.</td>
<td></td>
</tr>
<tr>
<td>Quality: assurance, control and surveillance management.</td>
<td></td>
</tr>
<tr>
<td>Risks: identification, ranking, action plans.</td>
<td></td>
</tr>
<tr>
<td>PROJECT CONTROL: COSTS &amp; SCHEDULE</td>
<td>1 d</td>
</tr>
<tr>
<td>Planning and scheduling: schedule elaboration, progress control, recovery plan.</td>
<td></td>
</tr>
<tr>
<td>Costs: estimation of facilities expenditures, budget elaboration, cost control, reporting.</td>
<td></td>
</tr>
<tr>
<td>OIL &amp; GAS PROJECT PHASES</td>
<td>1 d</td>
</tr>
<tr>
<td>Detailed engineering: work packages, main deliverables, project reviews, documentation control, changes.</td>
<td></td>
</tr>
<tr>
<td>Procurement: activities (purchasing, expediting, inspection, shipping), long lead items, company supplied items, material control systems.</td>
<td></td>
</tr>
<tr>
<td>Construction/fabrication challenges: contractors and resources, (sub) contract types.</td>
<td></td>
</tr>
<tr>
<td>Construction at site: execution plan, construction methods (temporary construction facilities, prefabrication, modularization, delivery, erection), interface with commissioning.</td>
<td></td>
</tr>
<tr>
<td>Fabrication at yards: load-out, transport and installation.</td>
<td></td>
</tr>
<tr>
<td>Completion activities: methodology, sequence, completion dossiers, commissioning systems, hand-over and acceptance of the facilities.</td>
<td></td>
</tr>
<tr>
<td>Project close out and management of collective knowledge.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: PIMP/PRJ/03/GB - 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>8 June</td>
<td>12 June</td>
<td>€3,680</td>
</tr>
<tr>
<td>Rueil-Malmaison</td>
<td>16 November</td>
<td>20 November</td>
<td>€3,680</td>
</tr>
</tbody>
</table>
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.

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, 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, unitization 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 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/PVMMGB  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, speculations 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, 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

www.ifptraining.com
General

Introduction to Basin Exploration .......................................................... p. 77
Hunting for Oil: Exploration & Upstream Overview ........................................ p. 78

Methods & Tools

Petroleum Geophysics ........................................................................ p. 79
Seismic Reflection Fundamentals ............................................................ p. 80
Petroleum Systems: Hydrocarbons from Source Rock to Reservoirs ........ p. 81
Structural Geology, Basin Development & Associated Traps ................... p. 82
Well Logging & Basic Log Interpretation (BL) ........................................ p. 83
Well Logging & Qualitative Log Interpretation ........................................ p. 84
3D Seismic Interpretation Workshop ..................................................... p. 85
Sedimentology & Sequence Stratigraphy .............................................. p. 86
Stratigraphic Modeling: Basin Architecture & Sediment Distribution ...... p. 87
Basin Modeling: Thermicity, Maturation & Migration ............................. p. 88
Wellsite Geology .................................................................................. p. 89

From Basin to Prospect Evaluation

Geosciences: from Basin Exploration to Discovery Certification .................. p. 90
Basin Assessment & Modeling Certification ............................................. p. 91
Play Assessment & Prospect Generation ................................................. p. 92
From Prospect to Development: an Integrated Approach ......................... p. 93
Seismic & Sequence Stratigraphy for Oil & Gas Exploration ..................... p. 94
Exploration Blocks Management ......................................................... p. 95
E&P Projects Value Management ......................................................... p. 96
E&P Project Risk & Decision Analysis Workshop .................................... p. 97
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

BASIN EXPLORATION CHALLENGES, STRATEGY & WORKFLOW 1 d
Basin potential evaluation, play concept assessment and prospect generation.
Prospect ranking. Decision-making process. License block leasing.
Examples.

BASIN EXPLORATION METHODS & TOOLS 3 d
Basin analysis:
Geodynamics: earth deformation and basin structuration (extensional & compressional).
Review of geological environments and related reservoir distribution.
Sedimentary basins: sediment infill and associated traps (structural & stratigraphic).
Hands-on practice on real examples.
Petroleum systems:
The petroleum trilogy: source rocks, reservoir rocks and seal rocks.
Source rock potential and maturity evaluation: hydrocarbon generation.
Structural evolution, hydrocarbon expulsion, migration and entrapment, relative timing of events.
Hands-on practice on real examples.
Seismic interpretation:
Review of acquisition techniques.
Seismic interpretation: objectives and methodology.
Structural interpretation of basins in extensional and compressional contexts.
Stratigraphic interpretation of basin fill.
Hands-on practice on real examples.
Well log analysis:
Wireline log acquisition and well log analysis.
Review of logging tools and recorded parameters.
"Quick-look" qualitative well-log interpretation.
Hands-on practice on real examples.

EVALUATION OF BASIN PETROLEUM POTENTIAL 1 d
Basin potential evaluation: tectono-stratigraphic framework, petroleum trilogy, entrapment, migration and timing.
Play assessment and mapping for exploration opportunities. Sweet spots identification.
Prospect definition and related geological risk analysis ("Prospect review card").
Workshop on a case study.

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

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 31 August 4 September €3,120

This course is also available in French: GENG/INFOBASFR. Please contact us for more information.
Hunting for Oil: Exploration & Upstream Overview
Serious Game Simulation Workshop

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) 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: GENG/HFO  •  Only available as an In-House course. Contact: gre.rueil@ifptraining.com

Course Content

| 5 days |

INTRODUCTION - EXPLORATION GEOLOGY 1 d
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 1 d
Lecture: seismic reflection (fundamentals, data acquisition, processing & interpretation).
Workshop: seismic interpretation, survey planning, commitment and permitting.

HYDROCARBON TRAPS - OPERATIONS GEOLOGY 1 d
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 1 d
Lecture: well design and completion; enhanced recovery.
Workshop: field appraisal strategy and development planning.

RESERVE EVALUATION - INTRODUCTION TO RESERVOIR MODELING 1 d
Lecture: understand the reservoir (sedimentological and structural modeling).
Workshop: accumulation evaluation (mapping and volumetric calculation - OOI); 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.
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

INTRODUCTION TO PETROLEUM GEOPHYSICS
0.25 d

SEISMIC WAVE PROPAGATION & SIGNAL PROCESSING
0.75 d
Seismic waves, rock velocities and densities, Snell-Descartes law.
Reflection coefficients, acoustic impedance.
Seismic reflection principle. Seismic shot gathers.
Seismic signal vs. Seismic noises. Time domain vs. Frequency domain.
Time and space sampling.

SEISMIC ACQUISITION
2.5 d
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…

SEISMIC PROCESSING & IMAGING
2.5 d
Seismic processing workflows, post-stack versus pre-stack.
Enhance signal versus noise.
CMP/Bin, static corrections, dynamic corrections, velocity analysis.
Stack, post-stack migrations, pre-stack migrations (PSTM - PSDM).
Workshop: 2D Seismic Processing.

BOREHOLE SEISMIC
0.75 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: THEORY & PRACTICE
2 d
Principles and methodology, seismic interpretation pitfalls.
2D seismic interpretation practice (on paper).
Workshop: 3D Seismic Interpretation.

SEISMIC FOR RESERVOIR ANALYSIS
1 d
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.

GRAVIMETRY, MAGNETOMETRY & ELECTRO-MAGNETOMETRY
0.25 d
Gravimetry: theory and principles.
Magnetometry: theory and principles.
Electro-magnetometry: theory and principles.

SUMMARY, SYNTHESIS & WRAP-UP

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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>30 November</td>
<td>11 December</td>
<td>€6,180</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

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
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

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

www.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 (lifted 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.

---

**Course Content**  

**PLATE TECTONICS & STRUCTURAL STYLES**  

1.5 d

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**  

1.5 d

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**  

1.5 d

- 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**  

0.5 d

---

Reference: METH/STRUCT  

Only available as an In-House course.  

Contact: gre.rueil@ifptraining.com
**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**

**BASIC INTERPRETATION CONCEPTS**
8 h
Seals and reservoirs.
Definition of main reservoir petrophysical and fluid properties (lithology, porosity, resistivity, saturation).
Fundamental equations for log interpretation in clean formations.
Measurement environment (drilling, borehole, invasion process).

**MEASUREMENTS & APPLICATIONS**
12 h
Mud logging and coring operations.
Wireline logging operations.
Well log: header, calibrations, parameters, repeat section, main log.
Logging tool principle, limitation, application, quality control.
Caliper, Gamma Ray and GR spectrometry, spontaneous potential.
Resistivity (induction, Laterolog) and microresistivity measurements.
Porosity and lithology measurements: nuclear (litho-density, neutron) and acoustic logging.

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

---

Reference: METH/BLULI

Contact: gre.rueil@ifptraining.com

Only available as an In-House course.
**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; WIRELINE 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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>14 September</td>
<td>18 September</td>
<td>€3,120</td>
</tr>
</tbody>
</table>

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.

WEEK 1
TEAM WORK ON 3D CASE STUDIES (extensional context)

STRUCTURAL INTERPRETATION - PROSPECT GEOMETRY IDENTIFICATION
Workshop presentation and objectives (0.5 day)
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.

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>16 November</td>
<td>27 November</td>
<td></td>
</tr>
</tbody>
</table>

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

Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STRATIGRAPHY - SEDIMENTOLOGY - DEPOSITIONAL ENVIRONMENTS</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Review of basic concepts in stratigraphy and sedimentology. Alluvial, fluvial, deltaic, shallow and deep marine facies models. Facies classification and related petrophysical characteristics.</td>
<td></td>
</tr>
<tr>
<td><strong>SEISMIC SEQUENCE STRATIGRAPHY AT BASIN SCALE</strong></td>
<td>2.5 d</td>
</tr>
<tr>
<td>Historical concept of depositional sequences and system tracts. Interpretation methodology both for clastics and carbonate facies. Prediction of potential source rocks &amp; reservoirs location. Application to seismic interpretation. State-of-art overview of sequence stratigraphy.</td>
<td></td>
</tr>
<tr>
<td><strong>HIGH-RESOLUTION SEQUENCE STRATIGRAPHY AT RESERVOIR SCALE</strong></td>
<td>1 d</td>
</tr>
<tr>
<td><strong>OVERVIEW OF STRATIGRAPHIC MODELING</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Interactive demo on Dionisos™ modeling software.</td>
<td></td>
</tr>
</tbody>
</table>

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 in 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.

Reference: METH/SEQSTRATI
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>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>15 June</td>
<td>19 June</td>
</tr>
</tbody>
</table>

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

SEQUENCE STRATIGRAPHY ANALYSIS
1 d
Depositional system concepts. Walther’s law.
Well log data.
Seismic data.
Sequence stratigraphy analysis workflow.

STRATIGRAPHIC PARAMETERS
1 d
Presentation of allogenic parameters through the use of DionisosFlow™ software.
Sensitivity analysis exercises with DionisosFlow™.

ACCOMMODATION & SHORELINE SHIFTS
1 d
Accommodation concept.
Shoreline trajectories.
Subsidence. Sediment supply.
Demo and exercises with DionisosFlow™.

SEISMIC & WELLS ANALYSIS
1 d
Stratigraphic surfaces.
Systems tracts.
Demo and exercises with DionisosFlow™.

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
### Course Content

#### SEDIMENTARY BASIN MODELING THROUGHOUT TIME
**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
**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
**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
**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.
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

**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.
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, TVDS) 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 test 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: METH/WSGEOG
Only available as an In-House course.

Contact: gre.rueil@ifptraining.com

www.ifptraining.com
Graduate Certificate
Geosciences: from Basin Exploration to Discovery Certification
Exploration Geology Disciplines

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 Certification.
- Ready-to-use skills.

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

Course Content

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 & TECHNIQUES 40 d
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 & ASSESSMENT 40 d
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 d
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.rueil@ifptraining.com
### Course Content

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 d**

- Play assessment: From basin analysis to exploration opportunities.
- Prospect generation and evaluation: from single to multi-prospect portfolio.
- Exploration & Production project economics and decision analysis.

#### Part 2: EXPLORATION TECHNIQUES & BASIN MODELING

**30 d**

- Structural geology: impact on petroleum system development and maturity.
- Well logging and qualitative log interpretation.
- 3D seismic interpretation workshop (structural & stratigraphic).
- Sedimentology and sequence stratigraphy workshop.
- Stratigraphic modeling (basin architecture and sediment distribution).
- Basin modeling (thermicity, maturation and migration).

#### Part 3: RESERVOIR STUDIES: ACCUMULATION & MODELING

**10 d**

- Hydrocarbons in place estimation: OOIP - Uncertainties & risks.
- Geological modeling workshop for integrated reservoir studies.

#### Part 4: FINAL PROJECT WORKSHOP

**10 d**

- 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.
Play Assessment & Prospect Generation

Course Content

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

PLAY ASSESSMENT
1 d

PROSPECT ANALYSIS & GENERATION
2 d

RISK ANALYSIS
1 d
Identification and assessment of risks and uncertainties related to:
- Geology (source rock, reservoir, seal, preservation).
- Fluids (generation, maturation, migration, entrapment, timing).

WRAP UP & CONCLUSION

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.

Reference: EVAL/PLAY
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>22 June</td>
<td>26 June</td>
<td>€3,260</td>
</tr>
</tbody>
</table>

This course is also available in French: EVAL/PLAYFR. Please contact us for more information.
From Prospect to Development: an Integrated Approach

Course Content

WEEK 1: BASIN ANALYSIS & PROSPECT GENERATION - FROM PLAY TO LEAD (5 days)

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 (5 days)

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.
Evaluation of a discovery well. Related uncertainties.
Proposals for location and program of the first appraisal well.

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

www.ifptraining.com
Seismic & Sequence Stratigraphy for Oil & Gas Exploration

Course Content

WEEK 1

SEQUENCE STRATIGRAPHY CONCEPTS & METHOD 2 d
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 1.5 d
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 1.5 d
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) 1.5 d
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) 1.5 d
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 2 d
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/STRATAADV Only available as an In-House course. Contact: gre.rueil@ifptraining.com
**Exploration Blocks Management**

**Level:** PROFICIENCY

**Purpose**

This course provides:
- the knowledge and skills required to assess and move forward with play assessment scenarios in order to set up strategies for acreage management;
- a comprehensive and practical understanding of the part of the E&P value chain that deals with the technical evaluation of an exploration asset;
- the fiscal framework as well as the appreciation of risk that can be factored into the economics of an exploration project, and the impact on the decision-making process.

**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 prospect definition workflow and assess the parameters involved in basins' hydrocarbon potential evaluation;
- identify the link between petroleum systems, plays and prospects in order to assess a basin's potential and to set up an adequate exploration strategy;
- acquire a practical knowledge and the workflow for reducing exploration risk by predicting proven and unproven plays performance;
- understand risks and uncertainties inherent to OHIP (Original Hydrocarbon In Place) assessment and to follow through the decision process along the E&P chain;
- review fundamental concepts of portfolio management and to use the results of assessment studies with the adequate caution;
- define the right exploration strategies and comprehend risk behavior in petroleum exploration;
- assess the value of a single prospect and the value of several independent (dependent) 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**

IPF 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**

**OPENING WORKSHOP: SETTING UP EXPLORATION BLOCK STRATEGY** 2 d

By studying a “theoretical basin”, this opening workshop will walk 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 their findings.

**PLAY ASSESSMENT: FROM BASIN ANALYSIS TO EXPLORATION OPPORTUNITIES** 3 d

- 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)
- Event charts definition.
- Workshop on real case studies.
- Play risk analysis and exploration opportunities (0.25 day)

**WEEK 2**

**PROSPECT GENERATION & EVALUATION: FROM SINGLE TO MULTI-PROSPECT PORTFOLIO** 5 d

- Prospect analysis and evaluation (2.5 days)
- Identification and assessment of risks and uncertainties (1.5 days)
- Deliverables for decision-making process (1 day)
- “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** 5 d

- 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.ruel@ifptraining.com

www.ifptraining.com

**15 days**
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, 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, unitization 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
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, 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
Reservoir Characterization & Modeling

- Introduction to Reservoir Characterization p. 99
- Integrated Petrophysics for Reservoir Characterization & Modeling Certification p. 100
- Reservoir Characterization & Modeling Certification p. 101
- Quantitative Well Log Analysis p. 102
- Fundamentals of Facies Analysis & Rock-Typing p. 103
- Seismic Interpretation & Attributes Analysis Workshop: Qualitative & Quantitative Methods p. 104
- Petroleum Geostatistics p. 105
- Geological Modeling Workshop for Integrated Reservoir Studies p. 106
- Hydrocarbon Accumulations & Uncertainties p. 107
- Naturally-Fractured Reservoirs: Static & Dynamic Modeling p. 108
- Petrophysical Properties: Core, Log & Test Data Integration for Reservoir Modeling p. 109
- Upscaling: from Static to Dynamic Model p. 110
- Borehole Imaging Interpretation Workshop with WellCad™ p. 111
- Fracture & Fault Modeling Workshop with FracaFlow™ p. 112
- Tight Reservoir Petrophysics p. 113
- Advanced Multivariate Geostatistics Certification p. 114
- Advanced Facies Analysis & Rock-Typing Certification p. 115
- Seismic Reservoir Characterization: AVO & Inversion Workshop Certification p. 116
- Geological Characterization & Modeling - Integrated Workshop Certification p. 117
- Tools for Seismic Reservoir Characterization: Pre-Stack Seismic Inversion p. 118
- Tools for Seismic Reservoir Characterization: Post-Stack Seismic Inversion p. 119
- SRC: Seismic Reservoir Characterization p. 120
- Static Model Construction: Field Constraints & Integration with Subsurface Data p. 121
- Fundamentals of Reservoir Geology p. 122
- Core Analysis for Reservoir Characterization p. 123
- Special Core Analysis p. 124
- Geomechanics for Geoscientists p. 125
- Reservoir Engineering

- Introduction to Reservoir Engineering p. 127
- Reservoir Fluid Properties - PVT p. 128
- Drilling & Completion - Wellbore Interface & Well Productivity p. 129
- Well Testing & Well Test Analysis p. 130
- Drive Mechanisms - Enhanced Oil Recovery p. 131
- Dynamic Reservoir Simulation p. 132
- EOR Concepts & Applications p. 133
- Miscible Gas EOR Certification p. 134
- Chemical EOR Certification p. 135
- Advanced Dynamic Reservoir Simulation p. 136
- Reservoir Simulation Workshop Certification p. 137
- Advanced Well Test Analysis Certification p. 138
- PVT Modeling p. 139
- Decline Curves Analysis p. 140
- Reservoir Management

- Reservoir Engineering Certification p. 141
- Reservoir Management p. 142
- Reserves Evaluation - Risks & Uncertainties p. 143
- Mature Fields - Subsurface Issues p. 144
- IRM - Integrated Reservoir Management p. 145
- Field Development

- Field Development Project & Uncertainties p. 146
- Field Operations Engineer Certification p. 147
- E&P Project Risk & Decision Analysis Workshop p. 150
- E&P Project Cost Estimation & Control Certification p. 151
- Field Development Project p. 148
- E&P Value Chain & Front-End Development p. 149
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

INTRODUCTION TO RESERVOIR CHARACTERIZATION 1 d
Reservoir characterization and modeling objectives.
Characterization and modeling workflows.
Data types, representativeness and related uncertainty.
Challenges of data integration.

RESERVOIR ARCHITECTURE 1.5 d
Seismic interpretation method and pitfalls. Hands-on: case study.
Static and dynamic information integration.

FACIES ANALYSIS - ROCK-TYPING 1.5 d
Litho-facies analysis (core description and upscaling methods).
Introduction to rock-typing: principle of electro-facies and petro-facies analyses.
Statistical analysis of sedimentological data (VPC analysis).

PETROPHYSICS & ROCK PROPERTIES - RESERVOIR HETEROGENEITIES 1 d
Petrophysics: principles, reservoir parameters.
Petrophysical parameter modeling (water injection simulation).
Heterogeneities: identification and inventory.
Wrap-up session.

Reference: RCM/INFOGEOL
Only available as an In-House course.

Contact: gre.rueil@ifptraining.com

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

www.ifptraining.com
Graduate Certificate
Integrated Petrophysics for Reservoir Characterization & Modeling Certification

Level: PROFICIENCY

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:
- understand concepts, techniques and methods of rock properties applied to reservoir modeling,
- characterize a fractured network on a field,
- develop the skills to check the validity of structural interpretation on seismic through time using balancing and structural restoration,
- apply the current borehole imaging tools and modern interpretation techniques,
- apply the workflow to characterize and model the fractures network 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.
- Software used during workshops: with courtesy of ALI, Beicip-Franlab, Geovariance, LithoTec, Schlumberger and Senergy.

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 requested in petroleum geology and seismic interpretation.

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

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

Course Content

90 days

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 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: RESERVOIR CHARACTERIZATION & MODELING
Introduction to reservoir characterization.
Geological modeling workshop for integrated reservoir studies.
Reservoir petrophysics: conventional and special core analysis.
Fundamentals of facies analysis & rock-typing.
Petroleum geostatistics.
Well logging and qualitative log interpretation.
Core analysis for reservoir characterization.
Seismic reservoir characterization AVO and inversion workshop.
Quantitative well log analysis.

Part 2: FRACTURED RESERVOIR MODELING
Naturally fractured reservoirs: static and dynamic modeling.
Applied structural geology workshop: structural restoration with LithoTect™.
Borehole imaging interpretation workshop with WellCAD™.
Fracture and fault modeling workshop with FracaFlow™.

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

Reference: RCM/PETRORES
Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Graduate Certificate
Reservoir Characterization & Modeling Certification

Level: PROFICIENCY

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.

Prerequisites
Engineering or geoscience degree, or equivalent professional experience.

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

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

Course Content
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 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: 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 & 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>7 September</td>
<td>27 November</td>
<td>€32,380</td>
</tr>
</tbody>
</table>

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

www.ifptraining.com
Quantitative Well Log Analysis

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.

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.

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

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 21 September 25 September €3,250

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

OVERVIEW ON ELECTROFACIES ANALYSIS & ROCK-TYPING
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
Probabilistic and neural network approaches.
Hands-on non-supervised electrofacies analysis.
Key points in non-supervised analysis.

SUPERVISED ANALYSIS
Hands-on supervised analysis with probabilistic approach.
Key points and pitfalls in supervised analysis.
Electrofacies analysis workflow.
Hands-on integration of electrofacies in sequence stratigraphy analysis.

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

Reference: RCM/ROCKTYP
Only available as an In-House course.
This course is also available in French: RCM/ROCKTYPFR. Please contact us for more information.

Contact: gre.rueil@ifptraining.com

www.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.

---

<table>
<thead>
<tr>
<th>Course Content</th>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>QUALITATIVE INTERPRETATION</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Geological frame for interpretation: tectonic environment and sedimentary basins.</td>
<td></td>
</tr>
<tr>
<td>Petroleum geophysics:</td>
<td></td>
</tr>
<tr>
<td>Wave propagation.</td>
<td></td>
</tr>
<tr>
<td>Acquisition.</td>
<td></td>
</tr>
<tr>
<td>Processing.</td>
<td></td>
</tr>
<tr>
<td>Seismic interpretation workflows:</td>
<td></td>
</tr>
<tr>
<td>Structural interpretation.</td>
<td></td>
</tr>
<tr>
<td>Stratigraphic interpretation.</td>
<td></td>
</tr>
<tr>
<td>Well-to-seismic tying.</td>
<td></td>
</tr>
<tr>
<td>Exercises: examples in various environments and basins.</td>
<td></td>
</tr>
<tr>
<td><strong>QUANTITATIVE INTERPRETATION</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Fundamentals of rock physics.</td>
<td></td>
</tr>
<tr>
<td>Post-stack attributes, acoustic impedance and seismic inversion.</td>
<td></td>
</tr>
<tr>
<td>Pre-stack and AVO.</td>
<td></td>
</tr>
<tr>
<td>Well data and seismic data preconditioning for seismic characterization.</td>
<td></td>
</tr>
<tr>
<td>Quantitative reservoir property prediction: lithologies and fluids.</td>
<td></td>
</tr>
<tr>
<td><strong>WORKSHOP - NORTH SEA CASE STUDY</strong></td>
<td>2 d</td>
</tr>
<tr>
<td>Case study presentation.</td>
<td></td>
</tr>
<tr>
<td>Conclusions.</td>
<td></td>
</tr>
</tbody>
</table>

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.

Course Content

FUNDAMENTALS OF GEOSTATISTICS
Basic statistics for data analysis.
Introduction to geostatistics.
Quantification of spatial variability: variogram.

KRIGING & VARIATIONS
Introduction to kriging.
Data integration: cokriging, collocated cokriging, external drift kriging.
Exercises.

MAPPING
Applications to time-to-depth conversion.
Property mapping.
Dealing with non-stationary cases (trends).

GEOSTATISTICAL SIMULATIONS
Why simulations: limitations of kriging.
Simulation methods for continuous parameters (as Phi and K).
Simulation methods for categorical variables (lithology).
Applications.
Risk assessment optimization.
Applications.

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

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 12 October 16 October €3,250
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>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BASIC PRINCIPLES - RESERVOIR CHARACTERIZATION WORKFLOW</strong></td>
</tr>
<tr>
<td>Introduction and objectives.</td>
</tr>
<tr>
<td>Case study: field presentation.</td>
</tr>
<tr>
<td><strong>PROJECT ORGANIZATION</strong></td>
</tr>
<tr>
<td>Project definition.</td>
</tr>
<tr>
<td>Data QC and summary table.</td>
</tr>
<tr>
<td>Data management.</td>
</tr>
<tr>
<td>Well data loading.</td>
</tr>
<tr>
<td>Manipulating scripts and Excel™ macros.</td>
</tr>
<tr>
<td><strong>STRUCTURAL MODELING</strong></td>
</tr>
<tr>
<td>Structural context.</td>
</tr>
<tr>
<td>Well correlation and stratigraphic data analysis.</td>
</tr>
<tr>
<td>Constraining static model with dynamic data.</td>
</tr>
<tr>
<td>Generating surfaces.</td>
</tr>
<tr>
<td>Picking horizons and faults on seismic.</td>
</tr>
<tr>
<td>Reservoir layering.</td>
</tr>
<tr>
<td>Structural modeling.</td>
</tr>
<tr>
<td>Mapping reservoir structures.</td>
</tr>
<tr>
<td>Modeling results QC.</td>
</tr>
<tr>
<td><strong>ROCK-TYPING &amp; PROPERTY MODELING</strong></td>
</tr>
<tr>
<td>Scaling up logs. Comparison with rock-types.</td>
</tr>
<tr>
<td>Geostatistical tools.</td>
</tr>
<tr>
<td>Facies modeling. Rock-typing (EasyTrace™).</td>
</tr>
<tr>
<td>Petrophysical modeling.</td>
</tr>
<tr>
<td>Mapping result for QC: gross thickness, N-t-G, reservoir properties.</td>
</tr>
<tr>
<td><strong>VOLUME CALCULATION</strong></td>
</tr>
<tr>
<td>Volumetrics: quantification of accumulation for selected parameters.</td>
</tr>
<tr>
<td>Sensitivity study on parameters.</td>
</tr>
<tr>
<td>Key parameters determination for risk assessment.</td>
</tr>
<tr>
<td><strong>SUMMARY, SYNTHESIS &amp; WRAP-UP</strong></td>
</tr>
</tbody>
</table>

Reference: RCM/GEOMODEL

Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Hydrocarbons Accumulations & Uncertainties

Level: PROFICIENCY

Purpose
This course provides a practical understanding of hydrocarbon accumulations estimation and the methods to assess related uncertainties.

Audience
Geoscientists, petroleum and reservoir engineers interested or involved in hydrocarbon accumulations estimation.

Learning Objectives
Upon completion of the course, participants will be able to:
- define and discuss the difference between hydrocarbon accumulations and reserves,
- estimate hydrocarbon accumulations using the volumetric method,
- define the main concepts of risks and uncertainties and related main assessment techniques,
- apply both deterministic and probabilistic methods for estimating volumes in place and gain a thorough understanding of various uncertainties levels,

Ways & Means
- Interactive presentations and practical exercises
- Real case study using a complete data set and a spread sheet for uncertainties assessment

Learning Assessment
Knowledge assessment with multiple choice questions.

Prerequisites
No prerequisites for this course.

Expertise & Coordination
IFP Training (permanent or contracted) geoscientist or reservoir engineer expert in hydrocarbon accumulations with a wide experience and whose competencies are kept up-to-date.

Course Content 5 days

HYDROCARBON ACCUMULATIONS & RESERVES 0.25 d
Definitions of accumulations and reserves.
Resources and reserves classification - PRMS.
Review of methods for estimating reserves: volumetrics, material balance, decline curves analysis, simulation models.

ESTIMATING HYDROCARBON ACCUMULATIONS - VOLUMETRIC METHOD 0.75 d
Overview of volumetric method.
Gross Rock Volume estimation from isobaths and/or geological models; contacts determination from logs and formation testing (RFT/MDT).
Porosity and Net-to-Gross estimation from logs; notion of cut off.
Saturation estimation from logs and cores.
Formation volume factor.
Exercises.

RISKS & UNCERTAINTIES 0.5 d
Definitions of risk and uncertainty.
Notion of probability and probability distribution.
Statistical description of data:
- Histograms and quantities.
- Theoretical models: population, samples, probability density functions.
- Common statistical distributions.

REAL CASE STUDY - WORKSHOP 3.5 d
Correlation of reservoir layers in order to visualize the reservoir units.
Qualitative log interpretation of several wells.
Evaluation of $H$, $H$, $\phi$ and $S_o$ on each well for each sub-reservoir unit.
Review of the available PVT studies (reports) and selection of the most reliable one to give the main characteristics of the reservoir fluids.
Calculation of the probable (P50) hydrocarbon volumes in place (calculation of rock volumes by using isobath maps).
Evaluation of the range of hydrocarbons in place (min & max) taking uncertainties into account with both deterministic and probabilistic methods (Monte-Carlo).
Synthesis and wrap-up.

Reference: RCM/OOIP
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: FRACPREICTOR™.

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

0.5 d

INTRODUCTION TO FRACTURED RESERVOIR

Introduction.
Types of fracture and their effects.
Fractured anticlines and fractures on cores.
Fractures effect on reservoir quality.

1 d

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.

1.5 d

NATURALLY FRACTURED RESERVOIR ENGINEERING

Production problems.
Well testing in fractured reservoirs.
Reservoir simulation in fractured reservoirs.

2 d

5 days

Reference: RCM/FRACMOD
Can be organized as an In-House course.

Location | Start Date | End Date | Tuition Fees excl. VAT
--- | --- | --- | ---
Rueil-Malmaison | 2 November | 6 November | €3,425

This course is also available in French: RCM/FRACMODFR. Please contact us for more information.
Petrophysical Properties: Core, Log & Test Data Integration for Reservoir Modeling

Course Content

RESERVOIR PROPERTIES FROM CONVENTIONAL & SPECIAL CORE ANALYSIS

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

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

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

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

Introduction to integration for reservoir modeling.
Geological model review: structural model, stratigraphic model and petrophysical model.
Reservoir, geological and petrophysical synthesis.
Gridding and upscaling.

Reference: RCM/PETRODATA

Can be organized as an In-House course.

Location | Start Date | End Date | Tuition Fees excl. VAT
--- | --- | --- | ---
Rueil-Malmaison | 17 November | 20 November | €3,250

This course is also available in French: RCM/PETRODATAFR. Please contact us for more information.
Upscaling: from Static to Dynamic Model

Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO UPSCALING</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Objectives of upscaling.</td>
<td></td>
</tr>
<tr>
<td>Why upscaling?</td>
<td></td>
</tr>
<tr>
<td>Aggregation rate, up-layering, heterogeneities, geological features.</td>
<td></td>
</tr>
<tr>
<td>Properties to upscale: porosity, net-to-gross, rock-types, saturation, permeability.</td>
<td></td>
</tr>
<tr>
<td><strong>UPSCALING METHODS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Algebraic methods: Cardwell and Parsons.</td>
<td></td>
</tr>
<tr>
<td>Numerical methods: flow based method.</td>
<td></td>
</tr>
<tr>
<td>Criteria to choose the upscaling method.</td>
<td></td>
</tr>
<tr>
<td><strong>VALIDATION</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Static validation: volumes, histograms.</td>
<td></td>
</tr>
<tr>
<td>Dynamic validation: volumes, simulation results on fine and coarse grids, well transmissivity.</td>
<td></td>
</tr>
<tr>
<td><strong>UPSCALING WORKSHOP: REAL CASE STUDY</strong></td>
<td>2 d</td>
</tr>
<tr>
<td>Geological model: heterogeneities.</td>
<td></td>
</tr>
<tr>
<td>Facies proportion curves analysis.</td>
<td></td>
</tr>
<tr>
<td>Up-layering definition: choice of the most appropriate up-layering.</td>
<td></td>
</tr>
<tr>
<td>Zone division and zone mapping.</td>
<td></td>
</tr>
<tr>
<td>Scale-up properties methodology: choice of the most appropriate method.</td>
<td></td>
</tr>
<tr>
<td>Volume calculation: static validation.</td>
<td></td>
</tr>
<tr>
<td>Dynamic validation: simulation and comparisons with the fine model.</td>
<td></td>
</tr>
<tr>
<td>Synthesis and wrap-up.</td>
<td></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 modeling.

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 modeling: 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/UPSCALEFR

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™).
- Software used during workshops: with courtesy of ALT.

## 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>5 days</th>
<th>INTRODUCTION TO BOREHOLE IMAGING LOG</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Introduction to borehole imaging log.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Borehole image log acquisition technologies.</td>
<td></td>
</tr>
</tbody>
</table>

| 1 d | BOREHOLE IMAGE TOOLS & QUALITY CONTROL |
|     | Understanding dip data integrating well trajectory. |
|     | Fracture interpretation on borehole images. |
|     | BHI fracture interpretation. |
|     | Tools/resolution. |
|     | BHI quality control (QC). |
|     | Automatic and manual dip analysis. |

| 1 d | BOREHOLE IMAGE INTERPRETATION SOFTWARE |
|     | Introduction to WellCAD™ software. |
|     | BHI fracture picking. |
|     | Data loading. |
|     | Fracture classification. |
|     | Fracture statistics. |
|     | BHI reporting. |

| 2.5 d | BOREHOLE IMAGE INTERPRETATION: CASE STUDY |
|       | Introduction and data loading. |
|       | Structural dip and structural zonation. |
|       | Recognition of zone boundaries - Unconformities, faults. |
|       | Fracture/fault characterization from image log data. |
|       | Conductive/resistive vs. open/close fracture. |
|       | Borehole bias. |
|       | In-situ stress determination from borehole breakout and induced fractures. |
|       | Bedding recognition vs. faulted areas. |
|       | Bed thickness analysis. |

## SUMMARY, SYNTHESIS & WRAP-UP

Reference: RCM/BHI

Only available as an In-House course.

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.

Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION &amp; DATA IMPORT (“NF” case study)</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Theoretical notions about fractured reservoirs.</td>
<td></td>
</tr>
<tr>
<td>Overview of OpenFlow™ platform.</td>
<td></td>
</tr>
<tr>
<td>Study creation, settings, 1D-2D-3D views.</td>
<td></td>
</tr>
<tr>
<td>Data import: reservoir grid, horizons, faults, wells and related data.</td>
<td></td>
</tr>
<tr>
<td>FRACTURED &amp; FAULT CHARACTERIZATION (“NF” case study)</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Fracture analysis at wells: orientation, dispersion, sets creation.</td>
<td></td>
</tr>
<tr>
<td>Fracture density computation.</td>
<td></td>
</tr>
<tr>
<td>Fault analysis: length, spatial distribution, sets creation, attribute maps.</td>
<td></td>
</tr>
<tr>
<td>MODELING, CALIBRATION, EQUIVALENT PARAMETERS COMPUTATION (“NF” case study)</td>
<td>1 d</td>
</tr>
<tr>
<td>Fracture and fault modeling/DFN generation:</td>
<td></td>
</tr>
<tr>
<td>Diffuse fractures and faults.</td>
<td></td>
</tr>
<tr>
<td>Quality control.</td>
<td></td>
</tr>
<tr>
<td>Equivalent parameters computation: full field analytical upscaling.</td>
<td></td>
</tr>
<tr>
<td>Calibration with KH data.</td>
<td></td>
</tr>
<tr>
<td>Dynamic simulations: flowmeter, well test simulation.</td>
<td></td>
</tr>
<tr>
<td>DATA IMPORT, DYNAMIC &amp; GEOLOGICAL ANALYSES (“MEMBER” case study)</td>
<td>1 d</td>
</tr>
<tr>
<td>Data import.</td>
<td></td>
</tr>
<tr>
<td>Dynamic analyses.</td>
<td></td>
</tr>
<tr>
<td>Mud loss, flowmeter, well test, production data.</td>
<td></td>
</tr>
<tr>
<td>Fracture analysis, fault analysis.</td>
<td></td>
</tr>
<tr>
<td>MODELING, EQUIVALENT PARAMETERS COMPUTATION ANALYSES (“MEMBER” case study)</td>
<td>1 d</td>
</tr>
<tr>
<td>Fracture and fault modeling/DFN generation.</td>
<td></td>
</tr>
<tr>
<td>Diffuse fractures and sub-seismic faults.</td>
<td></td>
</tr>
<tr>
<td>Quality control.</td>
<td></td>
</tr>
<tr>
<td>Equivalent parameters computation for fracture network (Phi Block size, Kx, Ky, Kz).</td>
<td></td>
</tr>
<tr>
<td>Local analytical upscaling.</td>
<td></td>
</tr>
<tr>
<td>Full field analytical upscaling.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: RCM/FRACA
Only available as an In-House course.

Contact: gre.rueil@ifptraining.com

This course is also available in French: RCM/FRACAFR. Please contact us for more information.
Tight Reservoir Petrophysics

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).

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.

Reference: RCM/TIGHTPETRO  Only available as an In-House course.

Contact: gre.rueil@ifptraining.com

www.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.

Audience
Experienced geoscientists and reservoir engineers involved in multidisciplinary teams, willing to widen their knowledge in tight reservoir characterization and modeling.

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.

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

Course Content

INTRODUCTION TO UNCONVENTIONAL RESOURCES
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
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
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
The geology of tight reservoirs.
Tight geological modeling drivers.
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
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.
Advanced Certificate

Advanced Multivariate Geostatistics Certification

Level: ADVANCED

Purpose

This course provides participants with a comprehensive technical knowledge and to get familiar with geostatistical methods used in Geophysics, Reservoir Characterization and Modeling studies.

Audience

This certification is designed for experienced geoscientists involved in data interpretation and management. Recommended for geologists, geophysicists and reservoir engineers involved in integrated reservoir studies.

Learning Objectives

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

- acquire a practical approach to the industrial methodology of reservoir characterization and modeling, in particular with geostatistical tools and methods,
- use geostatistical tools and methods (variograms, kriging, cokriging, external drift, simulations),
- use geostatistical methods for seismic data filtering and Time-to-Depth conversion,
- use geostatistical methods for enhancing classification for ElectroFacies determination,
- choose ways for property simulations using geostatistical algorithms: facies (pixel and object methods); petrophysics (gaussian methods),
- constrain 2D or 3D properties distribution using various information (e.g. geology, seismic and dynamic data) of different nature and accuracy,
- use industrial software dedicated for geostatistics.

Ways & Means

- Lectures and hands-on activities. 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 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.
- An expertise confirmed in Advanced Multivariate Geostatistics Certification.
- Ready-to-use skills.

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.

Course Content

MULTIVARIATE DATA ANALYSIS 1 d

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

GEOSTATISTICS & CLASSIFICATION 0.5 d

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. 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 Certification.
- 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.

Reference: RCM/ROCKTYPE. Only available as an In-House course.
Contact: gre.ruei@ifptraining.com
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: with 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 Certification.
- 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

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
3 d
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.

QUANTITATIVE INTERPRETATION: INVERSION & AVO 2 d
Fundamentals of rock physics.
Wavelets.
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
3 d
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

www.ifptraining.com 117
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™).
- 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.

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

INTRODUCTION TO RESERVOIR CHARACTERIZATION 1 d
Reservoir characterization and modeling objectives.
Characterization and modeling workflows.
Data types, representativeness and related uncertainty.
Challenges of data integration.

RESERVOIR ARCHITECTURE 1.5 d
Seismic interpretation method and pitfalls. Hands-on: case study.
Static and dynamic information integration.

FACIES ANALYSIS - ROCK-TYPING 1.5 d
Litho-facies analysis (core description and upscaling methods).
Introduction to rock-typing: principle of electro-facies and petro-facies analyses.
Statistical analysis of sedimentological data (VPC analysis).

PETROPHYSICS & ROCK PROPERTIES - RESERVOIR HETEROGENEITIES 1 d
Petrophysics: principles, reservoir parameters.
Petrophysical parameter modeling (water injection simulation).
Heterogeneities: identification and inventory.
Wrap-up session.

BASIC PRINCIPLES - RESERVOIR CHARACTERIZATION WORKFLOW 0.5 d
Introduction and objectives. Case study: field presentation.

PROJECT ORGANIZATION 0.5 d
Project definition.
Data QC and summary table.
Data management.
Well data loading.
Manipulating scripts and Excel™ macros.

STRUCTURAL MODELING 1.5 d
Structural context.
Well correlation and stratigraphic data analysis.
Constraining static model with dynamic data.
Generating surfaces.
Picking horizons and faults on seismic.
Reservoir layering.
Structural modeling.
Mapping reservoir structures.
Modeling results QC.

ROCK-TYPING & PROPERTY MODELING 1.5 d
Scaling up logs. Comparison with rock-types.
Geostatistical tools.
Facies modeling. Rock-typing (EasyTrace™).
Petrophysical modeling.
Mapping result for QC: gross thickness, N-t-G, reservoir properties.

VOLUME CALCULATION 1 d
Volumetrics: quantification of accumulation for selected parameters.
Sensitivity study on parameters.
Key parameters determination for risk assessment.
Final wrap up.

Reference: RCM/RCM Only available as an In-House course.
Contact: gre.rueil@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 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” 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.

Course Content

5 days

INTRODUCTION & REMINDERS
Model-based pre-stack inversion: What for? How does it work?
Examples.

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.

WELL-TO-SEISMIC CALIBRATION & WAVELETS
Sonic log correction.
Seismic wavelet extraction and analysis.
Well-to-seismic calibration.
Choosing final wavelets.

INITIAL MODELING
Role of initial or low frequency model.
Choosing wells and horizons.
Initial model building: IP, IS, Rho.

INVERSION TESTING & RUNNING
Inversion parameter sensitivity testing.
Running final inversion.
QC of inversion results.

INTERPRETING THE RESULTS
Deliverables: IP, IS, Rho.
Generating “Lamé” parameters.
Clues for Interpretation of pre-stack inversion.

Reference: RCM/PRESTACK  Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
Tools for Seismic Reservoir Characterization:
Post-Stack Seismic Inversion

Course Content

INTRODUCTION & REMINDERS
Model-based 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.
0.75 d

WELL-TO-SEISMIC CALIBRATION
Sonic log correction.
Seismic wavelet extraction and analysis.
Calibrating wells to seismic.
1 d

INITIAL MODELING
Role of initial or low frequency model.
Choosing wells and horizons.
Initial model building.
1 d

INVERSION TESTING & RUNNING
Inversion parameter sensitivity testing.
Running final inversion.
QC of inversion results.
1 d

INTERPRETING THE RESULTS
Interpretation of inversion.
Refining seismic interpretation.
Quantitative reservoir property prediction: lithologies and fluids.
Uncertainty analysis.
1 d

Reference: RCM/POSTSTACK
Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
 SRC: Seismic Reservoir Characterization  
E-learning with Remote Personal Coaching

**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.

**Reference:** RCM/BLSRC  
Only available as an In-House course.
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 Only available as an In-House course.
Contact: gre.rueil@ifptraining.com

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 demises. 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 demises.

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.
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. 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 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.

Course Content

INTRODUCTION TO RESERVOIR CHARACTERIZATION 5 d

Introduction to reservoir characterization:
- 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 correlation.
- 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.
- Rock 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.

