Facilities Course Progression Map

<table>
<thead>
<tr>
<th>Oil and Gas Processing</th>
<th>Process Safety</th>
<th>Instrumentation, Controls &amp; Electrical</th>
<th>Offshore &amp; Subsea</th>
<th>Pipeline Engineering</th>
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<td>Gas Treating and Sulfur Recovery – G6</td>
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<td>Fundamental and Practical Aspects of Produced Water Treating – PF23</td>
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<td>Applied Water Technology in Oil and Gas Production – PF21</td>
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<td>Process Safety Engineering – PS4</td>
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<td>Risk Based Process Safety Management – HS45 p.4</td>
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<td>Fundamentals of Process Safety – P32</td>
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<td>Electrical Engineering Fundamentals for Facilities Engineers – E3 p.3</td>
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<td>Instrumentation, Controls and Electrical Systems for Facilities Engineers – ICE21 p.3</td>
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Facilities Course Progression Map

### Mechanical Engineering

- **Non-Rotating**
  - Basics of Rotating and Static Mechanical Equipment – RSM

- **Rotating**
  - Compressor Systems - Mechanical Design and Specification – ME46 p.8
  - Fundamentals of Pump and Compressor Systems – ME44 p.6

- **Reliability**
  - Mechanical Specification of Pressure Vessels and Heat Exchangers – ME43
  - Piping Systems - Mechanical Design and Specification – ME41

### Operations & Maintenance

- **O&M Management**
  - Turnaround, Shutdown, and Outage Management – TSOM
  - Petroleum Project Management: Principles and Practices – PPM

- **Operator Training**
  - Amine Sweetening and Gas Dehydration for Operations & Maintenance – OT41
  - NGL Extraction, Stabilization and Fractionation for Operations & Maintenance – OT42
  - Crude Oil Pipeline Operations – OT50
  - LNG Facilities for Operations & Maintenance – OT43
  - Maintenance Planning and Work Control – OM41

### Project Mgmt.

- **Advanced Project Management**
  - Cost/Price Analysis and Total Cost Concepts in Supply Management – SC64
  - Managing Brownfield Projects – FPM42
  -Project Management for Engineering and Construction – FPM22
  - Project Controls for Contractors and Owners - PC21

### Procurement/Supply Chain Management

- **Advanced Project Mgmt Workshop**
- **Effective Materials Management**
- **Inside Procurement in Oil & Gas**

### Additional courses available in:

- **Production & Completions**
- **Health, Safety, Environment**
- **Petroleum Business**
- **Professional Petroleum Development**
- **Introductory and Multi-Discipline**
Instruments, Controls and Electrical Systems for Facilities Engineers – ICE21

**FOUNDATION 5-DAY**

This foundation-level course provides an introduction to oil and gas facilities, instrumentation, control, and safety systems typically encountered in oil and gas facilities. The focus is to understand the terminology, concepts, typical equipment configurations, and common pitfalls in order to improve communication with electrical and I&C professionals. This course covers some of the important system-level components of the course, but at a more conceptual level. This course is not a prerequisite for those that are not able to take both E3 and ICE.

**DESIGNED FOR**

Process, chemical, and mechanical engineers, as well as other technical and non-technical professionals with little or no background in I&C systems. Electrical and Instrumentation Engineers should consider E3 and ICE for more in-depth coverage.

**YOU WILL LEARN**

- Fundamentals of electricity, such as voltage, current, resistance, power factor, and single/three phase power systems.
- Electrical specifications, such as voltage selection, load lists, and power.
- How to read one-line diagrams and understand the function of the components of power distribution, including transformers, switchgear, MCCs, VFDs, and power distribution.
- The function and considerations of infrastructure components, such as cable, conduit, cable tray, and duct banks.
- Awareness of the concepts behind 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.
- Key requirements for instrument specifications such as accuracy, signal selection, process conditions, material compatibility, installation considerations, capabilities and limits, and relative cost.
- Basics of specification of shutdown and control values.
- Control system functions, limitations, and architectures, including PLC, DCS, SIS, RTU, and SCADA; common networking systems, including Ethernet, Modbus, and Fieldbus.
- Exposure to the typical documentation and drawings necessary for the design specification, installation, operation, and maintenance of electrical, instrumentation, and control systems.

