## Facilities Course Progression Map

### Oil and Gas Processing
- **Gas**
  - Troubleshooting Oil and Gas Processing Facilities – PF49
  - Separation Equipment - Selection & Sizing – PF42
  - Gas Treating and Sulfur Recovery – G6
- **Oil / Water**
- **General Processing**
  - Oil Well Pad Facilities (For Facilities Engineers) – OWPF-FE
  - Fundamental and Practical Aspects of Produced Water Treating – PF25
  - Applied Water Technology in Oil and Gas Production – PF21

### Process Safety
- **Electrical**
  - Process Safety Engineering – PS4
  - Risk Based Process Safety Management – HS45
  - Electrical Engineering Fundamentals for Facilities Engineers – E3
  - Fundamentals of Process Safety – PS2
- **Instrumentation & Controls**
  - Process Safety Engineering – PS4
  - Risk Based Process Safety Management – HS45
  - Electrical Engineering Fundamentals for Facilities Engineers – E3
  - Instrumentation and Controls Fundamentals for Facilities Engineers – IC3
  - Corrosion Management in Production/Processing Operations – PF22

### Instrumentation, Controls & Electrical
- **Electrical**
  - Practical PID Control and Loop Tuning – IC74
  - Flow and Level Custody Measurement – IC73
  - Valve and Actuator Technologies – IC72
  - PLC and SCADA Technologies – IC71
  - Flow Assurance for Offshore Production – FAOP
- **Instrumentation & Controls**
  - Electrical Engineering Fundamentals for Facilities Engineers – E3
  - Instrumentation and Controls Fundamentals for Facilities Engineers – IC3
  - Offshore Pipeline Design and Construction – PL43
  - Corrosion Management in Production/Processing Operations – PF22

### Offshore & Subsea
- **Offshore**
  - Overview of Offshore Systems: Design and Construction – OS4
  - Offshore Pipeline Facilities: Design, Construction and Operations – PL42
- **Subsea**
  - Overview of Subsea Systems – SS2

### Pipeline Engineering
- **Pipeline Engineering**
  - Terminals and Storage Facilities – PL44
  - Gas Conditioning and Processing - LNG Emphasis – G4LNG
  - Gas Conditioning and Processing – G4
  - Gas Conditioning and Processing Principles – G3 Virtual/Blended Course

### Basic
- **Introduction to Oil and Gas Production Facilities – PF2**
- **Overview of Gas Processing – G2**
- **Oil Well Pad Facilities (For Non-Facilities Engineers) – OWPF-NFE**
- **LNG Short Course: Technology and the LNG Chain – G20**
- **Choosing the Right Facilities Equipment for the Reservoir – PF3**

### Specialized
- **Fundamentals of Process Safety**
  - Basic
  - Introduction to Oil and Gas Production Facilities – PF2
  - Overview of Gas Processing – G2
  - Choosing the Right Facilities Equipment for the Reservoir – PF3
  - LNG Short Course: Technology and the LNG Chain – G20
  - Oil Well Pad Facilities (For Non-Facilities Engineers) – OWPF-NFE
  - Introduction to Oil and Gas Production Facilities – PF2
## Facilities Course Progression Map

### Mechanical Engineering
- **Non-Rotating**
  - Compressor Systems - Mechanical Design and Specification – ME46
- **Rotating**
  - Piping Systems - Mechanical Design and Specification – ME41
  - Fundamentals of Pump and Compressor Systems – ME44
- **Reliability**
  - Mechanical Specification of Pressure Vessels and Heat Exchangers – ME43
  - Process Plant Reliability and Maintenance Strategies – REL5

### Operations & Maintenance
- **O&M Management**
  - Petroleum Project Changes and Claims Workshop – PPCC
  - Construction Mgmt for the Project Professional – FPM64