Reference: RCM/RESGEOL
Contact: gre.rueil@ifptraining.com

www.ifptraining.com
Core Analysis for Reservoir Characterization

**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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CORING &amp; CORE ANALYSIS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Introduction.</td>
<td></td>
</tr>
<tr>
<td>Business value of core analysis demonstrated on real life examples.</td>
<td></td>
</tr>
<tr>
<td>Necessary quality procedures at the start of a measurement program.</td>
<td></td>
</tr>
<tr>
<td>Coring methods (conventional vs. pressure coring, decompression during tripping).</td>
<td></td>
</tr>
<tr>
<td>Core preservation.</td>
<td></td>
</tr>
<tr>
<td>Core cleaning.</td>
<td></td>
</tr>
<tr>
<td>Representative wettability (fresh vs. restored state).</td>
<td></td>
</tr>
<tr>
<td>Conventional and Special Core Analysis (SCAL).</td>
<td></td>
</tr>
<tr>
<td><strong>GENERALITIES ON TWO-PHASE FLOW PROPERTIES</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Darcy’s law for two phases, relative permeability.</td>
<td></td>
</tr>
<tr>
<td>Capillary pressure.</td>
<td></td>
</tr>
<tr>
<td>Wettability (Amott and USBM methods).</td>
<td></td>
</tr>
<tr>
<td>Impact of wettability on relative permeability and capillary pressure.</td>
<td></td>
</tr>
<tr>
<td>Basics of JBN analysis for the UnSteady-State experiment.</td>
<td></td>
</tr>
<tr>
<td>Effect of capillary pressure demonstrated by hands-on simulation, using the SCORES SCAL simulator.</td>
<td></td>
</tr>
<tr>
<td><strong>CONVENTIONAL CORE ANALYSIS</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Porosity definition and measurement.</td>
<td></td>
</tr>
<tr>
<td>Permeability (absolute) definition and measurements.</td>
<td></td>
</tr>
<tr>
<td>Formation factor and Resistivity Index definition and measurement.</td>
<td></td>
</tr>
<tr>
<td>Mercury injection (MICP) for reservoir saturation height function and pore size distribution.</td>
<td></td>
</tr>
<tr>
<td>Recent developments in MICP showing important problems in MICP for low permeability rock when assessing transition zones.</td>
<td></td>
</tr>
<tr>
<td><strong>SPECIAL CORE ANALYSIS (SCAL), MEASUREMENTS OF SCAL PROPERTIES</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Overview of measurement methods and data interpretation for relative permeability and capillary pressure.</td>
<td></td>
</tr>
<tr>
<td>Steady-state technique, in-situ saturation monitoring.</td>
<td></td>
</tr>
<tr>
<td>Unsteady-state technique, in-situ saturation monitoring.</td>
<td></td>
</tr>
<tr>
<td>Multi-speed centrifuge technique.</td>
<td></td>
</tr>
<tr>
<td>Single-speed centrifuge technique.</td>
<td></td>
</tr>
<tr>
<td>Porous plate technique.</td>
<td></td>
</tr>
<tr>
<td>Analysis of centrifuge data using Hassler-Brunner, Forbes methods.</td>
<td></td>
</tr>
<tr>
<td>Analysis of centrifuge data using Hagoort method.</td>
<td></td>
</tr>
<tr>
<td>Effect of relative permeability on capillary pressure measurement demonstrated by hands-on simulations using the SCORES SCAL simulator.</td>
<td></td>
</tr>
<tr>
<td><strong>QUALITY CONTROL OF AVAILABLE DATA</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Sample selection using X-ray CT for homogeneity assessment.</td>
<td></td>
</tr>
<tr>
<td>Representative wettability, special considerations for transition zones.</td>
<td></td>
</tr>
<tr>
<td>Recognizing unusual features.</td>
<td></td>
</tr>
<tr>
<td><strong>AVERAGING PETROPHYSICAL PROPERTIES</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Saturation height function assessment.</td>
<td></td>
</tr>
<tr>
<td>Leverett-J function.</td>
<td></td>
</tr>
<tr>
<td>Initial water saturation.</td>
<td></td>
</tr>
<tr>
<td>Rock-typing.</td>
<td></td>
</tr>
<tr>
<td>Gridding for reservoir simulation.</td>
<td></td>
</tr>
<tr>
<td><strong>DESIGN OF SCAL PROGRAM</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Establish SCAL program objective.</td>
<td></td>
</tr>
<tr>
<td>Understanding of strength and weaknesses of each SCAL method.</td>
<td></td>
</tr>
<tr>
<td>Need for imbibition capillary pressure to interpret relative permeability data.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: RCM/CONSCAL

Only available as an In-House course.

Contact: gre.rueil@ifptraining.com
## Special Core Analysis

### Course Content

**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 when 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 5 days

**INTRODUCTION**


**STEADY-STATE TECHNIQUE**


**CORE PLUG PREPARATION & UNSTEADY-STATE TECHNIQUE**

Core plug preparation:
- Plug selection, using quantitative X-ray CT images, cleaning.
- 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:

**CENTRIFUGE TECHNIQUE & SCAL DATA QUALITY ASSESSMENT**

Centrifuge technique:

**POROUS PLATE TECHNIQUE, SCAL FOR GAS FLOODING EXPERIMENTS, STRENGTHS & WEAKNESSES OF EACH SCAL TECHNIQUE**

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. Best practice: interpretation-by-simulation, hands-on through exercises with the SCORES/DuMux simulator: How to set-up simulations in the absence of data? Experimental design. Interpretation-by-simulation of capillary pressure and resistivity measurements. SCAL for gas flooding experiments:
- Understand limitations of UniSteady-State and Steady-State techniques through exercises in Excel: Impact of shock front in drainage and imbibition mode in UniSteady-State experiments. Haapont criterion for viscous fingering. 3-phase relative permeabilities, spreading condition, centrifuge experiments for GOGD. Best practice: interpretation-by-simulation, hands-on through exercises with the SCORES/DuMux simulator: impact of capillary pressure in flooding experiments. Plenary discussion of strengths and weaknesses of each SCAL measurement technique. Understanding main characteristics of each technique facilitates designing a lean and fit-for-purpose SCAL measurement program.

**SCAL FOR EOR & SCAL MASTER MEASUREMENT PROGRAM**

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.ruell@ifptraining.com
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.

**Reference:** RCM/GEOM

---

**Course Content**

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO GEOMECHANICS IN THE PETROLEUM INDUSTRY</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Review of all the applications of geomechanics in the reservoir and drilling fields illustrated with real cases.</td>
<td></td>
</tr>
<tr>
<td><strong>THEORETICAL BASES USEFUL FOR RESERVOIR APPLICATIONS</strong></td>
<td>2 d</td>
</tr>
<tr>
<td><strong>IMPACT OF GEOMECHANICS ON RESERVOIR SAFETY &amp; MANAGEMENT</strong></td>
<td>2 d</td>
</tr>
<tr>
<td>Workflow of the building of a coupled reservoir and geomechanical model. Arching effect. Determination of the maximum injection pressure and the storage capacity in a reservoir. Methods of monitoring of reservoir cover layer integrity.</td>
<td></td>
</tr>
<tr>
<td><strong>APPLICATION</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Exercise based on one or several real cases gathering the major issues of reservoir geomechanics. Knowledge assessment.</td>
<td></td>
</tr>
</tbody>
</table>

Contact: gre.rueil@ifptraining.com

Only available as an In-House course.
Introduction to Reservoir Engineering

Course Content

<table>
<thead>
<tr>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESERVOIR ENGINEERING WORKFLOW 0.25 d</td>
</tr>
<tr>
<td>Introduction to E&amp;P and reservoir engineering workflow through interactive teamwork.</td>
</tr>
<tr>
<td>FUNDAMENTALS OF RESERVOIR CHARACTERIZATION 1.25 d</td>
</tr>
<tr>
<td>FUNDAMENTALS OF RESERVOIR ENGINEERING 2 d</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>CASE STUDY: FIELD DEVELOPMENT 0.5 d</td>
</tr>
<tr>
<td>Application to an oil field evaluation and development: Identification of drive mechanisms. Reserves estimation and field development set-up.</td>
</tr>
<tr>
<td>FUNDAMENTALS OF RESERVOIR SIMULATION 0.5 d</td>
</tr>
<tr>
<td>RESERVES DEFINITION &amp; CLASSIFICATION 0.5 d</td>
</tr>
<tr>
<td>Reserves and resources: Economics criteria. Risks and uncertainties. Reserves and resources definition &amp; classification. Oil &amp; Gas reserves. Some figures.</td>
</tr>
</tbody>
</table>

Ways & Means

- E&P and Reservoir Engineering workflow interactive presentation.
- Interactive lectures, exercises and short movies.
- Dynamic reservoir simulator overview.
- Field case study workshop.

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

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 14 September 18 September €3,120

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.

Reference: RENG/PVT
\* 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>5 October</td>
<td>9 October</td>
<td>€3,250</td>
</tr>
</tbody>
</table>

This course is also available in French: RENG/PVTFR. Please contact us for more information.
Drilling & Completion - Wellbore Interface & Well Productivity

Course Content

Level: PROFICIENCY

Purpose
This course provides a comprehensive and practical understanding of fundamentals of drilling, completion, wellbore interface and well productivity applied to reservoir engineering concerns.

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:
- describe main drilling equipment and operations,
- describe main completion equipment, operations and configurations,
- describe main concepts of reservoir-wellbore interface and choose an interface adapted to the conditions encountered in the reservoir,
- discuss main concepts of wells productivity, included inflow, outflow and skin, detect problems holding down wells productivity and select adequate solutions.

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

Location  Start Date  End Date  Tuition Fees excl. VAT
Rueil-Malmaison  12 October  16 October  €3,250

This course is also available in French: RENG/WELLPRODFR. Please contact us for more information.
Well Testing & Well Test Analysis

Course Content

INTRODUCTION TO WELL TESTING, BASIC EQUATIONS & METHODS
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
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
Double porosity models: pseudo-steady state and transient state models.
Double permeability models.
Composite reservoir models.

BOUNDARY MODELS
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
Rate history definition.
Time and pressure error.
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
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.
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

DRIVE MECHANISMS - PRIMARY RECOVERY  2.5 d
Oil reservoirs:
- Undersaturated oil expansion.
- Solution gas drive.
- Gas gap drive.
- Natural water drive.
- Analytical aquifer models.
- Hurst & Van Everdingen model.
- Carter-Tracy model.
Gas reservoirs with and without aquifer.
Material balance:
- Principles and equations.
- Generalized material balance.
- Drive index.
- Campbell and cole plots.
Application: estimating recovery factors from material balance, checking aquifer and gas cap size, checking accumulation estimate…

DRIVE MECHANISMS - SECONDARY RECOVERY  2.5 d
Reminders about multiphase flow in the reservoir: wettability, capillarity, relative permeability.
Water and non-miscible gas injection:
- Principles.
- Sources of fluid, well injectivity, injectors pattern.
- Expected performance of water and gas injection.
Multiphase flow stability and influence of mobility ratio.
Diffusive flow:
- Buckley-Leverett frontal displacement theory.
- Welge method.
Sweep efficiency:
- Displacement or microscopic efficiency.
- Areal efficiency.
- Vertical efficiency.
- Cycling.

PRACTICAL MATERIAL BALANCE  2 d
Practical exercises on synthetic and real field case data using MBAL™ software:
- PVT and reservoir parameters history match.
- Production forecast.

ENHANCED OIL RECOVERY  3 d
Principles and mechanisms of main EOR methods:
- Chemical flooding.
- Miscible gas injection.
- Thermal flooding.
EOR projects:
- Screening criteria.
- Economics.
Application - Field cases.

Reference: RENG/DRIVEOR  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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>26 October</td>
<td>6 November</td>
<td>€5,190</td>
</tr>
</tbody>
</table>

[This course is also available in French: RENG/DRIVEORFR. Please contact us for more information.]
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

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>16 November</td>
<td>27 November</td>
<td>€6,850</td>
</tr>
</tbody>
</table>

This course is also available in French: RENG/SIMULRESFR. Please contact us for more information.
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 - MISCELLINEOUS 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.
- Laboratory 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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>28 September</td>
<td>2 October</td>
<td>€3,340</td>
</tr>
</tbody>
</table>
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 Certification.
- 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.

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.

Reference: RENG/EOR-G
Only available as an In-House course.
Contact: gre.rueil@ifptraining.com
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 Certification.
- 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.

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.

POLYMER FLOODING
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.

SURFACANT FLOODING
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
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-SURFACANT-POLYMER FLOODING (ASP)
Displacement mechanisms in ASP flooding.
Experimental design and calculation of appropriate injection pore volumes.

SMART WATER INJECTION
Definition and principles of smart water method.
Smart water injection design and workflow.
- Case studies.

Reference: RENG/EOR-C  Only available as an In-House course.
Contact: gre.rueil@ifptraining.com

www.ifptraining.com
## 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,  
- 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

<table>
<thead>
<tr>
<th><strong>FUNDAMENTALS OF DYNAMIC RESERVOIR SIMULATION</strong></th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical aspects and basic laws.</td>
<td></td>
</tr>
<tr>
<td>Mathematical and numerical aspects (diffusivity, transport and general equations).</td>
<td></td>
</tr>
<tr>
<td>Review of basic rock and fluid properties for input into dynamic reservoir simulation models.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>TIME &amp; SPACE DISCRETIZATION - GRIDDING &amp; UPSCALING</strong></th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time step management and main events to take into account.</td>
<td></td>
</tr>
<tr>
<td>Grid properties (Cartesian grid, radial grid, corner point grid, etc.) and key elements to take into account.</td>
<td></td>
</tr>
<tr>
<td>Gridding and local grid refinement - Principles and application.</td>
<td></td>
</tr>
<tr>
<td>Upscaling - Principles and application.</td>
<td>Practical exercise using the simulator.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>FRACTURED RESERVOIR MODELING</strong></th>
<th>0.75 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to fractured reservoirs:</td>
<td></td>
</tr>
<tr>
<td>Definition of fractured reservoirs and their difference with classic reservoirs.</td>
<td></td>
</tr>
<tr>
<td>Classification of fractured reservoirs (Nelson concept).</td>
<td></td>
</tr>
<tr>
<td>Data required for fractured reservoirs characterization and modeling.</td>
<td></td>
</tr>
<tr>
<td>Formalisms used by the simulator - Dual porosity models.</td>
<td>Practical exercise using the simulator.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>WELLS REPRESENTATION</strong></th>
<th>0.75 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formalisms used by the simulator:</td>
<td></td>
</tr>
<tr>
<td>Inflow Performance and numerical PI.</td>
<td></td>
</tr>
<tr>
<td>Outflow performance and VFP tables.</td>
<td></td>
</tr>
<tr>
<td>Practical exercise using the simulation software.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>COMPOSITIONAL SIMULATION</strong></th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components and composition - Black Oil vs. compositional models:</td>
<td></td>
</tr>
<tr>
<td>Lumping and de-lumping.</td>
<td></td>
</tr>
<tr>
<td>Compositional EOS - Ternary diagram.</td>
<td></td>
</tr>
<tr>
<td>Gas modeling in compositional models.</td>
<td></td>
</tr>
<tr>
<td>Practical exercise using the simulator.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ASSISTED HISTORY MATCHING</strong></th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles of assisted history matching:</td>
<td></td>
</tr>
<tr>
<td>Objective function and optimization.</td>
<td></td>
</tr>
<tr>
<td>Experimental design.</td>
<td></td>
</tr>
<tr>
<td>Response surface.</td>
<td></td>
</tr>
<tr>
<td>Practical exercise using the simulator.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: RENG/ADVSIMULRES  
Only available as an In-House course.  
Contact: gre.rueil@ifptraining.com
Advanced Certificate
Reservoir Simulation Workshop Certification

Course Content

Part 1: RESERVOIR SIMULATION COURSE

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 upsampling.
- 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 (equilibrium 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

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 and GOR.
  - 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.).

Reference: RENG/RESSIMU
Only available as an In-House course.

Contact: gre.rue@ifptraining.com

www.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.

Ways & Means
▷ An international recognition of your competencies.
▷ An Advanced Certificate delivered.
▷ An expertise confirmed in Advanced Well Test Analysis Certification.
▷ 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 horizontal well.
Field case 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 case 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/ADVWELLTEST
Contact: gre.rueil@ifptraining.com

Only available as an In-House course.
PVT Modeling

Level: ADVANCED

Purpose
This course provides an extensive and practical understanding for analyzing PVT reports, handling data and defining PVT models for use in compositional and black oil simulations.

Audience
Reservoir engineers and petroleum engineers willing to acquire advanced knowledge about PVT modeling.

Learning Objectives
Upon completion of the course, participants will be able to:
- analyze PVT reports and discuss and handle PVT data,
- build a PVT model in order to represent fluid behavior with respect to available and validated PVT data,
- match a PVT model.

Ways & Means
- Interactive courses and exercises.
- Hands-on practices using dedicated modeling software BEST™ or PVTi™ or PVTFlow™.
- Mini-project.
- Software used during workshops: with courtesy of Beicip-Franlab and Schlumberger.

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

Prerequisites
Basic knowledge in PVT (fluids properties, measurement techniques and data, thermodynamics and classical correlation) is recommended.

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

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 & Fetkovitch 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>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO PRODUCTION ANALYSIS</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Principles of production analysis - Reminders about flow regimes.</td>
<td></td>
</tr>
<tr>
<td><strong>TRADITIONAL DECLINE CURVE ANALYSIS - ARPS DECLINE CURVE ANALYSIS</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Exponential decline.</td>
<td></td>
</tr>
<tr>
<td>Hyperbolic decline.</td>
<td></td>
</tr>
<tr>
<td>Harmonic decline.</td>
<td></td>
</tr>
<tr>
<td>Arps type curves.</td>
<td></td>
</tr>
<tr>
<td>Power function analysis for b&gt;1.</td>
<td></td>
</tr>
<tr>
<td><strong>FETKOVICH DECLINE CURVES ANALYSIS</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Principle and equations - Fetkovich dimensionless variables.</td>
<td></td>
</tr>
<tr>
<td>Fetkovich type curves and decline curve analysis.</td>
<td></td>
</tr>
<tr>
<td><strong>INTRODUCTION TO BLASINGAME DECLINE CURVE ANALYSIS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Principle and equations - Blasingame dimensionless variables.</td>
<td></td>
</tr>
<tr>
<td>Blasingame type curves and decline curve analysis.</td>
<td></td>
</tr>
</tbody>
</table>

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 Certification.
- Ready-to-use skills.

Expertise & Coordination
IFP Training trainers having a good expertise and experience.

Course Content

Part 1: FUNDAMENTALS OF RESERVOIR GEOLOGY
15 d
Introduction to Reservoir Characterization.
Petrophysics - Reservoir Properties from Cores & Logs Evaluation.
Reservoir Modeling Workshop.

Part 2: FLUIDS, WELLBORE INTERFACE & WELL PRODUCTIVITY, WELL TESTING
15 d
Reservoir fluid properties.
Drilling & completion - Wellbore interface and well productivity.
Well Testing & Well Test Analysis.

Part 3: RESERVOIR DRIVE MECHANISMS & RESERVOIR MANAGEMENT
14 d
Drive Mechanisms - Enhanced Oil Recovery.
Reservoir Management.

Part 4: RESERVOIR SIMULATION & FINAL DEVELOPMENT PROJECT WORKSHOP
20 d
Dynamic Reservoir Simulation.
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.

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 laboratory 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 defense 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 Certification.
Ready-to-use skills.

Expertise & Coordination
IFP Training trainers having a good expertise and experience.

Reference: RMGT/RESENGIN
Can be organized as an In-House course.

Contact: gre.rueil@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 14 September 11 December €35,490

This course is also available in French: RMGT/RESENGINFR. Please contact us for more information.
Reservoir Management Workshop

Level: PROFICIENCY

Purpose
This course provides a comprehensive overview of various techniques used in the management of an asset, throughout its lifecycle, from discovery to end of production.

Audience
Geoscientists, reservoir engineers, petroleum engineers, asset managers and economists involved in reservoir management and production optimization related activities.

Learning Objectives
Upon completion of the course, participants will be able to:
- discuss main concepts of Reservoir Management from geology to hydrocarbon recovery and export point,
- include each Reservoir Management component within the field development workflow and discuss the importance of timing and cost/benefit analysis,
- describe and discuss decision making process of field development projects and related economical criteria,
- define and discuss concepts of resources and reserves and their related classification and describe Petroleum Resources Management System (PRMS),
- discuss main resources and reserves evaluation techniques
- describe main reservoirs monitoring techniques allowing to apply IOR/EOR methods and increase recovery,
- discuss main concepts of risks and uncertainties and their integration into reserves evaluation.

Ways & Means
- Interactive lectures and exercises.
- Field case study workshop.

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 4 days

INTRODUCTION TO RESERVOIR MANAGEMENT
Objective of Reservoir Management.
Field development projects: an integrated effort.

DECISION MAKING PROCESS & BUSINESS ASPECTS
Decision making process of field development projects.
Fundamentals of petroleum economics and economic criteria (NPV, IRR…).

RESOURCES & RESERVES DEFINITIONS & CLASSIFICATION
SPE-PRMS definitions and guidelines.
SEC definitions and guidelines.

RESERVOIR CHARACTERIZATION & ACCUMULATIONS EVALUATION
Data gathering, data base, quality control.
Reservoir characterization and geo-modeling workflow.
Accumulations evaluation.

RESERVES EVALUATION
Review of Oil & Gas reservoirs drive mechanisms and related expected recovery factors.
Analogs.
Performance analysis:
  - Material balance.
  - Decline curves analysis.
  - Dynamic reservoir simulation models

DATA ACQUISITION & RESERVOIR MONITORING FOR IOR/EOR
IOR/EOR definitions, facilities, planning and costs.
Cased hole logging (saturation logging, production logging…).
4D Seismic.

RISKS & UNCERTAINTIES
Introduction to risks and uncertainties:
  - Definitions.
  - Notions of probability and decision trees.
  - Statistical description of data.
Sources of uncertainties:
  - Structural uncertainties.
  - Geological uncertainties.
  - Reservoir uncertainties.
  - Uncertainty assessment techniques.
    - Monte-Carlo simulation.
    - Experimental design and response surface methodology.

WORKSHOP - CASE STUDY
Reservoir exploration through drilling and seismic profiles.
Reservoir characterization through PVT data and logs.
Reservoir development (number of wells, location…) and profile prediction.
Final investment decision based on economical analysis.

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

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 9 November 13 November €3,120

This course is also available in French: RMGT/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 and 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:
- describe E&P field development projects workflow and related decision making process,
- 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 principles of reservoir characterization and engineering,
- perform simple resources and reserves estimate,
- 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

INTRODUCTION TO FIELD DEVELOPMENT PROJECTS 1 d
E&P field development projects workflow and decision making process.
Fundamentals of petroleum economics and economic criteria (NPV, IRR...).
Oil & Gas resources and reserves definitions and classification:
SPE definitions and guidelines. Petroleum Resources Management System (PRMS).
SEC definitions and guidelines.

BASICS OF RESERVOIR CHARACTERIZATION & MODELING 1 d
Overview of rock and fluid properties.
Basics of reservoir characterization and geo-modeling.
Volumetric evaluation of Oil & Gas accumulations.

RESERVES EVALUATION 1 d
Review of Oil & Gas reservoirs drive mechanisms and related expected recovery factors.
Analogs.
Performance analysis:
Material balance.
Decline curves analysis.
Simulation models.

RISKS & UNCERTAINTIES 2 d
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.

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.

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

Location Start Date End Date Tuition Fees excl. VAT
Pau 5 October 9 October €3,550
Mature Fields - Subsurface Issues

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.

Course Content

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

This course is also available in French: RMGT/MATFIELD.FR. Please contact us for more information.
Advanced Certificate

IRM - Integrated Reservoir Management

Course Content

**RESERVOIR ENGINEERING & FIELD DEVELOPMENT FUNDAMENTALS (IFP Training)**

- 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.
- 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)**

- 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)**

- Application of model to identify an optimum field development plan with simple economic evaluation.
- 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.

**Ways & Means**

- Highly interactive course with actual case studies.
- Animation by E&P senior experienced lecturers.
- A field trip in Wessex (England) followed by a two weeks course in Imperial College (London) focused on field development optimization.
- A condensate gas reservoir integrated project focused on integrated production management and related tools.
- A final project focused on an FDP optimization including uncertainties assessment with a presentation to a jury.
- Software used during workshops: with courtesy of Beicip-Franlab, Kappa Engineering and Schlumberger.

**Prerequisites**

A degree in engineering or geosciences, with preferably a 3 to 5-years professional experience.

**Why an IFP Training Certification?**

- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in IRM - Integrated Reservoir Management.
- Ready-to-use skills.

**More info**

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.

Reference: RMGT/RIM • Only available as an In-House course.

Contact: gre.rueil@ifptraining.com

www.ifptraining.com
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.
Contact: gre.rueil@ifptraining.com

This course is also available in French: FDV/FDPFR. Please contact us for more information.
Graduate Certificate
Field Operations Engineer Certification

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

Module II: Oil & 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

ROTATING MACHINERY - TECHNOLOGY, SELECTION & OPERATION (in mechanical workshop)
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): Field architecture. Well design and completion. Process design and simulation. Main equipment sizing. Heat and mass balance. Fuel gas requirements. HAZID and plant layout.

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 specialist lecturers.
Numerous 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 expert confirmed in Field Operations Engineer Certification.
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.

Reference: PROP/FIELDENG Can be organized as an In-House course. Contact: exp.rueil@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 31 August 20 November €35,480

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

www.ifptraining.com 147
Course Content

15 days

- 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.
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:
Decision process for a farm-out strategy (case study).
Decision process from discovery to development and production:
Discovery appraisal, reserves evaluation 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:
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 evaluation 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
FEL3: 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.

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.

Reference: PIMP/PROJAFLGB 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>19 October</td>
<td>23 October</td>
<td>€3,680</td>
</tr>
</tbody>
</table>

www.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, 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
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 Certification.
- 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.

Reference: PCTR/COSTGB
Can be organized as an In-House course.

Location: Rueil-Malmaison
Start Date: 23 November
End Date: 27 November
Tuition Fees excl. VAT: €3,680

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

www.ifptraining.com
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Drilling &amp; Completion</td>
<td></td>
</tr>
<tr>
<td>Well Operations &amp; Completion Engineering Certification</td>
<td>p. 153</td>
</tr>
<tr>
<td>Supervisor Training on Drilling Simulator</td>
<td>p. 154</td>
</tr>
<tr>
<td>Drilling Fundamentals</td>
<td>p. 155</td>
</tr>
<tr>
<td>Drilling</td>
<td></td>
</tr>
<tr>
<td>Practical Aspects of Well Construction &amp; Planning</td>
<td>p. 160</td>
</tr>
<tr>
<td>Geological Field Trip for Drillers</td>
<td>p. 161</td>
</tr>
<tr>
<td>Fundamentals of Drilling &amp; Completion</td>
<td>p. 162</td>
</tr>
<tr>
<td>Well Architecture &amp; Equipment</td>
<td>p. 163</td>
</tr>
<tr>
<td>Bit &amp; Drill String &amp; Fishing while Drilling</td>
<td>p. 164</td>
</tr>
<tr>
<td>Rig, BOP’s &amp; Well Control Equipment</td>
<td>p. 165</td>
</tr>
<tr>
<td>Data Acquisition during Drilling Operations</td>
<td>p. 166</td>
</tr>
<tr>
<td>HSE in Drilling Operations</td>
<td>p. 167</td>
</tr>
<tr>
<td>Directional &amp; Horizontal Drilling Certification</td>
<td>p. 168</td>
</tr>
<tr>
<td>Fluids</td>
<td></td>
</tr>
<tr>
<td>Drilling Fluids</td>
<td>p. 176</td>
</tr>
<tr>
<td>Cementing Practices</td>
<td>p. 177</td>
</tr>
<tr>
<td>Completion &amp; Well Operations</td>
<td></td>
</tr>
<tr>
<td>Wellhead Selection &amp; Maintenance</td>
<td>p. 179</td>
</tr>
<tr>
<td>Well Productivity &amp; Reservoir - Wellbore Interface</td>
<td>p. 180</td>
</tr>
<tr>
<td>Well Test Operation</td>
<td>p. 181</td>
</tr>
<tr>
<td>Well-Completion Equipment &amp; Procedures for Flowing Wells</td>
<td>p. 182</td>
</tr>
<tr>
<td>Tubing Movement &amp; Forces</td>
<td>p. 183</td>
</tr>
<tr>
<td>Wellbore Treatments</td>
<td>p. 184</td>
</tr>
<tr>
<td>Matrix Acidizing</td>
<td>p. 185</td>
</tr>
<tr>
<td>Basic Hydraulic Fracturing</td>
<td>p. 186</td>
</tr>
<tr>
<td>Artificial Lift &amp; Well Intervention Fundamentals</td>
<td>p. 187</td>
</tr>
<tr>
<td>Artificial Lift: Gas Lift</td>
<td>p. 188</td>
</tr>
<tr>
<td>Well Control</td>
<td></td>
</tr>
<tr>
<td>Well Control - Level 2</td>
<td>p. 198</td>
</tr>
<tr>
<td>Well Control - Level 3 or 4</td>
<td>p. 199</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 2</td>
<td>p. 200</td>
</tr>
<tr>
<td>Well Completion &amp; Servicing</td>
<td>p. 156</td>
</tr>
<tr>
<td>Drilling &amp; Completion Engineering Certification</td>
<td>p. 157</td>
</tr>
<tr>
<td>Drilling Engineering</td>
<td>p. 158</td>
</tr>
<tr>
<td>Completion Engineering</td>
<td>p. 159</td>
</tr>
<tr>
<td>Geomechanics for Drillers</td>
<td>p. 169</td>
</tr>
<tr>
<td>Underbalanced &amp; Managed Pressure Drilling: Applications, Design &amp; Operations</td>
<td>p. 170</td>
</tr>
<tr>
<td>Geosteering</td>
<td></td>
</tr>
<tr>
<td>Deepwater Drilling &amp; Development Certification</td>
<td>p. 171</td>
</tr>
<tr>
<td>Wellhead &amp; Blowout Preventers</td>
<td>p. 172</td>
</tr>
<tr>
<td>Stuck Pipe Prevention</td>
<td>p. 173</td>
</tr>
<tr>
<td>HPHT Drilling Design &amp; Operations</td>
<td>p. 174</td>
</tr>
<tr>
<td>Directional &amp; Horizontal Drilling Certification</td>
<td></td>
</tr>
<tr>
<td>Geomechanics for Drillers</td>
<td>p. 169</td>
</tr>
<tr>
<td>Underbalanced &amp; Managed Pressure Drilling: Applications, Design &amp; Operations</td>
<td>p. 170</td>
</tr>
<tr>
<td>Geosteering</td>
<td></td>
</tr>
<tr>
<td>Deepwater Drilling &amp; Development Certification</td>
<td>p. 171</td>
</tr>
<tr>
<td>Wellhead &amp; Blowout Preventers</td>
<td>p. 172</td>
</tr>
<tr>
<td>Stuck Pipe Prevention</td>
<td>p. 173</td>
</tr>
<tr>
<td>HPHT Drilling Design &amp; Operations</td>
<td>p. 174</td>
</tr>
<tr>
<td>Advanced Cementing Practices</td>
<td>p. 178</td>
</tr>
<tr>
<td>Fluids</td>
<td></td>
</tr>
<tr>
<td>Drilling Fluids</td>
<td>p. 176</td>
</tr>
<tr>
<td>Cementing Practices</td>
<td>p. 177</td>
</tr>
<tr>
<td>Completion &amp; Well Operations</td>
<td></td>
</tr>
<tr>
<td>Wellhead Selection &amp; Maintenance</td>
<td>p. 179</td>
</tr>
<tr>
<td>Well Productivity &amp; Reservoir - Wellbore Interface</td>
<td>p. 180</td>
</tr>
<tr>
<td>Well Test Operation</td>
<td>p. 181</td>
</tr>
<tr>
<td>Well-Completion Equipment &amp; Procedures for Flowing Wells</td>
<td>p. 182</td>
</tr>
<tr>
<td>Tubing Movement &amp; Forces</td>
<td>p. 183</td>
</tr>
<tr>
<td>Wellbore Treatments</td>
<td>p. 184</td>
</tr>
<tr>
<td>Matrix Acidizing</td>
<td>p. 185</td>
</tr>
<tr>
<td>Basic Hydraulic Fracturing</td>
<td>p. 186</td>
</tr>
<tr>
<td>Artificial Lift &amp; Well Intervention Fundamentals</td>
<td>p. 187</td>
</tr>
<tr>
<td>Artificial Lift: Gas Lift</td>
<td>p. 188</td>
</tr>
<tr>
<td>Well Control</td>
<td></td>
</tr>
<tr>
<td>Well Control - Level 2</td>
<td>p. 198</td>
</tr>
<tr>
<td>Well Control - Level 3 or 4</td>
<td>p. 199</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 2</td>
<td>p. 200</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 3 or 4</td>
<td>p. 201</td>
</tr>
<tr>
<td>Stripping</td>
<td></td>
</tr>
<tr>
<td>Advanced Cementing Practices</td>
<td>p. 178</td>
</tr>
<tr>
<td>Fluids</td>
<td></td>
</tr>
<tr>
<td>Drilling Fluids</td>
<td>p. 176</td>
</tr>
<tr>
<td>Cementing Practices</td>
<td>p. 177</td>
</tr>
<tr>
<td>Completion &amp; Well Operations</td>
<td></td>
</tr>
<tr>
<td>Wellhead Selection &amp; Maintenance</td>
<td>p. 179</td>
</tr>
<tr>
<td>Well Productivity &amp; Reservoir - Wellbore Interface</td>
<td>p. 180</td>
</tr>
<tr>
<td>Well Test Operation</td>
<td>p. 181</td>
</tr>
<tr>
<td>Well-Completion Equipment &amp; Procedures for Flowing Wells</td>
<td>p. 182</td>
</tr>
<tr>
<td>Tubing Movement &amp; Forces</td>
<td>p. 183</td>
</tr>
<tr>
<td>Wellbore Treatments</td>
<td>p. 184</td>
</tr>
<tr>
<td>Matrix Acidizing</td>
<td>p. 185</td>
</tr>
<tr>
<td>Basic Hydraulic Fracturing</td>
<td>p. 186</td>
</tr>
<tr>
<td>Artificial Lift &amp; Well Intervention Fundamentals</td>
<td>p. 187</td>
</tr>
<tr>
<td>Artificial Lift: Gas Lift</td>
<td>p. 188</td>
</tr>
<tr>
<td>Well Control</td>
<td></td>
</tr>
<tr>
<td>Well Control - Level 2</td>
<td>p. 198</td>
</tr>
<tr>
<td>Well Control - Level 3 or 4</td>
<td>p. 199</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 2</td>
<td>p. 200</td>
</tr>
<tr>
<td>Well Intervention &amp; Pressure Control - Level 3 or 4</td>
<td>p. 201</td>
</tr>
<tr>
<td>Stripping</td>
<td></td>
</tr>
<tr>
<td>Advanced Cementing Practices</td>
<td>p. 178</td>
</tr>
</tbody>
</table>
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 Certification.
- 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: GEND/CE
Contact: fp.pau@ifptraining.com

Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1 - FUNDAMENTALS OF DRILLING &amp; COMPLETION</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 2 - WELL PRODUCTIVITY &amp; RESERVOIR - WELLBORE INTERFACE</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 3 - WELL COMPLETION EQUIPMENT &amp; PROCEDURES FOR FLOWING WELLS</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 4 - WELLBORE TREATMENTS</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 5 - ARTIFICIAL LIFT &amp; WELL INTERVENTION FUNDAMENTALS</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 6 - COILED TUBING &amp; NITROGEN OPERATIONS IN COMPLETION &amp; WORKOVER</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 7 - WELL INTERVENTION &amp; PRESSURE CONTROL</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 8 - PROJECT ON COMPLETION PROGRAM</td>
<td>5 d</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.
Supervisor Training on Drilling Simulator

**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.

---

**Course Content**

**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**
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.

Contact: fp.pau@ifptraining.com

This course is also available in French: GEND/FOSIMF. Please contact us for more information.
Drilling Fundamentals

Course Content

**ORGANIZATION OF DRILLING OPERATIONS**  
0.5 d  
Drilling principles.  
Cost, duration of a drilling job.  
Different people involved, types of contracts.  
Safety.

**DRILLING PRINCIPLES - EQUIPMENT**  
1.5 d  
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.

**WELL ARCHITECTURE**  
0.5 d  
Reservoir notions.  
Functions of different casings.  
Parameters to be taken into account to determine well architecture.  
Examples of architectures.

**SPECIAL OPERATIONS**  
1.25 d  
Cementing operations.  
Wellhead.  
Directional drilling.  
Well control.  
Fishing jobs.  
Wireline logging, well test (DST).

**DRILLING ON A SIMULATOR (Pau)**  
0.25 d  
Use of a well control simulator to show the drilling operations (tripping, drilling, running of casings).

**OFFSHORE DRILLING OPERATIONS**  
0.25 d  
Different types of rigs.  
Problems related to their use.

**WELL COMPLETION**  
0.25 d  
Reservoir-wellbore interface.  
Equipment for flowing wells.  
Well intervention.

**VISIT OF A DRILLING SITE***  
0.5 d

Reference: GEND/INFOR. 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>7 September</td>
<td>11 September</td>
<td>€3,690</td>
</tr>
<tr>
<td>Rueil-Malmaison</td>
<td>19 October</td>
<td>23 October</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: GEND/INFOR. 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”,
- “Drilling Fundamentals”, and “Oil & Gas Field Processing”.

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>30 November</td>
<td>4 December</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: GEND/INPFE. 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 Certification.
- Ready-to-use skills.

More info

This training program is made up of two complementary training programs: “Drilling Engineering” and “Completion Engineering”. 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/FOFPE - 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>27 January</td>
<td>12 June</td>
<td>€50,420</td>
</tr>
</tbody>
</table>

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

Course Content

Module 1 - GEOLOGICAL FIELD TRIP FOR DRILLERS  5 d
Module 2 - FUNDAMENTALS OF DRILLING & COMPLETION  5 d
Module 3 - WELL PRODUCTIVITY & RESERVOIR - WELLBORE INTERFACE  5 d
Module 7 - WELL ARCHITECTURE & EQUIPMENT  5 d
Module 8 - DRILLING FLUIDS  5 d
Module 9 - CEMENTING PRACTICES  5 d
Module 10 - BIT, DRILL STRING & FISHING WHILE DRILLING  5 d
Module 11 - DIRECTIONAL & HORIZONTAL DRILLING CERTIFICATION  5 d
Module 12 - RIG & BOP’S & WELL CONTROL EQUIPMENT  5 d
Module 13 - WELL TEST OPERATION  5 d
Module 14 - DATA ACQUISITION DURING DRILLING OPERATIONS  5 d
Module 15 - WELL CONTROL  5 d
Module 16 - DEEPWATER DRILLING & DEVELOPMENT CERTIFICATION  5 d
Module 17 - SUPERVISOR TRAINING ON DRILLING SIMULATOR  3 d
Module 18 - HSE IN DRILLING OPERATIONS  5 d
Module 19 - DRILLING PROGRAM  10 d

Well architecture.
Casing calculations.
Fluids and cementing design.
Chronology of operations.
Presentation to a jury.

Reference: GEND/FOFPFE

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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>27 January &amp; 9 March</td>
<td>14 February &amp; 12 June</td>
<td>€42,840</td>
</tr>
</tbody>
</table>

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.

Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Title</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1</td>
<td>GEOLOGICAL FIELD TRIP FOR DRILLERS</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 2</td>
<td>FUNDAMENTALS OF DRILLING &amp; COMPLETION</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 3</td>
<td>WELL PRODUCTIVITY &amp; RESERVOIR - WELLBORE INTERFACE</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 4</td>
<td>WELL COMPLETION EQUIPMENT &amp; PROCEDURES FOR FLOWING WELLS</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 5</td>
<td>WELLBORE TREATMENTS</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 6</td>
<td>ARTIFICIAL LIFT &amp; WELL INTERVENTION FUNDAMENTALS</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 15</td>
<td>WELL CONTROL</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 16</td>
<td>DEEPWATER DRILLING &amp; DEVELOPMENT CERTIFICATION</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 17</td>
<td>SUPERVISOR TRAINING ON DRILLING SIMULATOR</td>
<td>3 d</td>
</tr>
<tr>
<td>Module 18</td>
<td>HSE IN DRILLING OPERATIONS</td>
<td>5 d</td>
</tr>
<tr>
<td>Module 19</td>
<td>DRILLING &amp; COMPLETION PROJECT</td>
<td>10 d</td>
</tr>
</tbody>
</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.

Location | Start Date | End Date | Tuition Fees excl. VAT
--- | --- | --- | ---
Pau | 27 January & 4 May | 6 March & 12 June | €30,890

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

Contact: fp.pau@ifptraining.com
Practical Aspects of Well Construction & Planning

Level: FOUNDATION

Purpose
This course provides a comprehensive overview of all steps that should be taken to properly plan and budget Oil & Gas exploration or development wells, from pre-planning with geoscientists all the way to the well delivery for production or testing.

Audience
Young engineers, drilling and completion superintendents involved in well construction or with related activities.

Learning Objectives
Upon completion of the course, participants will be able to:
- Optimize and review the different parameters involved in oil or gas well planning.
- Identify major concerns and plan for dealing with them.
- Apply procedures and methods for designing oil or gas wells and preparing drilling programs.
- Learn how to estimate drilling time and costs, along with corresponding margins of error.
- Recognize the importance of effective well engineering and planning.

Ways & Means
- Interactive course with practical exercises using the Drilling Data Handbook.
- Videos and animations.

Learning Assessment
Continuous evaluation: exercises and oral questions.

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>WELL OBJECTIVES &amp; INPUTS TO THE DRILLING PROGRAM</th>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical objectives and inputs to an exploration or development well program.</td>
<td></td>
</tr>
<tr>
<td>Pore and fracuration pressure evaluation.</td>
<td></td>
</tr>
<tr>
<td>Criteria to consider for the well design.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CASING DESIGN: SHOE POSITIONING</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swab and surge considerations, kick tolerance, hypothesis selection.</td>
<td></td>
</tr>
<tr>
<td>Selection of mud weights, additional constraints, exercises with different hypothesis.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CASING DESIGN: CASING SELECTION</th>
<th>1.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical and mechanical properties of casings and casing connections.</td>
<td></td>
</tr>
<tr>
<td>Casing string calculation, selection.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WELLHEAD DESIGN &amp; SELECTION</th>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Different wellheads in onshore and offshore environments.</td>
<td></td>
</tr>
<tr>
<td>Wellhead and BOP selection.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BITS PROGRAM</th>
<th>0.75 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Different types of bits, bit selection: bit records, cost per foot, bit hydraulics.</td>
<td></td>
</tr>
<tr>
<td>Exercises.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DRILL STRING, COMPONENTS &amp; SELECTION</th>
<th>0.75 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drill string components.</td>
<td></td>
</tr>
<tr>
<td>Characteristics and limit of use.</td>
<td></td>
</tr>
<tr>
<td>BHA and drill pipe selection.</td>
<td></td>
</tr>
<tr>
<td>Exercises.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MUD &amp; CEMENT PROGRAM</th>
<th>1.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling fluid types and characteristics, mechanical treatment equipment.</td>
<td></td>
</tr>
<tr>
<td>Selection of mud program according to the well construction criteria.</td>
<td></td>
</tr>
<tr>
<td>Cementing technology and procedures, cement and slurry design.</td>
<td></td>
</tr>
<tr>
<td>Cementing program, cementing quality control.</td>
<td></td>
</tr>
<tr>
<td>Exercises.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FORMATION EVALUATION PROGRAM</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open hole logging tools (GR, resistivity, density, neutron, sonic).</td>
<td></td>
</tr>
<tr>
<td>Quick look exercise.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEVIA TED WELLS DESIGN: DIRECTIONAL DRILLING METHODS &amp; TECHNOLOGY</th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directional drilling tools and technology, directional program.</td>
<td></td>
</tr>
<tr>
<td>Trajectory planning coordinates systems.</td>
<td></td>
</tr>
<tr>
<td>Trajectory calculation methods, uncertainty evaluation, anti collision.</td>
<td></td>
</tr>
<tr>
<td>Drill string selection.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RIG SELECTION</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main drilling rig functions.</td>
<td></td>
</tr>
<tr>
<td>Types of rigs, rig selection criteria.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STUCK PIPE</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borehole stability, causes of stuck pipes and first actions.</td>
<td></td>
</tr>
<tr>
<td>Warning signs and method to free pipes, preventive measures.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WELL COMPLETION</th>
<th>1.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Different ways to complete the well.</td>
<td></td>
</tr>
<tr>
<td>Sand control, stimulation.</td>
<td></td>
</tr>
<tr>
<td>Tubing, packer, safety valve selection.</td>
<td></td>
</tr>
<tr>
<td>Well intervention: wireline, coiled tubing, snubbing, workover.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TIME ESTIMATE &amp; PROVISIONAL PROGRESS CURVE</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical rig times required for the different operations, contingencies.</td>
<td></td>
</tr>
<tr>
<td>Progress curve.</td>
<td></td>
</tr>
<tr>
<td>Cost estimation according to the environment (type of well, rigs).</td>
<td></td>
</tr>
</tbody>
</table>

Reference: DRIL/PAWPCE  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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>16 November</td>
<td>27 November</td>
<td>€6,970</td>
</tr>
</tbody>
</table>
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.

