PetroSkills®

2017 Operations & Maintenance Training Guide

OGCI® John M. Campbell RDC

Course Progression Map

Operations & Maintenance (O&M) provides training designed to help your team perform safely and efficiently.

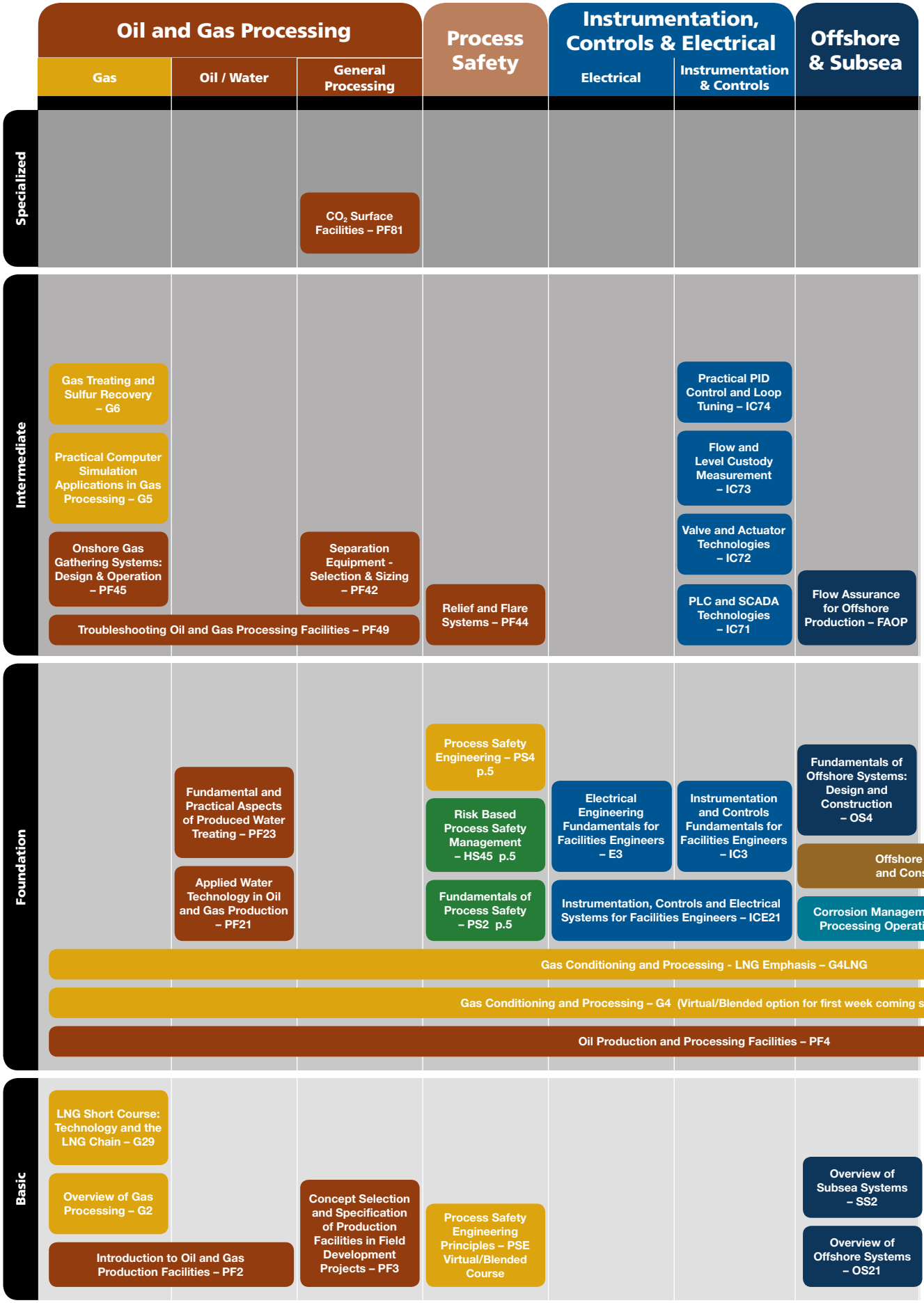
Skilled technicians are safe technicians.