### Project Mgmt.
- **Advanced Project Management**
  - Petroleum Project Management Principles and Practices – PPM
  - Managing Brownfield Projects – FPM42
  - Project Management for Engineering and Construction – FPM22
  - Project Controls for Capital Projects – PC21

### Procurement/Supply Chain Management
- **Advanced Project Management II**
  - Inside Procurement in Oil & Gas – SC61
- **Advanced Project Mgmt Workshop**
- **Supplier Relationship Management**
  - Strategic Procurement and Supply Management in the Oil and Gas Industry – SC62

### Additional courses available in:
- **Production & Completions**
- **Health, Safety, Environment**
- **Petroleum Business**
- **Professional Petroleum Development**
- **Multi-Discipline Training**
PetroSkills | John M. Campbell provides world class face to face operator training. In addition to our public course offerings, we have in-house training also. The in-house training offerings are fully customized to match your operations. Our operations and maintenance training group will work with your facilities supervisors to build a program specific to meet your needs with no customization fees. The current listing of available modules is in the table below. If you have a unit operations not listed, we would be happy to build the module to fit your needs. We can also arrange on-site facility tours to provide a “boots on the ground” experience in the training session with our instructors.

### GAS PROCESSING MODULES
- Overview of Gas Processing
- Overview of Oil and Gas Processing (optional)
- Industry terminology
- Process drawings
- Units of measurement
- Hydrocarbons physical properties
- Phase behavior fundamentals
- Water / hydrocarbon behavior
- Basic principles of fluid flow
- Amine gas sweetening
- TEG gas dehydration
- Mole sieve dehydration
- NGL Refrigeration Plants
- Gas expansion NGL recovery (valve and turboexpander)
- GSP (T/E) Process Operations
- Mechanical Refrigeration
- Mixed Refrigeration
- Cascade Refrigeration
- NGL stabilization and fractionation
- Gas sweetening and sulfur recovery
- Introduction to LNG facilities
- LNG Pre-treatment systems
- LNG COP Cascade® Overview
- LNG MR / DMR Overview
- LNG Storage, Pumping, Offloading and Boil-off management
- LNG Fire control systems

### OIL PRODUCTION AND PROCESSING MODULES
- Overview of Oil and Gas Processing
- Industry terminology
- Process drawings
- Units of measurement
- Hydrocarbons physical properties
- Phase behavior fundamentals
- Water / hydrocarbon behavior
- Basic principles of fluid flow
- Basic crude oil well pad operations
- Gas lift systems
- Production separators
- Crude oil dehydration
- Crude oil desalting
- Crude oil, condensate, and NGL stabilization
- Crude oil storage and vapor recovery systems
- Crude oil pipeline systems
- Produced water treating
- Process troubleshooting

### GENERAL / EQUIPMENT SPECIFIC / AND UTILITIES MODULES
- Practical thermodynamics: mass and energy balances
- Heat exchangers and fired heaters
- Mechanical refrigeration
- Introduction to process control
- Centrifugal pumps
- Positive displacement pumps
- Centrifugal compressors
- Positive displacement compressors
- Introduction to gas turbines
- Introduction to steam turbines
- Power generation systems
- Corrosion and corrosion monitoring
- Fire and Gas systems
- Relief and Flare systems
- Instrument air, utility air, and nitrogen systems
- Drain systems
- Cooling water systems
- Steam and condensate systems

CONTACT PETROSKILLS TODAY
WWW.PETROSKILLS.COM
CASE STUDY: A MAJOR MIDSTREAM OPERATOR CONDUCTS TAILORED OPERATOR TRAINING

CHALLENGE: A major midstream operator active in shale development in the Northeastern US needed to confirm that its operators possessed the equipment and process knowledge required to operate its gas processing facilities in a safe and efficient manner. Operator workload and availability issues dictated that the training be focused on specific topics and deliverable in a three-day format.

