

PetroSkills®

2017 Process Facilities Training Guide



OGCI®

John M. Campbell

RDC

Course Progression Map

	Oil and Gas Processing			Process Safety	Instrumentation, Controls & Electrical		Offshore & Subsea	Pipeline Engineering	
	Gas	Oil / Water	General Processing		Electrical	Instrumentation & Controls			
Specialized			CO ₂ Surface Facilities – PF81 p.5						
Intermediate	Gas Treating and Sulfur Recovery – G6 Practical Computer Simulation Applications in Gas Processing – G5 Onshore Gas Gathering Systems: Design & Operation – PF45 p.5		Separation Equipment - Selection & Sizing – PF42 p.4	Relief and Flare Systems – PF44 p.4		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		
Foundation		Fundamental and Practical Aspects of Produced Water Treating – PF23 p.4 Applied Water Technology in Oil and Gas Production – PF21 p.4		Process Safety Engineering – PS4 p.6 (Virtual/Blended option coming soon) Risk Based Process Safety Management – HS45 p.6 Fundamentals of Process Safety – PS2 p.6	Electrical Engineering Fundamentals for Facilities Engineers – E3 p.8 Instrumentation, Controls and Electrical Systems for Facilities Engineers – ICE21 p.8	Instrumentation and Controls Fundamentals for Facilities Engineers – IC3 p.8	Fundamentals of Offshore Systems: Design and Construction – OS4 p.8 Offshore Pipeline Design and Construction – PL43 Corrosion Management in Production/ Processing Operations – PF22	Terminals and Storage Facilities – PL44 Onshore Pipeline Facilities: Design, Construction and Operations – PL42	
	Gas Conditioning and Processing - LNG Emphasis – G4LNG								
	Gas Conditioning and Processing – G4 (Virtual/Blended option for first week coming soon)								
	Oil Production and Processing Facilities – PF4 p.3								
Basic	LNG Short Course: Technology and the LNG Chain – G29 Overview of Gas Processing – G2 Introduction to Oil and Gas Production Facilities – PF2 p.3		Concept Selection and Specification of Production Facilities in Field Development Projects – PF3 p.3				Overview of Subsea Systems – SS2 Overview of Offshore Systems – OS21	Pipeline Systems Overview – PL22	

Course Progression Map

Mechanical Engineering			Operations & Maintenance		Project Mgmt.	Procurement/ Supply Chain Management
Non-Rotating	Rotating	Reliability	O&M Management	Operator Training		
	Compressor Systems - Mechanical Design and Specification - ME46 p.7	Turbomachinery Monitoring and Problem Analysis - ME62			Advanced Project Management II - FPM63 Advanced Project Management - FPM62	
Mechanical Specification of Pressure Vessels and Heat Exchangers - ME43 p.7					Managing Brownfield Projects - FPM42 Project Management for Engineering and Construction - FPM22 Project Cost Scheduling - PCS	Cost/Price Analysis and Total Cost Concepts in Supply Management - SC64 Supplier Relationship Management - SC63 Strategic Procurement and Supply Management in the Oil and Gas Industry - SC62
Piping Systems - Mechanical Design and Specification - ME41 p.7	Fundamentals of Pump and Compressor Systems - ME44 p.7	Risk Based Inspection - REL61 Process Plant Reliability and Maintenance Strategies - REL5	Turnaround, Shutdown, and Outage Management - TSOM		Petroleum Project Management: Principles and Practices - PPM	Inside Procurement in Oil & Gas - SC61
			Maintenance Planning and Work Control - OM41	Crude Oil Pipeline Operations - OT50 LNG Facilities for Operations & Maintenance - OT43		Effective Materials Management - SC42 Contracts and Tenders Fundamentals - SC41
			Applied Maintenance Management - OM21	Oil & Gas Processing Facilities for Operations & Maintenance - OT1		

Additional courses available in:

Production & Completions

Health, Safety, Environment

Petroleum Business

Professional Petroleum Development

Introductory and Multi-Discipline



Introduction to Oil and Gas Production Facilities – PF2

BASIC 3-DAY

The scope of the discussion ranges from an overview of the oil and gas industry, hydrocarbon phase behavior characteristics, and different reservoir types, to product specifications and the processes used to meet these. Other facilities considerations are addressed, such as process safety and downstream processing that may impact the production facility selection and operation.

DESIGNED FOR

Those interested in an overview of production facilities, including subsurface professionals, line managers, sales or business development staff, environmental personnel, operational staff, and those new to the industry.