Course Content

INTRODUCTION TO PETROLEUM GEOLOGY

Basis and sedimentary rocks - Petroleum system:
- Sedimentary basin - Definitions, structure and terminology.
- Sedimentary rocks - Description and main facies - Comparison clastic versus carbonates - Sedimentary process.
- Petroleum system - Source rock, reservoir rock and seal rock - Trapping and migration process.
- Exercises: interpretation of geological cross section; identification of the petroleum components, petroleum system building; identification of potential prospects and implementation of exploration wells; analysis of limitations and drilling constraints.

FIELD TRIP IN THE PYRENEAN LACQ FIELD (active margin basin)

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.
  - Analysis of the turbidites structure in St Jean de Luz. Syn and post sedimentary structures - Observation of “chair folding”. Dissymmetry of the folding. Notions of pressure/stretching and under compacted zones. Comparison with turbidities 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/FTFPE  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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>27 January</td>
<td>31 January</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

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

Drilling & Completion Engineering
Reservoir & Field Development
Production Engineering
Surface Facilities Engineering
Project Management
HSE
Gas
Offshore
Unconventional
E&P Chain
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”.

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></th>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>INITIAL TEST</td>
<td>0.5 d</td>
</tr>
<tr>
<td>General knowledges about drilling and completion.</td>
<td></td>
</tr>
<tr>
<td>CAUSES OVERBURDEN PRESSURE, PORE PRESSURE, FRAC PRESSURE</td>
<td>1 d</td>
</tr>
<tr>
<td>Definitions.</td>
<td></td>
</tr>
<tr>
<td>Causes of abnormal pore pressure.</td>
<td></td>
</tr>
<tr>
<td>Detection of abnormal pore pressure.</td>
<td></td>
</tr>
<tr>
<td>Determination of frac pressure, LOT.</td>
<td></td>
</tr>
<tr>
<td>DRILLING FUNDAMENTALS</td>
<td>1 d</td>
</tr>
<tr>
<td>Principle of drilling, functions of the drilling fluid, well architecture.</td>
<td></td>
</tr>
<tr>
<td>Casing cementing.</td>
<td></td>
</tr>
<tr>
<td>Wellhead and safety.</td>
<td></td>
</tr>
<tr>
<td>HYDRODYNAMICS APPLIED TO WELL</td>
<td>2 d</td>
</tr>
<tr>
<td>Hydrostatic pressure, pressure losses.</td>
<td></td>
</tr>
<tr>
<td>Relation between static and circulating well pressures.</td>
<td></td>
</tr>
<tr>
<td>KNOWLEDGE ASSESSMENT</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

Reference: DRIL/BACFPF. 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>3 February</td>
<td>7 February</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: DRIL/BACFPF. Please contact us for more information.
Well Architecture & Equipment

Course Content

DRILLING & CASING PROGRAM
Role of casings.
Parameters to be considered to determine well architecture:
- Well type.
- Pore and frac pressures.
- Completion, lithology.
Different types of casings:
- Surface.
- Intermediate.
- Production.

WELLHEAD
Different elements.
Wellhead assembly sequences.

CHARACTERISTICS OF CASINGS
Geometric, physical and mechanical properties of the pipes, the connections.
Use of Drilling Data Handbook.

SHOE POSITIONING
Hypotheses to be considered, casing point - Kick tolerance.
Casing point - Kick tolerance.
Examples and exercises.

CASING STRING CALCULATION
Principles and assumptions to remember for the different strings.
Stress cases study:
- Collapse.
- Burst.
- Tension.
- Triaxial study.
- Safety factors.
Casing selection: examples and exercises.

CALCULATION EXAMPLES
Case studies and writing of a spreadsheet in order to determine the casing point, the kick margin, the pressure max…

KNOWLEDGE ASSESSMENT

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

Location Start Date End Date Tuition Fees excl. VAT
Pau 9 March 13 March €3,690

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.

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, equiresistant 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 wells.

KNOWLEDGE ASSESSMENT

0.25 d

Reference: DRIL/OUTGARN
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>30 March</td>
<td>3 April</td>
<td>£3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: DRIL/OUTGARNF. 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.

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

RIG
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
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

Reference: DRIL/BOPE

Can be organized as an In-House course.

Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT
Pau 14 April 17 April €3,690

This course is also available in French: DRIL/BOPF. Please contact us for more information.
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.
- 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 5 days

MUD LOGGING

Tasks of various professionals at the drilling site.

Main documents carried out.

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.

Case studies.

CORING OPERATIONS

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

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 technics for sampling with wireline and LWD tools.
- Prevention actions to handle sampling operations.

KNOWLEDGE ASSESSMENT

Reference: DRIL/LOGFIE. 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>20 April</td>
<td>24 April</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: DRIL/LOGFIF. Please contact us for more information.
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.
- 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.

HSE MANAGEMENT OF WELL CONTROL EQUIPMENT
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.

RISKS ASSOCIATED WITH SUPPORT FACILITIES
- Engine rooms, power generation and air compressors.
- 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.
- 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.

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>4 May</td>
<td>7 May</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

Reference: OHSE/HSEE
- Can be organized as an In-House course.

Contact: fp.pau@ifptraining.com

Note: 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.

Learning Assessment
Training exercises, writing of an Excel spreadsheet, written exam.

Prerequisites
Course “Well Architecture & Equipment”, 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 Certification.
- 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

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>6 April</td>
<td>10 April</td>
<td>£3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: DRIL/FDTDHF. 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.

Reference: DRIL/GEOME

Only available as an In-House course.

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

TASSELS & RUPTEURS DE MECHANISMS AROUND THE WELL
2 d
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
0.75 d
Exercise based on one or several real cases gathering the major issues of reservoir geomechanics.
Knowledge assessment.

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 DRILLING APPLICATIONS
2 d
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.

Course Content
3 days

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 DRILLING APPLICATIONS
2 d
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
2 d
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
0.75 d
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.

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

Contact: fp.pau@ifptraining.com

www.ifptraining.com
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

<table>
<thead>
<tr>
<th>5 days</th>
</tr>
</thead>
</table>

**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.pau@ifptraining.com
NEW Geosteering

Level: FOUNDATION

Purpose
This course provides unique opportunity to independently support the geosteering of horizontal wells in the conditions of real-time drilling, using an interactive simulator.

Audience
Geologists, reservoir engineers, drilling coordinators and supervisors, petrophysicists and geosteerers.

Learning Objectives
Upon completion of the course, participants will be able to:
- gain knowledge of the fundamentals of telemetry, measurements and logging while drilling and directional drilling technologies,
- become aware of the criteria for selecting the minimum required logging data set before a geosteering job,
- get acquainted with errors and uncertainties in the drilling of horizontal wells, related both to geology and to the limitations of telemetry and logging tools, and the methods of calculating the well trajectory,
- master the modern geosteering methods,
- become familiar with the basics of interpreting azimuthal logs,
- gain experience in modeling various geosteering scenarios before starting drilling for the risk management purposes,
- get real-time geosteering experience on-the-job.

Ways & Means
- Geosteering requires practice, and this is inevitably associated with making mistakes and wrong decisions. The price of making a wrong decision on a real well can vary from a few hours of non-productive time to a million-dollar sidetrack or a million barrels of oil that can never be extracted. These factors are associated with making a wrong decision on a real horizontal well.
- Participants will master the necessary knowledge to build a preliminary simulation and develop a strategy for drilling a horizontal well.
- Using a unique interactive simulator, participants will independently follow the drilling of at least three horizontal wells, while learning how to independently make timely and technically correct trajectory corrections.

Learning Assessment
Practice on geosteering simulator, debriefing, evaluating of effective length of the well after geosteering.

Prerequisites
Basic geology, directional drilling and well logging knowledge 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.

Course Content

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>BASICS OF TELEMETRY, MEASUREMENT WHILE DRILLING (MWD) &amp; DIRECTIONAL DRILLING TECHNOLOGIES</td>
<td>Drilling technology with motor and RSS. Logging and Measurements While Drilling (LWD/MWD). Telemetry and surveys. Errors and uncertainties while drilling.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING AZIMUTHAL DATA (theory)</td>
<td>Application of azimuthal data. Application of borehole images. “Zones of exclusion” and the error of the dips picked on the images.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING USING NON-AZIMUTHAL DATA (theory)</td>
<td>Method of matching synthetic curves with actual LWD. Benefits and limitations of synthetic curves method.</td>
</tr>
<tr>
<td>0.25 d</td>
<td>GEOSTEERING WITH DISTANCE TO BOUNDARY TECHNOLOGIES (theory)</td>
<td>Measurement principles of the distance to boundary technologies. Resistivity inversion in geosteering.</td>
</tr>
</tbody>
</table>

Benefits and limitations of synthetic curves method.

Reference: DRIL/GEOSTERE & DIRECTIONAL DRILLING TECHNOLOGIES

Can be organized as an In-House course.

Contact: ep.contact@ifptraining.com

www.ifptraining.com
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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>25 May</td>
<td>29 May</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: DRIL/OFDWF. Please contact us for more information.
Wellhead & Blowout Preventers

Course Content

**ONSHORE WELLHEAD & BLOWOUT PREVENTERS**

- 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**

- Closing and accumulation hydraulic unit.
- Choke manifold, chokes, valves…
- Mud gas separator.

**SUBSEA EQUIPMENT**

- Wellhead, BOPs.
- Risers.
- Subsea BOP closing system.
- API rules.
- Exercises on subsea BOP closing system sizing.

---

Reference: DRIL/WEADE

Only available as an In-House course.

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

Contact: fp.pau@ifptraining.com

www.ifptraining.com
Stuck Pipe Prevention

Course Content

**CONSEQUENCES OF STUCK PIPE INCIDENT**
- Impacts.
- Statistics.
- Causes.
- Basic rules.
0.5 d

**STUCK PIPE MECHANISMS**
- Differential sticking.
- Solids induced pack off.
- Mechanical and wellbore geometry.
1.5 d

**DRILL STRING, MUD & HOLE CLEANING**
- Characteristics and limits of the drill string.
- Margin of over-pull.
- Roles and characteristics of the drilling mud.
- Solids control equipment.
- Hole cleaning.
1 d

**METHODS TO FREE THE DRILL STRING**
- First actions for the driller.
- Use of drilling jars.
- Reduction of the differential pressure.
- Use of lubricant pills.
0.75 d

**PREVENTIVE MEASURES**
- Listen to the hole.
- Good drilling practices while drilling and tripping.
- Teamwork and monitoring.
0.25 d

**FISHING EQUIPMENT**
- Description, function and correct use of fishing equipment.
0.5 d

**HISTORY CASES**
- Identify stuck pipe mechanisms and analyze the causes.
0.25 d

**FINAL TEST**
- Identify stuck pipe mechanisms and analyze the causes.
0.25 d

Reference: DRIL/STUCKPIPE  
Only available as an In-House course.  
Contact: fp.pau@ifptraining.com
HPHT Drilling Design & Operations

Course Content

5 days

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)LÖT/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/HPHT
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.

**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>Functions of Drilling Fluids</th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical &amp; Chemical Characteristics</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Specific gravity.</td>
<td></td>
</tr>
<tr>
<td>Rheology.</td>
<td></td>
</tr>
<tr>
<td>Filtration.</td>
<td></td>
</tr>
<tr>
<td>Alkalinity.</td>
<td></td>
</tr>
<tr>
<td>Chloride.</td>
<td></td>
</tr>
<tr>
<td>Hardness.</td>
<td></td>
</tr>
<tr>
<td><strong>Types of Fluids</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Water base mud.</td>
<td></td>
</tr>
<tr>
<td>Oil base mud.</td>
<td></td>
</tr>
<tr>
<td><strong>Shale Inhibition</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Types of shale.</td>
<td></td>
</tr>
<tr>
<td>Chemical and physical inhibition.</td>
<td></td>
</tr>
<tr>
<td><strong>Mechanical &amp; Waste Treatment</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Function.</td>
<td></td>
</tr>
<tr>
<td>Selection of equipment and layout.</td>
<td></td>
</tr>
<tr>
<td>Separation ranges.</td>
<td></td>
</tr>
<tr>
<td>Overall efficiency.</td>
<td></td>
</tr>
<tr>
<td>Waste treatment:</td>
<td></td>
</tr>
<tr>
<td>Solidification.</td>
<td></td>
</tr>
<tr>
<td>Rejection.</td>
<td></td>
</tr>
<tr>
<td>Desorption.</td>
<td></td>
</tr>
<tr>
<td><strong>Troubleshooting</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Losses:</td>
<td></td>
</tr>
<tr>
<td>Detection.</td>
<td></td>
</tr>
<tr>
<td>Analysis and decision chart.</td>
<td></td>
</tr>
<tr>
<td>Treatment.</td>
<td></td>
</tr>
<tr>
<td>Hole cleaning:</td>
<td></td>
</tr>
<tr>
<td>Vertical well.</td>
<td></td>
</tr>
<tr>
<td>Deviated and horizontal wells.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: FLU/FLUE
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>16 March</td>
<td>20 March</td>
<td>€3,690</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.

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

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>23 March</td>
<td>27 March</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

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”, 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.

### Course Content

| 5 days |  
|---|---|
| **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 eccentered annulus.  
- Salt zone and temperature problems. |  
| **SPECIAL CASES** | 0.5 d |
| Gas zone cementing.  
- Deviated and horizontal wells cementing.  
- Remedial techniques.  
- CO₂ environment (CO₂ resistant cement). |  
| **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
# Wellhead Selection & Maintenance

## Level: FOUNDATION

### 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>INTRODUCTION: DOWNHOLE EQUIPMENT</th>
<th>Well construction.</th>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Casing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Completion equipment: tubing, SCSSV, SSD, ICV…</td>
<td></td>
</tr>
</tbody>
</table>

| WELLHEAD COMPONENTS               | Casing head, casing spool, casing hanger, packoff flange. | 0.5 d |
|-----------------------------------| Tubing head, tubing hanger, tubing head adapter. |       |
|                                   | Seals. | |

| X-MAS TREE (specifications)       | X-mas tree (natural flowing wells). | 1.25 d |
|-----------------------------------| Gas well X-mas tree, requirement for materials. |       |
|                                   | X-mas tree equipment and selection (MV, SSV, SV, WV, choke). |  |

| WELLHEAD MONITORING & MAINTENANCE | Wellhead installation procedures. | 1.75 d |
|------------------------------------| Wellhead protection during well intervention (pre-job and post job). |       |
|                                   | Surface equipment monitoring maintenance. |        |
|                                   | Function tests, pressure test. |        |
|                                   | Plan & execute maintenance. Well reinstatement. |        |
|                                   | Role and responsibilities over the various operational life of the well. |  |

| WELL INTEGRITY DURING OPERATIONS  | During: well start up, steady state, well intervention. | 0.5 d |
|-----------------------------------| Shut-in the well and handover. |       |

| TODAY’S SUCCESSFUL TECHNICIAN    | HSE goal and leadership. | 0.5 d |
|-----------------------------------| Role and responsibilities over the various operational life of the well. |       |
|                                   | Handover and reporting best practices. |       |

| KNOWLEDGE ASSESSMENT             | Only available as an In-House course. | 0.25 d |

Reference: COMP/WHMAINTE

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

Contact: fp.pau@ifptraining.com

www.ifptraining.com
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, $R_s$, $B_o$, $B_g$, GOR, WOR…).
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

Reference: COMP/PPLCTE 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>10 February</td>
<td>14 February</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: COMP/PPLCTF. Please contact us for more information.
Well Test Operation

Level: PROFICIENCY

Purpose
This course provides the required comprehensive knowledge and skills for implementing well tests.

Audience
Drilling and production engineers, supervisors involved in well test operation, reservoir engineers.

Learning Objectives
Upon completion of the course, participants will be able to:
- select the required well test equipment,
- design an operational well test program with regard to the reservoir engineer’s requirements,
- supervise the well test operation.

Ways & Means
- Several practical examples and case studies.
- Numerous videos and animations.

Learning Assessment
Quiz.

Prerequisites
No prerequisites for this course.

More info
This course can be delivered in French, with documentation in English. 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

WELL TESTING FUNDAMENTALS
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).

Well testing operation and surface set up:
Surface equipment and set up.
Well testing sequences of operation.
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.

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 equipment.
Deep water DST operations.
Deep water environment operation impact: wax deposition, paraffin, hydrates.

DST tools demo (movie).

KNOWLEDGE ASSESSMENT

Reference: COMP/CEPE
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>27 April</td>
<td>30 April</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

www.ifptraining.com
111
Well-Completion Equipment & Procedures for Flowing Wells

**Course Content**

**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 and 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

---

**Location**

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>17 February</td>
<td>21 February</td>
<td>£3,690</td>
</tr>
</tbody>
</table>

Contact: fp.pau@ifptraining.com

This course is also available in French: COMP/EQTPEF. Please contact us for more information.
Tubing Movement & Forces

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.

Course Content

GENERAL PRINCIPLES
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
Temperature effect.
Ballooning 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
Calculation principle.
Estimation of f_k
Determination of f_k taking buckling into account.

CASE STUDY

KNOWLEDGE ASSESSMENT
Wellbore Treatments

Introduction to Wellbore Treatments

**INTRODUCTION TO WELLBORE TREATMENTS**

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...**

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**

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**

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**

Origin of the problems.
Remedial.
Debate around several examples.
Case study.

**KNOWLEDGE ASSESSMENT**

Reference: COMP/TRAITE

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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>24 February</td>
<td>28 February</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: COMP/TRAITEF. 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”.

**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>INTRODUCTION TO RESERVOIR TREATMENTS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Fundamental reminders on the Productivity Index (PI), the skin effect and flow efficiency, the different components of the skin.</td>
<td></td>
</tr>
<tr>
<td>FORMATION DAMAGE</td>
<td>1 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>MATRIX TREATMENT: ACIDIZING CARBONATES</td>
<td>1 d</td>
</tr>
<tr>
<td>Aims; how it works. Sandstones: inner characteristics, reactivity to injected fluids. Laboratory studies. Exercises.</td>
<td></td>
</tr>
<tr>
<td>MATRIX TREATMENT: ACIDIZING SANDSTONES</td>
<td>1 d</td>
</tr>
<tr>
<td>Aims; how it works. Sandstones: inner characteristics, reactivity to injected fluids. Choosing the acids.</td>
<td></td>
</tr>
<tr>
<td>ACIDIZING ADDITIVES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Review of the different additives (corrosion inhibitor, iron complexing agents, surfactants, solvents, etc.). Selection of the additives.</td>
<td></td>
</tr>
<tr>
<td>MATRIX TREATMENT DESIGN</td>
<td>0.75 d</td>
</tr>
<tr>
<td>KNOWLEDGE ASSESSMENT</td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

Reference: COMP/ACIDIFE

Only available as an In-House course.

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

Contact: fp.pau@ifptraining.com

www.ifptraining.com
Basic Hydraulic Fracturing

Course Content

**INTRODUCTION TO HYDRAULIC FRACTURING**

Productivity index, skin effect, flow efficiency. Damage in the formation and in the pack. Candidate selection. 0.5 d

**DESCRIPTION OF THE PROCESS**

In situ stress, fracture orientation and fracture propagation. Different types of pressures: net pressure, tortuosity, friction. Fluid leak-off, slurry efficiency, dimensionless fracture conductivity. 0.5 d

**FRACTURING FLUIDS, PROPPANTS & FRACTURE CONDUCTIVITY**

Types of fracturing fluids. Types of proppants. Fluid and proppant selection. 1 d

**INPUT & FRACTURE DESIGN**

Requirement for fracture design. Fracture growth analysis. Hydraulic fracturing models. 1 d

**EQUIPMENT & PLACEMENT TECHNIQUES**

Surface pumping equipment. Placement techniques in vertical and horizontal wells. Planning and executing operation. 1 d

**FLOW BACK, FRACTURE MAPPING & POST-JOB ANALYSIS**

Flow back techniques: wellhead isolation tool, frac valve. Mapping: well test, tracer and micro-seismic. Post-job evaluation. Environmental considerations 0.75 d

**CONCLUSION, ASSESSMENT & FEEDBACK**

0.25 d

---

Reference: COMPHYDFRACE  Only available as an In-House course. Contact: fp.pau@ifptraining.com
Artificial Lift & Well Intervention Fundamentals

**Course Content**

<table>
<thead>
<tr>
<th>Course</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTIFICIAL LIFT BY CONTINUOUS GAS LIFT</td>
<td>1 d</td>
</tr>
<tr>
<td>ARTIFICIAL LIFT BY PUMPING</td>
<td>1 d</td>
</tr>
<tr>
<td>TYPES &amp; MEANS OF INTERVENTION ON PRODUCING WELLS</td>
<td>1 d</td>
</tr>
<tr>
<td>GENERAL PROCEDURE OF A WORKOVER</td>
<td>0.5 d</td>
</tr>
<tr>
<td>WELL KILLING PROCEDURE FOR A PRODUCING WELL</td>
<td>0.75 d</td>
</tr>
<tr>
<td>CASE STUDY: WORKOVER PROGRAM</td>
<td>0.5 d</td>
</tr>
<tr>
<td>KNOWLEDGE ASSESSMENT</td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

**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”.

**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.

**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", "Artificial Lift: Pumping" and "Well Servicing & Workover".

**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 | Start Date | End Date | Tuition Fees excl. VAT |
---|---|---|---|
Pau | 2 March | 6 March | €3,690 |

This course is also available in French: COMP/TAWOF. Please contact us for more information.
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”.

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/GLIFTE. 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.

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?
Main parameters relative to reservoir and well performance curve: inflow and outflow.
Need for artificial lift.

SUCKER ROD PUMPING
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)
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
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

Practical training on equipment calculation.
Numerous 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.

Reference: COMP/APOMPE
Only available as an In-House course.

Contact: fp.pau@ifptraining.com
This course is also available in French: COMP/APOMPPF. Please contact us for more information.
Coiled Tubing & Nitrogen Operations in Completion & Workover

Course Content

**BASIC DATA**
Importance of nitrogen in stimulation and workover.
Importance of coiled tubing in completion and workover.

**NITROGEN - NITRIFIED ACID - FOAMED ACID**
Nitrogen (properties, basic formula for design).
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.
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.
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.
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).
Cementing through coiled tubing: cement plug, squeeze (squeeze slurry characteristics, job design, key-points).

Reference: COMP/CTAE
Only available as an In-House course.

Contact: fp.pau@ifptraining.com

This course is also available in French: COMP/CTAF. Please contact us for more information.
Well Servicing & Workover

Course Content

**TYPES & MEANS OF INTERVENTION ON PRODUCING WELLS**

- **Purpose**: Mains types of intervention: measurement, maintenance, workover.
- **Introduction to 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 “unsettling”.

**WELL OPERATIONS ON PRODUCING WELLS**

- **Wireline operations**: principle and area of application, surface equipment, wireline tool string, WL tools, fishing tools, safety during operations.
- **Coiled tubing operations**: principle and area of application, surface equipment, CT downhole equipment, CT safety and operating considerations.

**CASE STUDY: WORKOVER PROGRAM**

- **5 days**

**KNOWLEDGE ASSESSMENT**

- **0.25 d**

---

Reference: COMP/WSWOE

Only available as an In-House course.

Contact: fp.pau@ifptraining.com

www.ifptraining.com
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_o, R_o, GOR, solids… Reservoir rock and fluids: porosity, permeability, saturation, relative permeability. 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. 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. Back pressure equation for gas wells. Global skin: formation damage, perforation, partial penetration, deviation.</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. GLR, tubing head pressure, tubing ID impact. Monophasic vs. polyphasic flow: minimum flowrate/well loading.</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. Well performance modeling, prediction and analysis vs. reservoir pressure, Pi, GLR, BSW, tubing ID.</td>
<td></td>
</tr>
<tr>
<td><strong>ARTIFICIAL LIFT</strong></td>
<td>1.5 d</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. PROSPER™ methodology for gas lift design and troubleshooting, manual application. 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.
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…
PROSPER™: building PVT model.

**RESERVOIR PROPERTIES & RESERVOIR–WELLBORE INTERFACE**
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**
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**
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**
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**
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**
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**
Presentation and discussion of the results of design (integrated case study).

Reference: COMP/WELLPERF2E Only available as an In-House course. Contact: fp.pau@ifptraining.com

www.ifptraining.com
Well Production Integrity

Purpose
This course provides skills in well integrity concepts: “how to keep hydrocarbons in the pipe” by designing, operating and maintaining well equipment to ensure safe containment of all wellbore fluids over the lifetime of a well.

Audience
Drilling, completion and production engineers and technicians.

Learning Objectives
Upon completion of the course, participants will be able to:
- recognize the importance and the concepts of well integrity,
- assess the link between well integrity and other key strategic operations,
- review, focus and design well integrity assurance,
- appreciate the role of the production technician with regard to well integrity.

Ways & Means
- Videos and animations showing how equipment work.
- Practical exercises and knowledge assessment.

Learning Assessment
Practical 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

| 2 days |
|-----------------|---------|
| WELL INTEGRITY DESIGN | 0.25 d |

| WELL INTEGRITY OPERATIONS | 0.25 d |

| OPERATIONS: YOUR ROLE | 0.25 d |
| 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 | 0.25 d |

| MAINTENANCE: YOUR ROLE | 0.25 d |
| 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 | 0.25 d |
| 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 | 0.25 d |
| 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) 0.25 d

Reference: COMP/WELINT Only available as an In-House course. Contact: fp.pau@ifptraining.com

This course is also available in French: COMP/WELINTF. Please contact us for more information.
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.paul@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 Certification.
- 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.
Measurements: sampling; bottom hole and surface sampling. Representativity and validity of sampling, analysis, PVT studies: oil-gas condensate, fluid modeling: PVT matching.
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.

Reference: COMP/WELLPERFENGE
Only available as an In-House course.
Contact: fp.pau@ifptraining.com
Graduate Certificate
Well Integrity Engineering Certification

**Course Content**

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASING DESIGN &amp; APPLICABLE STANDARDS</td>
<td>5 d</td>
</tr>
<tr>
<td>Drilling and casing program, wellhead, characteristics of casing. Shoe positioning: hypotheses to be considered, casing point. Kick tolerance, casing point. Kick tolerance &amp; well integrity. Casing String Calculation: principles and assumptions, stress cases study (collapse, burst, tension, triaxial study, safety factors). Casing selection.</td>
<td></td>
</tr>
<tr>
<td>CEMENTING: PRIMARY &amp; REMEDIAL, QUALITY CONTROL OF CEMENT</td>
<td>5 d</td>
</tr>
<tr>
<td>WELL COMPLETION EQUIPMENT, DESIGN, ACCEPTANCE CRITERIA</td>
<td>5 d</td>
</tr>
<tr>
<td>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 &amp; 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.</td>
<td></td>
</tr>
<tr>
<td>WELL INTEGRITY MANAGEMENT</td>
<td>5 d</td>
</tr>
<tr>
<td>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 &amp; 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.</td>
<td></td>
</tr>
<tr>
<td>WELL HEAD INTEGRITY &amp; MAINTENANCE</td>
<td>5 d</td>
</tr>
<tr>
<td>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 maintenance, function tests, pressure test, plan &amp; execute maintenance. Well reinstatement. Role and responsibilities over the various operational life of the well.</td>
<td></td>
</tr>
<tr>
<td>FLOW ASSURANCE</td>
<td>5 d</td>
</tr>
<tr>
<td>WELL SURVEILLANCE &amp; DATA MANAGEMENT</td>
<td>5 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

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

**Ways & Means**
- Highly interactive training with industry specialist lecturers.
- Multiple teamwork sessions and industrial case studies.
- Numerical simulation exercises using corresponding software PipeSim™.
- Knowledge assessment on a weekly basis.

**Learning Assessment**
Quiz.

**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/WELINTENGE  Only available as an In-House course.
Contact: fp.pau@ifptraining.com

www.ifptraining.com 197
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.

Course Content

5 days

THE VARIOUS PRESSURES IN THE WELL 0.75 d
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 0.25 d
Pore pressure, frac pressure, overburden pressure (LOT and FIT).
Necessity of a good casing cement job.

KICK DETECTION 0.75 d
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…).

PRINCIPLES OF WELL CONTROL METHODS 0.5 d
Principles and procedures.
Drillers, wait and weight, volumetric methods.

EQUIPMENT & TESTING PROCEDURES 0.75 d
Barriers’ principle (NORSOK standards),
BOP stack and BOP control unit.
Auxiliary circuits: choke-manifold, mud-gas separator.
Function test, pressure test, inflow test.

SUBSEA EQUIPMENT 0.5 d
Specific equipment of subsea BOP.
Problems related to floating rigs.

SIMULATOR 0.5 d
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 1 d
Written test on principles and procedures.
Written test on well control equipment.

Reference: WEL/FPESME2
This course is also available in French: WEL/FPESMF2. Please contact us for more information.

Contact: fp.pau@ifptraining.com

Only available as an In-House course.
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.
- 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.
- Can be organized as an In-House course.

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

INITIAL TEST ON WELL CONTROL 0.25 d

PRESSURE ANALYSIS & KICK CONTROL 0.75 d
Reminder on hydrostatic and hydrodynamic pressures.
Relationship between various pressures in the well.
Definition of gas law and migration.
Causes and signs of abnormal pore pressure.
Frac pressure and MAASP (LOT and FIT).
Causes and signs of a kick, impact of WBM or NABM.
Precautions to be taken to avoid kicks.

WELL CONTROL 1.75 d
- 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).

PARTICULAR CASES 0.25 d
- Incidents during circulation.
  - Shallow gas.
  - Volumetric method.
  - MAASP.
  - Deviated well.
  - Kick during running of casing or during cement jobs.

SURFACE WELL CONTROL EQUIPMENT 0.5 d
- 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 0.25 d
- Practice on a simulator, training for the IWCF certification.
- Exercises on: principles and procedures, kill sheet and well control equipment.

SUBSEA SPECIFICITIES 0.25 d
- 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 1 d
- Written test on principles and procedures.
- Written test on equipment.
- Practical assessment on simulator.

Reference: WEL/FPSME3-4
Contact: fp.pau@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT
Pau 9 March 13 March €2,490
Pau 11 May 15 May €2,490
Pau 14 September 18 September €2,490

This course is also available in French: WEL/FPSM3-4. 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**

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 …).

**COMPLETION EQUIPMENT**

- 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**

- 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 (strippers, BOP…).
  - Rigging up and pressure tests surface pressure control equipment.

- Snubbing *(optional)*
  - Barriers and specific equipment (strippers, annular BOP, stripping rams, safety rams…).
  - Rigging up and pressure tests surface pressure control equipment.

**IWCF CERTIFICATION**

- 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.
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.

Pre-requisites
- The Certification Level 2 is recommended for a first IWCF Certification.
- 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

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.

Reference: WEL/WELINE3-4
Contact: fp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>25 May</td>
<td>29 May</td>
<td>€3,580</td>
</tr>
</tbody>
</table>

*This course is also available in French: WEL/WELINF3-4. 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

<table>
<thead>
<tr>
<th>REMINDERS ON WELL CONTROL</th>
<th>0.75 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causes, signs of a kick.</td>
<td></td>
</tr>
<tr>
<td>Procedures in case of a sign of a kick.</td>
<td></td>
</tr>
<tr>
<td>Well shut-in procedures.</td>
<td></td>
</tr>
<tr>
<td>Control methods: driller’s method, wait and weight method.</td>
<td></td>
</tr>
<tr>
<td>Reminders on the equipment: BOP, closing unit, choke manifold, tests of equipment.</td>
<td></td>
</tr>
<tr>
<td>Equipment.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STRIPPING</th>
<th>2.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principle of the volumetric method, of the lubricating method.</td>
<td></td>
</tr>
<tr>
<td>Application of the volumetric method to a general case: change in annular capacity, deviated well, drill collar safety.</td>
<td></td>
</tr>
<tr>
<td>Stripping principle.</td>
<td></td>
</tr>
<tr>
<td>Additional equipment required for a stripping job.</td>
<td></td>
</tr>
<tr>
<td>Stripping through the annular preventer while running in on simulator.</td>
<td></td>
</tr>
<tr>
<td>How teams are organized on the rig site to carry out the job.</td>
<td></td>
</tr>
<tr>
<td>Stripping through ram BOP while running in on simulator.</td>
<td></td>
</tr>
<tr>
<td>Stripping procedure when pulling out of hole.</td>
<td></td>
</tr>
</tbody>
</table>

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

Reference: WEL/STRIPE

Only available as an In-House course.

Contact: fp.pau@ifptraining.com
Production Engineering

▶ Well Production
  Well Productivity & Reservoir - Wellbore Interface ................................................................. p. 204
  Wellbore Treatments ...................................................................................................................... p. 205
  Artificial Lift & Well Intervention Fundamentals ........................................................................ p. 206
  Well Servicing & Workover ........................................................................................................ p. 207
  Well Performance ........................................................................................................................ p. 208
  Advanced Well Performance ....................................................................................................... p. 209
  Well Production Integrity Management ..................................................................................... p. 210
  Well Equipment & Operation for Production Engineer ................................................................. p. 211

▶ Surface Production
  Production Engineering Certification .............................................................................................. p. 212
  Metering & Allocation ....................................................................................................................... p. 213
  Integrated Production Modeling - Module 1 ...................................................................................... p. 214
  Integrated Production Modeling - Module 2 (Project) ........................................................................ p. 215
  Gathering Network: Design Engineering ......................................................................................... p. 216
  Pipeline Hydraulics & Multiphase Flow ........................................................................................... p. 217
  Pipeline Network Engineering & Operation Certification .............................................................. p. 218
  Mature Fields - Surface Production Issues ...................................................................................... p. 219
  Heavy Oil Production & Processing ................................................................................................ p. 220
  Chemicals used in Production Activities ......................................................................................... p. 221
  Gas Cycling: an Integrated Approach .............................................................................................. p. 222
  Technical Standards for Surface Facilities Design .......................................................................... p. 223
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, $R_o$, $B_o$, $B_g$, GOR, WOR…).
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

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.

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.
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.

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” and “Basic Hydraulic Fracturing”.

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.

Location Start Date End Date Tuition Fees excl. VAT
Pau 24 February 28 February €3,690

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

Contact: fp.pau@ifptraining.com
Artificial Lift & Well Intervention Fundamentals

Course Content

<table>
<thead>
<tr>
<th>Area</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTIFICIAL LIFT BY CONTINUOUS GAS LIFT</td>
<td>1 d</td>
</tr>
<tr>
<td>Continuous gas lift: principle, well unloading, operating procedure and troubleshooting, field of application.</td>
<td></td>
</tr>
<tr>
<td>ARTIFICIAL LIFT BY PUMPING</td>
<td>1 d</td>
</tr>
<tr>
<td>Sucker rod pumping, Electrical Submersible centrifugal Pumping (ESP): principle, specific completion equipment, operating procedure and troubleshooting, field of application.</td>
<td></td>
</tr>
<tr>
<td>TYPES &amp; MEANS OF INTERVENTION ON PRODUCING WELLS</td>
<td>1 d</td>
</tr>
<tr>
<td>Mains types of intervention: measurement, maintenance, workover.</td>
<td></td>
</tr>
<tr>
<td>Main means (wireline unit, coiled tubing unit, snubbing unit, workover rig): principles, area of application.</td>
<td></td>
</tr>
<tr>
<td>GENERAL PROCEDURE OF A WORKOVER</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Main operation steps: chronology, more tricky operations from a safety point of view, main operations.</td>
<td></td>
</tr>
<tr>
<td>Case of depleted reservoirs: losses and formation damage, kick-off after the workover.</td>
<td></td>
</tr>
<tr>
<td>WELL KILLING PROCEDURE FOR A PRODUCING WELL</td>
<td>0.75 d</td>
</tr>
<tr>
<td>Killing the well by circulation: area of application, basis procedures (direct or reverse circulation), elaboration of the forward-looking pumping diagram.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Final killing phase: observing the well, operations to run after packer “unsetting”.</td>
<td></td>
</tr>
<tr>
<td>CASE STUDY: WORKOVER PROGRAM</td>
<td>0.5 d</td>
</tr>
<tr>
<td>KNOWLEDGE ASSESSMENT</td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

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.

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”, “Artificial Lift: Pumping” and “Well Servicing & Workover”.

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>2 March</td>
<td>6 March</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: COMP/TAWOF. Please contact us for more information.
Well Servicing & Workover

Course Content

5 days

TYPES & MEANS OF INTERVENTION ON PRODUCING WELLS
0.5 d
Mains types of intervention: measurement, maintenance, workover.
Introduction to main means (wireline unit, coiled tubing unit, snubbing unit, workover rig): principles, area of application.

GENERAL PROCEDURE OF A WORKOVER
0.5 d
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
1.25 d
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 “unsettling”.

WELL OPERATIONS ON PRODUCING WELLS
2 d
Wireline operations: principle and area of application, surface equipment, wireline tool string, WL tools, fishing tools, safety during operations.
Coiled tubing operations: principle and area of application, surface equipment, CT downhole equipment, CT safety and operating considerations.

CASE STUDY: WORKOVER PROGRAM
0.5 d

KNOWLEDGE ASSESSMENT
0.25 d

Reference: COMP/WSWOE
Only available as an In-House course.

Contact: fp.pau@ifptraining.com

www.ifptraining.com

Well Production

207
## Well Performance

### 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>
<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, Bp, Rs, GOR, solids…</td>
<td></td>
</tr>
<tr>
<td>Reservoir rock and fluids: porosity, permeability, saturation, relative permeability. 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. 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><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. GLR, tubing head pressure, tubing ID impact. Monophasic vs. polyphasic flow: minimum flowrate/well loading.</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. Well performance modeling, prediction and analysis vs. reservoir pressure, PI, GLR, BSW, tubing ID.</td>
<td></td>
</tr>
<tr>
<td><strong>ARTIFICIAL LIFT</strong></td>
<td>1.5 d</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. PROSPER™ methodology for gas lift design and troubleshooting, manual application. PROSPER™ methodology for ESP troubleshooting.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: COMP/WELLPERFE

Only available as an In-House course.

Contact: fp.pau@ifptraining.com
## Advanced Well Performance

**Level:** PROFICIENCY

**Purpose**
This course provides the practical, comprehensive understanding and skills needed to master well performance and make significant contributions to field productivity studies and well performance monitoring.

**Audience**
Reservoir, well performance or production engineers and technicians.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- select the adequate reservoir, fluid, near-wellbore zone, well completion and facilities characteristics related to well performance design,
- select the remediation/stimulation and artificial lift methods,
- model, forecast, assess, troubleshoot and optimize well performance.

**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**
Presentation and discussion of the results of design (integrated case study).

**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><strong>WEEK 1</strong></th>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO PRODUCTION SYSTEM</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>PVT DATA/PVT MODELING</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Oil &amp; Gas PVT properties: bubble point, $B_o$, $R_o$, GOR, solids… PROSPER™: building PVT model.</td>
<td></td>
</tr>
<tr>
<td><strong>RESERVOIR PROPERTIES &amp; RESERVOIR–WELLBORE INTERFACE</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Reservoir rock &amp; 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).</td>
<td></td>
</tr>
<tr>
<td><strong>INFLOW PERFORMANCE/IPR MODELING</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td><strong>WELLBORE FLOW, OUTFLOW PERFORMANCE/VLP MODELING</strong></td>
<td>1 d</td>
</tr>
<tr>
<td><strong>WELL PERFORMANCE</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>WEEK 2</strong></th>
<th>2.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ARTIFICIAL LIFT</strong></td>
<td>2.5 d</td>
</tr>
<tr>
<td><strong>PROSPER™ CASE STUDY</strong></td>
<td>2 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>KNOWLEDGE ASSESSMENT</strong></td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

Reference: COMP/WELLPERF2E  Only available as an In-House course. 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
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

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
Main jobs: measurement, maintenance, stimulation, workover.
Operations on killed wells (workover).
Operations on live wells (well intervention): wireline, coiled tubing, snubbing.

Reference: WPRO/WELLDB  
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>19 October</td>
<td>23 October</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: WPRO/WELLFR. Please contact us for more information.
Surface Production

Graduate Certificate
Production Engineering Certification

Level: FOUNDATION

Purpose

This training aims to provide a comprehensive knowledge and practical know-how of integrated subsurface and surface production engineering.

Audience

Production engineers, field engineers, production managers, etc. seeking to acquire comprehensive and solid engineering capabilities in Oil & Gas production, from the reservoir to the surface production facilities. 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, the participants will be able to:
- Identify and link all key subsurface and surface parameters impacting Oil & Gas production.
- Implement integrated production management from the reservoir to the export point.
- Use professional software to conduct production analysis studies and make recommendations for production optimization.
- Contribute to field development studies.

Ways & Means

- Highly interactive training course, delivered by industry experts and adapted to participants’ experience.
- Numerous case studies and hands-on activities on professional software: MBAL™, PROSPER™, GAP™ for production engineering, PIPESIM™ and OLGA™ for gathering networks and flow assurance.
- Teamwork project on a real case study of production optimization.

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 Production Engineering Certification.
- 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

FUNDAMENTALS OF GEOLOGY, RESERVOIR ENGINEERING & PRODUCTION MODES

5 d

FUNDAMENTALS OF DRILLING, WELL ARCHITECTURE & COMPLETION

5 d
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

5 d

WELL SERVICING & WORKOVER

5 d
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

5 d
Inflow performance/outflow performance. Well performance: well deliverability nodal analysis (inflow/outflow); well performance modeling, prediction and analysis/reservoir pressure, PI, GLR, BW, tubing head pressure. 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

5 d

OIL & GAS FIELD PROCESSING

5 d

OFFSHORE FIELD DEVELOPMENT - PIPELINES & FLOW ASSURANCE

5 d

METERING, MATERIAL BALANCE & PRODUCTION ALLOCATION

5 d

HSE IN PRODUCTION ACTIVITIES

5 d

PRODUCTION OPTIMIZATION: INTEGRATED PRODUCTION MODELING

5 d
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 d
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.

Reference: SPRO/PRODUCTIONGB

Only available as an In-House course.

Contact: exp.ruei@ifptraining.com

This course is also available in French: SPRO/PRODUCTIONF. 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

DIFFERENT TYPES OF METERING - IMPORTANCE OF METERING 0.5 d
Types of metering: technical, transactional, allocation, fiscal. Importance of metering accuracy.

DATA TREATMENT 0.5 d
Technical material balances, data reconciliation, data architecture, architecture of DCS, data recording.

IMPLEMENTATION OF A METERING INSTALLATION - INFLUENCE ON PROCESS 0.5 d
Friction losses, introduction of a cold spot, intrusivity, leakage risks…

SINGLE-PHASE METERING: OPERATING PRINCIPLE & EQUIPMENT 1 d
Fluids dynamics (laminar and turbulent flow). Different types of single-phase meters:
- Meters based on kinetic energy (Rho.V²): orifice plate meters, pitot tubes, rotameters.
- Meters based on velocity: direct meters (turbines, volumetric meters) or indirect meters (ultrasounds, electromagnetic, vortex, thermal, turbines).
- Derived meters: use of centrifugal pump characteristic curve, use of rotation speed of a positive displacement pump…
- Tracers: chemical, radioactive, inter-correlation.

TRANSACTIONAL METERING OF LIQUIDS 0.5 d
Static transactional metering or pseudo-transactional metering (tank being filled up…). Metering bench; turbines, volumetric, ultrasounds. Calibration of metering installations on test bench in manufacturing facilities or on site. Operation of metering installations: maintenance, calibration. Calculators: corrections, conversion into standard volumes. Sampling, online analysis and lab analysis.

TRANSACTIONAL METERING OF GASES 0.5 d
Metering bench; turbines, volumetric, ultrasounds. Calibration of metering installations on test bench in manufacturing facilities or on site. Operation of metering installations: maintenance, calibration. Calculators: corrections, conversion into standard volumes. Sampling, online analysis and lab analysis.

MULTIPHASE METERING: OPERATING PRINCIPLE & EQUIPMENT 1 d

ALTERNATIVES TO THE USE OF MULTIPHASE METERS 0.5 d
4D seismic. Use of natural or introduced tracers. Estimation of the contribution of each reservoir (allocation).

Reference: SPRO/METER. 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>28 September</td>
<td>2 October</td>
<td>€3,930</td>
</tr>
</tbody>
</table>

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

www.ifptraining.com
Integrated Production Modeling - Module 1

Course Content

**WELL PERFORMANCE**

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**

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**

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**

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: bottlenecks 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.

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>Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIELD PRESENTATION - OBJECTIVES OF THE PROJECT</td>
<td>0.25 d</td>
</tr>
<tr>
<td>BUILDING THE RESERVOIR MODEL</td>
<td>1.25 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>WELL PERFORMANCE</td>
<td>2 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>SURFACE ARCHITECTURE</td>
<td>1 d</td>
</tr>
<tr>
<td>Using GAP™, the following issues will be investigated: Global production modeling linking MBAL™, PROSPER™ and GAP™. Identify the bottle necks 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.</td>
<td></td>
</tr>
<tr>
<td>PROJECT PRESENTATION, SYNTHESIS &amp; WRAP-UP</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

Reference: SPRO/PRODOPT2GB  | Only available as an In-House course. |
Contact: exp.rueil@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
0.5 d
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.