SOLUTION: A PetroSkills instructor consulted with the client’s supervisory and subject matter expert staff to design a 3-day course addressing the topics most relevant to the client’s specific facilities. In a series of telephone conversations, the instructor and client representatives selected key elements from the PetroSkills standard 5-day operator course, OT-1, to design a course specifically addressing the client’s technical and timing requirements. In addition, client-specific supporting documents such as facility drawings and operating procedures were identified and incorporated into the course to enhance the relevance and value of the learning experience.

IMPACT: Through multiple deliveries of the shorter and more focused custom course, the client provided the needed training to its operator workforce with minimal impact to its day-to-day operations. Emphasis on how the underlying technical principles and knowledge could be applied in all aspects of facility operation generated ‘buy-in’ from the operators and met or exceeded all the client’s expectations in terms of knowledge transfer.

CONTACT PETROSKILLS TODAY ABOUT HOW WE CAN DESIGN A COURSE FOR YOUR OPERATOR WORKFORCE
# Oil and Gas Processing Facilities for Operations and Maintenance – OT1

## BASIC 5-DAY

The public course content is governed by the common production / processing facilities in the regions where the course is being held. There are gas / LNG content focus, gas / expander plant, or oil / water / gas focused courses. All locations include an overview of gas processing, industry terminology, process drawings, units of measurement, hydrocarbons physical properties, phase behavior fundamentals, plus the localized topics below. Course content is customizable to client needs at no additional cost.

- **Marcellus / Bakken Gas Processing Modules**
  - Basic principles of fluid flow
  - Amine gas sweetening
  - Mole sieve dehydration
  - Mechanical Refrigeration
  - GSP (T/E) Process Operations
  - NGL stabilization and fractionation

- **Permian / Eagle Ford / North Sea Oil and Gas Production and Processing Modules**
  - Basic principles of fluid flow
  - Gas lift systems
  - Production separators
  - Crude oil dehydration
  - Crude oil desalting
  - Crude oil, condensate, and NGL stabilization
  - Crude oil storage and vapor recovery systems
  - Crude oil pipeline systems
  - Produced water treating
  - Process troubleshooting

- **Australia Gas Processing Modules**
  - Water / hydrocarbon behavior
  - Basic principles of fluid flow
  - Amine gas sweetening (not in Brisbane)
  - Mole sieve dehydration
  - Mechanical refrigeration
  - Cascade refrigeration
  - Mixed refrigerants
  - NGL stabilization and fractionation
  - LNG facilities
  - Process troubleshooting

## DESIGNED FOR

Facility operators who require a working knowledge of the various processes used in production fluid conditioning and processing, including the common operational difficulties that may arise and operational tactics used to resolve them. Also suitable for maintenance technicians, supervisors, and managers, as well as other non-engineering personnel who would benefit in an understanding of gas processing techniques that can be applied in their daily work activities.

## YOU WILL LEARN

- The effects of produced fluid compositions (oil/gas/water) on facility operation
- About separation, conditioning, and processing operations to meet product specifications on oil, gas, and produced water streams for disposal/re-use
- How to operate facilities to minimize operating costs
- How to apply course material to troubleshooting equipment and unit operations

## COURSE CONTENT

- Physical properties of hydrocarbons
- Phase behavior fundamentals
- Water/hydrocarbon behavior
- TEG equipment
- TEG system operating procedures and problems
- Care of the TEG system
- Mole sieve gas dehydration
- Operation and adsorbent life
- Mole sieve operating problems and troubleshooting
- Amine gas sweetening
- Amino system operating procedures and problems
- Makeup water
- Anti-foam chemicals
- Managing system corrosion

## SEE WEBSITE FOR DATES AND LOCATIONS.

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# Amine Sweetening and Gas Dehydration for Operations and Maintenance – OT41

## FOUNDATION 4-DAY

This course will provide the basic knowledge required for understanding operating issues in natural gas amine sweetening and dehydration units. Course content is customizable to client needs at no additional cost.