YOU WILL LEARN

- How the reservoir type, drive mechanism, fluid properties, location, and product specifications influence the selection and design of the production facilities
- How to do quick 'back of the envelope' calculations to better understand equipment sizing and capacity
- Parameters that affect the design and specification of oil stabilization and dehydration equipment
- Awareness of the parameters that determine flowline/gathering system capacity
- The purpose of separators in a production facility and familiarity with the typical configurations
- Typical design parameters, operating envelopes, common operating problems of oil and gas production equipment, and the effect of changing feed conditions over the life of a field
- To describe oil dehydration/desalting process options and equipment
- Produced water treating options and the dependence on surface vs. subsurface, offshore vs. onshore disposal
- Compressor performance characteristics and how they affect production rates and facility throughput
- Gas dehydration process options, with a particular emphasis on glycol dehydration
- The principles of asset integrity and inherently safe design given the rate, composition, temperature, and pressure of the production stream
- About midstream facilities required downstream of the primary production facility to deliver saleable products to the market, and how these facilities are affected by production rates, composition, and production facility performance

COURSE CONTENT

Overview of oil and gas industry • Qualitative phase behavior and reservoirs • Hydrocarbon properties and terminology • Typical sales/disposal specifications • Flowlines, piping and gathering systems • Production separation • Oil processing • Water injection systems (including pumps) • Gas handling - compression, dehydration • Measurement and storage • Other facilities considerations - utilities, process safety • Midstream facilities - gas processing, pipelines, LNG

2017 Schedule and Tuition (USD)

HOUSTON, US	2-4 OCT	\$2995
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Concept Selection and Specification of Production Facilities in Field Development Projects – PF3

BASIC 5-DAY

This course is similar to Introduction to Oil and Gas Production Facilities (PF-2), but is presented in the context of concept selection and front-end field development planning.

DESIGNED FOR

This course is intended for those working on field development teams, as well as those who need to better understand how surface facilities are selected and how subsurface characteristics affect facility design and specification.

YOU WILL LEARN

- How to develop the project framework and decision making strategy
- How the specification of production/processing facilities is influenced by reservoir type, drive mechanism, fluid properties, location, and contractual obligations
- Operating conditions that affect the specification of the production facilities from the wellhead through initial separation
- Parameters that affect the design and specification of oil stabilization and dehydration equipment
- The design and specification of produced water systems appropriate for the rate and composition of the produced water to meet the required environmental regulations and/or injection well capacity
- The design and specification of gas handling facilities, including compression dehydration and sweetening
- The impact of artificial lift systems and secondary/tertiary production projects on facilities selection and design
- The principles of asset integrity and inherently safe design given the rate, composition, temperature, and pressure of the production stream
- About midstream facilities required downstream of the primary production facility to deliver saleable products to the market, and how these facilities are affected by production rates, composition, and production facility performance

COURSE CONTENT

Reservoir types, fluid properties, and typical product specifications • Flowlines, gathering systems, flow assurance, and production separation • Oil dehydration and stabilization • Produced water treating and water injection systems • Gas handling, including compression, dehydration, and sweetening • The effect of artificial lift systems, and secondary and tertiary recovery projects • Midstream facilities - gas processing, pipelines, product storage, and LNG • Other facility considerations - utility systems, process safety and asset integrity, and environmental regulations

2017 Schedule and Tuition (USD)

HOUSTON, US	24-28 APR	\$4150
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Oil Production and Processing Facilities – PF4

FOUNDATION 10-DAY

The emphasis of this course is on oil production facilities - from the wellhead, to the delivery of a specification crude oil product, to the refinery. Both onshore and offshore facilities are discussed. Produced water treating and water injection systems are also covered. Solution gas handling processes and equipment will be discussed at a relatively high level. In addition to the engineering aspects of oil production facilities, practical operating problems will also be covered, including emulsion treatment, sand handling, dealing with wax and asphaltene, etc. Exercises requiring calculations are utilized throughout the course. The course intended to complement the G-4 Gas Conditioning and Processing course, focused on the gas handling side of the upstream oil and gas facilities area.

DESIGNED FOR

Process/facilities engineers and senior operating personnel involved with the design and operation of oil and produced water processing facilities.

YOU WILL LEARN

- Well inflow performance and its impact on production/processing facilities
- About oil, gas, and water compositions and properties needed for equipment selection and sizing
- How to select and evaluate processes and equipment used to meet sales or disposal specifications
- To apply physical and thermodynamic property correlations and principles to the design and evaluation of oil production and processing facilities
- How to perform equipment sizing calculations for major production facility separation equipment
- To evaluate processing configurations for different applications
- How to recognize and develop solutions to operating problems in oil/water processing facilities

COURSE CONTENT

- Reservoir traps, rocks, and drive mechanisms
- Phase envelopes and reservoir fluid classification
- Well inflow performance
- Artificial lift
- Gas, oil, and water - composition and properties
- Oil gathering systems
- Gas-liquid separation
- Emulsions
- Oil-water separation
- Oil treating
- Desalting
- Oil stabilization and sweetening
- Oil storage and vapor recovery
- Sand, wax, asphaltene, and scale
- Pipeline transportation of crude oil
- Pumps
- Produced water treatment
- Water injection systems
- Solution gas handling

2017 Schedule and Tuition (USD)

DENVER, US	7-18 AUG	\$8670
DUBAI, UAE	3-14 DEC	\$8760
HOUSTON, US	27 NOV-8 DEC	\$8760
KUALA LUMPUR, MYS	17-28 JUL	\$8760
LONDON, UK	6-17 NOV	\$8760+VAT



Applied Water Technology in Oil and Gas Production – PF21

FOUNDATION 5-DAY

This course provides an overview of the main water handling systems typically encountered in upstream (E&P) production operations, both onshore and offshore. The chemistry of the main water-related problems of mineral scales, corrosion, bacteria, and oily water will be reviewed both from the theoretical and practical aspects. Produced water treatment equipment and typical water quality specifications will also be reviewed, as well as water injection and disposal systems. An exercise will be given to identify typical system problems and to apply the knowledge you gained to propose solutions. Emphasis will be placed on understanding and resolving operational problems in process equipment.