MULTIPHASE FLOW
0.5 d
Definition of multi-phase flow, main terminology.
Flow patterns, main considerations.
Basic understanding of different modeling approaches.

GATHERING SYSTEMS DESIGN & ARCHITECTURE SELECTION
0.5 d
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.

OIL/GAS GATHERING NETWORK PROJECTS
0.5 d
Project planning; route selection; jurisdiction, permitting and rights of way.
Surface considerations; alignment; surveying and mapping.
Construction; inspection and testing.
Operation and maintenance.

GATHERING NETWORK DESIGN & OPTIMIZATION USING PIPESIM™
2 d
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.

TIE-IN ASSESSMENT USING PIPESIM™
1 d
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™.

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

FUNDAMENTALS OF FLUID MECHANICS

1.5 d
FRICTION LOSSES IN SINGLE-PHASE FLOW
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.
Main flow assurance issues (hydrates, TLC, surge liquid volume handling).
“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.

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

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
# Pipeline Network Engineering & Operation Certification

## Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO CRUDE OIL &amp; NATURAL GAS PRODUCTION &amp; TRANSPORT</strong></td>
<td>Crude oil and natural gas production: fundamentals of reservoir, drilling and completion; well efficiency behavior, need for efficient 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.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>DESIGN, CONSTRUCTION &amp; OPERATION OF PIPELINES</strong></td>
<td>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.</td>
<td>10 d</td>
</tr>
<tr>
<td><strong>PUMPING STATIONS</strong></td>
<td>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).</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>COMPRESSOR STATIONS</strong></td>
<td>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).</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>METALLURGY &amp; MATERIALS, WELDING</strong></td>
<td>Metalurgy: 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 metal structure, post-welding heat treatment, identification of welding defects.</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>CORROSION PREVENTION - CATHODIC PROTECTION</strong></td>
<td>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).</td>
<td>5 d</td>
</tr>
<tr>
<td><strong>NETWORK OPERATION MANAGEMENT</strong></td>
<td>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. Maintenance management: 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.</td>
<td>10 d</td>
</tr>
<tr>
<td><strong>TRANSPORT ECONOMICS</strong></td>
<td>Investment costs (CAPEX). Operation costs (OPEX). Fundamentals of contracts. Pricing for access of third parties to the gas transport network.</td>
<td>1 d</td>
</tr>
<tr>
<td><strong>FINAL PROJECT &amp; JURY</strong></td>
<td>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.</td>
<td>5 d</td>
</tr>
</tbody>
</table>

Reference: SPRD/TRANSPORTGB. Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: SPRD/TRANSPORTFR. Please contact us for more information.
# Mature Fields - Surface Production Issues

**Level:** FOUNDATION  

**Purpose**  
This course aims to provide an overview of field aging effects on production and of the solutions to maintain the production in mature fields.

**Audience**  
Field, process or project engineers involved in mature oil field development/sales/take-over projects.

**Learning Objectives**  
Upon completion of the course, participants will be able to:  
- understand the specificities of mature field developments,  
- maintain well productivity,  
- compensate production decline,  
- adapt surface facilities to field aging.

**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**  

<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><strong>DRIVE MECHANISM &amp; ENHANCED OIL RECOVERY</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Concept selection of an EOR technique.</td>
<td></td>
</tr>
<tr>
<td>Validation process of an EOR technique.</td>
<td></td>
</tr>
<tr>
<td>Introduction to chemical EOR techniques.</td>
<td></td>
</tr>
<tr>
<td><strong>RESERVOIR PRESSURE MAINTENANCE TECHNIQUES</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td><strong>WELL ACTIVATION</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Gas lift.</td>
<td></td>
</tr>
<tr>
<td>Use of PCP, beam pump and ESPs.</td>
<td></td>
</tr>
<tr>
<td><strong>WELL PRODUCTIVITY</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Identifying a low well productivity.</td>
<td></td>
</tr>
<tr>
<td>Root causes and remediation.</td>
<td></td>
</tr>
<tr>
<td><strong>TROUBLESHOOTING OF MATURE Wells</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Identifying problems of each well and associated remediation.</td>
<td></td>
</tr>
<tr>
<td>Strategy for optimized remediation integration at the level of a field.</td>
<td></td>
</tr>
<tr>
<td>Integrity of mature wells.</td>
<td></td>
</tr>
<tr>
<td><strong>ADAPTATION OF OIL TREATMENT TO PRODUCTION AGING</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Evolution of emulsion quality over time.</td>
<td></td>
</tr>
<tr>
<td>Evaluation of separators water handling capacity (design case/current operating conditions).</td>
<td></td>
</tr>
<tr>
<td>Examples of process adaptation to field aging.</td>
<td></td>
</tr>
<tr>
<td><strong>ADAPTATION OF WATER TREATMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Evolution of water production over time.</td>
<td></td>
</tr>
<tr>
<td>Adaptation of production water treatment capacities.</td>
<td></td>
</tr>
<tr>
<td><strong>ADAPTATION OF GAS TREATMENT</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Evolution of associated gas flowrate over time.</td>
<td></td>
</tr>
<tr>
<td>Evolution of gas quality.</td>
<td></td>
</tr>
<tr>
<td>Gas recompression needs and adaptation of the gas compression package.</td>
<td></td>
</tr>
<tr>
<td>Condensate recovery.</td>
<td></td>
</tr>
<tr>
<td><strong>ENERGY EFFICIENCY IN MATURE FIELD</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Equipment performances.</td>
<td></td>
</tr>
<tr>
<td>Process optimization.</td>
<td></td>
</tr>
<tr>
<td>Fuel gas requirements vs. available associated gas.</td>
<td></td>
</tr>
<tr>
<td><strong>EXAMPLES OF MATURE FIELD DEVELOPMENTS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Example of Gabon and Cameroon mature fields developments.</td>
<td></td>
</tr>
<tr>
<td><strong>CORROSION MANAGEMENT IN MATURE FIELD</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Corrosion mechanism.</td>
<td></td>
</tr>
<tr>
<td>Integrity of wells and flow line.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: SPRO/MATUREGB  
Only available as an In-House course.  
This course is also available in French: SPRO/MATUREFR. Please contact us for more information.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
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 naptha, 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 crude oils 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, maximum recovery 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 COOKING
Heavy cuts thermal conversion processes. Visbreaking. Delayed coking process.

OTHER CONVERSION PROCESSES
Desphalting units: vacuum residues structure and properties; desphalting principles: different desphalting solvents, overall flow sheet, operating conditions; integration of desphalting units in conversion schemes.

INTEGRATION OF UPGRADING PROCESS WITH SUBSURFACE & SURFACE PRODUCTION

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

This course is also available in French: SPRO/HEAVYFR. Please contact us for more information.
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 course, 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 on 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>INTRODUCTION TO CHEMICAL TREATMENT IN PRODUCTION FIELD</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Review of different types of chemicals used in Oil &amp; Gas production.</td>
<td></td>
</tr>
<tr>
<td>Brief description of the associated logistics and chemical-specific hazards.</td>
<td></td>
</tr>
<tr>
<td>Methods for implementing chemical treatment.</td>
<td></td>
</tr>
<tr>
<td>CHEMICALS FOR OIL TREATMENT</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>CHEMICALS FOR GAS TREATMENT</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>CHEMICALS FOR INJECTION &amp; PRODUCED WATER PROCESSING</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>SPECIAL OPERATIONS</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
Only available as an In-House course.
This course is also available in French: SPRO/CHIMIQUE. Please contact us for more information.

Contact: exp.reuil@ifptraining.com

www.ifptraining.com
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

GAS CYCLING
- Introduction.
- The integrated gas cycle: elements, configuration, challenges.
- Gas cycling for pressure maintenance.
- Gas cycling for miscible gas displacement (EOR): sweeping and soaking, compositional effects.
- Dry gas cycling in retrograde condensate reservoirs.
- Major issues and constraints: reservoir, wells, flow lines and surface facilities.

WELL EFFLUENT BEHAVIOR
- Different types of well effluent. Main characterization parameters.
- Constituents that pose problems for storage and transport.
- Gas composition: rich and lean gas, sweet and sour gas.
- Gas PVT behavior.
- PVT properties of pure components and mixtures.

RESERVOIR FLUID BEHAVIOR & NEEDS FOR GAS CYCLING
- Phase envelop, reservoir and surface PVT issues.
- Ternary diagram, first contact miscibility, multiple contact miscibility: condensing drive and vaporizing drive, Minimum Miscibility Pressure (MMP).
- Specificities of condensate gas: retrograde region.

RESERVOIR ASPECTS
- Reservoir performance.
- Drive mechanisms: gas reservoirs, gas cap, gravity drainage displacement, tertiary gas displacement, miscible gas displacement.
- Requirements for gas quality for injection, flowrate, cycling rate and configuration of injection.
- Field development: architecture and phasing.

INTRODUCTION TO SURFACE FACILITIES DESIGN
- Gas specifications to conform with gas cycling (dew point, sulfur removal & valorization).
- Field processing of gas effluents for gas cycling.

GAS DEHYDRATION & SWEETENING
- Moisture content of natural gas.
- Gas dehydration processes.
- Gas sweetening, acid gases disposal.

CONDENSATE: RECOVERY, STABILIZATION & MONETIZATION
- Low-temperature separation techniques.
- Condensate stabilization.
- Monetization routes.

GAS COMPRESSION
- Multistage compression: design criteria.
- Gas compression versus field aging: effect on operating parameters, needs for booster station.

COMPRESSORS & DRIVERS
- Compressors technology: choice criteria, effect of gas density evolution.
- Compressor drivers.

INJECTION NETWORK
- Network architecture.
- Network operations, backpressure management.
- Well performance issues.

CASE STUDY: SYNTHESIS - WRAP UP
- 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.

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

This course is also available in French: NATG/GASCYCLFR. 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

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSE GUIDELINES FOR OIL &amp; GAS DEVELOPMENT PROJECTS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>WELDING &amp; QUALITY CONTROL INSPECTION OF PIPING</td>
<td>0.25 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>PIPELINE DESIGN, STANDARD FOR CONSTRUCTION &amp; INSPECTION</td>
<td>0.25 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>STANDARD PRACTICE FOR EQUIPMENT DESIGN, MAINTENANCE &amp; INSPECTION</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Scope of the inspections for certain stages in construction, in particular on hand over to a third party. Minimum requirements 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.</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL REQUIREMENTS FOR PROJECTS</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Establish the environmental requirements for projects design and E&amp;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.</td>
<td></td>
</tr>
<tr>
<td>LIQUID STORAGE TANKS</td>
<td>0.25 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>INSPECTION PLAN FOR EQUIPMENT &amp; STRUCTURES</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Corrosion control on production facilities: field operation. Minimum inspection requirements necessary to assure the integrity of plant and structures.</td>
<td></td>
</tr>
<tr>
<td>GAS FACILITIES DESIGN</td>
<td>2 d</td>
</tr>
<tr>
<td>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. Defining maintainability and inspeckability criteria necessary to ensure the installations' integrity throughout their life. Fundamentals for the maintenance strategy, by type of equipment. Production availability studies of Oil &amp; Gas facilities.</td>
<td></td>
</tr>
<tr>
<td>INTRODUCTION TO ISO 29001</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Main requirements for quality management.</td>
<td></td>
</tr>
<tr>
<td>WATER TREATMENT SYSTEMS</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

Reference: PENG/STANDGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/STANDFR. Please contact us for more information.
Field Operations

- **Production Operations**
  - Oil Terminals, FSO & FPSO ................................................................. p. 225
  - Oil & Gas Field Processing ................................................................. p. 226
  - Field Processing & Surface Production Facilities ............................... p. 227
  - Oil & Gas Field Processing Troubleshooting .................................... p. 228
  - Preparatory Course for Production Operator .................................... p. 229
  - Field Operator Certification .............................................................. p. 230
  - Panel Operator Certification ............................................................... p. 231
  - Production Operator Certification ..................................................... p. 232
  - Production Superintendent Certification ......................................... p. 233
  - Field Operations Engineer Certification ........................................... 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…
Diverse 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  Only available as an In-House course.
This course is also available in French: PROP/TERMFR. 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

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,
- detail field treatment of Oil & Gas streams and processes technology,
- 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.

Course Content

WELL EFFLUENTS BEHAVIOR
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
Reservoirs: types, exploration techniques.
 Drive mechanisms.
 Enhanced Oil Recovery (EOR): aim and principle of the main techniques.

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.
 Multiphase flow. Flow patterns.
 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
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 process 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.

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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>23 November</td>
<td>27 November</td>
<td>€3,680</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 specifics 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 on adult teaching methods, and whose competencies are kept up-to-date.

Course Content

WELL EFFLUENTS BEHAVIOR
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

FUNDAMENTALS OF DRILLING, COMPLETION & WELL PERFORMANCE
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
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

PRODUCTION & INJECTION WATER TREATMENT

GAS PROCESSING & CONDITIONING
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
Fundamentals of Liquefied Natural Gas (LNG) chain.

CASE OF OFFSHORE DEVELOPMENTS

ROTATING MACHINERY

THERMAL EQUIPMENT
Heat exchangers, air coolers, furnaces: types, operation, technology.

FUNDAMENTALS OF CORROSION
Different types of corrosion, prevention and monitoring.

ELECTRICAL SYSTEMS - INSTRUMENTATION & PROCESS CONTROL - SAFETY SYSTEMS

METERING & ALLOCATION

Reference: PROP/FPS/P. 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>23 November</td>
<td>4 December</td>
<td>€6,970</td>
</tr>
</tbody>
</table>

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

www.ifptraining.com
Oil & Gas Field Processing Troubleshooting

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.

Reference: PROP/TROUBLEGB
Only available as an In-House course.

Contact: exp.ueil@ifptraining.com

This course is also available in French: PROP/TROUBLEFR. Please contact us for more information.
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 25 days

<table>
<thead>
<tr>
<th>Topic</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>
</tr>
<tr>
<td>INORGANIC CHEMISTRY - FUNDAMENTALS OF AQUEOUS SOLUTION CHEMISTRY</td>
<td>1.5 d</td>
</tr>
<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>SYMBOLIZATION, SCHEMATICS &amp; INDUSTRIAL DRAWINGS</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.
## Field Operator Certification

### Vocational Certificate

#### Production Operations

**Level:** FOUNDATION

**Purpose**  
This course provides, through a comprehensive practical training, the required technical knowledge and skills to hold the position of field operator and to contribute to safe and efficient plant operations in upstream Oil & Gas facilities.

**Audience**  
Newly-hired personnel called on to hold the position of production operators in Oil & Gas production facilities or to train current production field operators in need of knowledge enhancement and skills development.

**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.

**Prerequisites**  
Pre-recruitment in a petroleum company at an operator position.

**Why an IFP Training Certification?**  
- An international recognition of your competencies  
- A Vocational Certificate delivered.  
- An expertise confirmed in Field Operator Certification.  
- Ready-to-use skills.

**More info**  
Duration mentioned here does not include OFF periods; training typically extends over one year. Training duration: 37 weeks spread over one year.

**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/BOAGB  
[Only available as an In-House course. Contact: exp.rueil@ifptraining.com]

### Course Content

<table>
<thead>
<tr>
<th>Training Course</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><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 under the responsibility of the company and with mentors nominated within experienced operators of the company. OJO activities allow participants to acquire hands-on knowledge of actual plant equipment and operating conditions and know-how of equipment operation: Identification and study of equipment: routine surveillance and associated operating procedures. Operation follow-up, production team organization, familiarization with field operators job duties.</td>
<td></td>
</tr>
<tr>
<td><strong>TRAINING COURSE: INSTRUMENTATION, PROCESS CONTROL &amp; THERMAL EQUIPMENT</strong></td>
<td>10 d</td>
</tr>
<tr>
<td><strong>ON THE JOB ORIENTATION (OJO)</strong></td>
<td>10 d</td>
</tr>
<tr>
<td>Centrifugal and volumetric pumps. Centrifugal and reciprocating compressors. Drives: electric motors, gas turbines, diesel engine.</td>
<td></td>
</tr>
<tr>
<td><strong>TRAINING COURSE: DOWNHOLE PRODUCTION, WELL EFFLUENTS PROCESSING, TERMINALS</strong></td>
<td>25 d</td>
</tr>
<tr>
<td>Introduction to reservoir and notions of drilling. Well completion equipment, notions of well productivity, artificial lift. Oil processing. Gas processing. Produced water and injection water processing. Oil storage - Oil &amp; Gas metering - Oil &amp; Gas transfer operations. Process safety systems.</td>
<td></td>
</tr>
<tr>
<td><strong>ON THE JOB ORIENTATION (OJO)</strong></td>
<td>10 d</td>
</tr>
<tr>
<td><strong>TRAINING COURSE: UTILITIES &amp; HSE PRODUCTION OPERATION</strong></td>
<td>10 d</td>
</tr>
<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 covered throughout the theoretical modules. Final written exams concluding the theoretical part of the program.</td>
<td></td>
</tr>
<tr>
<td><strong>ON-SITE TRAINING (OJT)</strong></td>
<td>50 d</td>
</tr>
<tr>
<td>On-site training, aiming at providing the specific know-how required for assuming the operator position: process, circuits, plant equipment, instrumentation and process control, operating conditions, risks specific to facilities and safe operating procedures. Practice of operator job duties under the supervision of a mentor and the production team.</td>
<td></td>
</tr>
<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 OJT assignment (hazards, details of the installations, operating conditions, equipment characteristice, site specificities…) as well as the capability to assume operator duties (routine monitoring, execution of routine and non-routine operations, Knowledge of HSE rules and behavior in the event of abnormal conditions and accident…). Preparation of a final OJT report, as a support for the final oral examinations.</td>
<td></td>
</tr>
</tbody>
</table>
Vocational Certificate
Panel Operator Certification

Level: FOUNDATION

Purpose
This course provides the required skills to hold the position of panel operator with the appropriate attitude towards plant operation safety issues. Allow proactive and efficient adaptation to the position of control room operator, based on professional experience of participants.

Audience
Experienced production field operators called on to hold a panel operator position in Oil & Gas production facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
► adopt the fundamental methodology and philosophy to operate Oil & Gas production facilities from the control room,
► be convinced of the absolute necessity of a proactive behavior and to implement an anticipatory operation,
► analyze and react methodically to anomalies, incidents and emergency situations in a safe manner,
► implement emergency procedures.

Ways & Means
► Very practical training course with numerous exercises and case studies on dynamic simulator derived from real life situations.
► The training is entirely delivered on dynamic simulator replicating a DCS environment.

Learning Assessment
Evaluation using simulator at the end of each module.

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 Certification.
► 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: PROCESS CONTROL, DCS & SIS
Control room organization and panel operator role.
Panel operator reporting and handover duties. Plant documentation in control room.
Radio-communication.
Process control:
Control loop, Field instrumentation,
Controllers operating principles & parameters, Control loops structures,
Stand-alone simulator: simple loop controller tuning and impact of P&I&D actions; study of various control loop structures; typical transmitters faults.

Distributed Control System (DCS):
DCS architecture and system components. Human-Machine Interface (HMI).
Examples of simulator exercises performed: DCS views and functionalities browsing; reading safety logs; 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.
Examples of simulator exercises performed: well; production lines section parameters analysis; FPSO case.

Module 3: ROTATING MACHINERY OPERATION
Centrifugal pumps:
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.

Module 4: SURFACE PROCESSING OPERATION
Crude oil processing: stabilization, dehydration and desalting.
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 slugs.
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).

Reference: PROP/PANEL/OPGPE
Only available as an In-House course.
Contact: exp.rue@ifptraining.com
This course is also available in French: PROP/PANEL/OPPR. Please contact us for more information.
Production Operations

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 effective 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 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-long 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 Certification.
- 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 45 days

<table>
<thead>
<tr>
<th>FUNDAMENTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals of chemistry: atoms, molecules, atomic weight, molecular weight.</td>
</tr>
<tr>
<td>Hydrocarbons types and main characteristics.</td>
</tr>
<tr>
<td>Applied physics: force, work and energy, temperature, thermal energy and heat transfer, pressure, hydrostatics, hydrodynamics and friction losses.</td>
</tr>
<tr>
<td>Well effluent: composition, types and characterization parameters.</td>
</tr>
<tr>
<td>Liquid-vapor equilibrium of pure components and mixtures.</td>
</tr>
<tr>
<td>Well effluents behavior. Need for effluents field processing. Specifications.</td>
</tr>
<tr>
<td>5 d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DOWNHOLE PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamentals of reservoir engineering.</td>
</tr>
<tr>
<td>Information on drilling techniques, completion techniques and equipment. Wellhead equipment.</td>
</tr>
<tr>
<td>Fundamentals of well performance.</td>
</tr>
<tr>
<td>Artificial lift by Gas Lift (GL), Electrical Submersible Pumps (ESP), Sucker Rod Pumps (SRP), Progressing Cavity Pumps (PCP).</td>
</tr>
<tr>
<td>Operating principle, selection criteria, operations, troubleshooting.</td>
</tr>
<tr>
<td>5 d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EFFLUENT PROCESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil treatment:</td>
</tr>
<tr>
<td>- Stabilization (degassing): principle, process parameters, foaming problems.</td>
</tr>
<tr>
<td>- Dehydration (water removal): principle, process parameters, emulsion problems.</td>
</tr>
<tr>
<td>- Sweetening (H₂S removal): different techniques, process parameters.</td>
</tr>
<tr>
<td>Production and injection water treatment.</td>
</tr>
<tr>
<td>- Gas dehydration and hydrate formation inhibition.</td>
</tr>
<tr>
<td>- Gas sweetening.</td>
</tr>
<tr>
<td>- NGL extraction/recovery.</td>
</tr>
<tr>
<td>- Fundamentals of LNG.</td>
</tr>
<tr>
<td>Oil &amp; Gas metering.</td>
</tr>
<tr>
<td>Terminals, FSO &amp; FPSO, offshore development.</td>
</tr>
<tr>
<td>- Fundamentals of process troubleshooting.</td>
</tr>
<tr>
<td>10 d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STATIC EQUIPMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping and valves. Metallurgy and corrosion.</td>
</tr>
<tr>
<td>Storage equipment.</td>
</tr>
<tr>
<td>Thermal equipment.</td>
</tr>
<tr>
<td>Instrumentation, process control. Distributed Control System (DCS). Electricity.</td>
</tr>
<tr>
<td>Safety System: HIPS, ESD, EDP, F&amp;G, USS.</td>
</tr>
<tr>
<td>5 d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROTATING MACHINERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumps: centrifugal and positive displacement.</td>
</tr>
<tr>
<td>Compressors: centrifugal and reciprocating.</td>
</tr>
<tr>
<td>Gas turbines.</td>
</tr>
<tr>
<td>5 d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTROL ROOM OPERATION &amp; SURFACE PRODUCTION TROUBLESHOOTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Troubleshooting methodology:</td>
</tr>
<tr>
<td>- Troubleshooting flowchart.</td>
</tr>
<tr>
<td>- Recognize a trouble when occurring.</td>
</tr>
<tr>
<td>- Methodological approach to identify causes and remedial options. Action plan.</td>
</tr>
<tr>
<td>- Implement operational/design modification.</td>
</tr>
<tr>
<td>- Troubleshooting toolbox.</td>
</tr>
<tr>
<td>- Case study: Feedbacks from industry.</td>
</tr>
<tr>
<td>- Troubleshooting in control room operations (on dynamic simulator):</td>
</tr>
<tr>
<td>- Use of DCS tools (trends, historical, alarm summary…) to anticipate deviations, identify and react to common production operations problems.</td>
</tr>
<tr>
<td>- Surface production units operation and troubleshooting: wells and production lines. Rotating machines. Oil &amp; Gas treatment.</td>
</tr>
<tr>
<td>- Production facilities start-up and shutdown.</td>
</tr>
<tr>
<td>- Troubleshooting mini-project on real case studies.</td>
</tr>
<tr>
<td>10 d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main HSE risks.</td>
</tr>
<tr>
<td>Hazards for personnel.</td>
</tr>
<tr>
<td>HSE in production operations.</td>
</tr>
<tr>
<td>HSE in construction and maintenance works.</td>
</tr>
<tr>
<td>Risks inherent to SIMultaneous OPerationS (SIMOPS).</td>
</tr>
<tr>
<td>HSE management. Responsibilities.</td>
</tr>
<tr>
<td>Risk analysis. Safety Engineering concepts.</td>
</tr>
<tr>
<td>5 d</td>
</tr>
</tbody>
</table>

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.
Course Content

58 days

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: quality requirements and associated treatments; operating conditions. Gas processing: required specifications; dehydration; hydrates, consequences and treatments; Natural Gas Liquids recovery.

OFFSHORE DEVELOPMENTS, FLOW ASSURANCE
2 d

ADVANCED TREATMENTS
5 d
Oil & Gas sweetening. Liquefied Natural Gas, principles and liquefaction 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.

PRODUCTION FACILITIES TROUBLESHOOTING, DYNAMIC SIMULATOR
5 d
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.

BEHAVIORAL MANAGEMENT
5 d
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
5 d
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, councils, cabinets, transformers, batteries, isolation, protections).

ROTATING MACHINERY
5 d
Pumps: pumping prerequisites (pressure, flowrate, head); centrifugal pumps (types, technology, auxiliaries, performances); volumetric pumps (rotating, reciprocating). 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, performance; technologies (compressor, combustion chamber, turbine, internal cooling); auxiliaries. HSE concerns.

TERMIAL, FSO & FPSO
5 d
Overview of oil terminals. FSO & FPSO technologies. Metering of oil quantities.

CORROSION, INSPECTION & INTEGRITY
2 d
Corrosion mechanisms. Types of corrosions in the Oil & Gas industry. Corrosion prevention and monitoring, fundamentals of inspection.

HSE RISKS & MANAGEMENT
15 d

REVIEWS - ORAL ASSESSMENT
2 d

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 position 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 Certification.
- 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.

Reference: P200/P0003
This course 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau &amp; Rusel</td>
<td>9 September</td>
<td>2 December</td>
<td>€42,820</td>
</tr>
</tbody>
</table>

www.ifptraining.com

233
Field Operations Engineer Certification

**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 specialist lecturers,
- Numerous 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 Certification,
- Ready-to-use skills.

**Course Content**

**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.

**PIPELINE & INSTRUMENTED SYSTEMS**
5 d

**ROTATING 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):

**Course Content**

- Case study and production balances reconstruction: back allocation, satellite fields…
- 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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>31 August</td>
<td>20 November</td>
<td>£35,480</td>
</tr>
</tbody>
</table>

Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/INGPROD. Please contact us for more information.
Well Operation & Testing

Course Content

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, WIRELINE, 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.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/WELLOPFR. Please contact us for more information.
# Operation of Gas Lift Wells

## Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HYDROSTATICS &amp; WELL DYNAMICS</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>GAS LIFT OPERATING PRINCIPLE &amp; ASSOCIATED EQUIPMENT</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>GAS LIFT WELL START-UP METHOD &amp; SEQUENCE</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>PROS &amp; CONS OF GAS LIFT</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td><strong>TEAMWORK EXERCISES - TROUBLESHOOTING OPERATIONS</strong></td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

## 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.
# Chemicals used in Production Activities

## Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION TO CHEMICAL TREATMENT IN PRODUCTION FIELD</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Review of different types of chemicals used in Oil &amp; Gas production.</td>
<td></td>
</tr>
<tr>
<td>Brief description of the associated logistics and chemical-specific hazards.</td>
<td></td>
</tr>
<tr>
<td>Methods for implementing chemical treatment.</td>
<td></td>
</tr>
<tr>
<td>CHEMICALS FOR OIL TREATMENT</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>CHEMICALS FOR GAS TREATMENT</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>CHEMICALS FOR INJECTION &amp; PRODUCED WATER PROCESSING</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>SPECIAL OPERATIONS</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>

## Learning Objectives

Upon completion of the course, 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.

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.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
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.

Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAPOR-LIQUID EQUILIBRIUM, ELEMENTS OF DISTILLATION &amp; ABSORPTION</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Phase envelopes.</td>
<td></td>
</tr>
<tr>
<td>Well effluents behavior from pay zone to surface processing facilities.</td>
<td></td>
</tr>
<tr>
<td>Techniques applied to mixture separation: flash process, distillation process.</td>
<td></td>
</tr>
<tr>
<td>Absorption and stripping phenomena.</td>
<td></td>
</tr>
<tr>
<td>SPECIFICATIONS &amp; WATER CONTENT OF GAS - HYDRATES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Constituents raising problems for storage, transport or end use of natural gas.</td>
<td></td>
</tr>
<tr>
<td>Different specifications and quality requirements for natural gas.</td>
<td></td>
</tr>
<tr>
<td>Necessary treatments to conform these specifications.</td>
<td></td>
</tr>
<tr>
<td>System behavior. Moisture content of a saturated gas.</td>
<td></td>
</tr>
<tr>
<td>Applications: Moisture content of different gases of various compositions.</td>
<td></td>
</tr>
<tr>
<td>Hydrate formation inhibition by injection of inhibitors: MeOH, MEG, DEG, LDHI…</td>
<td></td>
</tr>
<tr>
<td>GAS DEHYDRATION: TEG ABSORPTION, MOLECULAR SIEVES</td>
<td>0.75 d</td>
</tr>
<tr>
<td>Gas dehydration process: conventional TEG process.</td>
<td></td>
</tr>
<tr>
<td>Case study of gas processing operations: TEG process troubleshooting.</td>
<td></td>
</tr>
<tr>
<td>Gas dehydration by physical adsorption (molecular sieves): technologies, performances and operating principles.</td>
<td></td>
</tr>
<tr>
<td>GAS TREATMENT: SWEETENING, CONDENSATE EXTRACTION &amp; FRACTIONATION</td>
<td>0.75 d</td>
</tr>
<tr>
<td>Overview of the techniques dedicated to gas sweetening:</td>
<td></td>
</tr>
<tr>
<td>Chemical solvent processes - Amine units (MEA, DEA, DGA, MDEA…).</td>
<td></td>
</tr>
<tr>
<td>Physical solvent processes.</td>
<td></td>
</tr>
<tr>
<td>Hybrid (physico-chemical) solvent processes.</td>
<td></td>
</tr>
<tr>
<td>Conversion of H₂S: sulfur production (CLAUS process) and tail gas processing.</td>
<td></td>
</tr>
<tr>
<td>Natural Gas Liquids (NGL) extraction (removal of heavy components).</td>
<td></td>
</tr>
<tr>
<td>Low Temperature Separation processes (LTS): External refrigeration loop.</td>
<td></td>
</tr>
<tr>
<td>Joule-Thomson expansion. Turbo-Expander.</td>
<td></td>
</tr>
<tr>
<td>NGL Fractionation Schemes (C₃/LPG/C₅⁻: recovery).</td>
<td></td>
</tr>
<tr>
<td>TECHNOLOGY &amp; OPERATION OF CENTRIFUGAL &amp; RECIPROCATING COMPRESSORS</td>
<td>1 d</td>
</tr>
<tr>
<td>Operating principle, flowrate tuning.</td>
<td></td>
</tr>
<tr>
<td>Technology: constitutive elements and their function.</td>
<td></td>
</tr>
<tr>
<td>Circuits auxiliaries: lubrication, sealing system, cooling, safety systems.</td>
<td></td>
</tr>
<tr>
<td>Compressors operation: routine surveillance, transient conditions.</td>
<td></td>
</tr>
<tr>
<td>COMPRESSORS OPERATION (case studies)</td>
<td>0.75 d</td>
</tr>
<tr>
<td>Start-up, shutdown and on-line monitoring.</td>
<td></td>
</tr>
<tr>
<td>FEEDBACK &amp; CASE STUDIES - TROUBLESHOOTING SPECIFIC TO CLIENT ASSETS</td>
<td>0.75 d</td>
</tr>
<tr>
<td>Tailored workshops as per client requirements.</td>
<td></td>
</tr>
</tbody>
</table>

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

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 know-how 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 architecture 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**

**GETTING STARTED - DCS FUNCTIONALITIES FOR PROPER ANALYSIS**
1 d
Familiarization with HMI functions and operation.
DCS tools review.

**PROCESS CONTROL & SAFETY INSTRUMENTED SYSTEMS**
1 d
Impact of P&ID parameters and simple closed loop tuning.
Study of control loop structures: cascade, split-range on simulator.
Programmable logic controllers: introduction to automated sequences.
Monitoring of start-up sequence (compressor) through MMI.

**WELLS & PRODUCTION LINES OPERATION**
1 d
Well start-up (ramp-up) and shutdown.
Analysis of automatic well control.
Well monitoring and detection of abnormal conditions.

**ROTATING MACHINERY OPERATION**
1.5 d
Centrifugal pumps.
Centrifugal compressors:
Technology review, study of process and auxiliary lines, protection systems.
Start-up and shutdown sequences.
Analysis of operating conditions and operating parameters.

**PROCESS UPSET MANAGEMENT**
2.5 d
Alarms: priorities management and decision making.
Becoming aware of the need for anticipation VS on-alarm action.
Managing and predicting process disturbances by using trend views. Use of trends to anticipate deviations.
Global plant performance checks: identification and implementation of a routine checks roadmap.
Shift report and impact of a faulty report through role play situations.
Process upsets: learning to react and act in a structured manner.
Identification, analysis and containment of process upsets according to the learnt methodology.
Example of simulator exercises performed:
- Loss of centrifugal compressor.
- Loss of cooling media.
- Production rate decrease.
- Unexpected slugging.
- ESD activation due to process safety trip.

**SAFETY IN OPERATION**
1 d
Learning to operate the plant in critical situation, to make adequate decision, to follow-up on actions performed.
Example of simulator exercises performed:
- Gas leakage to the flare.
- Inhibition and downgraded situation mitigation (faulty pressure transmitter, SDV blocked open…).
- Manual ESD activation following leakage detection.

**PRODUCTION START-UP**
1 d
Analysis of production facilities start-up philosophy.
Safe plant start-up.
Implementing start-up procedure on simulator:
- Operating parameters analysis and anticipation of process upset.
- Generation of several malfunctions (by the instructor) to be fixed.

**CONTINUOUS ASSESSMENT TEST**
1 d
Weekly tests on simulator.

Reference: PROP/ADVCCRGB
Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: PROP/ADVCCRFRL. 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 analyzes 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

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, iodimetry).
  - 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 Triethylene Glycol (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: PROP/LABOGB
Only available as an In-House course.
Contact: exp.rueil@ifptraining.com
Refresher Course for Production Operator

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.

**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.

Reference: PROP/REFRESHPGB

Only available as an In-House course.

Contact:  exp.rueil@ifptraining.com

This course is also available in French: PROP/REFRESHPFR. Please contact us for more information.
Pumps Operation

Course Content

<table>
<thead>
<tr>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUMPING PREREQUISITES</td>
</tr>
<tr>
<td>Pump performance:</td>
</tr>
<tr>
<td>Hydraulic pumping fundamentals.</td>
</tr>
<tr>
<td>Pressure, flowrate, specific gravity, friction losses, centrifugal force, height/pressure relation, mechanic and hydraulic power, vapor pressure curve, energy conservation.</td>
</tr>
<tr>
<td>Pump choice and typical upstream implementations.</td>
</tr>
</tbody>
</table>

| TECHNOLOGY & PERFORMANCE | 2 d |
| 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 | 1.5 d |
| 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 | 0.75 d |
| Troubleshooting of most frequent problems (cavitation, priming situation, low flowrate…). |

| SAFETY IN OPERATION | 0.25 d |
| Leaks, vibrations, feed, overcharge… |
| Analysis of industrial incidents and accidents. |

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

This course is also available in French: PROP/PUMPOPFR. 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

COMPRESSION PREREQUISITES

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.

0.5 d

TECHNOLOGY & PERFORMANCE

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, IGV position.

2 d

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.

Reciprocating compressors:

1.5 d

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

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

Frequent problems: surge, slugging, lack of lubrication, vibrations…

0.5 d

SAFETY IN OPERATION

Industrials incidents and accidents analysis.

0.5 d

Reference: PROP/COMPOPGB
Only available as an In-House course.
Contact: exp.rueil@ifptraining.com
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 (choke) 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
Field operations mapping.
Nature and characteristics of fluids accounted for.
Field processing of well effluents: gathering network and surface production facilities.

PRODUCTION PLANNING USING CHOKE MODEL
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. “choke”); 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
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
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
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.
- Impact of third party on pipeline availability/ capacity constraints.

PERFORMANCE MONITORING & PRODUCTION REPORTING
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 and allocation rules:
  - Fundamentals of metering systems (technology, accuracy, calibration & locations); fiscal metering.
- Introduction to production accounting rules (based on API MPMS 21.1).
- 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
For a given production facility:
- Predict production 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 Only available as an In-House course. Contact: exp.rueil@ifptraining.com

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.

Reference: PMGT/BALSH
Only available as an In-House course.
This course is also available in French: PMGT/BILMAT. Please contact us for more information.

Reference: PMGT/BALSH
Only available as an In-House course.
This course is also available in French: PMGT/BILMAT. Please contact us for more information.

www.ifptraining.com 245
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**

**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**

**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**

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**

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: refreshener 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: MAI/INSTMAINTGB

Only available as an In-House course.

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

Contact: exp.pau@ifptraining.com

www.ifptraining.com
Course Content

ROLES & REQUIREMENTS OF A TURNAROUND
1 d
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.

PREPARATION OF A TURNAROUND
1 d
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.

SCHEDULING & DELAYS CONTROL
0.75 d
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.

INSPECTION OF PRESSURE EQUIPMENT
0.25 d
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.

OUTSOURCING & SUBCONTRACTING
0.25 d
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.

WORKS EXECUTION, CONTROLS & AUDITS
0.75 d
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.

SAFETY IN WORKS
0.75 d
Implementation of a HSE management system.
HSE management of turnover and construction activities.
Technical and safety worksite audits.
Management of change.

END OF WORKS & TERMINATION OF TURNAROUND
0.25 d
Detail review, final acceptance.
Turnaround report: inspection report, operation report…
Turnaround manager’s report.
Use of performance indicators and sharing of feedback.

Reference: MAI/TURNAROUNDFR
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

<table>
<thead>
<tr>
<th>TECHNICAL REPRESENTATION OF PARTS &amp; SIMPLE MECHANICAL SYSTEMS</th>
<th>2 d</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ELEMENTS OF CONSTRUCTION</th>
<th>1 d</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ELEMENTS OF MAINTENANCE</th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>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).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ELEMENTS OF REPAIR</th>
<th>1 d</th>
</tr>
</thead>
</table>

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.
Pump Maintenance Workshop

Course Content

WEEK 1: APPLIED THEORY

OIL & GAS PUMP TECHNOLOGY 1.5 d
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 32 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 1.5 d
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.
Bearings 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 1 d
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 0.5 d
Description of the different bearings: description, internal clearances, mounting.
Lifespans: influence of the load, lubrication, humidity, clearances.
Lubrication.
Coupling used depending on the load and the machine speed.

MACHINE ALIGNMENT 0.5 d
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 & METROLOGY INSTRUMENTS 5 d
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 site (*);
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/assembling 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/PUMPMANTEB

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: MAI/PUMPMANTEF. Please contact us for more information.
Compressors Maintenance

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…

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.

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
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.

DIAGNOSIS & 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)

Audience
Engineers, supervisors and maintenance technicians, mechanical work preparers, technicians from new works department, inspection, oil and petrochemical industry methods.

Learning Objectives
Upon completion of the course, participants will be able to:
► know the functioning of the machines and their components,
► know the mechanical effects induced by a change in operating conditions,
► master the failure modes of the different components,
► know how to avoid sudden failures and how to carry out diagnosis on the machines.

Ways & Means
► Functional approach and practice of rotating machinery.
► Reminder of the methods and fundamentals of assembling, disassembling, clearance and dimensional control.
► Illustration with case studies and analysis of information folders.

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: MAVROTMMAINT
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

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 group 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.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Maintenance Management Certification.
- 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

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.

RELIABILITY MEASUREMENT & FOLLOW-UP
Descriptive statistics: reliability and reliability indicators, equipment performance monitoring in terms of availability, MTBF, MTTR….

RELIABILITY ANALYSIS & IMPROVEMENT METHODS
FMEA (Failure Modes, Effects and their Criticality Analysis). Areas of application, basic techniques, probability assessment, common methodological errors. Action plan.

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.

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?

SHUTDOWN MANAGEMENT

IMPROVEMENT PLANS
From failure management to equipment management.

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 on a control loop or safety system….). To solve these problems, participants must use their technical knowledge, reasoning skills, multidisciplinarity and operational capability.

Reference: MAI/MAINTMGT. Can be organized as an In-House course.
Contact: exp.pau@ifptraining.com

Location  Start Date  End Date  Tuition Fees excl. VAT
Pau  2 November  6 November  €3,680

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

www.ifptraining.com

253
Rotating Machinery Vibration Analysis

Course Content

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 tools & 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.

Course Content

BASIC DEFINITIONS - OVERALL MEASUREMENTS
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.

0.75 d

RESONANCE
Simple system behavior: amplitude and phase. Actual rotor and bearings systems. Critical speeds.
Using phase to study resonance. Identifying and solving problems.

0.5 d

TOOLS FOR DIAGNOSIS
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.

0.5 d

MACHINERY DEFECTS & VIBRATION SIGNATURE
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.

2 d

PRACTICAL MACHINERY VIBRATION MONITORING
Vibration control policy: machinery improvement program. Different policies according to the type of machinery and its criticality.
Developing an effective program.

0.25 d

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

Reference: MTM/PAVIB-E
Only available as an In-House course.

Contact: rc.contact@ifptraining.com
Graduate Certificate
Upstream Maintenance Engineer Certification

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 (well head, 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 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 area.
- Disassembly, expertise, measurements, re-assembly of pumping equipment in an equipped workshop.
- Practical application of new knowledge: site energizing project, organization of major machines 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 Company representatives and IFP Training Lecturers.

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 certified in Upstream Maintenance Engineer Certification.
- 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

WELL EQUIPMENT & WELL EFFLUENT TREATMENTS
Notions of drilling/completion. Artificial lift: pumping, gas lift. Oil field processing (stabilization, dehydrating, sweetening) and water processing (production and injection water). Gas processing and conditioning (dehydrating, sweetening).

TECHNOLOGY & MAINTENANCE OF COMPRESSIONS
Compression fundamentals (ideal gas, real gas, isentropic compression, polytropic compression).
Dynamic compressors: different types and integration into the processes; technology of auxiliary elements: stator, rotor, bearings, thrust, sealing, oil circuit, sealing devices... Reciprocating compressors: different types and integration into the processes; technology of essential and auxiliary elements: piston, cylinder, valves, sealing, spacers, crankshaft, rod, moving part and cylinder lubrication, cooling circuit, sealing devices, connection to the flare. Pre-compressors (screws, liquid ring, lobes, vanes). Preventive, condition-based maintenance. Troubleshooting and repair techniques. Analysis of manufacturer folders and P&ID.

PRACTICE IN MECHANICAL WORKSHOP

TECHNOLOGY & MAINTENANCE OF DRIVING MACHINES
Gas and steam turbines. Diesel motors. Technology, working principle, main and auxiliary equipment operation and maintenance. Operation and performances changes (impact of the operating conditions). Driven machine/driving machine coupling.

COMMON ELEMENTS OF MACHINES & STRUCTURES

TECHNOLOGY & MAINTENANCE OF ELECTRICAL EQUIPMENT
Sources of electrical power (alternator, generator) and motors (alternating 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

Maintenance
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 Policy

PROJECT: MAINTENANCE ENGINEERING - JURY
During the final project, participants will work as teams and develop a project related to the maintenance, the energizing, the functioning of the support, the management of an inertia overload, a manufacturer brief... This 10-day project is based on existing data. Participants are coached all 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.

Reference: MAU/MAINTEN  —  Only available as an In-House course.
Contact: exp.paul@ifptraining.com

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

www.ifptraining.com 255
Maintenance

Vocational Certificate

Maintenance Supervisor Certification

Course Content

35 days

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, hydromechanics 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.

5 d

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 requalification.

5 d

MAINTENANCE & INSPECTION OF ROTATING MACHINERY

(in mechanical workshop)

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…).

10 d

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.
Controllers 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 PID controller: operating point, gain, interactions…; control loops: simple, cascade and split-range.
Distributed Control Systems (DCS): architecture, security/redundancy; alarms, history, newspapers.

5 d

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 elements, batteries; equipotential networks, earthing.

5 d

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.
Management of contractors.
Audits. Means of improving the HSE performance.

5 d

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

Level: FOUNDATION

Purpose
This course develops managerial and communication skills while providing an in-depth technical knowledge stretching over a wide range of issues and advanced topics in relation to the maintenance and operation of Oil & Gas treatment facilities. This certifying training deals in details with effluent processing, HSE, equipment maintenance and management.