## DESIGNED FOR

Plant and facility operations and maintenance technicians, supervisors, and managers.

## YOU WILL LEARN

- Basic principles of gas processing
- The physical properties of hydrocarbons
- Practical application of the principles of gas dehydration and formation
- To determine the water content of produced natural gas and the effects of acid gases
- The problems and dangers of hydrate formation
- Effective methods of hydrate inhibition
- The two types of dehydration processes: absorption and adsorption
- Principles and operational elements of TEG gas dehydration
- Principles and operational elements of mole sieve gas dehydration
- Principles and operational elements of amine sweetening

## COURSE CONTENT

- Physical properties of hydrocarbons
- Phase behavior fundamentals
- Water/hydrocarbon behavior
- TEG equipment
- TEG system operating procedures and problems
- Care of the TEG system
- Mole sieve gas dehydration
- Operation and adsorbent life
- Mole sieve operating problems and troubleshooting
- Amine gas sweetening
- Amino system operating procedures and problems
- Makeup water
- Anti-foam chemicals
- Managing system corrosion

## SEE WEBSITE FOR DATES AND LOCATIONS.

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# NGL Extraction, Stabilization and Fractionation for Operations and Maintenance – OT42

## FOUNDATION 4-DAY

This course is designed to deliver the basic knowledge required for understanding operating issues in NGL (Natural Gas Liquids) extraction and stabilization/fractionation. Course content is customizable to client needs at no additional cost.

## DESIGNED FOR

Plant and facility operations and maintenance technicians, supervisors, and managers.

## YOU WILL LEARN

- About the various unit operations required in gas processing and how they impact one another
- Conditions that favor hydrate formation, and methods to mitigate hydrates (hydrate inhibition)
- Principles and operations of gas compressors (centrifugal/scroll/reciprocating)
- Principles, operations, and troubleshooting mechanical refrigeration systems (propane economized systems)
- Molecular sieve dehydration operations and issues
- Operating principles, typical performance, and issues in LNG extraction processes (recovery/UT valve/turboparaxpanders)
- NGL stabilization and fractionation principles, operations, controls, and common operating problems

## COURSE CONTENT

- Overview of gas processing
- Water/hydrocarbon behavior
- Water/hydrocarbon behavior (hydrates and hydrate inhibition)
- Compression
- Mechanical refrigeration
- Molecular sieve dehydration
- NGL extraction (recovery with MEG inhibition, valve expansion, turboparaxpanders)
- Fractionation fundamentals
- Physical properties of hydrocarbons
- Phase behavior of hydrocarbons
- Troubleshooting

## SEE WEBSITE FOR DATES AND LOCATIONS.

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# LNG Facilities for Operations and Maintenance – OT43

## FOUNDATION 5-DAY

This 5-day, LNG facilities course provides an overview of field operations, and an in-depth review of the in-plant equipment and processes. The course includes the two most common types of LNG liquefaction processes, the AP–C3MR™ and ConocoPhillips Optimized Cascade® Process. Class exercises/problems focus on the application of theory to operational trends, so operators can understand their processes and become more proficient at identifying issues and troubleshooting problems before production suffers. Course content is customizable to client needs at no additional cost.

## DESIGNED FOR

LNG facility operators who require a working knowledge of the various processes used in LNG facilities, including the common operational difficulties that may arise and operational tactics used to resolve them. Also suitable for maintenance technicians, supervisors, and managers, as well as other non-engineering personnel who would benefit from an understanding of gas processing techniques that can be applied in their daily work activities.