DESIGNED FOR

Managers, engineers, chemists, and operators needing to understand water-related problems in oil and gas production and their solutions.

YOU WILL LEARN

- The basics of oilfield water chemistry
- How to monitor and control corrosion, scale, and bacterial growth in produced water and water injection/disposal systems
- How to implement system surveillance programs to detect potential problems before system damage occurs
- Produced (oily) water treatment options and related treatment equipment
- How to use the knowledge gained to identify typical system problems and be able to propose solutions

COURSE CONTENT

Water chemistry fundamentals • Water sampling and analysis • Water formed scales • Corrosion control • Water treatment microbiology • Produced water discharge/disposal and treatment principles • Produced water treating equipment - theory of operation, advantages and disadvantages, and the importance of oil droplet size • Water injection and disposal systems - theory of operation, corrosion, scale, and biological control • Case study

2017 Schedule and Tuition (USD)

HOUSTON, US	21-25 AUG	\$4150
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Fundamental and Practical Aspects of Produced Water Treating – PF23

FOUNDATION 5-DAY

This course covers topics related to Produced Water Treatment in upstream oil and gas operations. Produced water composition and physical properties are covered. Water quality requirements for various disposal methods are addressed, including onshore surface discharge, offshore discharge to sea, and reinjection for disposal or waterflood. Regulatory requirements and analytical methods used to monitor and ensure regulatory compliance are discussed. Treatment technology is presented along with practical considerations for selecting and operating typical water treatment equipment. Representative process flow diagrams illustrate equipment selection, design features, layout, and processes. Chemical treatment options are also considered.

DESIGNED FOR

Managers, engineers, chemists, and senior operations personnel responsible for designing, operating, and maintaining facilities that process and manage produced water. This course will provide participants with an understanding of the technical aspects required to select, design, maintain, and troubleshoot produced water equipment.

YOU WILL LEARN

- How produced water compositions affect water treatment system design and performance
- How to interpret produced water analytical data and calculate common Scale Indices
- How emulsions form and contribute to water treatment challenges
- How Total Suspended Solids (TSS) affects water quality and what to do about it
- What water quality is required for surface or overboard disposal, for injection disposal, or for beneficial use
- The regulatory requirements for offshore water disposal and what is in an NPDES Permit
- What analytical methods actually measure and how to select an appropriate method
- How separators, clarifier tanks, CPIs, hydrocyclones, flotation cells, and bed filtration work and how to improve their performance
- The most common causes of water treating problems and how to diagnose and resolve them
- Typical PFDs used to illustrate operational issues

COURSE CONTENT

Introduction to water treatment technology and issues • Produced water chemistry and characterization • Defining and characterizing emulsions that impact water quality and treatment • Water quality requirements for injection or surface disposal, NPDES permits, analytical methods • Primary water treatment technologies - separators, hydrocyclones, and CPIs • Secondary water treatment - induced gas flotation • Tertiary water treatment technologies - media and membrane filtration • Chemicals and chemical treatment • Diagnostic testing and in-field observations • Diagnosing and resolving water treatment issues based on actual field experiences

2017 Schedule and Tuition (USD)

HOUSTON, US	30 OCT-3 NOV	\$4150
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Separation Equipment - Selection and Sizing

– PF42

INTERMEDIATE 5-DAY

This course covers the different types of separation equipment typically encountered in oil and gas production facilities. Fractionation equipment and produced water treating equipment are not covered in this course. You will learn where the different types of separation equipment are used based on operating conditions and separation performance requirements. Frequent references will be made to real production facility process flow diagrams (PFDs). Typical operational problems and their solutions will also be discussed. Exercises requiring calculations are utilized throughout the course as well.

Please be aware that due to overlap in content, it is not necessary to take the PF-42 course if you have already taken the PF-4 Oil Production and Processing Facilities course.

DESIGNED FOR

Process/Facilities engineers who need skills for design and troubleshooting of separators.

YOU WILL LEARN

- Different types of separation equipment utilized in the oil and gas industry and where they are used
- Separation performance capabilities of the different types of equipment
- How to size the different types of separation equipment
- How to troubleshoot and debottleneck separation equipment
- How to calculate the wall thickness and estimate the weight of separators
- Instrumentation and controls used on separation equipment

COURSE CONTENT

Fluid properties and phase behavior • Phase separation processes • Gas-liquid separation equipment: slug catchers, conventional separators (horizontal and vertical), scrubbers, compact separators, filter separators/coalescing filters • Separator internals: inlet devices, mist extractors, baffles, weirs, etc. • Emulsions • Oil-water separation equipment: conventional 3-phase separators and freewater knockouts, wash tanks • Oil treating and desalting equipment: mainly electrostatic coalescers • Liquid-liquid coalescing filters • Mechanical design aspects: pressure vessel codes, wall thickness and vessel weight estimation, material selection, relief requirements • Operational problems

2017 Schedule and Tuition (USD)

HOUSTON, US	16-20 OCT	\$4150
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Relief and Flare Systems – PF44

INTERMEDIATE 5-DAY

This intensive course provides a comprehensive overview of relief and flare systems for oil and gas processing facilities. The course begins with the need for pressure control/overpressure protection, continues with the key engineering and design aspects including code considerations, and concludes with selecting and defining the components of a relief and flare system. The material of the course is applicable to onshore field production facilities, pipelines, gas plants, terminals, and offshore production facilities.