Audience
Professionals with a significant experience in maintenance of Oil & Gas production facilities, called on to hold the position of maintenance superintendent.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe the Oil & Gas production chain, from reservoir to offloading facilities.
- explain technology, working principle, operation and maintenance of main equipment in Oil & Gas facilities.
- anticipate production constraints and their consequences on maintenance.
- describe HSE management rules and responsibilities.
- use adapted work methods and communication skills.
- prepare and manage effectively a global maintenance plan.

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 assessment 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 Certification.
- 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.

Course Content

INTRODUCTION
Welcome and program overview. Entry test. Units. Dimensions.

DOWNHOLE PRODUCTION - WELL PERFORMANCE - PRODUCTION FUNDAMENTALS

OIL, WATER & GAS PROCESSING
Oil processing: required specificiations; 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 (MT-ET 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
HSE risks, flammability, overpressure systems: PSV, flare and flare network, closed and open drains... Safety in operation; use of utilities, degassing/inerting, confined space entry, start-up & shutdown. Safety during construction and maintenance works: lifting & rigging, work at height, electrical safety... Work permit system. SIMultaneous OPerationS (SIMOPS) management... Safety engineering: HAZID, HAZOP, layout optimization and identification of major accidents. Risks matrix... Safety systems: HIPS, ESD, EDP, FGS, USS. Safety logic diagrams. Human factors. Operate: philosophy and methodology; incident analysis and reporting. Root cause analysis.

REVISIONS - ORAL ASSESSMENT

58 days

Reference: MAI/MAINSI. *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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau, Rueil-Malmaison &amp; Martigues</td>
<td>9 September</td>
<td>2 December</td>
<td>€42,920</td>
</tr>
</tbody>
</table>

This course is also available in French: MAI/SIMAIN. 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
- Module 1: Thermodynamics Applied to Well Effluent Processing ...................................... p. 265
- Module 2: Oil & Water Processing ..................................................................................... p. 266
- Module 3: Gas Processing & Conditioning ....................................................................... p. 267
- Oil & Gas Process Simulation ............................................................................................ p. 268
- Schematization of Oil & Gas Processes ............................................................................. p. 269
- Gas Sweetening & Sulfur Recovery ..................................................................................... p. 270
- Fundamentals of Engineering Activities ........................................................................... p. 271
- Technical Standards for Surface Facilities Design .............................................................. p. 272

## Static Equipment
- Process Equipment Engineering .......................................................................................... p. 273
- Flare Network Design Engineering .................................................................................. p. 274

## Rotating Machinery
- Rotating Machinery Technology ....................................................................................... p. 275
- Mechanical Design Engineering ......................................................................................... p. 276
- Gas Turbines ....................................................................................................................... p. 277

## Electricity & Instrumentation
- E&I Technology for Oil & Gas Facilities ............................................................................ p. 278
- Instrumentation, Process Control & Safety Instrumented Systems ....................................... p. 279
- Instrumentation Maintenance ............................................................................................. p. 280
- Fundamentals of Electrical Power Generation & Distribution Equipment ......................... p. 281
- Electrical Equipment & Power Distribution Network (Advanced) ...................................... p. 282

## Maintenance & Inspection
- Asset Integrity Management ............................................................................................... p. 283
- Turnaround Management ................................................................................................ p. 284
- Fundamentals of Mechanical Maintenance ....................................................................... p. 285
- Pump Maintenance Workshop ......................................................................................... p. 286
- Compressors Maintenance ............................................................................................... p. 287
- Maintenance & Inspection of Rotating Machinery ............................................................. p. 288
- Maintenance Management Certification ............................................................................ p. 289
- Machinery Vibration ......................................................................................................... p. 290
- Upstream Maintenance Engineer Certification ..................................................................... p. 291
- Corrosion Prevention in Oil & Gas Production .................................................................... p. 292
- Maintenance & Inspection of Static Equipment ................................................................. p. 293
- Subsea Integrity Management (I) - Inspection, Monitoring & Testing ............................... p. 294
- Subsea Integrity Management (II) - Non Conformity Management ..................................... p. 295
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 contribute to safely 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 Certification.
- 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>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>THERMODYNAMICS APPLIED TO WELL EFFULCENT PROCESSING</td>
<td>5 d</td>
</tr>
<tr>
<td>OIL &amp; WATER TREATMENT</td>
<td>5 d</td>
</tr>
<tr>
<td>GAS PROCESSING &amp; CONDITIONING</td>
<td>5 d</td>
</tr>
<tr>
<td>DYNAMIC SIMULATION OF OIL &amp; GAS PROCESSING FACILITIES</td>
<td>5 d</td>
</tr>
<tr>
<td>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, dehydتروnation and desalting); gas dehydration (impact of TEG operating conditions); multistage gas compression and export: effect of operating parameters.</td>
<td></td>
</tr>
<tr>
<td>PIPING SYSTEMS &amp; PROCESS EQUIPMENT: SIZING &amp; OPERATION</td>
<td>5 d</td>
</tr>
<tr>
<td>GATHERING &amp; DISTRIBUTION SYSTEMS DESIGN - FLOW ASSURANCE</td>
<td>5 d</td>
</tr>
<tr>
<td>INSTRUMENTATION, PROCESS CONTROL, AUTOMATION &amp; ELECTRICAL SYSTEMS</td>
<td>5 d</td>
</tr>
<tr>
<td>ROTATING EQUIPMENT - TECHNOLOGY, SELECTION &amp; OPERATION</td>
<td>5 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>OIL &amp; GAS PROCESSING FACILITIES TROUBLESHOOTING</td>
<td>5 d</td>
</tr>
<tr>
<td>SAFETY ENGINEERING CASE STUDIES</td>
<td>5 d</td>
</tr>
<tr>
<td>Main safety engineering studies: HAZID and HAZOP workflow and application; plant layout case study; QRA: consequence analysis methodology.</td>
<td></td>
</tr>
<tr>
<td>PROCESS DEVELOPMENT PROJECT - JURY</td>
<td>10 d</td>
</tr>
<tr>
<td>During 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.</td>
<td></td>
</tr>
</tbody>
</table>

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 259
## Course Content

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 1: OVERVIEW OF OIL &amp; GAS FIELD PROCESSING</strong></td>
<td>2 d</td>
</tr>
<tr>
<td><strong>Module 2: EQUIPMENT DESIGN &amp; OPERATION</strong></td>
<td>6 d</td>
</tr>
<tr>
<td>Separator design methodology and case studies.</td>
<td></td>
</tr>
<tr>
<td>Desalters design and operation.</td>
<td></td>
</tr>
<tr>
<td>Rotating equipment technology pumps and compressors design and datasheet review methodology and case studies.</td>
<td></td>
</tr>
<tr>
<td>Relief system and flare network design methodology.</td>
<td></td>
</tr>
<tr>
<td><strong>Module 3: CORROSION MANAGEMENT IN OPERATION</strong></td>
<td>1 d</td>
</tr>
<tr>
<td><strong>Module 4: PROCESS CONTROL &amp; SAFETY</strong></td>
<td>4 d</td>
</tr>
<tr>
<td>Impact of HAZID and HAZOP studies on design.</td>
<td></td>
</tr>
<tr>
<td><strong>Module 5: PROCESS DESIGN DOCUMENTS VERIFICATION METHODOLOGY</strong></td>
<td>2 d</td>
</tr>
<tr>
<td>Process documents to be prepared during engineering phase.</td>
<td></td>
</tr>
<tr>
<td>Process datasheets review methodology and checklist.</td>
<td></td>
</tr>
<tr>
<td>Engineering document verification workshop.</td>
<td></td>
</tr>
<tr>
<td><strong>Module 6: PROCESS TROUBLESHOOTING METHODOLOGY</strong></td>
<td>2 d</td>
</tr>
<tr>
<td>Troubleshooting methodology and case studies.</td>
<td></td>
</tr>
<tr>
<td>EFR compressor failure, injection water scaling, emulsion case, desalting scheme, flowline erosion.</td>
<td></td>
</tr>
<tr>
<td><strong>Module 7: TROUBLESHOOTING EXERCISES</strong></td>
<td>3 d</td>
</tr>
<tr>
<td>Troubleshooting exercises in total learning plant and associated control room.</td>
<td></td>
</tr>
<tr>
<td><strong>Module 8: HAZID, HAZOP &amp; QRA REVIEW METHODOLOGY</strong></td>
<td>4 d</td>
</tr>
<tr>
<td>HAZID exercise.</td>
<td></td>
</tr>
<tr>
<td>HAZOP exercise.</td>
<td></td>
</tr>
<tr>
<td>QRA review exercise.</td>
<td></td>
</tr>
<tr>
<td>Bow-tie construction method.</td>
<td></td>
</tr>
<tr>
<td><strong>Module 9: PLANT LAYOUT &amp; GAD REVIEW</strong></td>
<td>2 d</td>
</tr>
<tr>
<td>Plant layout review tools application. Management of iterative design.</td>
<td></td>
</tr>
<tr>
<td>Technical workshop: plant layout review.</td>
<td></td>
</tr>
<tr>
<td><strong>Module 10: PROJECT MANAGEMENT</strong></td>
<td>3 d</td>
</tr>
<tr>
<td>Integration and scope management.</td>
<td></td>
</tr>
<tr>
<td>Project execution: contracting.</td>
<td></td>
</tr>
<tr>
<td>Project execution: organization.</td>
<td></td>
</tr>
<tr>
<td>Project control: cost and schedule.</td>
<td></td>
</tr>
<tr>
<td><strong>Module 11: TEAM MANAGEMENT &amp; TEAM LEADING</strong></td>
<td>6 d</td>
</tr>
<tr>
<td>Develop deep listening and expression skills.</td>
<td></td>
</tr>
<tr>
<td>Identify your own behavior style.</td>
<td></td>
</tr>
<tr>
<td>Providing feedback and getting things done.</td>
<td></td>
</tr>
<tr>
<td>Assertiveness assessment.</td>
<td></td>
</tr>
<tr>
<td>Regulate the team and prevent conflict.</td>
<td></td>
</tr>
<tr>
<td>Mastering a specific regulation tool: the DESC.</td>
<td></td>
</tr>
<tr>
<td>Situational management.</td>
<td></td>
</tr>
<tr>
<td>Identifying preferred managing style through co-development.</td>
<td></td>
</tr>
<tr>
<td>Mentorship, work organization and delegation.</td>
<td></td>
</tr>
<tr>
<td>Mentorship monitor.</td>
<td></td>
</tr>
<tr>
<td>Intermediate management.</td>
<td></td>
</tr>
</tbody>
</table>

**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.
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.

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 Certification.
- 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 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
Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/INGGAZ. Please contact us for more information.
LNG Processing Engineer Certification

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.

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 and 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.

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 confirmed in LNG Processing Engineer Certification.
- 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

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


LNG PROCESS SIMULATION

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, dehydration, compression); NGL fractionation and stabilization; simulation of a cascade liquefaction process, of a C3MR liquefaction process, 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


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 volumetric 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 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


CASE STUDY BASED ON LNG PLANT P&IDS & JURY

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.

Reference: LNG/LNGENG. Only available as an In-House course.

Contact: exp.rueil@iptraining.com

This course is also available in French: LNG/RJGNYL. Please contact us for more information.
LNG Process Simulation

Course Content

<table>
<thead>
<tr>
<th>Content Description</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEED FOR GAS FIELD PROCESSING - QUALITY REQUIREMENTS</td>
<td>0.25 d</td>
</tr>
<tr>
<td>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.</td>
<td>0.25 d</td>
</tr>
<tr>
<td>STEADY-STATE PRO/II™ OR HYSYS™ SIMULATION CASE STUDIES</td>
<td>0.75 d</td>
</tr>
<tr>
<td>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.</td>
<td>0.75 d</td>
</tr>
<tr>
<td>CONDENSATE RECOVERY, FRACTIONATION &amp; REFRIGERANT MAKE-UP</td>
<td>0.5 d</td>
</tr>
<tr>
<td>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.</td>
<td>0.5 d</td>
</tr>
<tr>
<td>SIMULATION OF CONDENSATE RECOVERY &amp; FRACTIONATION USING PRO/II™ OR HYSYS™</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Selection of thermodynamics packages. Simulation of a condensate fractionation and stabilization process.</td>
<td>0.5 d</td>
</tr>
<tr>
<td>CASCADE PROCESS OPERATING CONDITIONS &amp; SIMULATION</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Process diagram and operating parameters. Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing.</td>
<td>0.5 d</td>
</tr>
<tr>
<td>COMPARISON OF THE MAIN MIXED REFRIGERANTS LIQUEFACTION PROCESSES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Fields of application of liquefaction processes. Comparison with cascade process and turbo expander based process.</td>
<td>0.5 d</td>
</tr>
<tr>
<td>LIQUEFACTION WITH C3 - MIXED REFRIGERANTS - OPERATING CONDITIONS &amp; SIMULATION</td>
<td>1 d</td>
</tr>
<tr>
<td>Process diagram and operating parameters. Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing. Optimization of MR composition.</td>
<td>1 d</td>
</tr>
<tr>
<td>LIQUEFACTION WITH 2 MIXED REFRIGERANTS - OPERATING CONDITIONS &amp; SIMULATION</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Process diagram and operating parameters. Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing. Optimization of MR composition.</td>
<td>0.5 d</td>
</tr>
<tr>
<td>LIQUEFACTION PROCESSES PERFORMANCES COMPARISON</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Heat and mass balance for each process. Comparison of power requirements for the different processes.</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

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™.
- Simulation of DMR, MFC, N2/dual-expander & SMR processes can be performed in classroom or as e-learning upon request.

Learning Assessment
Assessment by test at the end of the course.

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.

Reference: LNG/LNGSIMGB
This course can be organized as an In-House course.
Contact: exp.rueil@ifptraining.com

www.ifptraining.com
Advanced Certificate

Advanced Oil & Gas Field Processing Certification

**Course Content**

**Module 1: THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING**  
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**  
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**  
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).

**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 all along these 3 weeks (simulation of a crude oil and associated gas treatment 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 Certification.  
- Ready-to-use skills.

**More info**

This course is a combination of three separate modules. Refer to next pages for detailed content.

**Reference:** PENG/ADVGB  
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.
#### Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WELL EFFLUENT</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Constitution and physical states of matter.</td>
<td></td>
</tr>
<tr>
<td>Constituents of well effluents: hydrocarbons, impurities, water, sediments…</td>
<td></td>
</tr>
<tr>
<td>Different types of effluents: black oil, light oil, volatile oil, condensate gas, dry gas…</td>
<td></td>
</tr>
<tr>
<td>Characterization parameters: GOR, CGR, BSW, WOR, water cut, Bo, Bg, B’g…</td>
<td></td>
</tr>
<tr>
<td>Examples of compositions of crude oil and natural gas effluent.</td>
<td></td>
</tr>
<tr>
<td><strong>LIQUID-VAPOR EQUILIBRIUM OF PURE SUBSTANCES</strong></td>
<td>1.25 d</td>
</tr>
<tr>
<td>Vapor pressure curves.</td>
<td></td>
</tr>
<tr>
<td>Overall phase diagram of a pure substance (three dimensions: P, T and V).</td>
<td></td>
</tr>
<tr>
<td>Enthalpy diagrams of pure substances.</td>
<td></td>
</tr>
<tr>
<td>Exercises: vapor pressure and boiling points of pure components; vapor pressure and boiling point; case of a column.</td>
<td></td>
</tr>
<tr>
<td>PRO/II™ simulation: propane cryogenic loop; operating parameters optimization; effect of ambient conditions.</td>
<td></td>
</tr>
<tr>
<td><strong>LIQUID-VAPOR EQUILIBRIUM OF MIXTURES - MIXTURE SEPARATION PROCESSES</strong></td>
<td>2 d</td>
</tr>
<tr>
<td>Phase envelopes.</td>
<td></td>
</tr>
<tr>
<td>PRO/II™ simulation: phase envelope of well effluents, sales gas, stabilized crudes.</td>
<td></td>
</tr>
<tr>
<td>Well effluents behavior from pay zone to surface processing facilities.</td>
<td></td>
</tr>
<tr>
<td>PRO/II™ simulation: evolution of the effluent behavior in a well.</td>
<td></td>
</tr>
<tr>
<td>Techniques applied to mixture separation: flash process, distillation process.</td>
<td></td>
</tr>
<tr>
<td>Absorption and stripping phenomena.</td>
<td></td>
</tr>
<tr>
<td>PRO/II™ simulation: LPG recovery by physical absorption; mixture separation by distillation (LPG splitter).</td>
<td></td>
</tr>
<tr>
<td><strong>IDEAL GAS &amp; REAL FLUID BEHAVIOR</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Ideal gas behavior.</td>
<td></td>
</tr>
<tr>
<td>Behavior of real fluids: compressibility factor, Amagat’s law, law of corresponding state with two and three parameters.</td>
<td></td>
</tr>
<tr>
<td>Equations Of State (EOS): conception, uses, examples, selection.</td>
<td></td>
</tr>
<tr>
<td><strong>HEAT TRANSFER, HEAT BALANCE &amp; THERMAL EQUIPMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Fundamentals of heat transfer.</td>
<td></td>
</tr>
<tr>
<td>Heat balance.</td>
<td></td>
</tr>
<tr>
<td>Technology of heat exchangers and air coolers.</td>
<td></td>
</tr>
<tr>
<td>Examples of thermal equipment applications.</td>
<td></td>
</tr>
</tbody>
</table>

#### Reference

Reference: PENG/ADV1GB

Can be organized as an In-House course.

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
Module 2: Oil & Water Processing
Sizing - Simulation - Operation

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 quantity 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
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>21 September</td>
<td>25 September</td>
<td>€3,980</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

Level: PROFICIENCY

Purpose
This course provides a comprehensive understanding of gas treatment processes, operation and troubleshooting.

Audience
Engineers involved in operating or designing gas field processing and conditioning facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
- assess various problems induced by unwanted elements in natural gas streams,
- master gas treatment and liquefaction processes, operations and related operating conditions,
- perform hand calculations for summary design of main gas processing equipment,
- ascertain main operating problems encountered in gas processing, conditioning and related solutions,
- simulate natural gas treatment processes using the PRO/II™ software.

Ways & Means
- Highly interactive training by 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.

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 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.
- 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) 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.

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 28 September 2 October €3,980

Reference: PENG/ADV3GB
Can be organized as an In-House course.
Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/ADV3FR. Please contact us for more information.

www.ifptraining.com

267
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 processing 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 5 days

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, dehydation 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 excl. VAT
Rueil-Malmaison 30 November 4 December €3,980

This course is also available in French: PENG/SIMULFR. 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/SCHEMFRI. Please contact us for more information.

Contact: exp.rueil@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.
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

FROM PRE-PROJECT STUDIES TO ENGINEERING
0.75 d
Context of a field development project.
Preliminary, conceptual and pre-project studies.
Basic engineering and Front-End Engineering Design (FEED).
Detailed engineering.
Greenfield vs. brownfield projects.
Discipline overview.

CONTRACTUAL SCHEMES
0.25 d
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.

PROCESS DESIGN
0.5 d
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 & Gas process diagrams: block flow, process flow, piping and instrumentation.

STRUCTURE & MECHANICAL
1 d
Pipe racks, loads and pipe supports.
Equipment design.
Static and rotating equipment.
Types of pumps.

SAFETY IN DESIGN
0.5 d
HAZID, HAZAN and HAZOP.
Plant layout, escape routes and fire zones.

SITE PREPARATION & CIVIL WORKS
0.5 d
Concrete slabs and foundations.
Vendor drawings.

MATERIALS & CORROSION
0.5 d
Material classes and selection, corrosion control.
Cathodic protection system design.
Painting insulation specifications.
Piping material, classes, installation and stress analysis.

ELECTRICITY & INSTRUMENTATION
0.5 d
Single-line diagrams.
Database management.

AREAS OF CONCERN DURING ENGINEERING EXECUTION
0.5 d
Typical critical path of an Oil & 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.

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

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: PENG/STANDGB  Only available as an In-House course. Contact: exp.rueil@ifptraining.com

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

Course Content

HSE GUIDELINES FOR OIL & GAS DEVELOPMENT PROJECTS 0.5 d

WELDING & QUALITY CONTROL INSPECTION OF PIPING 0.25 d
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 0.25 d
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 0.5 d
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 0.25 d
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.

LIQUID STORAGE TANKS 0.25 d
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 0.25 d
Corrosion control on production facilities: field operation. Minimum inspection requirements necessary to assure the integrity of plant and structures.

GAS FACILITIES DESIGN 2 d
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. Defining maintainability and inspectsability 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.

INTRODUCTION TO ISO 29001 0.25 d
Main requirements for quality management.

WATER TREATMENT SYSTEMS 0.5 d
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.

---

**Course Content**

**5 days**

**PIPING SYSTEMS**
Main concepts and definitions: operating/design pressure, piping schedules and rating, thickness…
Piping codes and standards.
Pipe materials and manufacturing.
Flanges assembly, fittings, gaskets and other pipework elements (spectacle blinds, strainers…).
Valves for flow control and flow shut-off: technology and selection criteria; check valves.
Pressure relief equipment sizing guidelines and datasheet review: pressure safety valves, thermal expansion valves, rupture disks, restriction orifices.
Line sizing basics; pipe and valves material selection according to service; consequences of an incorrect choice or assembly.
Basics of pipe stress and rupture analysis.
Pressure vessels: various types of pressure vessels, vessels behavior under pressure and under vacuum.

**HEAT EXCHANGERS**
Fundamentals of heat transfer.
Technology of heat exchangers and air coolers: selection criteria.
Fundamentals of design and heat exchanger performance.

**CRUDE OIL PROCESSING EQUIPMENT DESIGN & SIZING**
Separators technology (review of typical internals and impact on sizing) and selection criteria.
Operating parameters and operations problems.
Elements of calculation standards (thickness, welding coefficient…).
Sizing a 2-phase and 3-phase separator (nozzles, diameter, thickness, liquid hold-up times…).

**GAS PROCESSING EQUIPMENT DESIGN & SIZING**
Columns technology (review of typical internals and impact on sizing).
Selection criteria.
Operating parameters: pressure, temperature, flowrate…
Elements of sizing (diameter, number of theoretical and actual trays…).
Case study: summary design of a TEG column.
Column troubleshooting.

Reference: STAT/PROCDESIGNGB * Only available as an In-House course.
Contact: exp.rueil@ifptraining.com

www.ifptraining.com
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.

**Course Content**

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVERVIEW OF TYPICAL RELIEF &amp; FLARE SYSTEMS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>MECHANICAL SPECIFICATION OF PRESSURE VESSELS &amp; HEAT EXCHANGERS</td>
<td>0.75 d</td>
</tr>
<tr>
<td>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 &amp; Gas standards.</td>
<td></td>
</tr>
<tr>
<td>RELIEF GAS SYSTEM OVERVIEW</td>
<td>0.75 d</td>
</tr>
<tr>
<td>FLARE SYSTEM</td>
<td>1.5 d</td>
</tr>
<tr>
<td>CASE STUDY: FLARE SYSTEM SIZING</td>
<td>1.5 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>
Rotating Machinery Technology

Pumps - Compressors & Expanders - Gas Turbines

Level: PROFEICIENCY

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 machineries,
► 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

PUMPS

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

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

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>12 October</td>
<td>16 October</td>
<td>£3,680</td>
</tr>
</tbody>
</table>

This course is also available in French: ROT/MAT2. Please contact us for more information.

www.ifptraining.com
Mechanical Design Engineering

Course Content

PREREQUISITES
0.5 d
Operating physico-chemical parameters.
Machines specifications.
Energy and power, specific power.
Head, polytropic head, polytropic efficiency.

DESIGN METHODOLOGY
1 d
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
0.5 d
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
0.5 d
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
0.75 d
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
0.25 d
Natural reserve.
Hazardous zones.

PARTICULARIZATION
0.5 d
With pumps.
With compressors.

REGULATION & REFERENCE STANDARDS
0.5 d
Normative aspect (safety).
Practical, specific or global aspects (API, ISO, ATEX…).

APPROACH & MODELING
0.5 d
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

5 days

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.
Cycle 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, ratchet.
Washing of compressor and turbine.
Reading the P&ID of the gas turbine main circuits:
Start-up and hydraulic ratchet assembly.
Sealing and cooling air.
Fire safety.
Compressor washing.
Fuel.
Lubrication oil.
Control oil.
Monitoring.

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
Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: ROT/TG. 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 Oil & 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 or experience of the related topics, trained

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.
- Coupling of sources and throughput on structured networks.
- Equipment monitoring and maintenance.

Electrical Networks

Electrical networks:
- Constitution and components 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.
- Positions: principle of operation, types (pneumatic, electro-pneumatic…).
- Special technologies: single or double seat valves, cage valve, “Camflex”, three-way valve…
- Contacts: 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), serve control (variable setpoint).
- Control loops: simple, cascade and split-range.

Distributed Control System

Processing philosophy, workstation, terminology-glossary.
- Architecture:
  - Functional organization, hardware architecture.
  - Safety/redundancy.
  - Connection (sensors, actuators, networks, PLCs, others).

Safety Instrumented Systems (SIS)

Safety loops, safety functions.
- High Integrity Protection Systems (HIPS), Emergency Shutdown (ESD), Emergency Depressurization (EDP). 
- Fire & Gas System.

Reference: E&I/E&I1GB

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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>5 October</td>
<td>9 October</td>
<td>€3,680</td>
</tr>
</tbody>
</table>

This course is also available in French: E&I/E&I1FR. Please contact us for more information.
# 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,
- 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>PROCESS CONTROL OVERVIEW</td>
<td>0.5 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>MEASURING ELEMENT - SENSORS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>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…</td>
<td></td>
</tr>
<tr>
<td>SIGNAL TRANSMISSION - TRANSMITTERS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>ACTUATORS - CONTROL VALVES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>CONTROLLERS - CONTROL STRUCTURES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Controllers: role, operating principle, direct or inverted action, operating modes. Behavior of P&amp;ID type controllers: operating point, gain, interactions. Control loops: simple, cascade, and split-range. Ratio control, elaborated variable control, feed-forward control systems.</td>
<td></td>
</tr>
<tr>
<td>DISTRIBUTED CONTROL SYSTEM (DCS)</td>
<td>0.5 d</td>
</tr>
<tr>
<td>P&amp;ID CONTROLLERS</td>
<td>1 d</td>
</tr>
<tr>
<td>SAFETY INSTRUMENTED SYSTEMS (SIS)</td>
<td>1 d</td>
</tr>
<tr>
<td>Safety loop. Safety function, Safety Integrity Level. High Integrity Protection Systems (HIPS), Emergency ShutDown (ESD), Fire &amp; Gas (F&amp;G), Emergency DePressurization (EDP).</td>
<td></td>
</tr>
</tbody>
</table>

### 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** 5 days

**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:
- 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 flow rate 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
Distributed Control System (DCS):
- 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 procedure (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: MAI/INSTMAINTGB

Only available as an In-House course.

Contact: exp.pau@ifptraining.com

This course is also available in French: MAI/INSTMAINTFR. 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

GENERALITIES, MAIN FORMULAS, STANDARDS & SYMBOLS, DRAWINGS 1 d
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.

PRODUCTION & DISTRIBUTION NETWORKS, HV/LV SWITCHBOARDS 1 d
Production sources:
- Alternator, generator: principles and generic technology.
Distribution networks:
- Distribution network architecture (normal, essential and vital sources, redundancy) and protections (thresholds, selectivity, combinations).
- Switchboards and switchgears: cut off and isolation equipment, measurements.

BATTERIES, CHARGERS, MEASUREMENT & MEASURING DEVICES, ELECTRICAL PROTECTIONS 1 d
Batteries and chargers:
- Basic concept of batteries.
  - Battery charger technology (inverters, rectifiers, reversers).
Measurements and measuring devices:
- Functioning of measuring devices.
  - Precautions for a safe, reliable measurement.
Electrical protections:
- Main protection relays, circuit breakers and switches, principle of homopolar and differential protections.

ELECTRIC MOTORS, CABLES & ACCESSORIES, TRANSFORMERS, LIGHTING SYSTEMS 1 d
Induction electric motors:
- Basic theory of asynchronous, single-phase and three-phase motors.
- Starting and protection of electric motors.
Cables and accessories:
- Structure and construction of cables (diameter, conductivity, color code…), glands, connections.
Transformers:
- Principle and types of transformers (step-down, step-up, isolation).
  - Cooling and protection of transformers.
Lighting systems.

ELECTRICAL SAFETY, HAZARDOUS AREAS 1 d
Electrical safety:
- Hazards in the electrical installations.
- Effects and consequences of the electrical risks.
- Protection against the electrical risks (concept and protection classes).
Hazards areas:
- Definition of a hazardous area: explosion mechanism, explosivity limits.
  - Materials in hazardous areas: specifications and basic standards.

Reference: E&I/ELEC1GB
This course is also available in French: E&I/ELEC1FR. Please contact us for more information.

Only available as an In-House course.
Contact: exp.pau@ifptraining.com

www.ifptraining.com
Electrical Equipment & Power Distribution Network (Advanced)

Level: PROFICIENCY

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

ELECTRICAL POWER GENERATION
1 d
Gas turbine: technology used to drive the alternator.
Alternator: constitution, functioning, control, voltage and frequency generated, protections.
Coupling of sources and flow rate on a structured network.
Troubleshooting.

ELECTRICAL DISTRIBUTION & NETWORKS
1 d
Electrical distribution/networks:
- Constitution and constituents of HV and LV networks, architectures and equipment.
- Distribution philosophy: design and sizing, power distribution, network stability, control of cos Ø, logical selectivity, differential protection selectivity, redundancy of sources and supply means.
- Constituents:
  - HV and LV switchboards and switchgears.
  - Transformers: types, main parameters, protections, auxiliaries.
  - Circuit breakers, protection and isolation elements.
  - Inverters/battery chargers: inverters, reversers, rectifiers.
  - Batteries: types of battery, composition and functioning, charging modes.
- Earthing and neutral point treatments:
  - Equipotential networks.
  - Earthing on site.
  - Studies of the different neutral point treatments.
- Protections: types of electrical protections, protection relays, circuit breakers and fuses.

ELECTRIC MOTORS
1.5 d
Functioning and operation of electric motors:
- Functioning and technology of AC, induction, single-phase and three-phase motors (asynchronous motors).
- Functioning and technology of the main DC motors.
- Windings coupling, adjustment to site conditions.
- Impact of the process operating conditions and changes in the process operating conditions on the electric driving motors.
- Routine monitoring.
- Troubleshooting.
- Electric motor-related equipment:
  - Starting systems.
  - Variable speed systems: principle, functioning, constitution.
  - Circuits and auxiliary functions: lubrication, cooling, systems for explosive area application.
- Maintenance.

PROTECTION AGAINST THE ELECTRICAL RISKS (as per the UTE C 18-510)
0.5 d
Electrical risks:
- Hazards in the electrical installations.
- Voltage levels, safe approach distances, related safety devices.
- Effects and consequences of the electrical risks.
- Protection against the electrical risks: concept and protection classes.

HAZARDOUS AREAS & ATEX STANDARDS
0.5 d
Definition of a hazardous area:
- Explosion mechanism.
- Explosivity and flammability limits.
- 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).

ELEMENTS OF POWER MANAGEMENT SYSTEM
0.5 d
Piloting the network: producing both active and reactive or producing active and absorbing reactive?
Underground or submarine networks and Ferranti effect.
Setting the network voltage: the synchronous compensators.
Production/consumption balance: the frequency.
Distribution network safety, smart networks.
Practical application of the power management system on an oil production site.

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.
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>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSET INTEGRITY MANAGEMENT PROCESS</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRITICALITY &amp; RISK ASSESSMENT TOOLS</td>
<td>1 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSPECTION &amp; TESTS</td>
<td>1 d</td>
</tr>
<tr>
<td>Standards and regulations in force. Inspection tools and techniques: non-destructive examinations, sampling. Example of installation commissioning.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORROSION</td>
<td>1 d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSPECTION &amp; MAINTENANCE BASED ON FAILURE RISK (RBI)</td>
<td>1 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMPLEMENTATION &amp; CHALLENGE</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

---

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

www.ifptraining.com
Turnaround Management

**Course Content**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROLES &amp; REQUIREMENTS OF A TURNAROUND</strong></td>
<td>1 d</td>
</tr>
<tr>
<td><strong>PREPARATION OF A TURNAROUND</strong></td>
<td>1 d</td>
</tr>
<tr>
<td><strong>SCHEDULING &amp; DELAYS CONTROL</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>INSPECTION OF PRESSURE EQUIPMENT</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td><strong>OUTSOURCING &amp; SUBCONTRACTING</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td><strong>WORKS EXECUTION, CONTROLS &amp; AUDITS</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>SAFETY IN WORKS</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td><strong>END OF WORKS &amp; TERMINATION OF TURNAROUND</strong></td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

**Course Description**

- **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.

- **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/TURNAROUNDGB

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

**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/TURNAROUNDFR

Only available as an In-House course.

Contact: exp.pau@ifptraining.com
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**

<table>
<thead>
<tr>
<th>TECHNICAL REPRESENTATION OF PARTS &amp; SIMPLE MECHANICAL SYSTEMS</th>
<th>2 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical drawing agreement: 2D and isometric views, projections, section and cut-away views, perspectives, technical vocabulary.</td>
<td></td>
</tr>
<tr>
<td>Dimensioning of parts and mechanical systems, ISO tolerances and main adjustments.</td>
<td></td>
</tr>
<tr>
<td>Dimensional tolerances and clearance.</td>
<td></td>
</tr>
<tr>
<td>Geometric tolerances and surface condition characterization.</td>
<td></td>
</tr>
<tr>
<td>Presentation of the tools in a metrology shop, performances and rules of use.</td>
<td></td>
</tr>
<tr>
<td>Practical exercises:</td>
<td></td>
</tr>
<tr>
<td>- Dimensioning and full geometric control of a pump shaft.</td>
<td></td>
</tr>
<tr>
<td>- Understanding of a simple machine cut-away view.</td>
<td></td>
</tr>
<tr>
<td>- Representation of a machine element in 2D projection and perspectives.</td>
<td></td>
</tr>
</tbody>
</table>

**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.
- 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 pipings.
- 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.
Pump Maintenance Workshop

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 experienced) 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 1.5 d

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 325 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 flow rate and pressure.

- Monitoring and troubleshooting.

- Specific choices:
  - Driving systems
  - ATEX: material consequences

FUNDAMENTALS OF MECHANICS 1.5 d

- 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 1 d

- 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 0.5 d

- 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 0.5 d

- 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 & METROLOGY INSTRUMENTS 5 d

- 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 site

- Use of the technical files, 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/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

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

**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.

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: MAVROTMIAINT  Only available as an In-House course.
Contact: exp.pau@ifptraining.com

This course is also available in French: MAMACHMAINTFR. Please contact us for more information.
Advanced Certificate
Maintenance Management Certification

Course Content

5 days

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 preventive, condition-based, predictive, 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
Statistical functions and their applications to preventive maintenance. Main models, application to the search for preventive control optimization, equipment redundancy studies, standby equipment management. Pareto 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)).

SHUTDOWN 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. Improvement plans, key performance indicators, dashboards. Maintenance audits.

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 on a control loop or safety system...). To solve these problems, participants must use their technical knowledge, reasoning skills, multidisciplinarity and operational capability.

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 group 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.

Why an IFP Training Certification?
- An international recognition of your competencies.
- An Advanced Certificate delivered.
- An expertise confirmed in Maintenance Management Certification.
- 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: MAI/MAINTMGT
Can be organized as an In-House course.
Contact: exp.pau@ifptraining.com

Location: Pau
Start Date: 2 November
End Date: 6 November
Tuition Fees excl. VAT: £3,680

This course is also available in French: MAI/GESMAINT. Please contact us for more information.
Rotating Machinery Vibration Analysis

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 tools & 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.

Course Content

4 days

BASIC DEFINITIONS - OVERALL MEASUREMENTS
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.

0.75 d

RESONANCE
Simple system behavior: amplitude and phase. Actual rotor and bearings systems. Critical speeds.
Using phase to study resonance. Identifying and solving problems.

0.5 d

TOOLS FOR DIAGNOSIS
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.

0.5 d

MACHINERY DEFECTS & VIBRATION SIGNATURE
Unbalance. Shaft and coupling misalignment.
Anti-friction 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.

2 d

PRACTICAL MACHINERY VIBRATION MONITORING
Vibration control policy: machinery improvement program. Different policies according to the type of machinery and its criticality.
Developing an effective program.

0.25 d

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

Reference: MTM/PAVIB-E Only available as an In-House course.
Contact: rc.contact@ifptraining.com
Graduate Certificate

Upstream Maintenance Engineer Certification

Level: FOUNDATION

Purposes

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 (well head, 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 equipment workshop.
- Practical application of new knowledge: site energizing project, organization of major machines 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 Company representatives and IFP Training Lecturers.

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 expertise confirmed in Upstream Maintenance Engineer Certification.
- Ready-to-use skills.

Expedition & 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 EQUIPMENT & WELL EFFLUENT TREATMENTS

- Notions of drilling/completion. Artificial lift: pumping, gas lift. Oil field processing (stabilization, dehyrating, sweetening) and water processing (production and injection water). Gas processing and conditioning (dehyrating, 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 pressure. Preventive maintenance, 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

- Technical drawing convention: 2D and isometric views, projections, sections and cut-away views, perspectives, technical vocabulary. Parts and mechanical systems dimensioning, ISO tolerances and main adjustments. Dimensional tolerances and operating clearance. Geometric tolerances and surface condition characterization. Presentation and implementation of the tools in a metrology workshop, performances and rules of use. Disassembly, expertise, measurements and re-assembly of single-shaft and double-shaft ends pumping equipment. 5 d

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 essential and auxiliary elements: stator, rotor, bearings, thrust, sealing, oil circuit, sealing devices… Reciprocating compressors: different types and integration into the processes: technology of essential and auxiliary elements (cylinder, piston, valves, sealing, spacers, crankshaft, rod, moving part and cylinder lubrication, cooling circuit, sealing devices, connection to the flare), Rotary compressors (screws, liquid ring, lobes, vanes). Preventive, condition-based maintenance. Troubleshooting and repair techniques. Analysis of information folders and P&ID. Troubleshooting. 5 d

TECHNOLOGY & MAINTENANCE OF DRIVING MACHINES

- Gas and steam turbines. Diesel motors. Technology, working principle, main and auxiliary equipment operation and maintenance. Operation and performances (impact of the operating conditions). Driven machine/driving machine coupling. 5 d

COMMON ELEMENTS OF MACHINES & STRUCTURES

- Moving part lubrication: grease, oil (designiation, 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: bradded 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 (alternator 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 neutralization systems. Protection against the electrical risks and hazardous areas and ATEX standards. 5 d

INSTRUMENTATION, CONTROL, SAFETY INSURED SYSTEMS

- Simple and complex measuring devices, technologies and functional study. Signals and signal transmission. Control and safety devices (control valve, on/off valves). Control structures: role, working principle, direct or inverted action, operating modes. Control loops: simple, cascade and split-range. Distributed Control Systems (DCS) and Safety Instrumented Systems (SIS); safety loops, HIPS, ESD, EDP, F&G technologies. 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 Operations (SIMOPS), management of changes, underrated situation, human factors. 5 d

MAINTENANCE MANAGEMENT

- Maintenance policies and types: financial objectives. Maintenance cost versus failure cost. Different types of maintenance and respective importance: systematic preventive, condition-based, predictive, corrective. Preventive maintenance tools, measurement, follow-up and reliability engineering (fault tree, Pareto, identification of the “bad actors”); Methods and current trends: criticality analysis, Japanese and American methods, risk analysis-based decisions. Studied methods application: criticality rankings, levels of emergency, stocks of spare parts. Outsourcing and subcontracting, shutdown management, improvement plans. 5 d

PROJECT: MAINTENANCE ENGINEERING - JURY

- During the final project, participants will work as teams and develop a project related to the maintenance, the energizing, 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 all 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

Reference: MAU/MAINTENG  - Only available as an In-House course.
Contact: exp.paul@ifptraining.com

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

www.ifptraining.com
Corrosion Prevention in Oil & Gas Production

Course Content

5 days

**DEFINITION & MECHANISMS OF CORROSION**

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**

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**

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**

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**

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.
Foundation Level: FO
Purpose:
This course aims to acquire a comprehensive and practical knowledge of static equipment inspection in order to efficiently contribute to the entire scope of duties performed by an inspection department of an Oil & Gas company.

Audience:
Inspectors of the Oil & Gas industry, maintenance and inspection technicians, engineers and managers looking to acquire comprehensive inspection knowledge.

Prerequisites:
No prerequisites for this course.

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

- Identify materials comprising equipment, their composition, their mechanical characteristics and select the most appropriated material for a given Oil & Gas application.
- Describe the various welding processes and their limits.
- Identify most appropriate non-destructive or destructive testing for the different modes of degradation and perform several simple non-destructive testing.
- List the main characteristics and types of corrosion of metallic materials used in the Oil & Gas industries, describe protection means against each type of corrosion and implement associated monitoring.

Ways & Means:
Numerous industrial case studies and practical exercises.

Learning Assessment:
Written test upon training course completion.

Module 1: INSPECTOR OCCUPATION & STATUTORY REGULATIONS RELATING TO PRESSURE VESSELS

- Introduce to production facilities inspection:
  - Impact on safety, pressure vessel integrity, accident analysis.
  - 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

- 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

- 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 stress test.
  - Introduction to relevant codes and standards (ASME).
- 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

- 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: INS/INSPECTGB
- Only available as an In-House course.
Contact: exp.pau@ifptraining.com
This course is also available in French: INS/INSPECTFR. Please contact us for more information.

Contact us for more information at 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
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

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

Course Content

5 days

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.
“IInternal” 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.

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.

Reference: INSP/SUBINT2 - Only available as an In-House course.
Contact: exp.pau@ifptraining.com

www.ifptraining.com
Project Management

- **Project Implementation**
  - E&P Project Management Certification ................................................................. p. 297
  - Upstream Project Management Certification .............................................................. p. 298
  - E&P Value Chain & Front-End Development ............................................................... p. 299
  - E&P Projects Value Management .............................................................................. p. 300
  - E&P Project Risk & Decision Analysis Workshop ....................................................... p. 301
  - E&P Project Quality & Risk Management ................................................................. p. 302
  - Offshore E&P Project Management ......................................................................... p. 303
  - Building a Project Management Office (PMO) ......................................................... p. 304
  - E&P Project Logistics Management ......................................................................... p. 305

- **Project Control**
  - E&P Project Control Tools ....................................................................................... p. 306
  - E&P Technical Service Contracts ............................................................................. p. 307
  - E&P Technical Contract Negotiation ........................................................................ p. 308
  - E&P Project Cost Estimation & Control Certification ............................................... p. 309
  - E&P Project Operating Expenses Optimization ..................................................... p. 310
  - E&P Project Planning & Scheduling Workshop ....................................................... p. 311

- **Project Construction**
  - Upstream Project Construction Techniques ............................................................ p. 312
  - Upstream Project Construction Site Administration ................................................ p. 313
  - Upstream Project Construction HSE Management .................................................. p. 314
  - Offshore Oil & Gas Project Installation .................................................................... p. 315
  - Upstream Project Construction Works Supervision ............................................... p. 316
  - Upstream Project Precommissioning, Commissioning & Start-Up ......................... p. 317
  - Upstream Project Abandonment Operations .......................................................... p. 318
  - Subsea Production Systems (SPS) ........................................................................... p. 319
  - Subsea Pipelines ....................................................................................................... p. 320
  - E&P Project Construction Certification ................................................................... p. 321
  - E&P Construction Superintendent Certification ..................................................... p. 322
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 Certification.
- 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>Course Title</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E&amp;P CHAIN VALUE MANAGEMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Project evaluation and choices throughout the exploration and production value chain.</td>
<td></td>
</tr>
<tr>
<td><strong>INTEGRATION &amp; SCOPE MANAGEMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Preliminary, conceptual and pre-project studies and their deliverables.</td>
<td></td>
</tr>
<tr>
<td>EPC phase objectives and project execution plan.</td>
<td></td>
</tr>
<tr>
<td>Local content and sustainable development.</td>
<td></td>
</tr>
<tr>
<td><strong>TECHNICAL SERVICE CONTRACTS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Contracting strategy (project breakdown into contracts).</td>
<td></td>
</tr>
<tr>
<td>Types and comparison of technical contracts.</td>
<td></td>
</tr>
<tr>
<td>Endorsements and assignments.</td>
<td></td>
</tr>
<tr>
<td>Tendering process.</td>
<td></td>
</tr>
<tr>
<td><strong>PROJECT ORGANIZATION</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Interface management.</td>
<td></td>
</tr>
<tr>
<td>Management of human resources, organization charts, project manager's role.</td>
<td></td>
</tr>
<tr>
<td>Stakeholder management.</td>
<td></td>
</tr>
<tr>
<td>Communication management.</td>
<td></td>
</tr>
<tr>
<td><strong>HSE, QUALITY &amp; RISK MANAGEMENT</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>HSE: tools and techniques for safety and environment design, project reviews, safety concept and safety dossier.</td>
<td></td>
</tr>
<tr>
<td>HSE during construction phase, HSE indicators.</td>
<td></td>
</tr>
<tr>
<td>Quality: assurance, control and surveillance management.</td>
<td></td>
</tr>
<tr>
<td>Risks: identification, ranking, action plans.</td>
<td></td>
</tr>
<tr>
<td><strong>PROJECT CONTROL: COSTS &amp; SCHEDULE</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Planning and scheduling: schedule elaboration, progress control, recovery plan.</td>
<td></td>
</tr>
<tr>
<td>Costs: estimation of facilities expenditures, budget elaboration, cost control, reporting.</td>
<td></td>
</tr>
<tr>
<td><strong>OIL &amp; GAS PROJECT PHASES</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Detailed engineering: work packages, main deliverables, project reviews, documentation control, changes.</td>
<td></td>
</tr>
<tr>
<td>Procurement: activities (purchasing, expediting, inspection, shipping), long lead items, company supplied items, material control systems.</td>
<td></td>
</tr>
<tr>
<td>Construction/fabrication challenges: contractors and resources, (sub) contract types.</td>
<td></td>
</tr>
<tr>
<td>Construction at site: execution plan, construction methods (temporary construction facilities, prefabrication, modularization, delivery, erection), interface with commissioning.</td>
<td></td>
</tr>
<tr>
<td>Fabrication at yards: load-out, transport and installation.</td>
<td></td>
</tr>
<tr>
<td>Completion activities: methodology, sequence, completion dossiers, commissioning systems, hand-over and acceptance of the facilities.</td>
<td></td>
</tr>
<tr>
<td>Project close out and management of collective knowledge.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: PIMP/PROJGB  - - - 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>8 June</td>
<td>12 June</td>
<td>€3,680</td>
</tr>
<tr>
<td>Rueil-Malmaison</td>
<td>16 November</td>
<td>20 November</td>
<td>€3,680</td>
</tr>
</tbody>
</table>

Contact: pl.rieul@ifptraining.com
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,
- 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.