## YOU WILL LEARN

- Overview of oil and gas processing, including typical field operations
- The required feed quality specifications for LNG facilities, including issues with common contaminants
- Separation equipment with a focus on critical separation equipment in LNG facilities
- Operational aspects of acid gas removal units (AGRU) for LNG facilities
- Gas dehydration processes for LNG (including pre-cooling and molecular sieve)
- Mercury removal processes for LNG, and location/performance in the facility
- Centrifugal compressor operations and issues
- Refrigeration system operational principles (propane, cascade and mixed refrigerant)
- NGL stabilization and fractionation processes (regional)
- LNG CDP Cascade® Process Overview
- LNG AP–C3MR™ Process Overview
- LNG storage operations and considerations
- LNG ship loading and boil-off gas management issues and considerations
- Application of hydrocarbon physical properties and phase behavior to understand the process operational issues within the overall facility
- Gas turbine operations and issues
- Hydrocarbon physical properties and phase behavior as the natural gas flows through the plant

## COURSE CONTENT

- Overview of oil and gas processing
- Separation equipment
- LNG feed quality requirements
- LNG pre-treatment systems (AGRU/molecular sieve/Hg removal)
- Fundamentals of centrifugal compression
- Refrigeration principles (propane, cascade and mixed refrigerant)
- NGL stabilization and fractionation (regional)
- LNG CDP Cascade® Process Overview
- LNG AP–C3MR™ Process Overview
- LNG storage operations and considerations
- LNG shiploading operations and considerations
- Boil-off gas management methods
- and more...

## SEE WEBSITE FOR DATES AND LOCATIONS.
**Crude Oil Pipeline Operations – OT50**

**INTERMEDIATE 3-DAY**

Scheduled turnarounds are difficult to manage. Managing a surprise shutdown or outage is like firefighting. Firefighters succeed because they know what strategies work and are highly trained to handle complex, risky situations. Uncertainty and complexity abound when a plant is down. Extra work can appear when equipment is opened and inspected. Integrating project work increases the challenge. Experienced instructors show you how to control scope uncertainty, tackle the complexity of integrating project work, and get the facility restarted. Upon completion you will know how to deploy scarce resources (time, people and materials) to complete work on time and within budget; utilize best practices in TSO planning, execution and closeout; and manage engineering, maintenance, operations and project interfaces. A blend of instruction, guided discussion, and hands-on exercises using real world examples makes the sessions thought provoking. The exercises will include both single and group activities. Course content is customizable to client needs at no additional cost.

**DESIGNED FOR**

Managers, supervisors, engineers, schedulers in maintenance, operations, reliability, HSE, procurement and projects should attend. This course also helps business, commercial, finance and other non-technical personnel who want to know more about turnaround, shutdown and outage best practices.

**YOU WILL LEARN HOW TO**

- Establish goals to ensure support from all facility stakeholders
- Develop a robust resource plan and get the resources you need
- Integrate scopes for both maintenance and projects
- Establish turnaround scope selection criteria early
- Select a computerized work system
- Address key outage constraints and operations interfaces
- Develop a robust contracting plan
- Prepare an execution plan
- Measure and control shutdown progress

**COURSE CONTENT**

Six phases of turnaround, outage and shutdown management • Issues and challenges • Quality control • Health, safety and environmental planning • Computerized systems benefits and choices • Integrating the plan • Managing stakeholders and resources • Procurement and contracting • Tracking progress and controlling change

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**Turnaround, Shutdown and Outage Management – TSOM**

**INTERMEDIATE 3-DAY**

Scheduled turnarounds are difficult to manage. Managing a surprise shutdown or outage is like firefighting. Firefighters succeed because they know what strategies work and are highly trained to handle complex, risky situations. Uncertainty and complexity abound when a plant is down. Extra work can appear when equipment is opened and inspected. Integrating project work increases the challenge. Experienced instructors show you how to control scope uncertainty, tackle the complexity of integrating project work, and get the facility restarted. Upon completion you will know how to deploy scarce resources (time, people and materials) to complete work on time and within budget; utilize best practices in TSO planning, execution and closeout; and manage engineering, maintenance, operations and project interfaces. A blend of instruction, guided discussion, and hands-on exercises using real world examples makes the sessions thought provoking. The exercises will include both single and group activities. Course content is customizable to client needs at no additional cost.