DESIGNED FOR

Engineers and senior operating personnel responsible for designing, operating, and maintaining relief and flare systems in oil and gas facilities.

YOU WILL LEARN

- Purposes of relief and flare systems and their importance in safe operations
- Causes of overpressure and the ways to control/mitigate
- Defining the possible relief scenarios
- Commonly used pressure relieving devices, selection and sizing
- Determining set/relieving pressures to meet operational, safety, and code requirements
- Operational considerations of maintenance, testing, certification, and disposal of fluids
- Designing and operating relief and flare header systems considering fluid characteristics, service conditions, volumes, gas dispersion, and radiation
- Selection and sizing other key components of a relief/flare system

COURSE CONTENT

Overview of typical relief and flare systems and key components • Codes and standards as well as good practices typical in oil and gas facilities • Safety implications and causes of overpressure • Overpressure protection philosophy including source isolation and relief • Determination of relief requirements and defining set point pressures • Types, applications, and sizing of common relief devices • Blow-down/depressurizing - purpose and design/operational considerations • Design and specification considerations for relief valves and header systems, including fluid characteristics, services conditions, material selection, and header sizing • Environmental considerations • Radiation calculations and the impact of flare tip design • Selection and sizing of key components: knockout and seal drums, vent/flare stack, vent/flare tips, and flare ignition systems • Defining need and quantity of purge gas • Flare gas recovery, smokeless flaring, and purge gas conservation • Operational and troubleshooting tips

2017 Schedule and Tuition (USD)

ABERDEEN, UK	23-27 OCT	\$4780+VAT
HOUSTON, US	25-29 SEP	\$4150
KUALA LUMPUR, MYS	14-18 AUGUST	\$5460
PERTH, AUSTRALIA	7-11 AUG	\$5600+GST

Onshore Gas Gathering Systems: Design and Operations – PF45

INTERMEDIATE 5-DAY

This course deals with the design, operation, and optimization of onshore gas gathering systems and their associated field facilities, from the wellhead to the central gas processing facility. From a design perspective, the main variables that impact the flexibility and operational characteristics of an onshore gas gathering system will be discussed. Typical operating problems are covered including hydrates, multiphase flow issues, corrosion, declining well deliverability, etc. Exercises will be utilized throughout the course to emphasize the key learning points.

DESIGNED FOR

Production and facilities department engineers/senior operating personnel responsible for the design, operation and optimization of onshore gas gathering systems and their associated field facilities.

YOU WILL LEARN

- The impact of gathering system pressure on gas well deliverability
- The impact of produced fluids composition on gathering system design and operation
- How to evaluate field facility and gathering system configurations for different applications
- To recognize and develop solutions to operating problems with existing gas gathering systems

COURSE CONTENT

Gas well inflow performance and deliverability • Overview of gas well deliquification methods for low-rate, low pressure gas wells • Effect of gathering system/abandonment pressure on reserves recovery • Impact of produced fluids composition • Sweet/sour • CO₂ content • Rich/lean • Produced water • Hydrates and hydrate prevention • Dehydration • Heating • Chemical inhibition • Multiphase flow basics • Corrosion/materials selection • Gathering system layout • Wellsite/field facilities options • Provisions for future compression

Troubleshooting Oil and Gas Processing Facilities – PF49

INTERMEDIATE 5-DAY

This course will cover how to establish and apply a general troubleshooting methodology as well as how to conduct process/equipment specific troubleshooting. Definitions of good/normal performance will be discussed for each process/equipment type covered. Data gathering, validation and utilization procedures will be discussed. Criteria to use when evaluating possible problem solutions will also be covered. Real-world exercises will be utilized throughout the class to reinforce the learning objectives. Both onshore and offshore facilities will be discussed. It is assumed that course participants have a solid understanding of how typical oil and gas production and processing facilities work, including the commonly used processes and equipment involved.

DESIGNED FOR

Process/Facilities engineers with 5-10 years of experience, facilities engineering team leaders/supervisors, and senior facilities operational personnel.

YOU WILL LEARN

- The difference between troubleshooting, optimization, and debottlenecking
- How to recognize trouble when it is occurring
- How to develop a methodical approach to troubleshooting
- To recognize how different components of a facility interact with each other, and the significance of these interactions
- How to gather, validate, and utilize the data needed for troubleshooting
- The criteria to be considered for identifying the best solution when several feasible solutions are available
- Typical causes of problems, and their solutions, for the main types of processes and equipment used in the upstream-midstream oil and gas industry

COURSE CONTENT

Troubleshooting methodology fundamentals and data reconciliation • Gas - Liquid separators • Reciprocating compressors • Amine gas sweetening • Glycol dehydration units • 3-phase separators • Centrifugal pumps • Oil treating • Produced water treating systems • Shell and tube heat exchangers • Centrifugal compressors • Molecular sieve dehydration units • NGL recovery processes

CO₂ Surface Facilities

– PF81

SPECIALIZED 4-DAY

FIELD TRIP

This course emphasizes the effect of carbon dioxide on the selection and operation of equipment (separators, compressors, and dehydrators), as well as sweetening process equipment. This program, first introduced in 1985, assists those working with carbon dioxide or high carbon dioxide content natural gas. This course is particularly applicable to those persons who operate and/or design enhanced oil recovery (EOR) facilities using CO₂ as a miscible agent. Physical and thermodynamic property data for carbon dioxide/natural gas mixtures are discussed. Calculations are performed to illustrate principles and techniques. Midland is a four-day session including a CO₂ plant tour on Thursday, contingent on plant availability.