**COURSE CONTENT**

Fundamentals of electricity • Control system fundamentals • Field measurement and control devices • Hazardous area classification for oil and gas applications • Programmable electronic systems (PLC, DCS, SIS, SCADA) • and more...

2018-19 Schedule and Tuition (USD)

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Instruments, Controls and Electrical Systems for Facilities Engineers – ICE3

**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 field measurement devices, valves and actuators, electrical power, programmable logic controllers, power supplies, PLC, SCADA, DCS, SIS, hazardous areas, and installation methods. This course is a more in-depth version of the course ICE21 and ICE21 is not a prerequisite for taking this course.

**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**

- Fundamental concepts of electricity including voltage, current, resistance, power, induction, capacitance, and power factor.
- The key components of facilities electric power distribution, which include circuit arrangements, low and medium voltage switchgear, and single and single-phase and three phase schemes.
- Transformer operation, components, turns and voltage ratios, losses, efficiency, rating, and connections.
- The difference between direct current, induction and synchronous current motors, motor enclosures, and how to select, start, protect, and control motors.
- The principles of protecting electrical equipment, including time current curves, fuses, circuit breakers, and coordination.
- The purposes and sizing criteria for backup power, including generators and UPS power systems.
- The considerations and sizing criteria for on-site power generation, which includes standby, prime, peak, and co-generation.
- What grounding and bonding systems are, with an overview of Ignition sources, shock protection, separately derived systems, and substation grounding.
- The concepts, terminology and application of hazardous area classification standards, equipment protection methods, and installation requirements for NEC and IEC projects.

**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

PLC and SCADA Technologies – IC17

**INTERMEDIATE 5-DAY**

This workshop provides engineers and technicians with the basic theoretical and practical understanding of PLC and SCADA systems. It traces the evolution of the PLC as an intelligent ‘black box’ replacement for the relay panel and how, with the advent of modern communications architectures, it may be combined with Supervisory Control and Data Acquisition (SCADA) systems to allow stand-alone control systems to be configured. Throughout the workshop, participants will learn through active participation using exercises, questionnaires, and practical PC-based simulation (LogiPro), covering: basic ladder logic programming, hardware diagnostics, and implementation of various communication strategies. Participants will also examine the basic requirements of a safety PLC and the various voting system architectures required to meet different Safety Integrity Levels (SILs).

**DESIGNED FOR**

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

**YOU WILL LEARN**

- Operating principals and specification criteria for field measurement devices including level, pressure, temperature, and flow.
- Final elements and actuators including control loops, control valves, shutdown valves, actuators, and transducers.
- PID symbols and instrument tags, loop and logic diagrams, pitfall and best practices.
- ISA symbology, and creation of instrument and I/O lists.
- Signal types and wiring requirements for analog/digital inputs and outputs as well as other signals such as thermocouple, RTD, pulse, and digital communications.
- Typical control system functions, limitations, and architectures for PLC and DCS systems including programming methods such as ladder logic and function block.
- 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 communications.
- Common networking systems according to IEC 61131-3.
- The concepts, terminology, and application of hazardous area classification standards, equipment protection methods, and installation requirements for NEC and IEC projects.