**DESIGNED FOR**

Managers, supervisors, team leaders, or managers needing to improve their maintenance programs. This course is a broad survey of essential aspects of maintaining a safe, efficient, and reliable facility asset.

**YOU WILL LEARN**

- World class maintenance standards and how to apply them
- Key performance indicators for your dashboard
- Essential elements of work planning and scheduling
- Optimization of preventive and predictive maintenance
- To focus your resources on critical equipment
- How to work with contractors more effectively
- Development of organizational competence

**COURSE CONTENT**

World class standards • Maintenance strategies • Planning and scheduling • Optimizing preventive and predictive maintenance • Identifying critical equipment • Developing organizational competence • Presenting your action plan

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**Maintenance Planning and Work Control – OM41**

**INTERMEDIATE 3-DAY**

Applies regulatory codes, standards, and industry guidelines (PSMHA 195, ASME B31.4, API-1173 and others) that control and guide the operation and maintenance of pipeline facilities. • Explain fluid properties and behavior of crude oils, wax behavior, temperature relationships and use of DRA in crude oil pipelines • Explain pipeline hydraulics, pipeline pressure gradients and predict capacity on the system • Identify pipeline MOP; surge and causes of overpressure and mitigation measures • Explain pipeline facilities; pump stations, filtration, metering and LACT units, sampling and testing, pigging equipment, tank terminals and truck/rail loading facilities • Explain liquid pipeline operations; commissioning and purging/filling, startup, stopping, pigging and pig receiver operations, measurement and sampling activities • Identify principle causes of loss of containment and mitigating measures; corrosion, environmental cracking, overpressure, 3rd party damage and error • Review regulatory compliance requirements for CFR 49, Part 195, to be better prepared in the case of compliance audits • Explore emergency response measures to spills and loss of containment

**COURSE CONTENT**

Crude oil transportation systems • Industry codes and regulations, scope and applicability • Crude oils, waxes and DRA, fluid properties and behavior • Hydraulic analysis of pipelines and gradients • Pipeline pumps – components, operation, seal systems and seal leak detection • Pipeline surge and overpressure protection systems • Pipeline facilities – filtration, pressure controls, pigging equipment • Terminal facilities – tanks, truck/rail loading, metering, sampling and proving • Pigging goals, processes and activities • Pipeline repairs and maintenance • Corrosion overview and prevention • Leak detection methods • CFR 49, Part 195 review of documentation requirements and terminology

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**Applied Maintenance Management – OM21**

**BASIC 5-DAY**

No matter the price of oil, safe, efficient operations require well managed, integrated asset management. Effective, well organized maintenance management is the key. In this course, participants will receive a sound, integrated, basic knowledge of the maintenance function and how to progress towards world-class performance. Individual action plans will carry course learning into the work environment. A pre and post seminar self-assessment will be given to indicate delegates’ competency improvements. The assessment is taken from the PetroSkills industry standard competency map for Maintenance Management. Course content is customizable to client needs at no additional cost.

**DESIGNED FOR**

Maintenance supervisors, team leaders, or managers needing to improve their maintenance programs. This course is a broad survey of essential aspects of maintaining a safe, efficient, and reliable facility asset.

**YOU WILL LEARN**

- World class maintenance standards and how to apply them
- Key performance indicators for your dashboard
- Essential elements of work planning and scheduling
- Optimization of preventive and predictive maintenance
- To focus your resources on critical equipment
- How to work with contractors more effectively
- Development of organizational competence

**COURSE CONTENT**

World class standards • Maintenance strategies • Planning and scheduling • Optimizing preventive and predictive maintenance • Identifying critical equipment • Developing organizational competence • Presenting your action plan

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**Maintenance Planning and Work Control – OM41**

**INTERMEDIATE 3-DAY**

You will learn a systematic approach to planning projects. This course is designed to build competency in Work Control as a primary skill set required to achieve these new standards. It will focus on the six phases of work management: work identification, planning, prioritization, scheduling, execution, and history capture. These essential skills are the key components of integrity management, safety, efficient resource utilization, and reliable operation: A pre and post self-assessment will be used to measure competency improvement. In order to improve facility asset management, each participant will develop an action plan to help their organizations in the long-term effort to become more efficient and safe. Course content is customizable to client needs at no additional cost.