DESIGNED FOR

Engineers and senior operating personnel involved with carbon dioxide/natural gas/CO₂ EOR systems.

YOU WILL LEARN

- What to expect over the life of a CO₂ EOR system
- Impact of CO₂ on the design and operation of oil production equipment
- Physical and thermodynamic properties of pure CO₂, and the impact of CO₂ in hydrocarbon mixtures
- Dehydrate high CO₂-content gases
- Best practices to deal with Dense Phase pipelines, metering, flaring etc.
- How to pump and compress CO₂
- Using purification processes: membranes, Ryan-Holmes, amines, hot carbonate, etc.

COURSE CONTENT

Overview of CO₂ injection and process facilities • Heavy emphasis on CO₂ for enhanced oil recovery • Physical and thermodynamic properties of CO₂ and high CO₂ mixtures • Materials selection and design consideration in CO₂ systems • Process vessel specification • Pumps and compressors • Fluid flow and special pipeline design considerations such as the control of ductile fractures • Dehydration of CO₂ and CO₂-rich gases • General overview of processes to treat/recover CO₂

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- Rotating & Reciprocating Equipment
- Stationary Equipment
- Turnaround Planning

- Designed for the Global Oil and Gas Industry
- Pre- and Post-Testing
- Customization for Site Specifics
- Gap Identification and Remediation
- AICC/SCORM Compliant

2017 Schedule and Tuition (USD)

BRISBANE, AUSTRALIA	7-11 AUG	\$5600+GST
HOUSTON, US	23-27 OCT	\$4150

2017 Schedule and Tuition (USD)

HOUSTON, US	3-7 APR	\$4150
LONDON, UK	14-18 AUG	\$4780+VAT

2017 Schedule and Tuition (USD)

MIDLAND, US†	13-16 NOV	\$3875
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† includes field trip

For more information, visit:
petroskills.com/elearning

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

- nify 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
HOUSTON, US	24-28 APR	\$4040
LONDON, UK	31 JUL-4 AUG	\$4670+VAT

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

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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Overview of Offshore Systems – OS21

BASIC 5-DAY

This five-day course will accelerate the learning and productivity of individuals with little to no experience working in the offshore oil and gas industry. The course provides an overview of field development concepts and explains how offshore structures and facilities function as integrated systems. The content includes the full range of water depths from shallow water to ultra-deepwater. All major components required for offshore developments such as fixed and floating platforms, drilling and workover rigs, pipelines, risers, process and utilities and construction equipment are discussed. The importance of life-cycle considerations during development planning is emphasized. Individual and group exercises, including a case study, are used throughout the course. The course instructors are experienced offshore managers.

DESIGNED FOR

Technical staff, business professionals, technicians, analysts and other non-technical staff who are involved but have limited experience, or will be involved, with offshore oil and gas facilities. The course provides a basic understanding of offshore systems in all water depths, from shallow to ultra-deepwater, including design, construction, and operations.

YOU WILL LEARN HOW TO

- Identify the key steps in the development of offshore fields from discovery through decommissioning
- Understand the elements of field architecture to define a workable field development
- Recognize key stakeholder issues
- Recognize offshore production facilities and structures, fixed and floating.
- Understand the impact of the ocean environment on facilities design and operations
- Identify major design, construction, and operational issues and interfaces of offshore systems
- Recognize important forces on offshore structures and their influence on design and cost
- Understand strategic options for well drilling (construction) and servicing
- Appreciate the basic processes and equipment involved in the topsides design and operation
- Understand fluid transportation options and equipment
- Recognize the marine equipment used in the construction of offshore facilities
- Understand basic issues in life-cycle and decommissioning decisions
- Appreciate advances in offshore technology

COURSE CONTENT

Field development concepts, fixed and floating • Subsea systems • Wells, construction and servicing • Topsides facilities; processing; utilities • Oil and gas transportation systems, design and installation • Production operations • Offshore construction; equipment • Fabrication; transportation; integration; installation project management • Life-cycle considerations, including decommissioning

2017 Schedule and Tuition (USD)

HOUSTON, US	24-28 JUL	\$4150
LONDON, UK	19-23 JUN	\$4780+VAT

Piping Systems - Mechanical Design and Specification – ME41

INTERMEDIATE 5-DAY

This 5-day, intermediate level course for engineers and piping system designers reviews the key areas associated with the design of piping systems for oil and gas facilities. The course is focused on four areas: codes and standards, pipe materials and manufacture, piping components, and piping layout and design. Applicable piping codes for oil and gas facilities (ISO, B31.3, B31.4, B31.8, etc.), pipe sizing calculations, pipe installation, and materials selection are an integral part of the course. The emphasis is on proper material selection and specification of piping systems.