**COURSE CONTENT**

Introduction to control systems • SCADA versus PLC • PLC programming • Processing and scanning • Digital processing • Analog processing • Installation practices • Interference or noise reduction • Cable spacing and routing • Earthing and grounding • Binary and hexadecimal numbering systems • The IEC 61131-3 standard • Ladder logic diagrams • Functional block diagrams • Derived function blocks • Structured text • Instruction lists • Sequential function chart • SCADA basics • SCADA set-up and simulation • System architecture • Communication strategies • Asynchronous transmission • Coding • The RS-232 standard • The RS-485 standard • Modbus • Safety PLCs • Voting system architectures

2018-19 Schedule and Tuition (USD)

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2018-19 Schedule and Tuition (USD)

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<th>Location</th>
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Any course is available inhouse at your location. Contact us today. +1.918.828.2500 | petroskills.com | +1.800.821.5933 (toll free North America)
**Valve and Actuator Technologies – IC72**

**INTERMEDIATE  5-DAY**

This workshop provides a total in-depth insight into valve and actuator technology, covering: control valves, check valves, shut-off valves, solenoid valves, and pressure relief valves. A method is presented to ensure the optimum selection of size, choice of body and trim materials, components, and ancillaries. Whilst studying both liquid and gas valve sizing, delegates will also learn the correct procedures for calculating the spring ‘wind-up’ or ‘bunch set’. Maintenance issues also include: testing for dead-band/hysteresis, stick-slip, and non-linearity; on-line diagnostics; and signature analysis. Throughout the workshop, participants will learn through active participation using exercises, questionnaires, and practical sessions covering: systems choice; basic sizing calculations; computer-based sizing; and maintenance diagnostics.

**DESIGNED FOR**

Facilities, chemical, electrical, instrumentation, maintenance, and mechanical engineers and technicians involved in designing, selecting, sizing, specifying, installing, testing, operating and maintaining shut-off, pressure relief, and control valves.

**YOU WILL LEARN HOW TO**

- Compare the major technologies used in the final control element
- Calculate the valve flow coefficient Cv
- Perform flow and system pressure head loss calculations
- Contrast the different types of control, shut-off, and check valves
- Describe the principles of cavitation control and noise reduction
- Select optimum materials of construction to avoid corrosion and erosion
- Identify the correct requirements for trim selection
- Differentiate between inherent and installed characteristics
- Identify ANSI/DIN pipe sizes and pressure ratings
- Explain the control valve seat leakage classifications
- Evaluate the optimum valve-actuator combination
- Apply on-line valve testing and diagnostics for deadband and hysteresis, stick-slip, and non-linearity
- Examine the principles of preventive maintenance through the application of signature analysis
- Perform a bench set and calculate actuator spring wind-up
- Pick the correct positioner using our set of guidelines

**COURSE CONTENT**

- Choked flow
- Pressure recovery
- Flashing and cavitation
- Seat leakage
- sizing for liquids and gases
- Valve construction
- Cavitation control and noise reduction
- Valve types
- Valve trim and characterization
- Valve selection
- Actuators and positioners
- Valve testing and diagnostics
- Maintenance and repair

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**Flow and Level Custody Measurement – IC73**

**INTERMEDIATE  5-DAY**

This course is designed to acquaint users with the problems and solutions for high accuracy transfer of liquid and gas petroleum products from supplier to customer. These needs have been brought about by major changes in manufacturing processes and because of several dramatic circumstantial changes such as: the increase in the cost of fuel and raw materials; the need to minimize pollution; and the increasing pressures being brought to bear to adhere to the requirements for health and safety.

**DESIGNED FOR**

Instrumentation, automation, and process engineers and technicians involved in specifying, installing, testing, tuning, operating, and maintaining regulatory PID control systems.