**DESIGNED FOR**

Maintenance managers, superintendents, supervisors, team leaders, and planners engaged in work management, planning, and scheduling.

**YOU WILL LEARN**

- To develop world class planning and work control
- To employ business process analysis techniques in work control
- How to use a gap analysis on your work management system
- Step-by-step work control from identification through using work history
- Optimization of preventive and condition-monitoring activities
- Techniques: critical equipment analysis, critical spares control, and emergency response work

**COURSE CONTENT**

Work identification • Planning prioritization • Scheduling execution • History records • Optimizing preventive maintenance • Predictive maintenance planning • Critical equipment focus • Emergency response

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**2019-2020 Schedule and Tuition (US)**

<table>
<thead>
<tr>
<th>Location</th>
<th>Dates</th>
<th>Fee (USD)</th>
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<tr>
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<td>24-26 AUG 2020</td>
<td>$3370</td>
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<tr>
<td>DUBAI, UAE</td>
<td>13-17 OCT 2019</td>
<td>$4525+VAT</td>
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<tr>
<td>HOUSTON, US</td>
<td>16-20 MAR 2020</td>
<td>$4145</td>
</tr>
</tbody>
</table>

See website for dates and locations.
**Fundamentals of Process Safety** – PS2

**FOUNDATION 5-DAY**

The course will cover the fundamentals of Process Safety for all staff levels of processing facilities in the upstream and downstream oil, gas, and petrochemical industry. To identify how different disciplines and roles can have an impact on Process Safety performance, there is a rolling case study (Project COLEX) throughout the course that involves the installation of a separator vessel, and the Process Safety considerations and implications are explored and discussed at the various stages, from design to full operation.

**DESIGNED FOR**
The course will benefit all staff associated with the operation, maintenance, and governance in production and processing facilities and is relevant to roles, including senior management, project and engineering support teams, HSE support, supervisors, and operators and maintenance technicians. It provides an understanding of the design basis and essentials for safe operations, without addressing the more detailed calculation aspects covered in Process Safety Engineering PS4.

**YOU WILL LEARN HOW TO**
- Identify the systems and processes required to develop process safety in a high hazard installation
- Identify and choose appropriate techniques and tools to qualitatively assess process hazards
- Determine appropriate risk reduction strategies and identify effective risk reduction measures to prevent, control, and mitigate process safety risk
- Recognize and develop systems to manage Process Safety in operations through operating procedures and operating limits, ensuring plant integrity through maintenance and inspection
- Use a management of change process to minimize risk of change
- Identify and monitor key performance measures and verifications to maintain and improve safety performance

**COURSE CONTENT**
Business context for Process Safety • Risk assessment (hazard identification, hazard scenarios, consequence and likelihood analysis, and risk analysis and tools and techniques) • Risk reduction measures (barriers) (types and hierarchy of risk reduction measures (barriers)) • Management of process safety in operations (operating procedures, design and operating limits, human factors, inspection and maintenance, emergency response) • Management of change • Learning from previous incidents and near misses • Self-evaluation and measurement • Process safety key performance indicators • Management review and auditing • Process safety leadership (governance and culture)

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**Risk Based Process Safety Management** – HS45

**FOUNDATION 5-DAY**

This course introduces process safety management in the oil and gas industry, the elements and benefits of process safety management systems, and tools for implementing and managing a system. In this course the participant will learn to use tools and techniques for managing process safety. The Center for Chemical Process Safety’s (CCPS) book titled “Guidelines for Risk Based Process Safety” or “RBPS Guidelines” will be the text for this course. Participant centered exercises and selected case studies will be used to build on the concepts that CCPS advocates for risk based process safety.