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.

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 Certification.
- 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/UPMCGB
Only available as an In-House course.

Contact: pl.rueil@ifptraining.com

This course is also available in French: PIMP/UPMCFR. Please contact us for more information.
E&P Value Chain & Front-End Development

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 needing to keep 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
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.

Course Content

DECISION PATH ALONG THE E&P VALUE CHAIN
Strategic issues in exploration-production:
- Decision process from discovery to development and production:
  - Discovery appraisal, reserves evaluation 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
Fundamental contractual and economic aspects:
- Economic rent: value and sharing, bottom line of Oil & Gas 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). Sharing 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 evaluation 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
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
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
FEL3: 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/PROJAFELGB
- 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>19 October</td>
<td>23 October</td>
<td>€3,680</td>
</tr>
</tbody>
</table>

www.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, 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, unitization 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.
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, 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.

Level: **FOUNDATION**

**Purpose**
This course explains the importance of quality management in projects as well as how to continuously improve project practices.

**Audience**
Professionals involved in the management of industrial projects, in particular Oil & Gas projects.

**Learning Objectives**
Upon completion of the course, participants will be able to:
- manage project quality, the stakes involved and the benefits of feedback,
- apply quality assurance, quality control, quality tools, human and material quality resources in the development of projects,
- continuously improve project development methods to create added value for their company.

**Ways & Means**
- Extensive use of examples from actual E&P projects.
- Practical exercises: project objectives, surveillance plan, experience feedback, risk analysis.

**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: PIMP/QAQCGB
- 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

3 days

SPECIFIC TOPICS OF PROJECT MANAGEMENT APPLIED TO OFFSHORE PROJECTS 0.5 d

Risk Management - Group session and discussion.
Costs and schedule control.
Management of facilities risks and safety.

DESIGN CONSIDERATIONS 0.5 d

Pre-feasibility and feasibility checklists - Group session and discussion.
Plan and value improvement practices.

WORKS PREPARATION 0.5 d

Introduction and planning for success - Principles and elements.
Phases, organization and teamwork.

CONSTRUCTION ISSUES 0.5 d

Modularization.
Safety.
Quality.

LIFTING & INSTALLATION 0.5 d

Heavy lifts offshore and cranes.
Lifting offshore (center of gravity, weight control).

CASE STUDIES 0.5 d

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?
# Building a Project Management Office (PMO)

## Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VALUE OF A PROJECT MANAGEMENT OFFICE</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Setting up a PMO vision and creating a charter.</td>
<td></td>
</tr>
<tr>
<td>State of project and portfolio management.</td>
<td></td>
</tr>
<tr>
<td>Defining the to-be state and analyzing the gap.</td>
<td></td>
</tr>
<tr>
<td>Planning for success and defining PMO responsibilities within the organization.</td>
<td></td>
</tr>
<tr>
<td>Roadmap to mature the PMO.</td>
<td></td>
</tr>
<tr>
<td><strong>PROJECT MANAGEMENT PROCESSES</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Benefits of standardizing project management processes.</td>
<td></td>
</tr>
<tr>
<td>Developing and updating processes and standard document templates.</td>
<td></td>
</tr>
<tr>
<td>Standards for project content storage.</td>
<td></td>
</tr>
<tr>
<td>Project management and portfolio management.</td>
<td></td>
</tr>
<tr>
<td>Project Portfolio Management (PPM) tools.</td>
<td></td>
</tr>
<tr>
<td>Issues of capacity management.</td>
<td></td>
</tr>
<tr>
<td><strong>PROJECT TRAINING &amp; SUPPORT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Project staffing, knowledge management and career development.</td>
<td></td>
</tr>
<tr>
<td>Project managers’ skill development.</td>
<td></td>
</tr>
<tr>
<td>Project/portfolio management competencies.</td>
<td></td>
</tr>
<tr>
<td>Audits and project recovery assistance.</td>
<td></td>
</tr>
<tr>
<td><strong>PERFORMANCE MEASURES</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Portfolio analysis and project progress.</td>
<td></td>
</tr>
<tr>
<td>Key Performance Indicators (KPI).</td>
<td></td>
</tr>
<tr>
<td>Measuring project costs and benefits.</td>
<td></td>
</tr>
<tr>
<td>Establishing KPI roles and responsibilities.</td>
<td></td>
</tr>
<tr>
<td>Assessing at-risk projects/portfolios and reporting progress.</td>
<td></td>
</tr>
<tr>
<td>Performance reports.</td>
<td></td>
</tr>
<tr>
<td><strong>CONTINUOUS IMPROVEMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Providing guidance and control.</td>
<td></td>
</tr>
<tr>
<td>Structuring PMO roles and responsibilities.</td>
<td></td>
</tr>
<tr>
<td>Validating compliance to standards and regulations.</td>
<td></td>
</tr>
<tr>
<td>Incorporating best practices and implementing change.</td>
<td></td>
</tr>
</tbody>
</table>

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

**Contact:** pl.rueil@ifptraining.com
E&P Project Logistics Management

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.

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.
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.

---

**Location**
Rueil-Malmaison

**Start Date**
12 October

**End Date**
16 October

**Tuition Fees excl. VAT**
€3,680

Reference: PCTR/PCGB  Can be organized as an In-House course.

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>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Different types of technical contracts.</td>
<td></td>
</tr>
<tr>
<td>CONTRACTING STRATEGY</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Assignment of main equipment.</td>
<td></td>
</tr>
<tr>
<td>Endorsement of the design dossier.</td>
<td></td>
</tr>
<tr>
<td>Interfaces between contracts.</td>
<td></td>
</tr>
<tr>
<td>Contractors.</td>
<td></td>
</tr>
<tr>
<td>Local content.</td>
<td></td>
</tr>
<tr>
<td>Monopole/oligopole.</td>
<td></td>
</tr>
<tr>
<td>Design competition.</td>
<td></td>
</tr>
<tr>
<td>CALL FOR TENDER PROCEDURES</td>
<td>0.75 d</td>
</tr>
<tr>
<td>Tendering phase.</td>
<td></td>
</tr>
<tr>
<td>Prequalification.</td>
<td></td>
</tr>
<tr>
<td>Instructions to tenderers.</td>
<td></td>
</tr>
<tr>
<td>Tender schedule.</td>
<td></td>
</tr>
<tr>
<td>Tender evaluation procedure.</td>
<td></td>
</tr>
<tr>
<td>Inflation and currency hedging.</td>
<td></td>
</tr>
<tr>
<td>Final selection and contract award.</td>
<td></td>
</tr>
<tr>
<td>Single source contract.</td>
<td></td>
</tr>
<tr>
<td>Contractor bid preparation.</td>
<td></td>
</tr>
<tr>
<td>LEGAL ISSUES</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Interfaces between patrimonial agreements and operations contracts.</td>
<td></td>
</tr>
<tr>
<td>Legal issues and contract negotiation/administration.</td>
<td></td>
</tr>
<tr>
<td>LIABILITIES &amp; INSURANCES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Insurance basis.</td>
<td></td>
</tr>
<tr>
<td>Knock for knock principle.</td>
<td></td>
</tr>
<tr>
<td>Risk management process.</td>
<td></td>
</tr>
<tr>
<td>Risk assessment and reduction.</td>
<td></td>
</tr>
<tr>
<td>Claim control for projects.</td>
<td></td>
</tr>
<tr>
<td>CONTRACT ARTICLES</td>
<td>0.75 d</td>
</tr>
<tr>
<td>Main agreement: articles and annexes.</td>
<td></td>
</tr>
<tr>
<td>Exhibits.</td>
<td></td>
</tr>
<tr>
<td>Examples of main articles.</td>
<td></td>
</tr>
<tr>
<td>Vendor lists.</td>
<td></td>
</tr>
<tr>
<td>CONTRACT ADMINISTRATION</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Progress measurement and control.</td>
<td></td>
</tr>
<tr>
<td>Change orders.</td>
<td></td>
</tr>
<tr>
<td>Claim management.</td>
<td></td>
</tr>
<tr>
<td>PROCUREMENT ACTIVITIES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Procurement strategy.</td>
<td></td>
</tr>
<tr>
<td>Procurement management process.</td>
<td></td>
</tr>
<tr>
<td>Long lead items and critical equipment.</td>
<td></td>
</tr>
<tr>
<td>Inspection.</td>
<td></td>
</tr>
<tr>
<td>Material control.</td>
<td></td>
</tr>
<tr>
<td>Logistics and incoterms.</td>
<td></td>
</tr>
<tr>
<td>SPECIFIC TOOLS &amp; REQUIREMENTS</td>
<td>1 d</td>
</tr>
<tr>
<td>Main agreements at holding level.</td>
<td></td>
</tr>
<tr>
<td>Design competition and open book tender.</td>
<td></td>
</tr>
<tr>
<td>Local content.</td>
<td></td>
</tr>
<tr>
<td>Certificates.</td>
<td></td>
</tr>
<tr>
<td>General limit of liabilities.</td>
<td></td>
</tr>
<tr>
<td>Guarantees.</td>
<td></td>
</tr>
<tr>
<td>Governing law.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: PCTR/CPGB
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>19 October</td>
<td>23 October</td>
<td>€3,680</td>
</tr>
</tbody>
</table>
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

4 days

METHODOLOGY
0.5 d
Principles.
Preparation and discussions wheels.
Performance evaluation.
Case study A - LILAC Project: negotiation of a claim.

METHODOLOGY APPLIED TO PROJECTS
0.5 d
Preparation and discussions wheels.
Performance evaluation.
Case study B - TUMACO Project: how to manage variations in time schedules.

SIMULATION 1
0.5 d
Case study: negotiation of a claim.

ARGUMENTS & SEARCHING FOR A COMPROMISE
0.5 d
The 3 “Ego states”.
Arguments and objections.
Looking for a compromise. Reciprocity.
Tools and tactics.

SIMULATION 2
0.5 d
Case study: resolution of a technical dispute linked with problems occurred during transportation of equipment.

CLAIM MANAGEMENT
0.5 d
Methodology. Application to projects.
Case study C - CARACAL project: modernization of existing plant & construction of a new 16” pipeline.

SIMULATION 3
0.5 d
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.

INFLUENCE GAMES & GROUP DYNAMICS
0.5 d
Decode the games of influence.
How to identify and manage them?
Group dynamics:
- How to build a team?
- Legitimacy and credibility.
- Your group dynamic and the one of the other party.
Final case study (compilation of cases A, B, C and D).

Reference: PCTR/NEGOGB
Only available as an In-House course.
Contact: pl.rueil@ifptraining.com
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 Certification.
- 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

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.
  - 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.

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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>23 November</td>
<td>27 November</td>
<td>€3,680</td>
</tr>
</tbody>
</table>

This course is also available in French: PCTR/COSTFR. Please contact us for more information.
### Purpose
This course provides an insight on how to manage higher operating costs which invariably arise as production revenues decline but also how to mitigate risks and uncertainties associated with long-term cost forecasting.

### Audience
Field engineers and operation managers who need to understand how to optimize operating expenses.

### Learning Objectives
Upon completion of this course, participants will be able to:
- perform analysis of high and critical expense areas,
- assess gaps between budget and actual costs, planned and actual activities,
- identify cost performance improvement opportunities.

### Ways & Means
The course is illustrated by numerous examples.

### 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.

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IDENTIFY OPEX SAVINGS</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Use of an open standard technology.</td>
<td></td>
</tr>
<tr>
<td>Increased information for better operation, accuracy of measurement and control.</td>
<td></td>
</tr>
<tr>
<td>Enhancement in control function and the performance.</td>
<td></td>
</tr>
<tr>
<td>Improved throughput.</td>
<td></td>
</tr>
<tr>
<td>Online diagnosis enables true preventive maintenance.</td>
<td></td>
</tr>
<tr>
<td>Improve troubleshooting.</td>
<td></td>
</tr>
<tr>
<td><strong>INCREASING PLANT AVAILABILITY</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Faster time-to-profit.</td>
<td></td>
</tr>
<tr>
<td>Higher sustained production with minimized costs.</td>
<td></td>
</tr>
<tr>
<td>Safer operation.</td>
<td></td>
</tr>
<tr>
<td>Fewer unscheduled outages.</td>
<td></td>
</tr>
<tr>
<td><strong>MANAGING OPERATION &amp; PRODUCTION COSTS</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Improved maintenance for fewer process upsets and high availability.</td>
<td></td>
</tr>
<tr>
<td>Improved quality and productivity.</td>
<td></td>
</tr>
<tr>
<td>Improved alert capabilities for better operation.</td>
<td></td>
</tr>
<tr>
<td>Improved accuracy of measurement and control.</td>
<td></td>
</tr>
<tr>
<td>Data access for business intelligence.</td>
<td></td>
</tr>
<tr>
<td><strong>MANAGING MAINTENANCE COSTS</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Reducing unnecessary trips to plant.</td>
<td></td>
</tr>
<tr>
<td>Avoiding failure instead of solve failure.</td>
<td></td>
</tr>
<tr>
<td>Reducing time to repair.</td>
<td></td>
</tr>
<tr>
<td>Identification and elimination of root causes.</td>
<td></td>
</tr>
<tr>
<td>Reducing inventory costs.</td>
<td></td>
</tr>
<tr>
<td>Centralizing maintenance.</td>
<td></td>
</tr>
<tr>
<td>Centralizing data management.</td>
<td></td>
</tr>
<tr>
<td><strong>CONTROL IN THE FIELD</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Synchronizing data sampling and control.</td>
<td></td>
</tr>
<tr>
<td>Reducing latency effects in the control chain.</td>
<td></td>
</tr>
<tr>
<td>Enhancing process integrity.</td>
<td></td>
</tr>
<tr>
<td>Reducing variability.</td>
<td></td>
</tr>
<tr>
<td>Tighter loop control.</td>
<td></td>
</tr>
<tr>
<td><strong>MAXIMIZING ASSETS UTILIZATION</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Field controllers.</td>
<td></td>
</tr>
<tr>
<td>Equipment monitoring.</td>
<td></td>
</tr>
<tr>
<td>Role-based diagnostics.</td>
<td></td>
</tr>
<tr>
<td><strong>MANAGING MAINTENANCE OPERATIONS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Wear reserve.</td>
<td></td>
</tr>
<tr>
<td>Centralized tooling and configuration data.</td>
<td></td>
</tr>
<tr>
<td>Audits and data management.</td>
<td></td>
</tr>
<tr>
<td>Better calibration management.</td>
<td></td>
</tr>
<tr>
<td>Asset management software.</td>
<td></td>
</tr>
<tr>
<td>Asset data access.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: PCTR/OPXGB

*Only available as an In-House course.*

Contact: pl.rueil@ifptraining.com
# E&P Project Planning & Scheduling Workshop

## 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

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PLANNING &amp; SCHEDULING PROCESSES</strong></td>
<td>1 d</td>
<td>Planning basis, scheduling sequence and critical path. Schedule updates reflecting actual performance. Progress measurement and control of each execution phase (engineering, procurement and construction).</td>
</tr>
<tr>
<td><strong>ONSHORE CASE STUDY USING MS PROJECT</strong></td>
<td>1 d</td>
<td>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.</td>
</tr>
<tr>
<td><strong>OFFSHORE CASE STUDY USING PRIMAVERA</strong></td>
<td>3 d</td>
<td>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.</td>
</tr>
</tbody>
</table>

Reference: PCTR/PSPCGB

Only available as an In-House course.

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

Contact: pl.rueil@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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTRUCTION WORKS &amp; THEIR CONTEXT</td>
<td>0.25 d</td>
</tr>
<tr>
<td>CIVIL &amp; STRUCTURAL WORKS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>ELECTRICAL WORKS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>STRUCTURES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>PIPING</td>
<td>0.25 d</td>
</tr>
<tr>
<td>CATHODIC PROTECTION &amp; PAINTING</td>
<td>0.5 d</td>
</tr>
<tr>
<td>CRANES &amp; LIFTING OPERATIONS ON SITE</td>
<td>0.5 d</td>
</tr>
<tr>
<td>SITE VISIT</td>
<td>2 d</td>
</tr>
</tbody>
</table>

CONSTRUCTION WORKS & THEIR CONTEXT
Overview of E&P projects. Importance and criticality of the construction phase. Main areas of concern.

CIVIL & STRUCTURAL WORKS

ELECTRICAL WORKS
Potential issues. Installation of power and instrument cables.

STRUCTURES

PIPING

CATHODIC PROTECTION & PAINTING
Introduction to corrosion. Cathodic protection. Painting and coating.

CRANES & LIFTING OPERATIONS ON SITE

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  Only available as an In-House course. Contact: pl.rueil@ifptraining.com
Upstream Project Construction Site Administration

Level: PROFICIENCY

Purpose
This course provides an overview of team management, site control scheduling, cost control, contracts, precommissioning, commissioning and quality.

Audience
Field engineers and supervisors involved in the construction activities of an upstream project.

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.

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/CONST2GB - Only available as an In-House course.
Contact: pl.rueil@ifptraining.com

Course Content

5 days

TEAM MANAGEMENT
- Site work organization, roles and responsibilities, organization charts, coordination of site supervisors.
- Communication: purpose and management of periodic meetings, information tools, team-building.
- Management of site access cards, night shifts, back-to-back rotation, shift handover reports.
- Vendors mobilization/demobilization depending on contract types. Contract reviews.
- Management of individual performance.
- Relationship with contractors and subcontractors: contracts (lump sum, reimbursable, change-orders), conflictual situations.
- Relationship with field operations.
- Reporting: how to prepare clear reports.

SITE CONTROL SCHEDULE, COSTS & CONTRACTS
- Schedule: main field constraints, optimization of the detailed construction schedule.
- Contractual progress measurement and reporting. Recovery plan in case of delays.
- Cost control: reporting, change management.
- Construction All Risk insurances (CAR).

PRECOMMISSIONING, COMMISSIONING & QUALITY
- 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.
Upstream Project Construction HSE Management

Course Content

<table>
<thead>
<tr>
<th>Duration</th>
<th>Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 d</td>
<td>SAFETY RISK MANAGEMENT ON THE FIELD</td>
</tr>
<tr>
<td>1.5 d</td>
<td>HSE MANAGEMENT</td>
</tr>
<tr>
<td>0.5 d</td>
<td>ON SITE HSE</td>
</tr>
<tr>
<td>0.5 d</td>
<td>AUDITS</td>
</tr>
<tr>
<td>1.5 d</td>
<td>HAZARD IDENTIFICATION &amp; RISK ASSESSMENT OF MAINTENANCE &amp; CONSTRUCTION WORKS</td>
</tr>
<tr>
<td>0.5 d</td>
<td>SECURITY</td>
</tr>
</tbody>
</table>

SAFETY RISK MANAGEMENT ON THE FIELD
HSE prevention plan: definition and evaluation of risk, subcontractor organization and training. Preventive action plan.

HSE MANAGEMENT

ON SITE HSE
Surveillance: surveillance plan, field HSE audits, safety tour, behavioral observations, subcontractor HSE evaluation. Monitoring of SIMOPS activities.

AUDITS
Objectives of an audit. Pre-audit preparations: boundaries, expectations, checklists, plans. Findings vs. expectations.

HAZARD IDENTIFICATION & RISK ASSESSMENT OF MAINTENANCE & CONSTRUCTION WORKS
Risk assessment and recommended mitigation measures associated to:
- Lifting: manual and mechanical.
- Work at height/over water/diving.
- Use of tools: sand blasting, lifting, chemical and HP cleaning, hydraulic tests, flexible pipes, welding tools, milling…
- Radioactive sources: hazards, markers, use.
- Electrical equipment: electrical classes, hazards, habilitation, consignation, personnel protection.
- Confined space works: ventilation, gas detection, oxygen content of air, penetration, evolution of hazard during works, supervision.
- Hydrostatic testing.
- Welding/grinding/cutting.

SECURITY
Security management: definition, site management with regards to external events (robbery, kidnapping, data). Security control and technologies.

Reference: PCONS/CONST3GB
Contact: pl.rueil@ifptraining.com

Only available as an In-House course.
Offshore Oil & Gas Project Installation

Level: PROFIENCY

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 transversal 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**

1 d

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**

1 d

Typical construction risk analysis.
Organization of operations on the facilities.
SIMultaneous OPerationS (SIMOPS).
Work permits (instructions, procedure, audit).

**WORK INSTRUCTIONS & QUALITY ISSUES**

1 d

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**

1 d

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**

1 d

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

Only available as an In-House course.

Contact: pl.rueil@ifptraining.com

This course is also available in French: PCONS/CONSUPFR. Please contact us for more information.
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**

**IMPORTANCE OF E&P PROJECT COMPLETION**

- 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.

**PRECOMMISSIONING: MECHANICAL COMPLETION**

- Definition and responsibilities.
- Operations to be performed.
- Ready for commissioning.
- Hand over to commissioning team.
- Typical precommissioning dossier.
- Case studies.

**COMMISSIONING ACTIVITIES**

- 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.

**START-UP**

- 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.

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.
Upstream Project Abandonment Operations

Course Content

DECOMMISSIONING PROJECTS MANAGEMENT
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
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
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)
Well abandonment overview.
Short term and long term well integrity.
Types of well completions.
Primary-cementing; preventing gas migration; fishing.
Plug and abandonment methods, procedures and technologies.
Remedial squeeze cementing and cement-plug placement as permanent well-barrier elements.
Conductor removal.

PLATFORM REMOVAL
Transport barge and lifting capacity requirements.
Topsides removal.
Subsea structure (jacket) removal.
Seabed removal (templates, pilings).

PIPELINE DECOMMISSIONING
Pipeline decommissioning and burial procedure.

MATERIALS DISPOSAL & SITE CLEARANCE
Platform materials disposal and recycling.
Site clearance: pre/post decommissioning surveys, site clearance assessment (divers, ROV, test trawling).

Reference: PCONS/DISMGB - Only available as an In-House course.
Contact: pl.rueil@ifptraining.com
Subsea Production Systems (SPS)

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.
Pipeline and riser concept.
Materials (steel, corrosion resistant alloys, anti-corrosion coatings, thermal insulation…).
Pipeline 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.

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”. 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.ruei@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 14 September 18 September €3,510

This course is also available in French: SUB/SPSFR. Please contact us for more information.
Subsea Pipelines

Course Content

4 days

PIPELINE OPERATION: INTRODUCTION & MAIN CONSTRAINTS
0.5 d

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.

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 21 September 24 September €2,750

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

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.

NEGOTIATION 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
**Course Content**

**OIL, WATER & GAS PROCESSING**

**ADVANCED TREATMENTS**
- Oil & Gas sweetening.
- Liquefied Natural Gas, principles and liquefaction processes.
- Liquid Natural Gas treatments.
- Actual malfunctions of facilities and teamwork investigation.

**CONSTRUCTION TECHNIQUES**
- Construction:
  - Lifting and handling. Equipment erection on site. Civil works, structural steel, equipment layout. Piping (welding and weld controls), and installation (erection, pipe-racks, supports). Electrical and instrumentation. Painting, insulation works.
  - Offshore works:
    - Preparation of offshore operations. Load out methods; lifting, skidding, rolling, Sea fastening. Transportation and installation barges, vessels. Marine warranty surveys.
    - Oil & Gas equipment:
      - Onshore sites. Offshore facilities.
      - SPS and other subsea equipment. Pipelines (onshore & offshore).
      - LNG tanks. Terminals. Terminals (onshore & offshore).

**HSE MANAGEMENT & SAFETY ENGINEERING**
- HSE risks, flammability, overpressure systems: PSV, flare and flare network, closed and open drains…
- Safety in operation: use of utilities, degassing/inerting, confined space entry, start-up & shutdown.
- Safety during construction and maintenance works: lifting & rigging, work at height, electrical safety…
- Work permit system. SIMultaneous OPerations (SIMOPS) management...
- Safety systems: HIPS, ESD, EDP, F&G, USS. Safety logic diagrams.
- Safety engineering: HAZID, HAZOP, layout optimization and identification of major accidents. Risks matrix…
- Safety during construction and maintenance works: lifting & rigging, work at height, electrical safety…
- Safety during construction and maintenance works: lifting & rigging, work at height, electrical safety…
- Safety in operation: use of utilities, degassing/inerting, confined space entry, start-up & shutdown.
- Safety during construction and maintenance works: lifting & rigging, work at height, electrical safety…
- Incident analysis and reporting. Root cause analysis.

**SHUTDOWNS: ORGANIZATION, COORDINATION & MANAGEMENT**
- 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.

**MULTIDISCIPLINARY CONFERENCES**
- Terminals and FSO/PSO. Deep offshore: development challenges and specific operating constraints.

**PROJECT CONTROL**
- Management of contracts:
  - Contract strategy, documentation, call for tender, tender analysis and choice of contractor.
- Planning and costs:

**WORK METHODS & COMMUNICATION**
- Work methods and team management.
- Written and oral communication.

**REVIEW & FINAL ASSESSMENT**
- Quality, pre-commissioning, commissioning, transfer to production. Reports.

---

**Prerequisites**
No prerequisites for this course.

---

**Why an IFP Training Certification?**
- An international recognition of your competences.
- A Vocational Certificate delivered.
- An expertise confirmed in E&P Construction Superintendent Certification.
- Ready-to-use skills.

---

**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.

---

**Certification?**
Why an IFP Training Certification?
- An international recognition of your competences.
- A Vocational Certificate delivered.
- An expertise confirmed in E&P Construction Superintendent Certification.
- Ready-to-use skills.

---

**Purpose**
This course provides an in-depth technical knowledge of Oil & Gas processing operations, along with the managerial and communication skills needed for construction superintendents.

---

**Course Content**

<table>
<thead>
<tr>
<th>Course Segment</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>OIL, WATER &amp; GAS PROCESSING</td>
<td>5 d</td>
</tr>
<tr>
<td>ADVANCED TREATMENTS</td>
<td>5 d</td>
</tr>
<tr>
<td>CONSTRUCTION TECHNIQUES</td>
<td>15 d</td>
</tr>
<tr>
<td>HSE MANAGEMENT &amp; SAFETY ENGINEERING</td>
<td>15 d</td>
</tr>
<tr>
<td>SHUTDOWNS: ORGANIZATION, COORDINATION &amp; MANAGEMENT</td>
<td>5 d</td>
</tr>
<tr>
<td>MULTIDISCIPLINARY CONFERENCES</td>
<td>5 d</td>
</tr>
<tr>
<td>PROJECT CONTROL</td>
<td>5 d</td>
</tr>
<tr>
<td>WORK METHODS &amp; COMMUNICATION</td>
<td>2 d</td>
</tr>
<tr>
<td>REVIEW &amp; FINAL ASSESSMENT</td>
<td>3 d</td>
</tr>
</tbody>
</table>

---

**Reference:** PCONS/CONSINGB

---

**Contact:** pl.rueil@ifptraining.com

---

*Only available as an In-House course.*
HSE

Operational HSE

HSE in Drilling Operations ................................................................. p. 324
Well Control - Level 2 ................................................................. p. 325
Well Control - Level 3 or 4 ............................................................... p. 326
Well Intervention & Pressure Control - Level 2 ................................................................. p. 327
Well Intervention & Pressure Control - Level 3 or 4 ............................................................. p. 328
HSE Superintendent Certification .................................................. p. 329
HSE in Surface Production Operations ........................................ p. 330
Unconventional Resources: Safety Issues ................................ p. 331
Positive HSE Culture ................................................................. p. 332
HSE in Maintenance & Construction Activities ................................ p. 333
Occupational Safety ................................................................. p. 334
Occupational Health ................................................................. p. 335

Process Safety & Safety Engineering

Process Safety Engineer Certification ...................................................... p. 336
Fundamentals of Process Safety .......................................................... p. 337
Process Safety Management ......................................................... p. 338
Safety Engineering Certification ......................................................... p. 339
Safety Engineering - Module 1 ............................................................... p. 340
Safety Engineering - Module 2 ............................................................... p. 341
Safety Engineering - Module 3 (Project) ................................................................. p. 342
Area Classification & Control of Ignition Sources ........................................ p. 343

Sustainable Development

Environmental & Social Risk Management .................................................. p. 344
Social Risk Management ................................................................. p. 345
Environmental Management ................................................................. p. 346
Unconventional Resources: Environmental Management Certification .................................................. p. 347
Gas Flaring Reduction: Operational & Environmental Stakes .................................................. p. 348
Environmental Management of Water in E&P .................................................. p. 349
Environmental Pollution & Waste Management .................................................. p. 350
Oil Spill Management ................................................................. p. 351

HSE Management

HSE Engineer Certification ................................................................. p. 352
HSE Management ................................................................. p. 353
Emergency Response Planning ............................................................. p. 354
Major Emergency Management - Initial Response Training .................................................. p. 355
HSE Management of Contractors ..................................................... p. 356
HSE Management of Logistics ............................................................. p. 357
HSE for Support Personnel ................................................................. p. 358
Upstream Project Construction HSE Management .................................................. p. 359
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,
- 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…
- Health and hygiene risks. Medical fitness to work certificates.
- Electrical Risks. Area classification requirements. Certificates.
- Personal Protective Equipment (PPE).

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.

HSE MANAGEMENT OF WELL CONTROL EQUIPMENT
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.

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/HSEE. Can be organized as an In-House course.
Contact: tp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>4 May</td>
<td>7 May</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

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.

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…).

PRINCIPLES OF WELL CONTROL METHODS
Principles and procedures.
Drillers, wait and weight, volumetric methods.

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.

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.

Reference: WEL/FPESME2
Only available as an In-House course.

This course is also available in French: WEL/FPESMF2. Please contact us for more information.

Contact: fp.pau@ifptraining.com

Learning HSE
www.ifptraining.com
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, toolpushers, 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.
- 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
5 days

INITIAL TEST ON WELL CONTROL 0.25 d

PRESSURE ANALYSIS & KICK CONTROL 0.75 d
Reminder on hydrostatic and hydrodynamic pressures.
Relationship between various pressures in the well.
Definition of gas law and migration.
Causes and signs of abnormal pore pressure.
Frac pressure and MAASP (LOT and FIT).
Causes and signs of a kick, impact of WBM or NABM.
Precautions to be taken to avoid kicks.

WELL CONTROL 1.75 d
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).

PARTICULAR CASES 0.25 d
Incidents during circulation.
Shallow gas.
Volumetric method.
MAASP.
Deviated well.
Kick during running of casing or during cement jobs.

SURFACE WELL CONTROL EQUIPMENT 0.5 d
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 0.25 d
Practice on a simulator, training for the IWCF certification.
Exercises on: principles and procedures, kill sheet and well control equipment.

SUBSEA SPECIFICITIES 0.25 d
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 1 d
Written test on principles and procedures.
Written test on equipment.
Practical assessment on simulator.

Reference: WEL/FPESME3-4 - - 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>9 March</td>
<td>13 March</td>
<td>€2,490</td>
</tr>
<tr>
<td>Pau</td>
<td>11 May</td>
<td>15 May</td>
<td>€2,490</td>
</tr>
<tr>
<td>Pau</td>
<td>14 September</td>
<td>18 September</td>
<td>€2,490</td>
</tr>
</tbody>
</table>

This course is also available in French: WEL/FPESMF3-4. Please contact us for more information.
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

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 (strippers, BOP…).
Rigging up and pressure tests surface pressure control equipment.

Snubbing (optional)
Barriers and specific equipment (strippers, 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

**Course Content**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASIC PRINCIPLES &amp; WELL FUNDAMENTALS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>PRESSURE CONTROL APPLIED TO COMPLETION &amp; WELL INTERVENTION</td>
<td>1.5 d</td>
</tr>
<tr>
<td>COMPLETION EQUIPMENT</td>
<td>0.5 d</td>
</tr>
<tr>
<td>DIFFERENT TYPES OF INTERVENTION WITH THEIR RESPECTIVE EQUIPMENT</td>
<td>2 d</td>
</tr>
</tbody>
</table>

**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.
- 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.

Reference: WEL/WELINE3-4

Can be organized as an In-House course.

**Location**

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>25 May</td>
<td>29 May</td>
<td>£3,580</td>
</tr>
</tbody>
</table>

**Note:** 1, 2 or 3 options have to be selected in addition to the compulsory tests.

This course is also available in French: WEL/WELINF3-4. Please contact us for more information.
Course Content

58 days

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: water quality requirements and associated treatments. Gas processing; required specifications, dehydration, hydrates, consequences and treatments; Natural Gas Liquids recovery.

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

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, expansion, combustion, expansion, performances, technology. HSE concerns.

CORROSION, INSPECTION & INTEGRITY
Corrosion mechanisms. Types of corruptions in the Oil & Gas industry. Corrosion prevention and monitoring, fundamentals of inspection.

HSE IN SURFACE PRODUCTION OPERATIONS

HSE MANAGEMENT

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.

ENVIRONMENTAL MANAGEMENT

FINAL ASSESSMENT

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 Certification.
- 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 trainings. 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 related topics, trained to adult teaching methods, and whose competencies are kept up-to-date.

Course Content

58 days

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: water quality requirements and associated treatments. Gas processing; required specifications, dehydration, hydrates, consequences and treatments; Natural Gas Liquids recovery.

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

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, expansion, combustion, expansion, performances, technology. HSE concerns.

CORROSION, INSPECTION & INTEGRITY
Corrosion mechanisms. Types of corruptions in the Oil & Gas industry. Corrosion prevention and monitoring, fundamentals of inspection.

HSE IN SURFACE PRODUCTION OPERATIONS

HSE MANAGEMENT

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.

ENVIRONMENTAL MANAGEMENT

FINAL ASSESSMENT

Reference: OHSE/HSESI
Contact: exp.paul@ifptraining.com

Pau & Rueil 9 September 2 December €42,520

This course is also available in French: OHSE/HSESI. Please contact us for more information.
HSE in Surface Production Operations

Course Content

| 5 days |

OPERATIONS & HSE
Hazards and risks incurred. Consequences.
Risk management means: equipment, organizational and human aspects.

MAIN HAZARDS OF HYDROCARBON PROCESSING
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 H2S. 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
Fundamentals of risk assessment process.
Job Safety Analysis (JSA) procedure and steps.
JSA exercise.

RISK IN NORMAL PROCESS OPERATIONS
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
Management of isolations.
Steps of process isolations.
Valve types and issues.
Electrical lock-out.
Degassing-inerting: steam, nitrogen, water, vacuum, work permits…
Risks associated to operations of depressurization and drainage toward: flare, slops, tanks, oily water.
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
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
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
Main concepts.
Tools to manage sustainability.
Potential environmental impacts in field operations.
Sustainability reporting. Introduction to regulatory framework.

Reference: OHSE/EXP SAFOP  
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>28 September</td>
<td>2 October</td>
<td>€3,680</td>
</tr>
</tbody>
</table>

This course is also available in French: OHSE/EXP SECOP. Please contact us for more information.
Unconventional Resources: Safety Issues

Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL RISKS ASSOCIATED TO OIL &amp; GAS OPERATIONS</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Risk of flammability:</td>
<td></td>
</tr>
<tr>
<td>Explosive atmospheres (ATEX): flammable products, explosive limits and flash point.</td>
<td></td>
</tr>
<tr>
<td>Ignition sources: naked flame, auto-ignition temperature, sparks and static electricity…</td>
<td></td>
</tr>
<tr>
<td>Risks associated with chemical products, fracturing fluids and toxic gas (H₂S).</td>
<td></td>
</tr>
<tr>
<td><strong>RISKS ASSOCIATED WITH DRILLING EQUIPMENT</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Introduction to risks associated to derrick, rig floor, derrick board and crown block. Certificates.</td>
<td></td>
</tr>
<tr>
<td>Risk of dropped objects.</td>
<td></td>
</tr>
<tr>
<td>Works at height.</td>
<td></td>
</tr>
<tr>
<td>Introduction to risks associated to drawworks, top drive, travelling block, winches and pipe handling system. Certificates.</td>
<td></td>
</tr>
<tr>
<td>HSE management of lifting and rigging operations.</td>
<td></td>
</tr>
<tr>
<td>General layout of drilling activities: safety distances.</td>
<td></td>
</tr>
<tr>
<td><strong>RISKS ASSOCIATED WITH DRILLING OPERATIONS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Risks associated to mud preparation, mud tanks and mud pumps.</td>
<td></td>
</tr>
<tr>
<td>Risks associated to cuttings treatment units: shakers, degasser, desander, centrifuge…</td>
<td></td>
</tr>
<tr>
<td>Risks associated to cementing units and cementing operations.</td>
<td></td>
</tr>
<tr>
<td>Well control hazards and equipment.</td>
<td></td>
</tr>
<tr>
<td>Testing requirements: functional and pressure tests.</td>
<td></td>
</tr>
<tr>
<td>Inspection and certification of equipment and personnel with responsibilities in well control scenarios.</td>
<td></td>
</tr>
<tr>
<td><strong>RISKS ASSOCIATED WITH COMPLETION &amp; WELL INTERVENTION OPERATIONS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Risks associated with well completion and well testing operations. Main precautions.</td>
<td></td>
</tr>
<tr>
<td>Risks during well interventions:</td>
<td></td>
</tr>
<tr>
<td>Perforation.</td>
<td></td>
</tr>
<tr>
<td>Hydraulic fracturing.</td>
<td></td>
</tr>
<tr>
<td>Coiled tubing.</td>
<td></td>
</tr>
<tr>
<td>Particular HSE aspects of workover operations.</td>
<td></td>
</tr>
<tr>
<td><strong>RISKS OF LOGISTICS - LAND TRANSPORTATION</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Vehicles fitness and drivers competency assurance.</td>
<td></td>
</tr>
<tr>
<td>Journey management plan elements.</td>
<td></td>
</tr>
<tr>
<td>Transportation of dangerous goods.</td>
<td></td>
</tr>
<tr>
<td><strong>MANAGEMENT OF SIMULTANEOUS PRODUCTION &amp; WELL OPERATIONS</strong></td>
<td>1.5 d</td>
</tr>
<tr>
<td>Introduction toSIMultaneous OPerationS (SIMOPS) in shale Oil &amp; Gas production operations.</td>
<td></td>
</tr>
<tr>
<td>Main roles and responsibilities of the process.</td>
<td></td>
</tr>
<tr>
<td>Definition of works specific dossiers.</td>
<td></td>
</tr>
<tr>
<td>Hazard Identification and risk assessment of specified works. Exercise.</td>
<td></td>
</tr>
<tr>
<td>Development of interface document and matrix of permitted operations.</td>
<td></td>
</tr>
<tr>
<td>Exercise of development of a compatibility matrix.</td>
<td></td>
</tr>
<tr>
<td>Kick off meeting and induction of involved parties.</td>
<td></td>
</tr>
<tr>
<td>Management system framework. HSE bridging document.</td>
<td></td>
</tr>
<tr>
<td>SIMOPS management steering group. Meetings and activity planning.</td>
<td></td>
</tr>
<tr>
<td>Use of interface matrix. Exercise. Communication systems.</td>
<td></td>
</tr>
<tr>
<td>Emergency arrangements.</td>
<td></td>
</tr>
<tr>
<td>Management of change and downgraded situations in SIMOPS.</td>
<td></td>
</tr>
<tr>
<td><strong>CASE STUDY - MANAGEMENT OF SIMOPS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Case study of a shale gas production plant and drilling:</td>
<td></td>
</tr>
<tr>
<td>Hazard identification and risk assessment. SIMOPS compatibility matrix development.</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>ELEMENTS OF POSITIVE HSE CULTURE</th>
<th>1 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HSE LEADERSHIP</th>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements defining HSE leadership in the organization. Characteristics of HSE leaders.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HUMAN FACTORS &amp; BEHAVIORS</th>
<th>0.75 d</th>
</tr>
</thead>
</table>

Reference: OHSE/POSITCULTGB  Only available as an In-House course. Contact: exp.pau@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.

Course Content 5 days

OPERATIONS & HSE

Hazards and risks incurred - Consequences.
Risk management means: equipment, organizational and human aspects.

MAIN HAZARDS OF HYDROCARBON PROCESSING

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 H2S; use of Safety Data Sheet (SDS).
Fluid behavior and related hazards: vessel pressure, consequences of temperature variation (thermal expansion, vaporization, vacuum, water hammer).

RISK ASSESSMENT TOOLS - JOB SAFETY ANALYSIS

Fundamentals of risk assessment process.
Job Safety Analysis (JSA) procedure and steps.
JSA exercise.

PERMIT TO WORK SYSTEM PROCEDURE

Permit To Work (PTW) system. Objectives. Roles and responsibilities.
Main elements of PTW system. Typical approval process and information flowchart.
Master permit and associated certificates.
Management of shift and rotation handover. Permit renewals.
New technologies applied to PTW system. Digital PTW.

HAZARD IDENTIFICATION & RISK ASSESSMENT OF MAINTENANCE & CONSTRUCTION WORKS

Risk assessment and recommended mitigation measures associated to:
Lifting: manual and mechanical.
Work at height/over water/diving.
Use of tools: sand blasting, lifting, chemical and HP cleaning, hydraulic tests, welding tools, milling...
Radioactive sources: hazards, markers, use.
Electrical equipment: electrical classes, hazards, habilitation, consignation, personnel protection.
Confined space works: ventilation, gas detection, oxygen content of air, penetration, evolution of hazard during works, supervision.
Hydrostatic testing.
Welding/grinding/cutting.

ENVIRONMENTAL MANAGEMENT IN MAINTENANCE & CONSTRUCTION OPERATIONS

Main concepts.
Tools for environmental management.
Potential environmental impacts in maintenance and construction operations.
Waste management principles and strategies for planning and implementation.

ORGANIZATIONAL FRAMEWORK - HUMAN FACTORS

Introduction to HSE Management system.
SIMultaneous OPerationsS (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.

HSE MANAGEMENT OF CONTRACTORS

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.

AUDITS - MEANS OF IMPROVING THE HSE PERFORMANCE

Objectives of an audit.
Pre-audit preparations: audit boundaries, expectations, audit checklists, audit plans.
Audit: findings versus expectations.

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.

www.ifptraining.com
# 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.

### 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.

## 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/OCCSAFPR. 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

<table>
<thead>
<tr>
<th>HEALTH &amp; HYGIENE RISK ASSESSMENT</th>
<th>1.5 d</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>MEDICAL EMERGENCY RESPONSE</th>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical emergency evacuation plan. Requirements for medical facilities.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERGONOMICS &amp; APPLIED PSYCHOSOCIOLOGY</th>
<th>1 d</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>FATIGUE MANAGEMENT</th>
<th>0.25 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept and why it is relevant. Fatigue risk assessment.</td>
<td></td>
</tr>
</tbody>
</table>

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

Reference: OHSE/OCCHEALTHGB  Only available as an In-House course.
This course is also available in French: OHSE/OCCHEALTHFR. Please contact us for more information.

Contact: exp.paul@ifptraining.com

www.ifptraining.com
## 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 Certification.
- Ready-to-use skills.

### 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.

#### 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.

#### 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.

#### 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.

#### 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.

#### EMERGENCY RESPONSE PLANNING
- Introduction to emergency response management.
- Scenario identification and development. Tier definition.
- Definition of resources.