PetroSkills O&M courses:

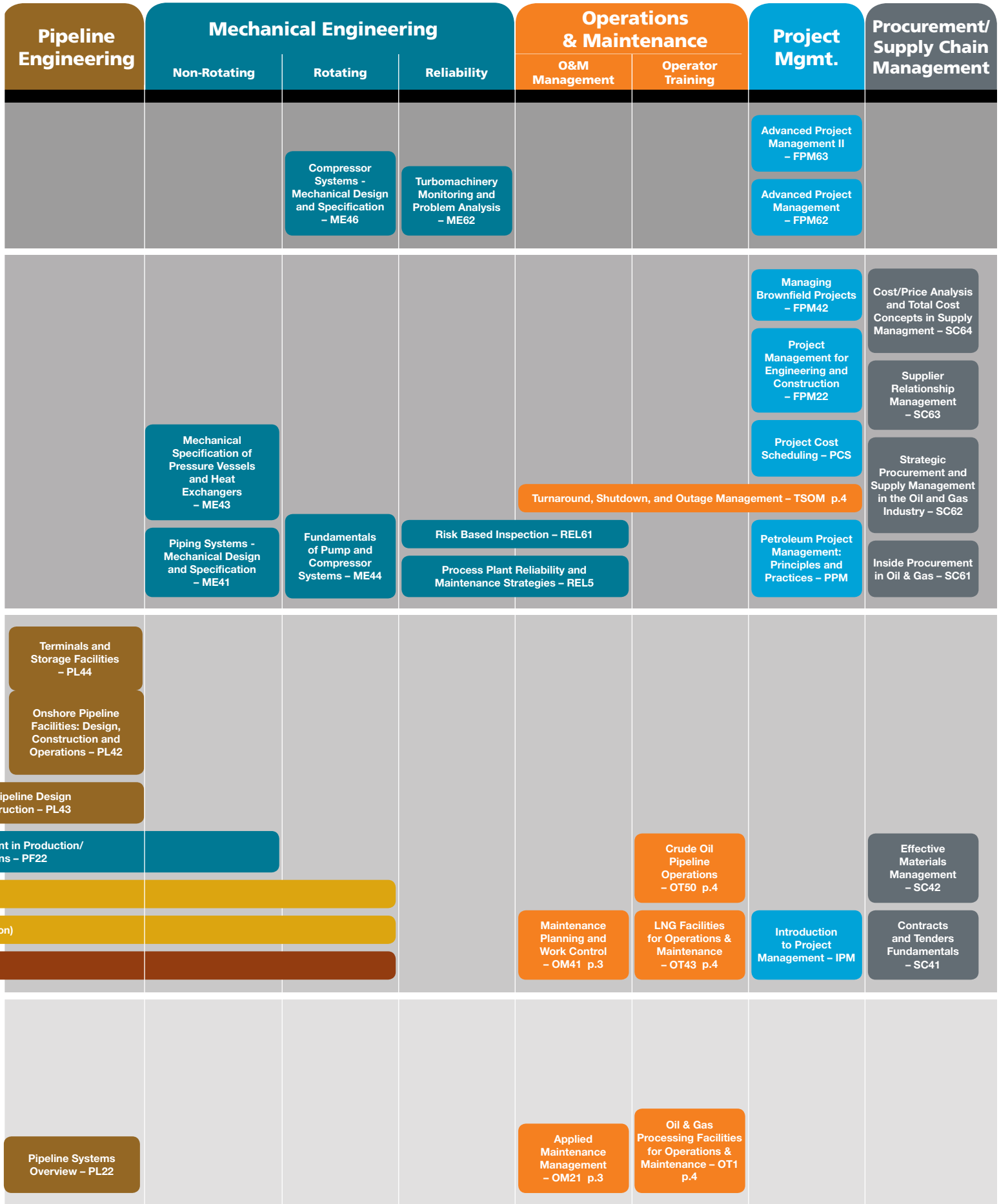
- Offer customized courses based on your PFDs
- Improve the technical communication between operators and engineers
- Develop in-depth understanding of process operations
- Include flexible course topics from a bank of course content
- Allow flexible course lengths (3-, 5-, and 10-day courses available)
- Are flexible and adaptable to shift schedules
- Offer non-mathematical courses available
- Offer advanced level courses available

The following instructors have been selected and approved by the PetroSkills Curriculum Network:

Mr. Jimmy Clary
Mr. Perry Lovelace
Mr. Alan Royer
Mr. Buck Titsworth
Mr. Danny van Schie
Mr. Stuart Watson



Course Progression Map



NEW Operations & Maintenance Courses

Crude Oil Pipeline Operations – OT50

An intensive 5-day course utilizes case studies and industry best practices for operating and maintaining onshore crude oil and liquid pipeline systems that maximize life cycle reliability; employee, public, and environmental safety; and operational cost effectiveness.

To learn more, see **page 4**
or **petroskills.com/course/ot50**

Turnaround, Shutdown and Outage Management – TSOM

This course addresses Turnaround, Shutdown and Outage (TSO) Management principles and practices as they relate to activity planning, execution and closeout activities for midstream, petrochemical and refining facilities in the petroleum industry.