Throughout the course, participants will be challenged to think about how their process safety management system can be enhanced and modified to meet the concepts of risk-based decision making. An individual action plan will be developed to apply the information from the course to the workplace.

**DESIGNED FOR**
HSE professionals, operations and maintenance technicians, engineers, supervisors and project managers requiring a basic foundation in developing and managing process safety. The more technical aspects of process safety engineering are covered in PS4, Process Safety Engineering.

**YOU WILL LEARN HOW TO**
- Identify processes applicable to Process Safety Management (PSM) and describe relevant terms used
- Identify which standards are to be applied for managing process hazards
- Apply programs and tools for managing a PSM system
- Choose appropriate decision making methods and tools to identify process hazards
- Describe and use techniques available for control of hazards associated with process designs
- Describe the criteria and methods of selecting equipment and safe guarding controls
- Research and apply the performance parameters for the safety systems in operations
- Explain the role of all disciplines and their contribution to the management of potential HSE hazards

**COURSE CONTENT**
Process safety culture and competency • Compliance with standards • Understand hazards and risk • Operating procedures and safe work practices • Asset integrity and reliability • Management of change • Conduct of operations • Incident investigation (associated with plant failure) • Measurement and metrics • Management review and continuous improvement

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**Process Safety Engineering** – PS4

**FOUNDATION 5-DAY**

This is a competency driven, fundamental course covering the broad scope of process safety engineering. Other topics relevant to process safety are introduced, showing how process safety engineering fits into the broader context of risk management and process safety management, but the emphasis is on the technical content. While many of the examples are drawn from upstream and midstream oil and gas facilities, the principles are applicable across all hydrocarbon processing industries. The course is designed to accelerate the participants process safety learning curve. Serious process safety incidents occur somewhere in the industry nearly every week, and few if any are new; essentially the same ways of going wrong are found repeatedly, in different operating contexts. One of the main objectives of PS-4 is to develop knowledge of the more common ways of going wrong, and one of the ways of doing that is discussion of major incidents, including some of those that have affected our regulatory environment. PS-4 graduates should be able to see their facilities and projects with a new perspective, a new sense of not only how things work, but also of how things fail.

**DESIGNED FOR**
Anyone who needs to work with process safety engineers; this would include facilities engineers, operations and maintenance supervisors, project engineers and managers, entry level process safety engineers, experienced professionals new to oil and gas, and anyone who needs a general understanding of the breadth of the process safety engineering discipline. Technical staff from insurance companies and regulatory agencies have found the course useful. Those requiring a less technical course may be interested in PS-2, Fundamentals of Process Safety. For risk based process safety management is the subject of HS-45.

**YOU WILL LEARN**
- Types of equipment and process systems that have historically been problematic in the upstream and midstream oil and gas industry
- Basics of risk analysis
- Thinking in terms of Inherently Safer Design
- Most common process hazard analysis methods and where they are used
- Layers of Protection concept – what the different layers are and how they are applied
- Detection and mitigation methods for different types of hazards

**COURSE CONTENT**
Historical incidents and problem areas • Risk analysis basics • Process hazards analysis techniques – overview • Layers of protection • Inherently safer design • Hazards associated with process fluids • Leak and dispersion of hydrocarbons • Combustion behavior of hydrocarbons • Sources of ignition • Hazards associated with specific plant systems • Plant layout and equipment spacing • Fire protection systems • SS, monitoring and control
Safe and productive operations rely on skilled and knowledgeable workers. With the right knowledge, operators can anticipate issues and take actions that reduce risk and avoid costly errors. ePilot gives learners anytime/anywhere access to secure, online learning programs proven to effectively transfer knowledge.

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