**YOU WILL LEARN HOW TO**

- Define the principles of fluid mechanics
- Identify the fundamental problems related to uncertainty
- Compare the different methods of measuring flow in oil and gas industries
- Describe the various methods of level measurement
- Compare the different methods used to derive striping tables
- Evaluate the different custody transfer standards in use today
- Contrast the methods used in flow calibration
- Identify the different types of prover systems
- Explain the methodology used in truck transfer custody
- Examine the challenges regarding pipelines
- Describe the basics of leak detection
- Analyze the methodology for monitoring and controlling production losses
- Evaluate and compare the problems and solutions associated with the measurement of NGL, LPG, and LNG

**COURSE CONTENT**

- Fluid mechanics
- Flowmeter classification
- Uncertainty analysis
- Flow measurement
- Turbine
- Positive displacement
- Ultrasonic flowmeters
- Coriolis mass flowmeters
- Level measurement
- Capacitance
- Ultrasonic measurement
- Radar measurement
- Flow calibration
- Terminal custody transfer
- Tank management systems
- Lease automatic custody transfer
- Truck transfer custody transfer
- Pipeline considerations
- Fugitive emissions
- Leak detection
- Real time transient model
- Loss control systems
- Custody transfer sampling
- Monitoring and controlling production losses
- Physical leaks
- Meter performance
- API standards
- Measuring the suspended S&W content
- Calculating net volume
- Flowmeter selection and costs
- Initial considerations
- Meter selection
- Properties and measurement of NGL, LPG, and LNG

**Risk Based Process Safety Management – HS45**

**FOUNDER  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**

- Identify the principles 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 impact 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

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**Practical PID Control and Loop Tuning – IC74**

**INTERMEDIATE  5-DAY**

This workshop provides instrumentation, automation, and process engineers and technicians with the basic theoretical and practical understanding of regulatory control systems and how this can be applied to optimize process control in terms of quality, safety, flexibility, and costs. Centered on the ISA-recommended PC-Control LAB simulator, participants will learn through active participation using exercises, questionnaires, and a series of 16 practical simulation sessions covering: process reaction; tuning methods; diagnostic tools; effect of different algorithms; surge tank level control; analysis of such problems as valve hysteresis, stick and non-linearities and the impact on controllability; and integral windup.

**DESIGNED FOR**

Instrumentation, automation, and process engineers and technicians involved in specifying, installing, testing, tuning, operating, and maintaining regulatory PID control systems.

**YOU WILL LEARN HOW TO**

- Define such terms as process lag, capacitance, and resistance
- Explain the significance of the process reaction curve
- Identify the effects of filtering on loop performance
- Distinguish the effect on the span of the system performance
- Analyze such problems as valve hysteresis, sticking, and non-linearities
- Evaluate the effects of proportional, integral, and derivative control
- Identify and correct problems due to process dead time
- Discuss the top 20 mistakes made in the field of process control

**COURSE CONTENT**

- Basic process considerations
- Process lag, capacitance, and resistance
- Process reaction curve
- PID and 2nd order reactions
- Instrumentation calibrating
- Filtering
- Aliasing
- Reaction masking
- Sensor placement
- Correct PV
- Effect of span
- Inherent and installed valve characteristics
- Actuators
- Valve positioning
- Tuning procedures and analysis
- ON/OFF control
- Proportional control
- Proportional offset
- Reset
- Integral action and windup
- Stability
- Derivative action
- PID control
- Control algorithms
- Load disturbances and offset
- Speed, stability, and robustness
- Open loop reaction curve tuning method (Ziegler-Nichols)
- Typical settings
- Closed loop continuous cycling tuning method (Ziegler-Nichols)
- Fine tuning
- Fine tuning
- Surge transfer
- Split parallel range control
- Cascade systems
- Feed-forward and combined systems
- Ratio control
- System integration

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**2018-19 Schedule and Tuition (USD)**

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**2019 Schedule and Tuition (USD)**

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*plus computer charge*
Gas Conditioning and Processing – G4

The Campbell Gas Course®

FOUNDATION

The Campbell Gas Course® has been the standard of the industry for more than 52 years. Tens of thousands of engineers have attended our G4 program, considered by many to be the most practical and comprehensive course in the oil and gas industry. The Campbell Gas Course® textbooks, Volumes 1 and 2, are routinely updated to reflect evolving technologies in this broad industry.