#### 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.

#### FINAL ORAL ASSESSMENT

---

**Reference:** PHSE/PSENG  
This course is also available in French: PHSE/INGPS. Please contact us for more information.
Fundamentals of Process Safety

Course Content

**FUNDAMENTALS OF PROCESS SAFETY**

0.5 d

Safe design principles. Introduction to inherently safer design.
Fundamentals of flammability and fluid behavior.

**PROCESS HAZARD ANALYSIS**

1.5 d

Process Safety Information: products, technology, equipment and human intervention.
Methodology for carrying out a HAZID.
HAZID exercise.
HAZOP exercise.
Major accident hazards. Introduction to bowtie diagram representation.
Consequence of loss of containment. Introduction to consequence analysis.

**ASSET INTEGRITY**

1.5 d

Safe containment of hydrocarbons. Storage tanks and pressurized vessels.
Safe design and operation of thermal equipment.
Control of ignition sources. Electrical equipment regulations.
Control of hydrocarbon inventory. Pressure safety valves technology. Rupture disks.
Flares and vents. Emergency depressurization systems. Standards API 520 & API 521.
Introduction to safety instrumented systems: ESD, HIPS, Fire & Gas.
SIL level definition and requisitions.
Maintenance inspection and testing. Methodologies and planning. Introduction to reliability analysis.
Material failure modes.
Introduction to corrosion. Origin and prevention.

**OPERATING PROCEDURES**

1.5 d

Pre-startup safety review. Operational readiness.
Safe isolation of equipment.
Safe work practices. Permit to work system.
Management of change. Downgraded situation.
Human factors in process control. Human error in process plants.

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.
Process Safety Management

Course Content

**FUNDAMENTALS OF PROCESS SAFETY**
1 d
- Concept of process safety. Historical approach.
- Process safety roles and responsibilities.
- Safe design principles. Introduction to inherently safer design.
- Concept of loss of containment. Fundamentals of flammability and fluid behavior.
- Major accident hazards. Introduction to bowtie diagram representation.

**PROCESS SAFETY REGULATIONS**
0.5 d
- Identification and compliance with legislation and industry standards.
- Best practices standards: OSHA, CCPS.
- Relationship with other benchmarking standards: offshore safety case regulation, SEVESO III.

**PROCESS SAFETY CULTURE**
0.5 d
- Safety leadership and commitment.
- Safety culture.
- Workforce involvement.
- Stakeholders identification and communication.

**PROCESS HAZARD ANALYSIS**
1.5 d
- Process safety information: products, technology, equipment and human intervention.
- Hazards related to typical Oil & Gas process.
- Methodology for carrying out a HAZID.
- HAZID application.
- HAZOP register matrix. Group management.
- Introduction to What-if methodology.
- HAZOP exercise.
- Introduction to Failure Mode and Equipment Analysis (FMEA study).
- Introduction to fault tree analysis.
- Plant layout. Introduction to consequence analysis.

**OPERATING PROCEDURES**
1.5 d
- Definition of operating phase steps and limits.
- Safe isolation of equipment.
- Pre-startup safety review. Operational readiness.
- Case study: Buncefield.

**ASSET INTEGRITY**
2 d
- Safety critical equipment. Equipment deficiencies and quality assurance.
- Definition and functions of safety systems.
- Control of ignition sources. Electrical equipment regulations.
- Control of hydrocarbon inventory. Flares and vents.
- Introduction to safety instrumented systems.
- Fire & gas detection systems.
- Passive and active fire protection.
- Maintenance procedures and training.
- Introduction to corrosion.
- Inspection and testing planning and execution.

**ORGANIZATIONAL ELEMENTS**
1.5 d
- Safe work practices. Permit to work system.
- Management of change.
- Downgraded situations.
- Emergency response planning. Escape, evacuation and rescue.
- HSE management of contractors: evaluation and performance monitoring.
- Workforce training. Training matrix development.
- Case study: platform P-36.

**CONTINUOUS IMPROVEMENT ELEMENTS**
1.5 d
- Undesired events reporting and investigation. Analysis strategies.
- Management system audit.
- Process Safety Key Performance indicators. API RP 754.
- IOGP Process safety reporting scope.
- Management review.
- Case Study: Piper Alpha.

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.
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 Certification.
- 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.

Module 1: FUNDAMENTALS
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
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
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
Can be organized as an In-House course.
Contact: exp.reiel@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>16 November</td>
<td>4 December</td>
<td>€9,850</td>
</tr>
</tbody>
</table>

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

www.ifptraining.com
Safety Engineering - Module 1
Hazid/Hazop - Risk Identification, Reduction & Mitigation of Risks

Level: PROFICIENCY

Purpose
This course provides the knowledge necessary 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:
- identify HSE standards and describe hazard identification methods of safety engineering in Oil & Gas processing,
- interpret the contents of standard hazard studies,
- explain the safe design principles and to propose mitigation measures,
- define, predict and measure possible outcomes and effects.

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

FUNDAMENTALS OF SAFETY ENGINEERING 0.5 d

"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

MAJOR HAZARD ASSESSMENT 0.75 d

LAYERS OF PROTECTION 0.5 d

PLOT PLAN REVIEW 0.5 d

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

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.rueil@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT
Pau 16 November 20 November €3,680

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

Level: PROFICIENCY

Purpose
This course provides the knowledge and tools for coordinating HSE studies, for the different stages of offshores, Oil & Gas, grass-roots or major revamping projects.

Audience
Safety engineers, HSE superintendents, other engineers and managers (environment, project, process, instrument and operations) involved in operating or designing and implementing major projects.

Learning Objectives
Upon completion of the course, participants will be able to:
- describe the probabilistic methods of safety engineering and typical safety systems design,
- design safety systems including firewater, fire and gas detection, and over-pressure relief,
- take part in risk assessment and project evaluation,
- contribute to a corporate, experience-based, safety culture.

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.

Course Content

INHERENTLY SAFER PLANT DESIGN 0.25 d
Possible options for the elimination of a hazard.
Provision or addition of control means.
Limitation of inventories of hazardous products.

CONSEQUENCE ANALYSIS METHODOLOGY 0.75 d
Examples of types of scenarios to be considered.
Consequence modeling e.g. blast overpressure, dispersion modeling...
Criteria for impact assessment.
Exercise.

QUANTITATIVE RISK ASSESSMENT (QRA) 1 d
Methodology to be used.
Systematic QRA approach (step by step).
Assessment and improvement.
Case studies and application.

SAFETY INSTRUMENTED SYSTEMS (SIS) 1 d
Examples of Safety Instrumented Systems & performance targets.
Typical architecture.
Safety Instrumented Function (SIF) and Safety Integrity Level (SIL).
Design of ESD systems, hierarchy of ESD and actions, causes and effects.

DESIGN OF FIRE & GAS (F&G) DETECTION SYSTEMS 1 d
Selection of F&G detector types.
Positioning of F&G detectors.
Logic associated with the activation of the F&G detectors.

ACTIVE & PASSIVE FIRE PROTECTION 0.5 d
Design of firewater network, calculations for firewater demand.
Fire protection using water, foam, dry chemicals and inert gas.
Firewater systems, pump types and selection guidance.
Practical exercise.

HUMAN FACTORS & HUMAN ERRORS 0.5 d
Human factors in process control. Alarm systems.
Human error in process plants. Downgraded situations.
Emergency situations.

Reference: PHSE/SAFENG2GB Can be organized as an In-House course.
Contact: exp.reueil@ifptraining.com

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>23 November</td>
<td>27 November</td>
<td>€3,680</td>
</tr>
</tbody>
</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.
Hazard 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), boilover, 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

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>30 November</td>
<td>4 December</td>
<td>€3,680</td>
</tr>
</tbody>
</table>

This course is also available in French: PHSE/SEWFR. 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>
</tr>
</thead>
<tbody>
<tr>
<td>FLAMMABILITY HAZARDS OF HYDROCARBON PROCESSING</td>
<td>0.75 d</td>
</tr>
<tr>
<td>PREVENTION OF HYDROCARBON IGNITION</td>
<td>1.25 d</td>
</tr>
<tr>
<td>CONTROL OF IGNITION SOURCES IN OPERATION</td>
<td>0.5 d</td>
</tr>
<tr>
<td>CASE STUDY</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

FLAMMABILITY HAZARDS OF HYDROCARBON PROCESSING
Hazards and risks incurred - Consequences.
Flammability: flame ignition and propagation principles. Types of combustibles, oxidizers and most common ignition sources in process facilities.
Concept of loss of containment. Loss of containment scenario definition.

PREVENTION OF HYDROCARBON IGNITION
Introduction to hazardous area classification methodology.
Regulatory framework. Recommended practice API RP 500. EU ATEX directive 2014/34/EU.
Classification of releases and their vicinity.
Identification of loss of containment potential points. Register.
Strategies to define classified area distances. Direct example method. Consequence analysis simulation method.
Electrical equipment and suitability with regard to hazardous area classification. Identification, labeling, maintenance and inspection.

CONTROL OF IGNITION SOURCES IN OPERATION
Concept of hot work. Hot work permit.
Gas testing procedure.
Exercise: risk assessment of a hot work.

CASE STUDY
Group exercise for the definition of the classified areas of a plant in a drawing.

Reference: PHSE/AREACLASSGB
Only available as an In-House course.
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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVIRONMENTAL ISSUES RELATED TO E&amp;P ACTIVITIES</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Historical overview of impact awareness, management.</td>
<td></td>
</tr>
<tr>
<td>Definitions: environmental impact, significance, accidental vs. operational discharges, discharge and pollution.</td>
<td></td>
</tr>
<tr>
<td>THE STAKES</td>
<td>0.75 d</td>
</tr>
<tr>
<td>Environmental issues: local, regional, global.</td>
<td></td>
</tr>
<tr>
<td>Air, water (availability, pollution), biodiversity, wastes.</td>
<td></td>
</tr>
<tr>
<td>Kyoto protocol, carbon dioxide accounting, cap and trade, clean development mechanisms.</td>
<td></td>
</tr>
<tr>
<td>Toxicity, ecotoxicity.</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL RISK ASSESSMENT (ERA), LEGAL REQUIREMENTS/LEGAL STANDARDS: NATIONAL, REGIONAL, INTERNATIONAL</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Environmental Risk Assessment (ERA).</td>
<td></td>
</tr>
<tr>
<td>Legal standards: definition, standard determination, best available technology, best environmental practices.</td>
<td></td>
</tr>
<tr>
<td>Environmental Quality Standards (EQS), discharge standards - Regional, international, conventions.</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL IMPACT ASSESSMENT - PROJECTS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Environmental impact assessment activities throughout the life cycle of a field, tools used for impact prediction.</td>
<td></td>
</tr>
<tr>
<td>The EIA process, scoping an EIA. ENVID (Environmental Hazard Identification), environmental management plan.</td>
<td></td>
</tr>
<tr>
<td>Case study.</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL RISK MANAGEMENT - PRODUCTION ACTIVITIES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>HSE MS - EMS (ISO 14001), continuous improvement processes.</td>
<td></td>
</tr>
<tr>
<td>Key environmental procedures: wastes management, chemical management, monitoring.</td>
<td></td>
</tr>
<tr>
<td>Oil spill contingency planning.</td>
<td></td>
</tr>
<tr>
<td>MONITORING &amp; REPORTING</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Key performance indicators, industry performance - Trends.</td>
<td></td>
</tr>
<tr>
<td>Environmental monitoring &amp; surveillance.</td>
<td></td>
</tr>
<tr>
<td>Green house gases estimation and reporting.</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL RISK MANAGEMENT - ABANDONMENT</td>
<td>0.25 d</td>
</tr>
<tr>
<td>SOCIAL ISSUES RELATED TO E&amp;P ACTIVITIES: THE RISKS, THE STAKES &amp; THE STRATEGIES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>The risks and the stakes. Some high profile cases (human rights, NGOs activism, etc.).</td>
<td></td>
</tr>
<tr>
<td>Documentary viewing and discussion on social risks in E&amp;P activities.</td>
<td></td>
</tr>
<tr>
<td>How to change practices and image?</td>
<td></td>
</tr>
<tr>
<td>PARTICIPATIVE SOCIAL IMPACT ASSESSMENT AS A RISK MANAGEMENT TOOL</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Participative social impact assessment: definition, business case and standards, process.</td>
<td></td>
</tr>
<tr>
<td>Social management plans and monitoring. Focus on special topics: involuntary resettlement, local communities, business in conflict zones.</td>
<td></td>
</tr>
<tr>
<td>STAKEHOLDER ENGAGEMENT</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Stakeholder engagement: definition and business case.</td>
<td></td>
</tr>
<tr>
<td>Public consultation and disclosure plan (steps and techniques).</td>
<td></td>
</tr>
<tr>
<td>Stakeholder mapping.</td>
<td></td>
</tr>
<tr>
<td>Stakeholder engagement: misguiding assumptions and key success drivers.</td>
<td></td>
</tr>
<tr>
<td>CASE STUDY: SOCIAL SCREENING OF AN OIL &amp; GAS PROJECT</td>
<td>0.5 d</td>
</tr>
<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/ENVGB. Can be organized as an In-House course. Contact: exp.rueil@ifptraining.com

Location  Start Date  End Date  Tuition Fees excl. VAT
Rueil-Malmaison 16 November 20 November €3,660

This course is also available in French: SUST/ENVFR. Please contact us for more information.
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:
1. Identify and understand what constitutes a social risk (non-technical risk), an impact assessment and management.
2. Understand key concepts related to SIA and Social Impact Management Plans (SIMPs).
3. Understand social management methodologies and their appropriate uses.
4. Design and implement a stakeholder engagement strategy and plan.
5. 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

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCIAL ISSUES RELATED TO OIL &amp; GAS ACTIVITIES: RISKS, STAKES &amp; STRATEGIES</td>
<td>1 d</td>
</tr>
<tr>
<td>Risk of overlooking non-technical risks.</td>
<td></td>
</tr>
<tr>
<td>How to spot non-technical risks?</td>
<td></td>
</tr>
<tr>
<td>How to identify and understand the underlying mechanisms?</td>
<td></td>
</tr>
<tr>
<td>How to manage social risks?</td>
<td></td>
</tr>
<tr>
<td>Oil &amp; Gas industry reaction to underlying mechanisms.</td>
<td></td>
</tr>
<tr>
<td>Why and how should they be managed as a risk and an opportunity?</td>
<td></td>
</tr>
<tr>
<td>Key risks areas for Oil &amp; Gas industry and developed standards:</td>
<td></td>
</tr>
<tr>
<td>transparency and corruption, business and human rights, operations</td>
<td></td>
</tr>
<tr>
<td>in areas of conflict, etc.</td>
<td></td>
</tr>
<tr>
<td>STAKEHOLDER ENGAGEMENT</td>
<td>1 d</td>
</tr>
<tr>
<td>Social License to Operate (SLO).</td>
<td></td>
</tr>
<tr>
<td>How to build this SLO?</td>
<td></td>
</tr>
<tr>
<td>What is the Free Prior &amp; Informed Consent (FPIC) principle?</td>
<td></td>
</tr>
<tr>
<td>Stakeholders-business interactions analysis.</td>
<td></td>
</tr>
<tr>
<td>How to do a stakeholder analysis and mapping?</td>
<td></td>
</tr>
<tr>
<td>How to design and implement a stakeholder engagement plan?</td>
<td></td>
</tr>
<tr>
<td>How to design, implement and monitor a grievance mechanism?</td>
<td></td>
</tr>
<tr>
<td>What are the do’s and don’ts in stakeholder engagement?</td>
<td></td>
</tr>
<tr>
<td>PARTICIPATIVE SOCIAL IMPACT ASSESSMENT AS A RISK MANAGEMENT TOOL</td>
<td>1 d</td>
</tr>
<tr>
<td>Conceptual framework and techniques used for Social Impact Assessment.</td>
<td></td>
</tr>
<tr>
<td>International standards.</td>
<td></td>
</tr>
<tr>
<td>Definition of a social impact.</td>
<td></td>
</tr>
<tr>
<td>Links between environmental and social impacts.</td>
<td></td>
</tr>
<tr>
<td>Predict, analyze and assess the likely social impacts pathways and</td>
<td></td>
</tr>
<tr>
<td>evaluate their significance.</td>
<td></td>
</tr>
<tr>
<td>Develop a mitigation strategy for negative impacts and an enhancement</td>
<td></td>
</tr>
<tr>
<td>strategy for the project-related opportunities.</td>
<td></td>
</tr>
<tr>
<td>How to monitor social impacts?</td>
<td></td>
</tr>
<tr>
<td>How to assess a SIA quality?</td>
<td></td>
</tr>
<tr>
<td>How to achieve the full potential of a SIA?</td>
<td></td>
</tr>
<tr>
<td>SOCIAL IMPACT MANAGEMENT PLANS &amp; MONITORING: TOOLS &amp; PROCESSES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Social Impact Management Plans (SIMP).</td>
<td></td>
</tr>
<tr>
<td>The main components of a SIMP.</td>
<td></td>
</tr>
<tr>
<td>How can a SIMP be operational?</td>
<td></td>
</tr>
<tr>
<td>What are the organizational and institutional arrangements that need</td>
<td></td>
</tr>
<tr>
<td>to be developed?</td>
<td></td>
</tr>
<tr>
<td>The role for the project’s stakeholders in a SIMP?</td>
<td></td>
</tr>
<tr>
<td>Implementation and results monitoring and reporting.</td>
<td></td>
</tr>
<tr>
<td>SOCIAL IMPACT MANAGEMENT PLANS &amp; MONITORING: FOCUS ON SPECIAL TOPICS &amp; ISSUES</td>
<td>1 d</td>
</tr>
<tr>
<td>Depending on the audience’s needs and expectations, a focus can be</td>
<td></td>
</tr>
<tr>
<td>put on specific social issues and how to manage them through specific</td>
<td></td>
</tr>
<tr>
<td>social impact management plans: Resettlement Action Plan (RAP),</td>
<td></td>
</tr>
<tr>
<td>Community Development Plan and Social investments, local content, etc.</td>
<td></td>
</tr>
<tr>
<td>CASE STUDY: SOCIAL SCREENING OF AN OIL &amp; GAS PROJECT</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Through a work in group, the participants will do a stakeholder</td>
<td></td>
</tr>
<tr>
<td>mapping, a high level impact assessment with the use of a mind</td>
<td></td>
</tr>
<tr>
<td>mapping and an identification of potential impacts and mitigation</td>
<td></td>
</tr>
<tr>
<td>strategies.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: SUST/SOCIALGB. Only available as an In-House course.

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

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
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

**FUNDAMENTALS OF ENVIRONMENTAL MANAGEMENT**
0.5 d
Why environmental management is necessary. Concept of sustainability.
Definitions: environmental impact, significance, accidental vs. operational discharges, discharge and pollution.
Legal standards: definition, standard determination. Best available technology. Best environmental practices.
Environmental Quality Standards (EQS), discharge standards - Regional, international, conventions.
Introduction to social management.

**ENVIRONMENTAL, SOCIAL & HEALTH IMPACT ASSESSMENT**
1 d
Risk assessment: concept of hazards, risks, hazard identification and risk assessment process.
Impact assessment throughout the lifecycle of the project.
Aspect and potential impact identification.
Sources of environmental information.
Impacts on atmosphere: air pollution, GHG emissions.
Impacts on aquatic resources: water pollution and water availability.
Impacts on land resources: ground pollution and land use.
Impacts on biodiversity.
Socio-economic and cultural impact.

**ENVIRONMENTAL MANAGEMENT PLAN**
0.75 d
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.

**MONITORING & REPORTING**
0.5 d
Key performance indicators, industry performance - Trends.
Environmental monitoring and surveillance.
Green house gases estimation and reporting.

**WASTE MANAGEMENT PLAN**
0.5 d
Strategy - Type of waste.
Waste collection.
Transport and storages (primary, final…).
Treatments options (biological, thermal desorption).

**MANAGEMENT OF ENVIRONMENTAL EMERGENCIES**
0.75 d
Identification of spill scenarios.
Oil spill contingency planning strategies: onshore and offshore cases.
Typical resources for oil spill contingency plans.

**STAKEHOLDERS ENGAGEMENT**
0.25 d
Stakeholders identification.
Engagement and information process.
Stakeholders engagement plan review.

**ENVIRONMENTAL MANAGEMENT SYSTEM**
0.5 d
Elements of environmental management systems.
Referentials and certification. ISO 14001.
EMS as part of integrated management systems.
Environmental culture and leadership in the organization.

**ENERGY MANAGEMENT**
0.25 d
Introduction to energy sources.
Energy efficiency. Measures for improvement.

Reference: SUST/ENVMGTGB. 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>19 October</td>
<td>23 October</td>
<td>€3,680</td>
</tr>
</tbody>
</table>

This course is also available in French: SUST/ENVMGTFR. 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:
- 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 Certification.
- 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

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/SHALEEVENGB
Only available as an In-House course.

Contact: exp.pau@ifptraining.com

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

www.ifptraining.com
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 3 days

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.
Environmental Management of Water in E&P

Level: FOUNDATION

Course Content

INTRODUCTION TO INDUSTRIAL WASTEWATER IN E&P 0.5 d

INDUSTRIAL WASTEWATER REGULATIONS FRAMEWORK 0.5 d

PRODUCED WATER TREATMENT 1 d

INDUSTRIAL WASTEWATER FROM DRILLING OPERATIONS 0.5 d

DOMESTIC SEWAGE WATER MANAGEMENT 0.5 d
Sources of domestic sewage water. Strategies for treatment.

AVAILABILITY OF WATER - MAIN CHALLENGES 0.5 d

MONITORING & REPORTING 0.5 d
Main key performance indicators regarding water management. Reporting of quality standards.

WATER MANAGEMENT IN UNCONVENTIONAL DEVELOPMENTS 0.5 d
Fracking and water. Hazardous chemicals; proppant. Waste (e.g. sands, NORM & metals).

PRODUCED WATER & WATER FLOWBACK 0.5 d

Reference: SUST/WATERMGT. Only available as an In-House course. Contact: exp.rueil@ifptraining.com
This course is also available in French: SUST/IMGTEAUL. Please contact us for more information.

www.ifptraining.com
Environmental Pollution & Waste Management

Course Content

**INTRODUCTION TO WASTE & POLLUTION MANAGEMENT**
Environmental stakes of Oil & Gas companies and projects.
Environmental mitigation measures principles.
0.25 d

**ATMOSPHERIC POLLUTION & TREATMENT**
Air emission and pollutant inventory. Greenhouse gases. Flare emissions reduction techniques.
Case studies:
- 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.
1 d

**WASTE EFFLUENT POLLUTION & TREATMENT**
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.
1.25 d

**OIL SPILL RESPONSE AT SEA - TECHNOLOGIES**
Content of an oil spill contingency plan.
Offshore spill treatment (dispersants, booms and recovery…).
Onshore spill treatment (pumping, skimming, bioremediation, thermal desorption…).
1 d

**SOLID WASTE TREATMENT TECHNOLOGIES**
Chemical treatments.
Physical treatments.
Disposal methods: advantages/drawbacks.
0.5 d

**POLLUTION & REMEDIATION TECHNIQUES**
Treatment selection: in-situ, onsite, ex-situ.
When and how applying technologies: physical, chemical, biological treatments.
Case study.
0.75 d

**MONITORING & REPORTING**
Main key performance indicators related to pollution control and waste treatment.
0.25 d

Reference: SUST/POLLUTIONGB

Only available as an In-House course.

Contact: exp.rueil@ifptraining.com

This course is also available in French: SUST/POLLUTIONFR. Please contact us for more information.
Oil Spill Management

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.

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.
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,
- describe HSE management roles and responsibilities, set-up and implement 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.

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 Certification.
- 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

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.

Contact: exp.rueil@ifptraining.com

This course is also available in French: HMGT/INGHSE. 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 0.25 d

FUNDAMENTALS OF HSE MANAGEMENT SYSTEM 0.5 d

MANAGEMENT COMMITMENT & LEADERSHIP 0.5 d

RISK MANAGEMENT 1 d

HSE PLANNING & CRISIS MANAGEMENT 0.75 d

ELEMENTS FOR EXECUTION & CONTROL 1 d

AUDITS & CONTINUOUS IMPROVEMENT 1 d

Reference: HMGT/HSEMGTGB
Can be organized as an In-House course.

Contact: exp.pau@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT
Pau 2 November 6 November €3,680

This course is also available in French: HMGT/HSEMGTFR. Please contact us for more information.
Emergency Response Planning

Course Content

3 days

INTRODUCTION TO MAJOR CRISIS MANAGEMENT 1 d
What is a crisis? Consequence of a catastrophic event.
Emergency response levels. Tier 3 emergency definition.
Identification of catastrophic events through risk assessment tools. Risk map.
Tools to evaluate catastrophic scenarios.
Types of catastrophic events with historic examples:
  - Industrial accidents: blowout, industrial accident affecting public, major oil spills.
  - Social and political incidents.
  - Security incidents.
Examples from other industries.

CRISIS MANAGEMENT PLAN 1.5 d
Structure, roles and resources of crisis management plan at HQ level.
Responsibilities of top management.
Development of scenarios and identification of potential affected parties: relatives, partners, public, authorities, media…
Activation of Crisis Management Plan. Support for decision making.
Crisis Management Team members. Roles of decision makers (managers) and technical advisors.
Resources of a crisis management control center.
Information and communication means.
External resources for crisis management: blowout contingency, oil spill management, evacuation and rescue, external communication, legal advice.
Human factors in crisis situations.
Training requirements and emergency drills.

EXERCISE 0.5 d
A specific event is proposed and participants will develop the crisis management plan scenario, defining roles, required resources and identifying the external elements affected.

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.

Reference: HMGT/EMERGENCYGB
Only available as an In-House course.

Contact: exp.reu@ifptraining.com

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
0.25 d
- 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
0.5 d
- 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
0.25 d
- 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
0.25 d
- Equipment:
  - Communication means.
  - Recording means.
  - Plans and technical data.
- Ergonomics.

### EMERGENCIES SPECIFIC TOOLS & METHODS
0.5 d
- 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
1 d
Based on one of the ERP scenarios.

---

Contact: exp.pau@ifptraining.com

<table>
<thead>
<tr>
<th>Reference: HMGT/MEMIRGB</th>
<th>Contact: <a href="mailto:exp.pau@ifptraining.com">exp.pau@ifptraining.com</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be organized as an In-House course.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Start Date</th>
<th>End Date</th>
<th>Tuition Fees excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>26 October</td>
<td>28 October</td>
<td>€2,220</td>
</tr>
</tbody>
</table>
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.

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

Course Content 2 days

OVERVIEW OF HSE ELEMENTS IN CONTRACTOR MANAGEMENT PROCESS 0.25 d
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.

TENDER PROCESS - ELEMENTS OF HSE EVALUATION 0.5 d
General tender process structure. Definition of HSE information to be evaluated. Definition of HSE evaluation matrix. HSE evaluation reporting.

CONTRACTUAL FRAMEWORK 0.5 d

HSE MANAGEMENT DURING EXECUTION 0.5 d

CONTRACTOR FINAL EVALUATION 0.25 d
Importance of final evaluation. Aspects to retain.

This course is also available in French: HMGT/HSECTRFR. Please contact us for more information.
HSE Management of Logistics

Course Content

LAND TRANSPORTATION
- Main risks and impacts.
- Vehicle and drivers fitness for purpose.
- Journey management plan elements.
- Transportation of dangerous goods.

MARINE TRANSPORTATION
- Main risks and impacts.
- Boat and vessel fitness review.
- Basic evacuation features.
- Marine and river transportation of dangerous goods.

AIR TRANSPORTATION
- Main risks and impacts.
- Air transportation safety policy elements.
- Fixed wing features.
- Rotary wing features.

STORAGE
- Basic safety storage features.
- Lifting operations and equipment.

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.

Reference: HMGT/HSELOGGB

Only available as an In-House course.

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

Contact: exp.rueil@ifptraining.com

www.ifptraining.com

3 days

LAND TRANSPORTATION 1 d
MARINE TRANSPORTATION 1 d
AIR TRANSPORTATION 0.5 d
STORAGE 0.5 d
HSE for Support Personnel

Level: FOUNDATION

Purpose
This course provides the participants with a wider and high level HSE management knowledge, allowing them to take a step forward regarding risk awareness and safety leadership, as well as developing their team management and oral & written communication skills.

Audience
This program is intended to all professionals within the petroleum industry (commercial, legal, financial or support entities) who seek to acquire professional skills regarding Health, Safety and Environment management subjects for a successful long term career conversion and in order to ensure a safe and sustainable workplace.

Learning Objectives
Upon completion of the course, participants will be able to:
- identify the elements of the overall production chain, from reservoir to offloading facilities,
- detail the elements of HSE management applicable to the different E&P activities,
- contribute to risk assessment process for the different E&P activities,
- participate in undesired event investigation teams,
- explain the different key performance indicators applicable to HSE management,
- describe the different elements of the environmental and societal management in E&P.

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.

Course Content

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPLORATION &amp; PRODUCTION OVERVIEW</td>
<td>5 d</td>
</tr>
<tr>
<td>Fundamentals of reservoir engineering, drilling, completion and well servicing. Notions of field operations and field development process.</td>
<td></td>
</tr>
<tr>
<td>HSE CULTURE &amp; LEADERSHIP</td>
<td>5 d</td>
</tr>
<tr>
<td>Human factors. HSE leadership. HSE culture development.</td>
<td></td>
</tr>
<tr>
<td>OCCUPATIONAL HEALTH &amp; SAFETY</td>
<td>10 d</td>
</tr>
<tr>
<td>HSE MANAGEMENT SYSTEMS</td>
<td>5 d</td>
</tr>
<tr>
<td>Structure of HSE management systems. HSE management of contractors. HSE performance evaluations.</td>
<td></td>
</tr>
<tr>
<td>RISK AWARENESS &amp; EMERGENCY RESPONSE</td>
<td>5 d</td>
</tr>
<tr>
<td>Risk awareness in the workplace. Introduction to emergency response. Fire fighting training.</td>
<td></td>
</tr>
<tr>
<td>HSE IN LOGISTICS</td>
<td>5 d</td>
</tr>
<tr>
<td>Land transportation. Marine transportation. Air transportation selection.</td>
<td></td>
</tr>
<tr>
<td>ENVIRONMENTAL &amp; SOCIAL MANAGEMENT</td>
<td>10 d</td>
</tr>
<tr>
<td>FINAL PROJECT EVALUATION</td>
<td>15 d</td>
</tr>
<tr>
<td>Group project. Jury.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: HMGT/HSESUPPORTGB

Contact: exp.rueil@ifptraining.com

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

SAFETY RISK MANAGEMENT ON THE FIELD
HSE prevention plan: definition and evaluation of risk, subcontractor organization and training.
Preventive action plan.

HSE MANAGEMENT
HSE incident management: root cause analysis of incidents, including consequence analysis. Immediate actions. Corrective and preventive actions.
Reporting.
Communication and crisis management.
Emergency response plan. Communications.
Experience feedback.

ON SITE HSE
Surveillance: surveillance plan, field HSE audits, safety tour, behavioral observations, subcontractor HSE evaluation.
Monitoring of SIMOPS activities.

AUDITS
Objectives of an audit.
Pre-audit preparations: boundaries, expectations, checklists, plans.
Findings vs. expectations.

HAZARD IDENTIFICATION & RISK ASSESSMENT OF MAINTENANCE & CONSTRUCTION WORKS
Risk assessment and recommended mitigation measures associated to:
Lifting: manual and mechanical.
Work at height/over water/diving.
Use of tools: sand blasting, lifting, chemical and HP cleaning, hydraulic tests, flexible pipes, welding tools, milling…
Radioactive sources: hazards, markers, use.
Electrical equipment: electrical classes, hazards, habilitation, consignation, personnel protection.
Confined space works: ventilation, gas detection, oxygen content of air, penetration, evolution of hazard during works, supervision.
Hydrostatic testing.
Welding/grinding/cutting.

SECURITY
Security management: definition, site management with regards to external events (robbery, kidnapping, data).
Security control and technologies.

5 days

Reference: PCONS/CONST3GB Only available as an In-House course.
Contact: pl.rueil@ifptraining.com

www.ifptraining.com
Natural Gas Chain

- Natural Gas .............................................................. p. 361
- Gas Cycling: an Integrated Approach ........................................... p. 362
- Natural Gas Storage ................................................................. p. 363
- Natural Gas Transport by Pipeline ...................................................... p. 364
- From Gas to Energy ................................................................. p. 365
- Gas Production & Processing Engineer Certification ......................... p. 366
- Gas Sweetening & Sulfur Recovery .................................................. p. 367
- Gas Processing & Compression Operations ...................................... p. 368
- Gas Flaring Reduction: Operational & Environmental Stakes .............. p. 369
- Laboratory Analyses for Oil & Gas Production ...................................... p. 370

LNG Chain

- Liquefied Natural Gas (LNG) ....................................................... p. 371
- LNG Processing Engineer Certification ........................................... p. 372
- Natural Gas Liquids Extraction ..................................................... p. 373
- LNG Process Simulation ............................................................ p. 374
Natural Gas
Production - Treatments - Transport - End Uses

Course Content

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.
- Numerical 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: TYPES & PRODUCTION TECHNIQUES
Types and characteristics of natural gas fields. Production techniques.
Different types of natural gases (condensate, wet or dry gas) and characterization parameters.
Case of associated gases: recovery techniques, characteristics, composition, etc.

END USES OF NATURAL GAS - MAIN QUALITY REQUIREMENTS
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
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, 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
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
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
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>5 October</td>
<td>9 October</td>
<td>€3,680</td>
</tr>
</tbody>
</table>

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

www.ifptraining.com
Gas Cycling: an Integrated Approach

Course Content

**GAS CYCLING**
0.5 d
Introduction.
The integrated gas cycle: elements, configuration, challenges.
Gas cycling for pressure maintenance.
Gas cycling for miscible gas displacement (EOR): sweeping and soaking, compositional effects.
Dry gas cycling in retrograde condensate reservoirs.
Cycling non-hydrocarbon gases.
Major issues and constraints: reservoir, wells, flow lines and surface facilities.

**WELL EFFLUENT BEHAVIOR**
0.5 d
Different types of well effluent. Main characterization parameters.
Constituents that pose problems for storage and transport.
Gas composition: rich and lean gas, sweet and sour gas.
Gas PVT behavior.
PVT properties of pure components and mixtures.

**RESERVOIR FLUID BEHAVIOR & NEEDS FOR GAS CYCLING**
0.5 d
Phase envelope, reservoir and surface PVT issues.
Ternary diagram, first contact miscibility, multiple contact miscibility: condensing drive and vaporizing drive,
Minimum Miscibility Pressure (MMP).
Specificities of condensate gas: retrograde region.

**RESERVOIR ASPECTS**
0.5 d
Reservoir performance.
Drive mechanisms: gas reservoirs, gas cap, gravity drainage displacement, tertiary gas displacement, miscible
gas displacement.
Requirements for gas quality for injection, flowrate, cycling rate and configuration of injection.
Field development: architecture and phasing.

**INTRODUCTION TO SURFACE FACILITIES DESIGN**
0.25 d
Gas specifications to conform with gas cycling (dew point, sulfur removal & valorization).
Field processing of gas effluents for gas cycling.

**GAS DEHYDRATION & SWEETENING**
0.25 d
Moisture content of natural gas.
Gas dehydration processes.
Gas sweetening, acid gases disposal.

**CONDENSATE: RECOVERY, STABILIZATION & MONETIZATION**
0.5 d
Low-temperature separation techniques.
Condensate stabilization.
Monetization routes.

**GAS COMPRESSION**
0.25 d
Multistage compression: design criteria.
Gas compression versus field aging: effect on operating parameters, needs for booster station.

**COMPRESSORS & DRIVERS**
0.5 d
Compressors technology: choice criteria, effect of gas density evolution.
Compressor drivers.

**INJECTION NETWORK**
0.25 d
Network architecture.
Network operations, backpressure management.
Well performance issues.

**CASE STUDY: SYNTHESIS - WRAP UP**
1 d
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.

Reference: NATG/GASCYCLGB
Only available as an In-House course.

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

Level: FOUNDATION

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

Reference: NATG/STOCKGB
Only available as an In-House course.

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

Course Content

2 days

NATURAL GAS: AS A STORABLE ENERGY
0.25 d
How? Summary presentation of the different storage systems: depleted reservoirs, aquifers, salt domes, LNG storage tanks, etc.
Where? History of underground gas storage, storage sites in Europe and worldwide. Maps and tables by types of storage, per country and stored volumes.
Gas storage and its environment: noise, exhaust, surface footprints, landscape integration, local taxes, workforce.

STORAGE TYPES
0.5 d
Fluid flow in porous media. Reservoir modeling.
Depleted reservoirs, aquifers, salt domes, LNG storage tanks.
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.

STORAGE EQUIPMENT
0.25 d
Wells: drilling specificities, downhole and surface equipment.
Gathering network.
Gas compression: why, when and how?
Extracted gas treatment: dehydration, sweetening, odorization.
Auxiliary equipment: manifolds, instrumentation and control system, safety, treatment of effluents.
Metering: primary meter, correctors, data processing.

COMPRESSOR
0.25 d
Characteristics of compressors specific to natural gas storage sites: compression ratio, runtime 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, etc.
Comparison between gas turbine and motor drivers, fuel gas and electricity power.

GAS TREATMENT
0.25 d
At the wellhead: hydrate prevention by heating or methanol injection.
In the station: dehydration, sweetening, odorization.
For each treatment, presentation of the treatment target, risks, regulation aspects, treatment techniques, common processes used for gas treatment and product regeneration, effluent treatment.

ECONOMICAL ASPECT OF GAS STORAGE
0.5 d
Life cycle of a gas storage site.
Estimated values for CAPEX and OPEX for each storage type.
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.
Simulation of cost price per kWh, stored or delivered, for common site configurations.
## 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

<table>
<thead>
<tr>
<th></th>
<th>2 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO NATURAL GAS</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>TRANSPORT NETWORK</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td><strong>DESIGN &amp; CONSTRUCTION OF A GAS PIPE</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>COMPRESSION</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>OPERATION OF A NETWORK</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>ECONOMICAL ASPECTS OF GAS TRANSPORT BY PIPELINE</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

---

Reference: NATG/TRANSGB  ❌ 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.
From Gas to Energy

Level: FOUNDATION

Purpose
This course provides a comprehensive technical and economic review of the natural gas processing and its use to produce energy through thermal power plants and combined cycles.

Audience
Managers, engineers, and technicians, looking for technical information and understanding of energy production facilities.

Learning Objectives
Upon completion of the course, participants will be able to:
- acquire technical knowledge and practical approach of energy production facilities (technology and operating principle of the equipment),
- explain the basics of natural gas production, processing and transport,
- understand economics of gas and power supply markets, explain how a power plant works,
- detail the available process technologies allowing to produce energy efficiently,
- be aware of innovative technology deployed over the world.

Economic Aspect
- 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
- 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
- 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
- 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
- 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.

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

Contact: exp.rueil@ifptraining.com

www.ifptraining.com
Graduate Certificate

Gas Production & Processing Engineer Certification

Course Content

**FUNDAMENTALS OF GEOLOGY, RESERVOIR ENGINEERING & PRODUCTION MODES**

**FUNDAMENTALS OF DRILLING, WELL COMPLETION & WELL PERFORMANCE**

**GATHERING NETWORKS DESIGN & OPERATION - FLOW ASSURANCE ISSUES**

**THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING**

**GAS PROCESSING & CONDITIONING**

**PROCESS SIMULATION**
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**
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**

**ELECTRICAL SYSTEMS, INSTRUMENTATION, PROCESS CONTROL & SAFETY SYSTEMS**
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 & Gas system.

**ROTATING MACHINERY: TECHNOLOGY, SELECTION & OPERATION**
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**
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**

**GAS FIELD DEVELOPMENT PROJECT & JURY**
10-day teamwork on a real case study with deliverables to be presented on the last day (jury).

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 Certification.
- 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: PENG/GASENG. Only available as an In-House course. Contact: exp.rueil@ifptraining.com

This course is also available in French: PENG/GASEZ. Please contact us for more information.
# Gas Sweetening & Sulfur Recovery

**Level:** PROFICIENCY

**Purpose**
This course provides a comprehensive technical review of sour gas treatment, sulfur recovery, conditioning processes and storage facilities, including operating and troubleshooting issues.

**Audience**
Professionals interested in sour gas: engineers involved in Oil & Gas field facilities operation or design, managerial staff in gas processing facilities, equipment providers, personnel from engineering companies.

## Learning Objectives
Upon completion of the course, participants will be able to:
- comprehend all concerns linked to sour gas treatment and sulfur recovery,
- review sulfur and acid pollutants main physical properties, specificities and induced hazards,
- understand operating principles and conditions of gas sweetening and sulfur recovery/handling processes,
- grasp main operating problems encountered in sour gas processing and sulfur recovery and handling.

**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

### OVERVIEW OF GAS SWEETENING PROCESSES
0.25 d

### AMINE SWEETENING PROCESSES
1.5 d

### OTHER GAS SWEETENING PROCESSES
0.75 d

### 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

### SULFUR CONDITIONING & STORAGE
0.25 d

Reference: PENG/ACIDGB

This course is also available in French: PENG/ACIDFR. 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.

Course Content

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VAPOR-LIQUID EQUILIBRIUM, ELEMENTS OF DISTILLATION &amp; ABSORPTION</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Phase envelopes.</td>
<td></td>
</tr>
<tr>
<td>Well effluents behavior from pay zone to surface processing facilities.</td>
<td></td>
</tr>
<tr>
<td>Techniques applied to mixture separation: flash process, distillation process.</td>
<td></td>
</tr>
<tr>
<td>Absorption and stripping phenomena.</td>
<td></td>
</tr>
<tr>
<td><strong>SPECIFICATIONS &amp; WATER CONTENT OF GAS - HYDRATES</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Constituents raising problems for storage, transport or end use of natural gas.</td>
<td></td>
</tr>
<tr>
<td>Different specifications and quality requirements for natural gas.</td>
<td></td>
</tr>
<tr>
<td>Necessary treatments to conform these specifications.</td>
<td></td>
</tr>
<tr>
<td>System behavior. Moisture content of a saturated gas.</td>
<td></td>
</tr>
<tr>
<td>Applications: Moisture content of different gases of various compositions.</td>
<td></td>
</tr>
<tr>
<td>Hydrate formation inhibition by injection of inhibitors: MeOH, MEG, DEG, LDHI…</td>
<td></td>
</tr>
<tr>
<td><strong>GAS DEHYDRATION: TEG ABSORPTION, MOLECULAR SIEVES</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Gas dehydration process: conventional TEG process.</td>
<td></td>
</tr>
<tr>
<td>Case study of gas processing operations: TEG process troubleshooting.</td>
<td></td>
</tr>
<tr>
<td>Gas dehydration by physical adsorption (molecular sieves): technologies, performances and operating principles.</td>
<td></td>
</tr>
<tr>
<td><strong>GAS TREATMENT: SWEETENING, CONDENSATE EXTRACTION &amp; FRACTIONATION</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Overview of the techniques dedicated to gas sweetening: Chemical solvent processes - Amine units (MEA, DEA, DGA, MDEA…).</td>
<td></td>
</tr>
<tr>
<td>Physical solvent processes.</td>
<td></td>
</tr>
<tr>
<td>Hybrid (physico-chemical) solvent processes.</td>
<td></td>
</tr>
<tr>
<td>Overview of other techniques.</td>
<td></td>
</tr>
<tr>
<td>Conversion of H₂S: sulfur production (CLAUS process) and tail gas processing.</td>
<td></td>
</tr>
<tr>
<td>Natural Gas Liquids (NGL) extraction (removal of heavy components).</td>
<td></td>
</tr>
<tr>
<td>Low Temperature Separation processes (LTS): External refrigeration loop.</td>
<td></td>
</tr>
<tr>
<td>Joule-Thomson expansion.</td>
<td></td>
</tr>
<tr>
<td>Turbo-Expander.</td>
<td></td>
</tr>
<tr>
<td>NGL Fractionation Schemes (C₃/LPG/C₅⁺ - recovery).</td>
<td></td>
</tr>
<tr>
<td><strong>TECHNOLOGY &amp; OPERATION OF CENTRIFUGAL &amp; RECIPROCATING COMPRESSORS</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Operating principle, flowrate tuning.</td>
<td></td>
</tr>
<tr>
<td>Technology: constitutive elements and their function.</td>
<td></td>
</tr>
<tr>
<td>Circuits auxiliaries: lubrication, sealing system, cooling, safety systems.</td>
<td></td>
</tr>
<tr>
<td>Compressors operation: routine surveillance, transient conditions.</td>
<td></td>
</tr>
<tr>
<td><strong>COMPRESSORS OPERATION (case studies)</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Start-up, shutdown and on-line monitoring.</td>
<td></td>
</tr>
<tr>
<td><strong>FEEDBACK &amp; CASE STUDIES - TROUBLESHOOTING SPECIFIC TO CLIENT ASSETS</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Tailored workshops as per client requirements.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: PROP/GASCHAINGB

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

Contact: exp.rueil@ifptraining.com

Only available as an In-House course.
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** 3 days

**INTRODUCTION TO GAS FLARING REDUCTION**
0.5 d

**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

**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
This course is also available in French: SUST/GASMGTFR. Please contact us for more information.

www.ifptraining.com

Contact: exp.reuil@ifptraining.com

Only available as an In-House course.
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 analyzes 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>5 days</th>
</tr>
</thead>
</table>

### ROLE & RESPONSIBILITIES OF LABORATORY STAFF
0.5 d
Member of production staff. Equipment yields controls/monitoring. Final product quality controls/monitoring. Recommendations to improve treatments.