DESIGNED FOR

This PetroSkills training course is ideal for mechanical, facilities, plant, or pipeline engineers and piping system designers who are involved in the design of in-plant piping systems for oil and gas facilities.

YOU WILL LEARN

- To apply piping system codes and standards
- About line sizing and layout of piping systems in various types of facilities
- How to specify proper components for process and utility applications
- To compare alternative materials of construction
- The process of steelmaking, pipe manufacturing, and material specifications
- Joining methods and inspection techniques
- Key considerations for flare and vent systems, including PSV sizing

COURSE CONTENT

Piping codes and standards (ANSI/ASME, API, ISO) • Pipe materials and manufacturing • Basic pipe stress analysis methods • Valves and actuators • Welding and non-destructive testing • Line sizing basics (single-phase and multiphase flow) • Pipe and valve material selection • Piping layout and design • Manifolds, headers, and flare/vent systems • Non-metallic piping systems • Operations and maintenance considerations of facilities and pipelines

2017 Schedule and Tuition (USD)

DENVER, US	17-21 JUL	\$4160
DUBAI, UAE	5-9 NOV	\$5190
HOUSTON, US	11-15 DEC	\$4150
MIDLAND, US	21-25 AUG	\$4,110

Mechanical Specification of Pressure Vessels and Heat Exchangers – ME43

INTERMEDIATE 5-DAY

FIELD TRIP

This 5-day, intermediate level course for facility engineers and project engineers reviews the key areas associated with the mechanical design of pressure vessels and heat exchangers for oil and gas facilities. The course is focused on vessels, heat exchangers built in accordance to ASME VIII Div 1, considering material selection, key design calculations, and manufacturing processes. The course is not aimed at process engineers sizing equipment (PF-42 covers these elements), although a brief review of the sizing correlations is included. The course is delivered from the perspective of a vessel fabricator to better understand the dos and don'ts of ideal mechanical specification of pressurized equipment by owner/operators, in order to optimize material utilization and minimize construction costs. The Houston session features an afternoon field trip to a large pressure vessel fabricator.

DESIGNED FOR

Mechanical, facilities, construction, or project engineers and plant piping/vessel designers who are involved in the specification and purchasing of pressure vessels, heat exchangers, and other pressure-containing equipment for oil and gas facilities.

YOU WILL LEARN

- About ASME B&PV code and the commonly used sections relevant to oil and gas equipment
- To specify correct and commonly used materials according to ASME II
- How to design vessel shells, heads, nozzles, and heat exchanger details
- How to provide accurate equipment specification documents and review documentation for code compliance
- Key fabrication processes used in the workshop and how to simplify construction through correct vessel specification
- About welding processes and inspection requirements per ASME IX

COURSE CONTENT

Vessel codes and standards (ASME B&PV Code, TEMA, API) • Vessel material selection, corrosion mechanisms, heat treatment, and basic metallurgy • Essential design calculations for vessels and heat exchangers • Welding process overview and inspection requirements • Constructability and operability considerations • Vessel integrity, evaluation, and re-purposing of pressure-containing equipment according to API/ASME

2017 Schedule and Tuition (USD)

HOUSTON, US †	28 AUG-1 SEP	\$4325
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† includes field trip

Fundamentals of Pump and Compressor Systems – ME44

INTERMEDIATE 5-DAY

This is an intensive 5-day course providing a comprehensive overview of pumps and compressor systems. The focus is on equipment selection; type, unit, and station configuration; and integration of these units in the process scheme and control strategy in upstream and midstream oil and gas facilities. The material of the course is applicable to field production facilities, pipelines, gas plants, and offshore systems.

DESIGNED FOR

Engineers, senior technicians, and system operators designing, operating, and maintaining pump and compressor systems in oil and gas facilities.

YOU WILL LEARN

- Selecting the appropriate integrated pump and compressors units (drivers, pumps, compressors, and auxiliary systems)
- Integrating the pump or compressor units with the upstream and downstream piping and process equipment
- Evaluating pump and compressor units and their drivers in multiple train configurations, parallel and series
- Identifying the key local and remote control elements of pumps and compressors as well as their drivers
- Defining the major life-cycle events, such as changes in flows, fluid composition, and operating conditions that can affect equipment selection and operating strategies
- Assessing the key pump hydraulics and compressor thermodynamics, and their effect on selection and operations
- Identifying significant operating conditioning monitoring parameters and troubleshooting techniques

COURSE CONTENT

Types of pumps, compressors, and drivers, and their common applications and range of operations • Evaluation and selection of pumps and compressors, and their drivers for long-term efficient operations • Unit and station configuration including multiple trains in series and/or parallel operations • Integration with upstream and downstream process equipment, local and remote control systems, and facilities utilities • Key auxiliary systems including monitoring equipment, heat exchangers, lube and seal systems, and fuel/power systems • Major design, installation, operating, troubleshooting, and maintenance considerations

2017 Schedule and Tuition (USD)

COVINGTON, US	18-22 SEP	\$4110
DENVER, US	24-28 JUL	\$4160
DUBAI, UAE	12-16 NOV	\$5190
KUALA LUMPUR, MYS	20-24 NOV	\$5460
MIDLAND, US	4-8 DEC	\$4,110

Compressor Systems - Mechanical Design and Specification – ME46

SPECIALIZED 5-DAY

This 5-day, specialized level course is for facility design engineers, operations engineers, and technicians seeking an in-depth understanding of centrifugal, reciprocating, and screw compressors. This course provides basic knowledge of compressor types and associated auxiliary systems, mechanical design of equipment, operating and performance characteristics, control and monitoring systems, maintenance practices, and codes and standards.