To learn more, see **page 4**
or **petroskills.com/course/tsom**

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. Better utilization of Computerized Maintenance Management Systems (CMMS) will also be covered in this course. 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.

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 preventative and predictive maintenance • Identifying critical equipment • Utilizing your CMMS Supplier certification • Developing organizational competence • Presenting your action plan

2017 Schedule and Tuition (USD)

HOUSTON, US	11-15 SEP	$3860
ORLANDO, US	11-15 DEC	$3920

Maintenance Planning and Work Control – OM41

FOUNDATION 5-DAY

No matter what the price of oil is, safe facilities operations require effective maintenance work control. ISO 55000 (PAS 55) is the asset management standard everyone is moving towards. 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.

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

2017 Schedule and Tuition (USD)

HOUSTON, US	17-21 APR	$3860

Oil and Gas Processing Facilities for Operations and Maintenance – OT1

BASIC 5-DAY

This course will provide the basic knowledge required for understanding processes and operating issues common to gas processing facilities. Course content is customizable to client needs.

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

- About the effects of produced fluid (OGW) compositions on facility design and operation
- About various separation and conditioning processes for meeting specifications on oil, gas, and produced water streams
- Refrigeration 4-cycle process and application of economizers to the refrigeration process
- To understand how to operate facilities so as to minimize processing costs
- How to apply course material to troubleshooting gas conditioning and process anomalies

COURSE CONTENT

Basic chemistry and physical principles related to hydrocarbons • Quick overview of gas processing • Phase behavior fundamentals • Mass transfer operations • Amine gas sweetening • Water-hydrocarbon behavior, including hydrate formation • TEG gas dehydration • Solid bed adsorbers • Mechanical refrigeration • Gas expansion NGL recovery (turbo expanders and Joule-Thompson effect) • NGL stabilization and fractionation • Claus sulfur recovery • Specific to Geographical Regions: Stavanger/Aberdeen - Typical North Sea oil and gas producing operations, produced water treating, seawater treating, and other offshore topics of general interest • Brisbane - Gas processing and introduction to liquefied natural gas (LNG) processes • Midland - Gas conditioning and processing, sour gas treating, and sulfur recovery • Pittsburgh - Mechanical refrigeration principles and equipment, NGL fractionation, and cryogenic NGL recovery

2017 Schedule and Tuition (USD)

MIDLAND, US	6-10 NOV	$3820

LNG Facilities for Operations and Maintenance – OT43

FOUNDATION 5-DAY

This is a 5-day, LNG-industry version of our popular OT-1 Gas Production/Processing for Operations and Maintenance course, with expanded coverage on refrigeration, liquefaction, and utilities. The course includes in-depth information on basic LNG mixed refrigerant processing. Instructors will explain contaminant removal processes employed in LNG processes. Relevant details of the APCI LNG liquefaction processes are described. Class exercises/problems focus on application of theory to operational trends, so operators can understand their processes and become proficient at identifying issues and troubleshooting problems before production suffers. Course content is customizable to client needs.

DESIGNED FOR

LNG 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 from an understanding of gas processing techniques that can be applied in their daily work activities.

YOU WILL LEARN

- Basic chemistry and physical principles related to hydrocarbons
- Fundamentals of gas processing and conditioning for the LNG industry
- Important specifications for gas, LNG, NGLs, and condensate
- Phase behavior fundamentals
- Practical thermodynamics: mass and energy balances
- Important topics of H_2S and CO_2 removal before liquefaction
- Processes used to sweeten and dehydrate produced fluids
- Mechanical refrigeration principles
- Other contaminants in LNG feed-gas
- NGL stabilization and fractionation
- Introduction to APCI LNG process

COURSE CONTENT

Basic chemistry and physical principles related to hydrocarbons • Introduction to LNG facilities • Phase behavior fundamentals • Mechanical refrigeration • Production separators and oil dehydration • Mass transfer operations • Amine sweetening • Water-hydrocarbon behavior • Solid bed adsorbers • Gas expansion NGL recovery • Fractionation fundamentals • Basic LNG mixed refrigerant process

2017 Schedule and Tuition (USD)

HOUSTON, US	27 NOV-1 DEC	$3880

Crude Oil Pipeline Operations – OT50

FOUNDATION 5-DAY

NEW

This course utilizes case studies and industry best practices for operating and maintaining onshore crude oil and liquid pipeline systems that maximize life cycle reliability; employee, public, and environmental safety; and operational cost effectiveness. It focuses on open discussions and troubleshooting techniques that may be applied to crude, HVL (High Volatility Liquids) and refined product pipelines and their associated infrastructure. The course aims to improve the operation profitability and communication with management and engineering staff.