### ANALYZES SPECIFIC TO CRUDE OIL
1 d
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:
- \( \text{H}_2\text{S} \) content (methylene blue).
- \( \text{H}_2\text{S} \) and mercaptans by potentiometry.
Total Acid Number (TAN) of liquid hydrocarbons.
Fluid rheology: pour point, kinematic viscosity, wax content.

### ANALYZES SPECIFIC TO GAS
0.5 d
Gas characterization analyzes:
- Dew point (HC and water).
- Gas composition by Gas Phase Chromatography (GPC).
Gas specific gravity estimate from composition.
Acid components content:
- \( \text{H}_2\text{S} \) content (Dräger), \( \text{H}_2\text{S} \) and mercaptans content (potentiometry, iodometry).
- \( \text{CO}_2 \) content (Dräger and acidimetry).

### ANALYZES FOR THE FOLLOW-UP OF EFFLUENT TREATMENT OPERATIONS
1 d
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
1 d
Equipment visualization.
Discussions on practices, difficulties…

### ANALYZES DONE TO OPTIMIZE ANTICORROSION TREATMENTS
0.5 d
Deposits and scale analyzes.
Chemical corrosion and bacterial corrosion appraisal.
Recommendations for chemical additives and treatments.

### HSE IN LABORATORY ACTIVITIES
0.5 d
Laboratory facilities design and implementation.
Chemicals management (storage, use…).
Occupational health and safety behavior.

---

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 5 days

THE LNG WORLD
0.5 d

LNG SPECIFIC PROPERTIES & ASSOCIATED HAZARDS
0.5 d
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.

LNG HAZARD PREVENTION & MITIGATION MEASURES
0.5 d
LNG spillage control at design stage and in operation. LNG clouds control in operation. LNG fires control at design stage and in operation.

LIQUEFACTION & REGASIFICATION PROCESSES
0.75 d
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.

LNG STORAGE, LOADING/OFFLOADING & TRANSPORT
0.75 d
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.

TECHNOLOGY OF LNG SPECIFIC EQUIPMENT
1 d
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.

LNG PLANT OPERATION
0.25 d
Day to day activities in an LNG plant. Experience of some plants.

LNG TRENDS - RESEARCH & NEW DEVELOPMENTS
0.25 d

LNG ECONOMIC ASPECTS
0.5 d

Reference: LNG/LNG. 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>2 November</td>
<td>6 November</td>
<td>€4,840</td>
</tr>
</tbody>
</table>

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

www.ifptraining.com
Graduate Certificate

LNG Processing Engineer Certification

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.

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 and 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.

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 confirmed in LNG Processing Engineer Certification.
- 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
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 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
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, dehydration, compression); NGL fractionation and stabilization; simulation of a cascade liquefaction process, of a C3MR liquefaction process, 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 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.

Reference: LNG/LNENG5. Only available as an In-House course.

Contact: exp.rueil@iptraining.com

This course is also available in French: LNG/RJGNL. Please contact us for more information.
NEW Natural Gas Liquids Extraction
Production - Treatments

Level: ADVANCED

Purpose
This course provides an advanced review of the techniques involved in natural gas liquids extraction and processing.

Audience
Process engineers, involved in advanced Natural Gas Liquids recovery.

Learning Objectives
Upon completion of the course, participants will be able to:
- explain technical issues and specific constraints of natural gas liquids extraction,
- explain and simulate main NGL extraction processes,
- compare process performances,
- explain NGL specifications and associated treatments.

Ways & Means
- Highly interactive training by industry-specialist lectures.
- Process simulation using HYSYS or PROII.

Prerequisites
Good understanding or process engineering and 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

NATURAL GAS & NATURAL GAS LIQUIDS PRODUCTION & VALORIZATION 0.5 d
Field treatment of natural gas, transportation by pipe and associated quality requirements. Natural gas monetization routes and NGLs markets.

MAIN QUALITY REQUIREMENTS 0.25 d
Quality requirements for commercial natural gases and associated products (ethane, LPG, condensates) and associated pre-treatment: mercury removal, conversion or adsorption of mercaptans (RSH), etc.

TECHNOLOGY USED IN THE NGL EXTRACTION UNITS 0.25 d
Review and main characteristics of the equipment used in the NGL recovery units: plate fine heat exchangers (typical pressure drops), turbo-expander (typical efficiency, acceptable liquid ratio, enthalpy drop), demethanizer (used internals and their efficiency).

NGL RECOVERY WITH CONVENTIONAL PROCESS 0.5 d
Needed notions of process performances and associated thermodynamics.
Process review.
Case studies:
- Simulation of expansion of a natural gas stream through a valve and a turbo-expander, impact of operating parameters on NGL recovery and products quality.
- Simulation of NGL recovery process with columns, impact of reflux on NGL recovery.

ORTLOFF PROCESS 0.5 d
Process review.
Case study: simulation of Ortloff process, impact of reflux stream composition on NGL recovery.

CRYOMAX PROCESS 0.5 d
Process review.
Case study: simulation of Cryomax process, comparison with Ortloff process.

NGL FRACTIONATION & ASSOCIATED TREATMENTS 0.5 d
NGL fractionation process review.
Case study: simulation of NGL fractionation process with mercaptans, mercaptans mass balance.
NGL needed treatments (Merox or equivalent) and comparison with the adsorption process on the main gas stream.

Reference: LNG/NGL 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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>21 April</td>
<td>23 April</td>
<td>€3,200</td>
</tr>
</tbody>
</table>

www.ifptraining.com
LNG Process Simulation

Level: PROFICIENCY

Purpose
This course aims to acquire a comprehensive knowledge and practical know-how in the simulation of natural gas pre-treatment and liquefaction processes, with an emphasis on condensate recovery, fractionation and integration with the liquefaction process.

Audience
Process design engineers involved in conceptual design, basic or detailed engineering of LNG plants.

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

► assess various problems that can be induced by unwanted elements and compounds in gas streams,
► design, explain the operation and operating parameters of gas condensate recovery systems and natural gas liquefaction processes,
► perform steady-state simulations with PRO/II™ or HYSYS™, model set-ups, and simulate gas processing and liquefaction processes,
► optimize process operating conditions, compare processes performances, evaluate power requirements, size equipment…,
► check plant performance under different operating conditions, implement the optimal process scheme.

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™.
► Simulation of DMR, MFC, N2/dual-expander & SMR processes can be performed in classroom or as e-learning upon request.

Learning Assessment
Assessment by test at the end of the course.

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.

Course Content

<table>
<thead>
<tr>
<th>5 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEED FOR GAS FIELD PROCESSING - QUALITY REQUIREMENTS 0.25 d</td>
</tr>
<tr>
<td>Review of main concepts and products within the gas/condensate chain.</td>
</tr>
<tr>
<td>Undesired constituents for storage, transport, or end use of natural gas.</td>
</tr>
<tr>
<td>Different specifications and quality requirements for natural gas: sales gas specifications, reach/lean gas specifications.</td>
</tr>
<tr>
<td>Required treatments and overview of gas processing.</td>
</tr>
<tr>
<td>Examples of compositions of commercialized natural gases.</td>
</tr>
</tbody>
</table>

| 0.75 d |
| STEADY-STATE PRO/II™ OR HYSYS™ SIMULATION CASE STUDIES |
| 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. |

| 0.5 d |
| CONDENSATE RECOVERY, FRACTIONATION & REFRIGERANT MAKE-UP |
| 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. |

| 0.5 d |
| SIMULATION OF CONDENSATE RECOVERY & FRACTIONATION USING PRO/II™ OR HYSYS™ |
| Selection of thermodynamics packages. |
| Simulation of a condensate fractionation and stabilization process. |

| 0.5 d |
| CASCADE PROCESS OPERATING CONDITIONS & SIMULATION |
| Process diagram and operating parameters. |
| Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing. |

| 0.5 d |
| COMPARISON OF THE MAIN MIXED REFRIGERANTS LIQUEFACTION PROCESSES |
| Fields of application of liquefaction processes. |
| Comparison with cascade process and turbo expander based process. |

| 1 d |
| LIQUEFACTION WITH C3 - MIXED REFRIGERANTS - OPERATING CONDITIONS & SIMULATION |
| Process diagram and operating parameters. |
| Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing. |
| Optimization of MR composition. |

| 0.5 d |
| LIQUEFACTION WITH 2 MIXED REFRIGERANTS - OPERATING CONDITIONS & SIMULATION |
| Process diagram and operating parameters. |
| Simulation of the liquefaction process: optimization of the operating conditions, compressors sizing. |
| Optimization of MR composition. |

| 0.5 d |
| LIQUEFACTION PROCESSES PERFORMANCES COMPARISON |
| Heat and mass balance for each process. |
| Comparison of power requirements for the different processes. |

Reference: LNG/LNGSIMGB

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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>7 December</td>
<td>11 December</td>
<td>€4,270</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

**Course Content**

<table>
<thead>
<tr>
<th>Category</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>PETROLEUM SYSTEM CONCEPT OF UNCONVENTIONAL RESOURCES</td>
<td>1 d</td>
</tr>
<tr>
<td>TIGHT SANDS</td>
<td>1.5 d</td>
</tr>
<tr>
<td>SHALE PLAYS</td>
<td>2 d</td>
</tr>
<tr>
<td>RESOURCE APPLICATIONS: CASE STUDY</td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

## 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. Emphasis 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. Emphasis 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.

Reference: UNCO/TIGHTSHALE  
Contact: gre.rueil@ifptraining.com

Only available as an In-House course.
**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", "Unconventional Reservoirs Completion and Stimulation".

**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><strong>PETROLEUM SYSTEM CONCEPT (Reminder)</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td><strong>UNCONVENTIONAL RESOURCES (Part 1)</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Oil shales.</td>
<td></td>
</tr>
<tr>
<td>Heavy oils, extra heavy oils, tar sands.</td>
<td></td>
</tr>
<tr>
<td>Geological biogenic gases (ex-early diagenesis, ex-oil biodegradation).</td>
<td></td>
</tr>
<tr>
<td>Gas hydrates.</td>
<td></td>
</tr>
<tr>
<td>“Clean Coal” (coal bed methane, coal mine methane, underground coal gasification).</td>
<td></td>
</tr>
<tr>
<td><strong>UNCONVENTIONAL RESOURCES (Part 2)</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Shale plays (shale gas, shale oil).</td>
<td></td>
</tr>
<tr>
<td>Tight gas in basin centered gas system.</td>
<td></td>
</tr>
<tr>
<td><strong>UNCONVENTIONAL RESOURCES FROM AN EXTENDED PETROLEUM PERSPECTIVE</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Burial and thermal history - Source rock maturation.</td>
<td></td>
</tr>
<tr>
<td>Kinetic parameter determination, kerogen expulsion and cracking.</td>
<td></td>
</tr>
<tr>
<td>Migration of hydrocarbons and pressure regime.</td>
<td></td>
</tr>
</tbody>
</table>

Reference: UNCO/UNCON  
[Only available as an In-House course.](mailto:gre.rueil@ifptraining.com)
## Course Content

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WORLD ENERGY DEMAND &amp; SHALE GAS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Introduction, definitions, world data resources.</td>
<td></td>
</tr>
<tr>
<td><strong>HYDROCARBONS IN UNCONVENTIONAL SETTINGS</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Exploration aspects: geology and geochemistry.</td>
<td></td>
</tr>
<tr>
<td><strong>SHALE GAS STIMULATION</strong></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><strong>SHALE GAS PETROPHYSICS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Status of petrophysical evaluation of shale gas accumulations.</td>
<td></td>
</tr>
<tr>
<td><strong>SHALE GAS RESOURCES</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Evaluation of resources (in place and technically recoverable). Methodology.</td>
<td></td>
</tr>
<tr>
<td><strong>PRODUCTIVITY &amp; FIELD DEVELOPMENT</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Well productivity assessment. Field development case study: Establish well pattern. Estimate the plateau rate and duration. Build field development spread-sheet</td>
<td></td>
</tr>
<tr>
<td><strong>ECONOMICS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Economics of development of shale gas - Production costs.</td>
<td></td>
</tr>
<tr>
<td><strong>ENVIRONMENTAL IMPACT</strong></td>
<td>0.5 d</td>
</tr>
</tbody>
</table>

## More info

Kindly refer also to the complementary courses which might be of interest: “Unconventional Field Development Program - Hydrocarbons in Unconventional Settings”, “Unconventional Reservoirs Completion & Stimulation”.

## 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.
This course provides a practical understanding of exploration, drilling & completion, and production techniques & procedures in an unconventional hydrocarbon context.

Geoscientists, reservoir engineers and petroleum engineers involved in exploring, developing and producing unconventional fields.

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.

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.

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.

Engineering degree or equivalent experience in the E&P industry.

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.
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,
- 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.

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

### 5 days

<table>
<thead>
<tr>
<th>Topic</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DRILLING &amp; CASING PROGRAM</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Role of casings.</td>
<td></td>
</tr>
<tr>
<td>Parameters to be considered to determine well architecture:</td>
<td></td>
</tr>
<tr>
<td>Well type.</td>
<td></td>
</tr>
<tr>
<td>Pore and frac. pressures.</td>
<td></td>
</tr>
<tr>
<td>Completion, lithology.</td>
<td></td>
</tr>
<tr>
<td>Different types of casings:</td>
<td></td>
</tr>
<tr>
<td>Surface.</td>
<td></td>
</tr>
<tr>
<td>Intermediate.</td>
<td></td>
</tr>
<tr>
<td>Production.</td>
<td></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.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Examples and exercises.</td>
<td></td>
</tr>
<tr>
<td><strong>CASING STRING CALCULATION</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Principles and assumptions to remember for the different strings.</td>
<td></td>
</tr>
<tr>
<td>Stress cases study:</td>
<td></td>
</tr>
<tr>
<td>Collapse.</td>
<td></td>
</tr>
<tr>
<td>Burst.</td>
<td></td>
</tr>
<tr>
<td>Tension.</td>
<td></td>
</tr>
<tr>
<td>Tri-axial study.</td>
<td></td>
</tr>
<tr>
<td>Safety factors.</td>
<td></td>
</tr>
<tr>
<td>Casing selection: examples and exercises.</td>
<td></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.</td>
<td></td>
</tr>
<tr>
<td>Measuring equipment: MWD.</td>
<td></td>
</tr>
<tr>
<td><strong>DRILLING ENGINEERING</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Well planning and trajectory calculations.</td>
<td></td>
</tr>
<tr>
<td>Limits of use of a drill string: buckling.</td>
<td></td>
</tr>
<tr>
<td>Drill string design.</td>
<td></td>
</tr>
<tr>
<td>Torque and drag calculation.</td>
<td></td>
</tr>
<tr>
<td>Drilling fluids and cementing program.</td>
<td></td>
</tr>
<tr>
<td>Hole cleaning.</td>
<td></td>
</tr>
<tr>
<td>Logging.</td>
<td></td>
</tr>
<tr>
<td>Well control.</td>
<td></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.
- Numerous 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

**DRILLING & CASING PROGRAM FOR DIRECTIONAL & HORIZONTAL WELLS**
0.5 d
Introduction: directional and horizontal drilling, objectives, well geometry...
Directional drilling equipment: downhole motors, rotary steerable system, measuring equipment ‘MWD’.
Drilling consideration of deviated and horizontal wells: torque and drag, bucking, hole cleaning...
Casing program for horizontal wells.

**COMPLETION DESIGN**
0.5 d
Introduction to well completion and hydraulic fracturing.
Completion design, operations, equipment.
Plug and perf technique.
Ball and sleeve technique.
Actual completion trends: examples.
Technological challenges: new techniques.
Stimulation: fracturing techniques & design (horizontal multistaged hydraulic fracking techniques & operations).

**INPUT & FRACTURE DESIGN**
1.75 d
Requirement for fracture design.
Rock mechanics for fracturing design.
In situ stress, fracture orientation and fracture propagation.
Different types of pressures: net pressure, tortuosity, friction.
Fluid leak-off, slurry efficiency, dimensionless fracture conductivity.
Fracture growth analysis.
Hydraulic fracturing models.

**FRACTURING FLUIDS, PROPPANTS & FRACTURE CONDUCTIVITY**
1 d
Types of fracturing fluids.
Types of proppants.
Fluid and proppant selection.

**EQUIPMENT & PLACEMENT TECHNIQUES**
0.5 d
Surface pumping equipment.
Placement techniques in horizontal wells.
Planning and executing operation.
Flow back techniques: wellhead isolation tool, frac valve.

**FRACTURE MAPPING & POST-JOB ANALYSIS**
0.5 d
Mapping: well test, tracer and micro-seismic.
Post-job evaluation.
Environmental considerations of hydraulic fracturing.

**KNOWLEDGE ASSESSMENT**
0.25 d

Reference: UNCO/URCS
Only available as an In-House course.
Contact: fp.pau@ifptraining.com
# Well Performance: Shale Gas Wells

**Level:** FOUNDATION  
**Purpose:** This course provides the practical, comprehensive understanding and skills needed to master well performance on shale gas plays and make significant contributions to field productivity studies and well performance monitoring.

**Audience:** Reservoir, well performance or production engineers and technicians.

**Learning Objectives:**  
Upon completion of the course, participants will be able to:  
- step by step building PROSPER Modeling of shale gas well,  
- select the relevant characteristics shale gas system and fluid properties related to well performance modeling,  
- optimize well performance,  
- analyze the impact of well completion and equipment on well performance,  
- analyze the operation process.

**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.

## Course Content

### 5 days

<table>
<thead>
<tr>
<th>Module</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRODUCTION TO PRODUCTION SYSTEM</strong></td>
<td>0.25 d</td>
</tr>
<tr>
<td>Introduction to well performance nodal analysis: inflow x outflow.</td>
<td></td>
</tr>
<tr>
<td>Overview of PROSPER™ software workflow: PROSPER™: building initial well system file.</td>
<td></td>
</tr>
<tr>
<td><strong>PVT DATA/PVT MODELING</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Gas PVT properties.</td>
<td></td>
</tr>
<tr>
<td>PROSPER™: building PVT model for shale gas well.</td>
<td></td>
</tr>
<tr>
<td><strong>SHALE GAS PLAYS PROPERTIES &amp; WELLBORE INTERFACE</strong></td>
<td>0.75 d</td>
</tr>
<tr>
<td>Shale gas systems characterization- dual porosity, stress dependent permeability, gas desorption.</td>
<td></td>
</tr>
<tr>
<td>Shale gas completion stimulation (hydraulic fracturing).</td>
<td></td>
</tr>
<tr>
<td>Introduction to well performance analysis of unconventional gas reservoirs.</td>
<td></td>
</tr>
<tr>
<td>Effect of productivity parameters for horizontal wells (length, wellbore radius, permeability “anisotropy”, thickness vs. position “Well Eccentricity”, drainage area, formation damage “Skin”).</td>
<td></td>
</tr>
<tr>
<td>Derivation of analytical solutions.</td>
<td></td>
</tr>
<tr>
<td><strong>INFLOW PERFORMANCE/IPR MODELING</strong></td>
<td>1.25 d</td>
</tr>
<tr>
<td>Inflow Performance Relationship (IPR).</td>
<td></td>
</tr>
<tr>
<td>Back pressure equation for gas wells.</td>
<td></td>
</tr>
<tr>
<td>Transient gas model for horizontal wells completed and stimulated with multiple transverse fractures.</td>
<td></td>
</tr>
<tr>
<td>IPRs for horizontal wells: PROSPER™: IPR modeling exercise.</td>
<td></td>
</tr>
<tr>
<td>IPR of horizontal drains: shale gas well exercise: PROSPER™: fractured horizontal well modeling.</td>
<td></td>
</tr>
<tr>
<td><strong>WELLBORE FLOW, OUTFLOW PERFORMANCE/VLP MODELING</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Minimum flow rate/gas well loading (pressure drop through a horizontal well for gas flow, effect of the well geometry TOE up, TOE down).</td>
<td></td>
</tr>
<tr>
<td>Pressure gradient and Vertical Lift Performance (VLP) curves.</td>
<td></td>
</tr>
<tr>
<td>Tubing head pressure, tubing ID impacts: PROSPER™: tubing correlations, VLP modeling of shale gas well.</td>
<td></td>
</tr>
<tr>
<td>Flow in a choke.</td>
<td></td>
</tr>
<tr>
<td><strong>WELL PERFORMANCE</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Well deliverability nodal analysis: inflow x outflow on shale gas well:</td>
<td></td>
</tr>
<tr>
<td>PROSPER™: IPR + VLP well performance modeling, prediction, analysis and diagnosis.</td>
<td></td>
</tr>
<tr>
<td>Sensitivity study.</td>
<td></td>
</tr>
<tr>
<td>Effect of compaction permeability reduction.</td>
<td></td>
</tr>
<tr>
<td>Effect of well geometry.</td>
<td></td>
</tr>
<tr>
<td><strong>KNOWLEDGE ASSESSMENT</strong></td>
<td>0.25 d</td>
</tr>
</tbody>
</table>

Reference: UNCO/UWELLPERFSGE  
- Only available as an In-House course.  
Contact: fp.pau@ifptraining.com  
www.ifptraining.com
# Unconventional Resources: Safety Issues

## Level: FOUNDATION

### Purpose

This course provides a thorough understanding of risks and safety measures related to products, equipment and different operations in unconventional Oil & Gas production facilities.

### Audience

Engineers and staff involved in operating unconventional Oil & Gas field production facilities.

### Learning Objectives

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

- deepen knowledge of hazards involved in hydrocarbon processing,
- assess risks involved in drilling and well intervention operations,
- assess risks associated with land transportation,
- describe the main elements to correctly manage simultaneous operations of production and drilling.

### 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

**Course Duration:** 5 days

### GENERAL RISKS ASSOCIATED TO OIL & GAS OPERATIONS

<table>
<thead>
<tr>
<th>0.75 d</th>
</tr>
</thead>
</table>

### RISKS ASSOCIATED WITH DRILLING EQUIPMENT

<table>
<thead>
<tr>
<th>0.75 d</th>
</tr>
</thead>
</table>

### RISKS ASSOCIATED WITH DRILLING OPERATIONS

<table>
<thead>
<tr>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

### RISKS ASSOCIATED WITH COMPLETION & WELL INTERVENTION OPERATIONS

<table>
<thead>
<tr>
<th>0.5 d</th>
</tr>
</thead>
</table>

### RISKS OF LOGISTICS - LAND TRANSPORTATION

<table>
<thead>
<tr>
<th>0.5 d</th>
</tr>
</thead>
</table>

### MANAGEMENT OF SIMULTANEOUS PRODUCTION & WELL OPERATIONS

<table>
<thead>
<tr>
<th>1.5 d</th>
</tr>
</thead>
</table>

### CASE STUDY - MANAGEMENT OF SIMOPS

<table>
<thead>
<tr>
<th>0.5 d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study of a shale gas production plant and drilling: Hazard identification and risk assessment. SIMOPS compatibility matrix development.</td>
</tr>
</tbody>
</table>

---

Reference: OHSE/SHALESAFOPGB 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:
- 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 Certification.
- 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

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.
Offshore Field Architecture

- Deepwater Drilling & Development Certification ................................................................. p. 387
- HPHT Drilling Design & Operations ...................................................................................... p. 388
- Offshore Field Development - Pipelines & Flow Assurance ................................................ p. 389
- Offshore Field Development Engineering Certification ....................................................... p. 390

Subsea

- Gathering Network: Design Engineering .......................................................................... p. 391
- Pipeline Hydraulics & Multiphase Flow .............................................................................. p. 392
- Subsea Activities .................................................................................................................. p. 393
- Subsea Production Systems (SPS) ...................................................................................... p. 394
- Subsea Pipelines .................................................................................................................. p. 395
- Subsea Integrity Management (I) - Inspection, Monitoring & Testing .............................. p. 396
- Subsea Integrity Management (II) - Non Conformity Management ...................................... p. 397
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.

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 Certification.
- 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.
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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pau</td>
<td>25 May</td>
<td>29 May</td>
<td>€3,690</td>
</tr>
</tbody>
</table>

This course is also available in French: DRIL/OFDFWE. 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.

Reference: DRIL/HPHTE

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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>16 November</td>
<td>20 November</td>
<td>€3,690</td>
</tr>
</tbody>
</table>
Offshore Field Development - Pipelines & Flow Assurance

Level: FOUNDATION

Purpose

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

Audience

Engineers and technicians involved in designing, constructing or operating Oil & Gas offshore production facilities.

Learning Objectives

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

- understand the technology and design of offshore production facilities,
- grasp the architecture of offshore field developments, from shallow water to deep offshore,
- understand pipelines technology, laying techniques and main operational problems,
- learn the techniques used to prevent main problems of flow assurance.

Ways & Means

- Highly interactive training by industry-specialist lecturers.
- Numerous case studies from the offshore industry.

Learning Assessment

Assessment by test at the end of the course.

Prerequisites

No prerequisites for this course.

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>
</tr>
</thead>
<tbody>
<tr>
<td>OVERVIEW OF OFFSHORE DEVELOPMENTS</td>
<td>0.25 d</td>
</tr>
<tr>
<td>FIXED &amp; FLOATING PRODUCTION STRUCTURES</td>
<td>0.25 d</td>
</tr>
<tr>
<td>CONSTRUCTION &amp; INSTALLATION OF PLATFORMS</td>
<td>0.5 d</td>
</tr>
<tr>
<td>DEEP OFFSHORE DEVELOPMENTS</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. Role and technology of each piece of equipment. Examples of deep offshore developments.</td>
<td></td>
</tr>
<tr>
<td>FPSO/FSO TECHNOLOGY</td>
<td>0.5 d</td>
</tr>
<tr>
<td>OPERATION OF TERMINALS</td>
<td>0.25 d</td>
</tr>
<tr>
<td>Technology of tankers and loading/offloading equipment. Marine operations of reception and exports. Terminal constraints: storage capacity, scheduling.</td>
<td></td>
</tr>
<tr>
<td>NEW DEEP WATER TECHNOLOGIES</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>FLOW ASSURANCE 1/2: PREVENTION OF DEPOSITS IN FLOWLINES</td>
<td>0.5 d</td>
</tr>
<tr>
<td>Main flow assurance problems: hydrates, paraffins, sulfates, sand, salt, naphtenates… Main technical solutions and preservation operations. Intervention techniques.</td>
<td></td>
</tr>
<tr>
<td>FLOW ASSURANCE 2/2: MONITORING OF MULTI-PHASE FLOW THROUGH FLOWLINES</td>
<td>1 d</td>
</tr>
<tr>
<td>Multi-phase flow patterns. Application to Oil &amp; Gas upstream activities. Gas dominated systems: dry versus wet scheme, flowline and slug catcher design. Oil dominated systems: hydrodynamic slug flow, examples.</td>
<td></td>
</tr>
<tr>
<td>PIPELINES: TECHNOLOGY, LAYING &amp; OPERATION</td>
<td>1 d</td>
</tr>
</tbody>
</table>

Reference: ODEV/OFFSHGB. Can be organized as an In-House course.

Contact: exp.rueil@ifptraining.com

Location Start Date End Date Tuition Fees excl. VAT

- Rueil-Malmaison 19 October 23 October €3,680

This course is also available in French: ODEV/OFFSHFR. Please contact us for more information.
Certification

Offshore Field Development Engineering Certification

Graduate Certificate

Purpose
This program aims to provide engineers with 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
Reduction 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 feedback 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 Certification.
- 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>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fundamentals of Geosciences &amp; Reservoir Engineering</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Well log interpretation. Well testing. Reservoir engineering and simulation.</td>
<td></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.</td>
<td></td>
</tr>
<tr>
<td>Specific equipment for various rigs (jack-up, semi-submersible, drillship)</td>
<td></td>
</tr>
<tr>
<td>- Mud line suspensions.</td>
<td></td>
</tr>
<tr>
<td>- Riser tensioner, passive and active heave compensator.</td>
<td></td>
</tr>
<tr>
<td><strong>Well Control</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Various pressures in the well. Definitions of pressures. Kick detection.</td>
<td></td>
</tr>
<tr>
<td>Principles of well control methods. Equipment and testing procedures.</td>
<td></td>
</tr>
<tr>
<td>Subsea equipment. Simulator.</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</td>
<td></td>
</tr>
<tr>
<td>horizontal and multilaterals wells. Well completion design, and well completion</td>
<td></td>
</tr>
<tr>
<td>equipment. New completion trends. Intelligent completion.</td>
<td></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:</td>
<td></td>
</tr>
<tr>
<td>jacket, semi-submersible, SPAR, TLP, FPSO. Technology, selection criteria,</td>
<td></td>
</tr>
<tr>
<td>limitations; focus on FPSO technology. Offshore field architecture (study of</td>
<td></td>
</tr>
<tr>
<td>various options, feedback from industry, selection criteria): surface/subsea</td>
<td></td>
</tr>
<tr>
<td>wells, natural gas field developments, crude oil field developments.</td>
<td></td>
</tr>
<tr>
<td><strong>Subsea Production System (SPS)</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Subsea components and field architecture. Pipeline and risers. Subsea</td>
<td></td>
</tr>
<tr>
<td>construction and intervention. Inspection, maintenance and repair. Production</td>
<td></td>
</tr>
<tr>
<td>from production platform.</td>
<td></td>
</tr>
<tr>
<td><strong>Subsea Pipelines &amp; Flow Assurance Issues</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Pipelines technology: design of subsea pipelines and risers, flexible</td>
<td></td>
</tr>
<tr>
<td>pipelines design; offshore pipeline construction, shore approach construction,</td>
<td></td>
</tr>
<tr>
<td>subsea tie-in; pipeline operation and integrity. Study of flow assurance</td>
<td></td>
</tr>
<tr>
<td>issues using PIPESIM™ software: fundamentals of fluid mechanics, multilphase</td>
<td></td>
</tr>
<tr>
<td>flow; flow assurance issues (flow stability, erosion, deposits, hydrates,</td>
<td></td>
</tr>
<tr>
<td>heat transfer issues); study of wet gas streams. Study of crude oil streams.</td>
<td></td>
</tr>
<tr>
<td><strong>Offshore Processing Technology</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Main specifications and required treatments. Crude oil processing: Multi-Stage</td>
<td></td>
</tr>
<tr>
<td>Separation (MSS), dehydration and desalting, sweetening, offshore storage;</td>
<td></td>
</tr>
<tr>
<td>technologies specific to offshore facilities (case of FPSOs). Gas processing</td>
<td></td>
</tr>
<tr>
<td>and compression: sweetening, dehydration, Natural Gas Liquids (NGLs) extraction;</td>
<td></td>
</tr>
<tr>
<td>gas compression chain. Production and injection water processing: produced</td>
<td></td>
</tr>
<tr>
<td>water treatment technologies for offshore facilities; seawater treatment for</td>
<td></td>
</tr>
<tr>
<td>injection; chlorination, filtration, oxygen removal, sulfate removal.</td>
<td></td>
</tr>
<tr>
<td><strong>Safety Engineering Applied to Offshore Developments</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Process hazard analysis - HAZID studies, HAZOP studies. Plant layout in</td>
<td></td>
</tr>
<tr>
<td>offshore facilities. Case study of shallow waters and FPSO.</td>
<td></td>
</tr>
<tr>
<td>Major hazard assessment in offshore process facilities. Safety instrumented</td>
<td></td>
</tr>
<tr>
<td>systems. Fire detection and protection systems. Emergency evacuation and rescue</td>
<td></td>
</tr>
<tr>
<td>in offshore facilities.</td>
<td></td>
</tr>
<tr>
<td><strong>Environmental Impact Management of Offshore Development Projects</strong></td>
<td>5 d</td>
</tr>
<tr>
<td>Environmental impact of offshore production operations. Main regulations</td>
<td></td>
</tr>
<tr>
<td>regarding offshore operations. OSPAR, IMO, other regional agreements.</td>
<td></td>
</tr>
<tr>
<td>Environmental impact assessment in offshore projects. Best available</td>
<td></td>
</tr>
<tr>
<td>technologies for impact mitigation. Oil spill contingency plan.</td>
<td></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</td>
<td></td>
</tr>
<tr>
<td>projects. Project management: project cost estimation and cost control,</td>
<td></td>
</tr>
<tr>
<td>contracts management, offshore installation: preparation, installation</td>
<td></td>
</tr>
<tr>
<td>operations, construction vessels, works management.</td>
<td></td>
</tr>
<tr>
<td><strong>Offshore Field Development Project - Jury</strong></td>
<td>10 d</td>
</tr>
<tr>
<td>10-day teamwork offshore field development project based on actual data.</td>
<td></td>
</tr>
<tr>
<td>Participants are coached throughout the project to produce the required</td>
<td></td>
</tr>
<tr>
<td>deliverables, which are to be presented on the last day (jury): Field</td>
<td></td>
</tr>
<tr>
<td>architecture. Drilling campaign, well design and completion. (Subsea)</td>
<td></td>
</tr>
<tr>
<td>Production system design and sizing. Assessment of flow assurance issues,</td>
<td></td>
</tr>
<tr>
<td>Production structure and process scheme. HAZID, plant layout studies. Project</td>
<td></td>
</tr>
<tr>
<td>profitability. Project Management. Contracting strategy, Installation</td>
<td></td>
</tr>
<tr>
<td>Management.</td>
<td></td>
</tr>
</tbody>
</table>

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

This course is also available in French: ODEV/OFSHDEVFR. 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

<table>
<thead>
<tr>
<th>Course Content</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FUNDAMENTALS OF FLUID MECHANICS</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Total energy of a fluid; Bernoulli law.</td>
<td></td>
</tr>
<tr>
<td>Real fluid flow: viscosity, friction coefficient.</td>
<td></td>
</tr>
<tr>
<td>Flow regimes: laminar and turbulent flows.</td>
<td></td>
</tr>
<tr>
<td>Application: evaluation of pressure drop in a pumping station.</td>
<td></td>
</tr>
<tr>
<td><strong>MULTIPHASE FLOW</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Definition of multi-phase flow, main terminology.</td>
<td></td>
</tr>
<tr>
<td>Flow patterns, main considerations.</td>
<td></td>
</tr>
<tr>
<td>Basic understanding of different modeling approaches.</td>
<td></td>
</tr>
<tr>
<td><strong>GATHERING SYSTEMS DESIGN &amp; ARCHITECTURE SELECTION</strong></td>
<td>0.5 d</td>
</tr>
<tr>
<td>Types of gathering systems, a review of common architectures.</td>
<td></td>
</tr>
<tr>
<td>Backpressure &amp; well productivity.</td>
<td></td>
</tr>
<tr>
<td>Design practices and guidelines.</td>
<td></td>
</tr>
<tr>
<td>Main considerations: pressure drop, erosion velocities.</td>
<td></td>
</tr>
<tr>
<td>Design of pipelines, sizing criteria and sizing methodology.</td>
<td></td>
</tr>
<tr>
<td>Application: sizing of an oil/gas condensate production line.</td>
<td></td>
</tr>
<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>
<td></td>
</tr>
<tr>
<td>Surface considerations; alignment; surveying and mapping.</td>
<td></td>
</tr>
<tr>
<td>Construction; inspection and testing.</td>
<td></td>
</tr>
<tr>
<td>Operation and maintenance.</td>
<td></td>
</tr>
<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>
<td></td>
</tr>
<tr>
<td>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:</td>
<td></td>
</tr>
<tr>
<td>Well performance vs. back-pressure.</td>
<td></td>
</tr>
<tr>
<td>Multiphase flow modeling (flow regimes, liquid holdup, slug characteristics and pressure loss analysis) across the production network.</td>
<td></td>
</tr>
<tr>
<td>Comparison of different gathering network configurations.</td>
<td></td>
</tr>
<tr>
<td>Determination of optimal locations for pumps and compressors.</td>
<td></td>
</tr>
<tr>
<td>Identification of locations most prone to flow assurance issues (erosion, corrosion, hydrate formation, deposits).</td>
<td></td>
</tr>
<tr>
<td>Analysis of heat transfer across the production network and associated flow assurance issues.</td>
<td></td>
</tr>
<tr>
<td>Identification of bottlenecks and optimization opportunities.</td>
<td></td>
</tr>
<tr>
<td><strong>TIE-IN ASSESSMENT USING PIPESIM™</strong></td>
<td>1 d</td>
</tr>
<tr>
<td>Tie-ins and their impact on existing networks.</td>
<td></td>
</tr>
<tr>
<td>Implementation strategies, design and operation considerations.</td>
<td></td>
</tr>
<tr>
<td>Introduction to gathering network simulation using PIPESIM™.</td>
<td></td>
</tr>
<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
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

FUNDAMENTALS OF FLUID MECHANICS FRICTION LOSSES IN SINGLE-PHASE FLOW
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
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
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
Natural gas field development:
“Dry” scheme versus “Wet” scheme.
Main flow assurance issues (hydrates, TLC, surge liquid volume handling).
“Wet” scheme simulations.
Operating envelope.
Geometry impacts.
Example of slug-catcher design.

CRUDE OIL STREAMS
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: PROFICIENCY

Purpose
This course provides technical knowledge on Oil & Gas subsea production systems.

Audience
This course is designed for 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.

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

Course Content

Module 1: SUBSEA PRODUCTION SYSTEMS
5 d
Subsea components and field architecture.
Subsea construction and intervention.
Inspection, maintenance and repair.
Operation from production platforms.

Module 2: SUBSEA PIPELINES
4 d
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.

Module Content 9 days
Module 1: SUBSEA PRODUCTION SYSTEMS
5 d
Subsea components and field architecture.
Subsea construction and intervention.
Inspection, maintenance and repair.
Operation from production platforms.

Module 2: SUBSEA PIPELINES
4 d
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/OFFGB  
Only available as an In-House course.  
Contact: exp.rueil@ifptraining.com
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”. 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**
1.5 d
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.
Pipeline and riser concept.
Materials (steel, corrosion resistant alloys, anti-corrosion coatings, thermal insulation…).
Pipeline installation.
New technologies under development (subsea separation, subsea processing, subsea pumping, subsea compression, heating, surface support…).

**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.

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 excl. VAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueil-Malmaison</td>
<td>14 September</td>
<td>18 September</td>
<td>€3,510</td>
</tr>
</tbody>
</table>

This course is also available in French: SUB/SPSFR. 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”. 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

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

Location Start Date End Date Tuition Fees excl. VAT
Rueil-Malmaison 21 September 24 September €2,750

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**

<table>
<thead>
<tr>
<th>INSPECTIONS &amp; THEIR OBJECTIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>By contractor (with operator follow-up).</td>
</tr>
<tr>
<td>By operator.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEEP WATER SYSTEMS INSPECTION ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Standard” types.</td>
</tr>
<tr>
<td>Means, constraints, limitations.</td>
</tr>
<tr>
<td>Visual indications specific to deep subsea conditions.</td>
</tr>
<tr>
<td>Main challenges.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INSPECTION PLAN/INTERVALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory requirements, RBI approach…</td>
</tr>
<tr>
<td>Inspection plan.</td>
</tr>
<tr>
<td>Inspection zones, inspection mean times.</td>
</tr>
<tr>
<td>Inspection plan revision.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GENERIC SUPPORT DOCUMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECIFIC SUPPORT DOCUMENTS</td>
</tr>
<tr>
<td>INSPECTION MANAGEMENT DATABASE</td>
</tr>
<tr>
<td>Objectives and functionalities.</td>
</tr>
<tr>
<td>Contents and structure.</td>
</tr>
<tr>
<td>Inputs and outputs.</td>
</tr>
</tbody>
</table>

| 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.
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
- Production & HSE
  Engineering & Project Management
232 avenue Napoléon Bonaparte
92852 Rueil-Malmaison Cedex - France
Secretarial Department
Tel. + 33 (0)1 41 39 11 60
Fax + 33 (0)1 47 08 92 83
ep.contact@ifptraining.com

Pau
- Drilling & Completion
- Production & HSE
  Engineering & Project Management
Rue Paul et Henri Courteault
64000 Pau - France
Secretarial Department
Tel. + 33 (0)5 59 30 82 50
Fax + 33 (0)5 59 30 68 76
ep.contact@ifptraining.com

Refining & Chemicals

Rueil-Malmaison
232 avenue Napoléon Bonaparte
92852 Rueil-Malmaison Cedex - France
Secretarial Department
Tel. + 33 (0)1 41 39 11 00
Fax + 33 (0)1 47 08 92 83
rc.contact@ifptraining.com

Martigues
Le Bâteau Blanc - Bât. C
Chemin de Paradis
13500 Martigues - France
Secretarial Department
Tel. + 33 (0)4 42 44 43 00
Fax + 33 (0)4 42 80 61 20
rc.contact@ifptraining.com

Lillebonne
Immeuble Futura 1
Rue A. Desgenetais
76170 Lillebonne - France
Secretarial Department
Tel. + 33 (0)2 35 39 60 77
Fax + 33 (0)2 35 38 62 03
rc.contact@ifptraining.com

Solaize
Rond-point de l’échangeur de Solaize
BP3 - 69360 Solaize - France
Secretarial Department
Tel. + 33 (0)4 37 37 68 20
rc.contact@ifptraining.com

CFA Lillebonne
Immeuble Futura 1
Rue A. Desgenetais
76170 Lillebonne - France
Secretarial Department
Tel. + 33 (0)2 35 39 60 70
Fax + 33 (0)2 35 38 62 03
op.certif@ifptraining.com

Lillebonne
Immeuble Futura 1
Rue A. Desgenetais
76170 Lillebonne - France
Secretarial Department
Tel. + 33 (0)2 35 39 60 77
Fax + 33 (0)2 35 38 62 03
rc.contact@ifptraining.com

IC Engines & Lubricants

232 avenue Napoléon Bonaparte
92852 Rueil-Malmaison Cedex - France
Secretarial Department
Tel. + 33 (0)1 41 39 12 00
Fax + 33 (0)1 47 08 92 83
ml.contact@ifptraining.com

Economics & Management

232 avenue Napoléon Bonaparte
92852 Rueil-Malmaison Cedex - France
Secretarial Department
Tel. + 33 (0)1 41 39 10 80
Fax + 33 (0)1 47 08 92 83
em.contact@ifptraining.com

IFP Training Middle-East

contact.middleeast@ifptraining.com
Tel. +973 17 21 01 38

IFP Training Congo

contact.congo@ifptraining.com
Tel. + 242 (0)6 655 43 43
Tel. + 33 (0)1 41 39 12 12

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 initialed 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 to 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: NATXFRPPPXX

For 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.
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 conditions 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.
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 6th 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 anyone put in contact with the other Party by one Party during the training session. All educational documents and information transmitted by a Party within the framework of the training sessions belong to the said Party and/or 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. Under no circumstances may these GTS be interpreted as conferring, expressly or implicitly, on the recipient Party the grant by the disclosing Party of a license right, or a promise to grant a license right, for any direct or indirect reproduction, adaptation, modification, representation or dissemination by the recipient Party, in any form whatsoever, of all or part of the documents (in particular educational documents produced by IFP Training) transmitted by the disclosing Party and/or the information contained, to its non-participants at the session or to third parties; any use for the purpose of marketing, organizing or carrying out training activities (including internal training) is expressly prohibited. The Recipient Party is responsible for any unauthorized use, copying or distribution of information or documents (in particular educational documents produced by IFP Training) transmitted by the disclosing Party as part of the training sessions.

The Client agrees not to remove any proprietary notices present on educational documents sent by IFP Training as part of the services.

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 the IFP Training Clients for advertising purposes, on any support and medium.

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.

The Parties agree to consider as a Force Majeure event notably extreme weather conditions, lightning or fire, any requirement demanded for the protection of public safety, strikes, social movements from the personnel of the prevented Party or from the personnel of its subcontractor(s).

The Party that is prevented from executing its obligations under the present Training Order because of the occurring of a Force Majeure event shall inform the other Party(ies), as quickly as possible by any means, confirmed in writing by the dispatching of registered letter with an acknowledgement of receipt, within a five (5) working days period following the occurrence of said event, indicating the nature of its circumstances and, as far as possible, its estimated duration and the extent of the impediment. 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 in this delay or in the effects of the 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.

In case of a Force Majeure occurrence lasting more than thirty (30) consecutive days, the Party faced with such Force Majeure occurrence can immediately terminate, by the dispatching of registered letter with an acknowledgement of receipt, the Training Order, without compensation to the other Party.

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 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.

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.

All 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.