DESIGNED FOR

Mechanical, facilities, plant, or pipeline engineers and technicians needing an in-depth understanding of the different types of compressors.

YOU WILL LEARN

- How to apply thermodynamics to compressor performance and operating characteristics
- How to size, specify, and select compressors
- Compressor auxiliary systems
- Series and parallel application of compressors
- How to integrate compressor systems into process facilities used in the oil and gas industry
- How to use state-of-the-art monitor and control devices in the operation, maintenance, and troubleshooting of compression systems
- How to apply maintenance practices to improve compressor reliability
- Shop and field performance testing
- Compressor economics including OPEX vs. CAPEX considerations

COURSE CONTENT

Types and application of compressors • Selection criteria of dynamic and positive displacement compressors • Compressor thermodynamics and operating characteristics • Performance curves and off-design evaluations • Key compressor components and other auxiliary systems • Equipment specifications • Compressor controls and monitoring devices • Driver and gear involvement • Installation, operation, maintenance practices, and troubleshooting • Economic considerations

2017 Schedule and Tuition (USD)

HOUSTON, US	18-22 SEP	\$4150
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Instrumentation, Controls and Electrical Systems for Facilities Engineers – ICE21

FOUNDATION 5-DAY

This foundation-level course provides an overview of electrical systems, instrumentation, process control, and control/safety systems typically encountered in oil and gas facilities, such as: separation, gas dehydration, gas sweetening, NGL recovery, and associated facilities. The focus is to understand terminology, concepts, typical equipment configurations, control strategies, and common pitfalls in order to effectively manage and execute multi-discipline projects.

DESIGNED FOR

Process, chemical, and mechanical engineers, (i.e. non-instrumentation and non-electrical disciplines), as well as other professionals with little or no background in IC&E systems, in order to more effectively execute complete projects. Electrical and Instrumentation Engineers should consider IC3 and E3 for more in-depth coverage of alternate disciplines.

YOU WILL LEARN

- Fundamentals of electricity, such as: voltage, current, resistance, and power factor
- Electrical specifications, such as: voltage selection, load lists, and power
- One-line diagrams and components of power distribution, including: transformers, switchgear, MCCs, VFDs, and power distribution
- Infrastructure components, such as: cable, conduit, cable tray, and duct banks
- Classification of hazardous locations and equipment specifications
- Safety risks and mitigation strategies for power systems, including: short circuit and overcurrent protection, ground faults, shock hazards, and arc flash
- Fundamentals of control systems, sensors, controllers, and final elements
- Typical control strategies and configurations for common oil and gas process equipment, such as: separators, pumps, distillation towers, filters, contactors, compressors, heat exchangers, and fired heaters
- Key requirements for instrument specifications: accuracy, signal selection, pressure/temperature limits, material compatibility, installation considerations, capabilities and limits, and relative cost
- Basics of sizing criteria of shutdown and control valves
- Control system functions, limitations, and architectures, including: PLC, DCS, SIS, RTU, and SCADA; common networking systems, including: Ethernet, Modbus and Fieldbus

COURSE CONTENT

Fundamentals of electricity • Power distribution and motor control systems for oil and gas applications • Emergency power systems • Hazardous area classification for oil and gas applications • Electrical safety in industrial facilities • Control system fundamentals • Field measurement and control devices • Programmable electronic systems (PLC, DCS, SIS, SCADA) • Control system networking • Drawings and documentation for IE&C projects

2017 Schedule and Tuition (USD)

HOUSTON, US	25-29 SEP	\$4150
KUALA LUMPUR	7-11 AUG	\$5460
LONDON, UK	3-7 JUL	\$4780+VAT

Electrical Engineering Fundamentals for Facilities Engineers – E3

FOUNDATION 5-DAY

This course applies fundamental electrical engineering principles to oil and gas facilities. The course is designed for Facilities Engineers who interface with electrical systems, and provides practical insight and development of new Facilities Electrical Engineers. Through the use of individual and group problem solving, attendees will learn about power transformers, motors, generators, one-line diagram interpretation, protection and coordination of electrical equipment, site and standby generation, electrical safety, and hazardous areas identification. Participants will gain a better understanding of electrical power systems in oil and gas facilities.

DESIGNED FOR

Those facilities personnel who interface with facility electrical power systems, including project engineers, operation leads, instrumentation, controls personnel, and electrical engineers who are new to electrical power systems within oil and gas facilities.