DESIGNED FOR

Pipeline operations personnel who require a working knowledge of onshore liquid pipeline and terminal systems, including the common operational difficulties that may arise and operational tactics used to resolve them. Also suitable for maintenance personnel, metering technicians, lead supervisors, area managers, and engineering staff that need a working knowledge of field pipeline operations.

YOU WILL LEARN HOW TO

- Apply regulatory codes, standards, and industry guidelines (PHSMA 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

See website for dates and locations

Turnaround, Shutdown and Outage Management – TSOM

INTERMEDIATE 3-DAY

NEW

This course addresses Turnaround, Shutdown and Outage (TSO) Management principles and practices as they relate to activity planning, execution and closeout activities for midstream, petrochemical and refining facilities in the petroleum industry. The specific training received in TSO management and the proper use of scarce resources (time, people and materials) will help the TSO or Project Manager improve cost, schedule and operability results. Upon completion of this course, the participant will know what the critical success factors for a TSO are and be able to utilize best practices in TSO planning, execution and closeout. Participants will understand how maintenance, operations and contractor resources relate to one another and what tools are available for the TSO team to ensure properly-managed interfaces among key stakeholders. The course is taught using a combination of instruction, facilitated discussion, and hands-on exercises using real-world TSO examples. The exercises will include both individual and group activities that will provide each participant with a hands-on application of the principles and practices discussed throughout the course.

DESIGNED FOR

Maintenance superintendents and supervisors, project managers and project engineers, maintenance engineers, planner/schedulers, operations representatives, HSE representatives, and procurement professionals who plan, manage, or participate in turnarounds, shutdowns and outage management. Special emphasis will be placed on best practices and future trends in TSO management.

YOU WILL LEARN HOW TO

- Understand what a day in the life of a TSO Manager during a shutdown is like
- Establish business strategies and objectives for a TSO to ensure support from all facility stakeholders
- Develop a robust TSO resource plan and get the resources you need
- Develop and validate work scopes for both maintenance and project activities
- Establish criteria early in the planning cycle for TSO work scope selection
- Select a computerized maintenance management system, including those features needed for TSO management
- Integrate capital projects and maintenance work during a TSO
- Identify and address key TSO constraints and operations interfaces
- Develop a robust contracting plan for the TSO to align work scope
- Prepare a TSO execution plan
- Utilize fit-for-purpose progress measurement and control techniques

COURSE CONTENT

Six-phase TSO management process • TSO issues and challenges • TSO quality plan • TSO safety planning • CMMS benefits, selection and implementation • Developing an integrated TSO plan • Managing TSO stakeholders and resources • Monitoring progress and controlling change • Procurement and contracting for a TSO

See website for dates and locations

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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 petro chemical 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 operator 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 create 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, and emergency response] • Management of change • Learning from previous incidents and near misses • Self-verification and measurement • Process safety key performance indicators • Management review and auditing • Process safety leadership [governance and culture]

2017 Schedule and Tuition (USD)

HOUSTON, US	9-13 OCT	$4040
LONDON, UK	4-8 DEC	$4670+VAT

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 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

- ntify 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 failures) • Measurement and metrics • Management review and continuous improvement

2017 Schedule and Tuition (USD)

DUBAI, UAE	24-28 SEP	$5090
LONDON, UK	31 JUL-4 AUG	$4670+VAT

Process Safety Engineering – PS4

FOUNDATION 5-DAY

This course provides an overview of process safety engineering fundamentals for hydrocarbon processing facilities, with emphasis on the upstream oil and gas sector. The focus of this course is on the engineering/design aspects of Process Safety Management. Frequent reference will be made to historical incidents and recurring problem areas. Techniques for analyzing and mitigating process safety hazards applicable to oil and gas processing will also be reviewed. Integration of the concepts covered to achieve a measured approach to Process Safety Engineering is a key aim of this course as well. Exercises and group projects will be utilized to emphasize the key learning points.

DESIGNED FOR

Facilities, process, and design engineers, as well as new safety/loss prevention engineers who require an overview of Process Safety Engineering.

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 • Leakage and dispersion of hydrocarbon releases • Combustion behavior of hydrocarbons • Sources of ignition • Hazards associated with specific plant systems • Plant layout and equipment spacing • Pressure relief and disposal systems • Corrosion and materials selection • Process monitoring and control • Safety instrumented systems • Fire protection principles • Explosion protection

2017 Schedule and Tuition (USD)

DUBAI, UAE	17-21 DEC	$5490
HOUSTON, US	18-22 SEP	$4350
LONDON, UK	27 NOV-1 DEC	$5060+VAT

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Unconventional Resources
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Pipeline Engineering
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Petroleum Business and Professional Development

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Project Management

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