YOU WILL LEARN

- The key components of facilities electric power distribution, which include circuit arrangements, low and medium voltage switchgear, and single-phase and three phase schemes
- Operation, components, electromotive forces, turns and voltage ratios, losses, efficiency, rating, and connections of transformers
- The difference between direct current, induction and synchronous current motors, motor enclosures, and how to select motors
- The principles of protecting electrical equipment, including time current curves, fuses, circuit breakers, and coordination
- What standby power is, including generators and UPS power systems
- The purpose for power generation, which includes standby, prime, base, peak, and co-generation
- About power factor and correction
- What grounding and bonding systems are, with an overview of ignition sources, separately derived systems, and substation grounding
- Hazardous area identification principles with general information on NEC, IEC, equipment protection, certification, and definitions

COURSE CONTENT

Fundamentals of insulation and conduction • Direct current, alternating current • Transformers power and instrument • Motors Induction and synchronous • Power distribution • System protection and coordination • Standby power systems • Power generation • Variable speed drive principles • Grounding, bonding, and electrical safety • Hazardous area identification

2017 Schedule and Tuition (USD)

ORLANDO, US	23-27 OCT	\$4210
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Instrumentation and Controls Fundamentals for Facilities Engineers – IC3

FOUNDATION 5-DAY

This course applies fundamental instrumentation and control engineering principles to oil and gas facilities design and operation, and is designed to accelerate the development of new facilities Instrumentation and Control Engineers. Through the use of individual and group problem solving, attendees will learn about field measurement devices, final elements and actuators, pressure relief and regulation, documentation, programmable logic controllers, power supplies, SCADA, DCS, SIS, hazardous areas, and installation methods.

DESIGNED FOR

Facilities and Project Engineers as well as newly graduated Electrical, Controls and Instrument Engineers (0-5 yrs.) with a need to improve basic understanding of instrumentation and control systems within oil and gas facilities.

YOU WILL LEARN

- Field measurement devices including level, pressure, temperature, and flow
- Final elements and actuators including control loops, control valves, shutdown valves, actuators, and transducers
- P&ID symbols and instrument tags, loop and logic diagrams, Pitfalls and best practices, ISA symbology, and creation of instrument and I/O Lists
- Signal types and wiring requirements for analog/discrete inputs and outputs as well as other signals such as thermocouple, RTD, pulse, and digital
- Typical control system functions, limitations, and architectures for PLC and DCS systems including programming and ladder logic
- Process control basics with an emphasis on control loops, types, and configurations for common oil and gas process equipment such as separators, pumps, distillation towers, filters, contactors, compressors, heat exchangers, and fired heaters
- Understanding of the PID algorithm, loop tuning, and advanced process control techniques such as feed forward, cascade, selective, and ratio control
- Supervisory Control and Data Acquisition (SCADA) Systems to include telemetry, RTUs, internet, and web based
- Common networking systems including Ethernet, Modbus, and Fieldbus
- Risk mitigation, technologies, and architecture of Safety Instrumented Systems (SIS)
- The best practices for hazardous areas and equipment selection

COURSE CONTENT

Control system fundamentals • Field measurement devices • Control and shutdown valves • Programmable electronic systems (PLC, DCS, SIS, SCADA) • Control system networking • Instrumentation and control strategies for common oil and gas equipment • Installation and infrastructure requirements • Drawings and documentation for IE&C projects

2017 Schedule and Tuition (USD)

DENVER, US	17-21 JUL	\$4160
HOUSTON, US	13-17 NOV	\$4150

Fundamentals of Offshore Systems Design and Construction – OS4

FOUNDATION 10-DAY

This 10-day course provides a fundamental understanding of the technology and work processes used for the design and construction of all types of offshore systems, including consideration of asset development, surveillance, and management. The content includes the full range of water depths from shallow water to ultra-deepwater and will also address life-cycle considerations in all phases of offshore field development and operation. All major components required for offshore developments, such as fixed and floating platforms, drilling rigs, workover equipment, pipelines, risers, process, and utilities and construction equipment are discussed. Emphasis is placed on the multi-discipline team approach needed to manage the myriad interfaces of offshore facility design, construction, and operations. Individual and group exercises are used throughout the course. A case study for an offshore project development is included.

DESIGNED FOR

Individuals with a basic awareness of or experience in offshore engineering and operations. Technical staff, project engineers, engineering discipline leads, engineering specialists, and operating staff find this course accelerates their capability to contribute on offshore field development planning, design, and construction projects and field operations.

YOU WILL LEARN HOW TO

- Identify the key facilities parameters that must be evaluated for field development
- Recognize the best applications and characteristics of each type of offshore fixed and floating structure
- Account for the effects of the ocean environment on facilities design, construction, and operations
- Identify the impact space, loads and forces have on the structural design and global performance of offshore structures and how they influence their cost
- Describe the impact topside facilities (drilling, well servicing, processing, and utilities) affect the structural design and how the topside design process is done
- Recognize and manage key design and operational interfaces between the major components of offshore facilities systems
- Understand and apply the key design, construction, and installation issues associated with fixed and floating platforms to your work

COURSE CONTENT

Offshore systems overview and field architecture selection • Well construction and servicing equipment and operation • Flow assurance • Topside facilities • Oil and gas transportation facilities • Riser systems • Subsea systems • Production operations • Infrastructure impact on design and operations • Effects of the ocean environment • Introduction to naval architecture • Structural design processes and tools • Construction plans and execution • Project management lessons learned • Life-cycle and decommissioning considerations

2017 Schedule and Tuition (USD)

HOUSTON, US	14-25 AUG	\$7615
LONDON, UK	11-22 SEP	\$8270+VAT
SINGAPORE, SGP	30 OCT-10 NOV	\$7960

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