Both hand-methods and computer-aided analyses are used to examine sensitivities of technical decisions. To enhance the learning process, about 30 problems will be assigned, reviewed, and discussed throughout the course. Problems will be solved individually and in teams.

DESIGNED FOR

Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This course is for facilities engineers, process engineers, senior operations personnel, field supervisors, and engineers who select, design, install, evaluate, or operate gas processing plants and related facilities. A broad approach is taken with the topics.

YOU WILL LEARN HOW TO

• Application of gas engineering and technology in facilities and gas plants
• Important specifications for gas, NGL, and condensate
• About the selection and evaluation of processes used to dehydrate natural gas, meet hydrocarbon dewpoint specifications, and extract NGLs
• How to apply physical/thermodynamic property correlations and principles to the operation, design, and evaluation of gas processing facilities
• Practical equipment sizing methods for major process equipment
• To evaluate technical validity of discussions related to gas processing
• To recognize and develop solutions for operating problem examples and control issues in gas processing facilities

COURSE CONTENT

• Gas processing systems
• Physical properties of hydrocarbons
• Terminology and nomenclature
• Qualitative phase behavior
• Vapor-liquid equilibrium
• Water-hydrocarbon phase behavior, hydrates, etc.
• Basic thermodynamics and application of energy balances
• Process control and instrumentation
• Relief and flare systems
• Fluid hydraulics; two-phase flow
• Separation equipment
• Heat transfer equipment
• Pumps
• Compressors and drivers
• Refrigeration in gas conditioning and NGL extraction facilities
• Fractionation
• Glycol dehydration, TEG
• Adsorption dehydration and hydrocarbon removal
• Gas treating and sulfur recovery
• Overview and summary

2018-19 Schedule and Tuition (USD)

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Onshore Pipeline Facilities - Design, Construction and Operations – PL42

DESIGNED FOR

Pipeline project managers and engineers, operations and maintenance supervisors, regulatory compliance personnel, and other technical professionals with 1-3 years of experience in natural gas, crude oil, refined petroleum products, LPGs, NGL, chemical, carbon dioxide pipeline engineering, construction, operations, or maintenance. This course is intended for participants needing a broad understanding of the planning, development, construction, start-up, and operating and asset integrity management of onshore pipelines.

YOU WILL LEARN HOW TO

• Apply regulatory codes, standards, and industry guidelines (API and others) that control and guide the permitting, design, construction, operation, and maintenance of pipeline facilities
• Apply mechanical and physical principles to pipeline design, hydraulics, and material selection
• Apply mechanical and physical principles to pump and compressor selection
• Describe the important factors in station design
• Describe the importance of route selection and hydraulics for long term profitability, reliability, and safety
• Identify special design and construction challenges of onshore pipeline systems
• Describe methods of river and road crossings, HDD crossings, bores
• Identify the principle interfaces and potential interrelationships of pipeline facilities, such as pump stations and terminals, on design and operations
• Apply operational and maintenance tools and procedures, including system monitoring and control, leak detection, corrosion control, custody measurement and quality control, asset integrity management, and emergency response planning

COURSE CONTENT

• Regulations and code compliance requirements
• Pipeline survey and routing • Mechanical and hydraulic design • Proper system sizing and design • Equipment selection criteria • Facilities sites and design concerns • Construction methods and contracting approaches • Operations and asset integrity management

2018-19 Schedule and Tuition (USD)

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<th>Tuition (USD)</th>
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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 the key design, construction, and installation issues associated with fixed and floating platforms and how to apply the lessons learned 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 – Risers 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 – and more...

2018-19 Schedule and Tuition (USD)

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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 asphaltenes, 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, asphaltenes, and scale
• Transportation of crude oil
• Produced water treatment
• Water injection systems
• Solution gas handling

2018-19 Schedule and Tuition (USD)

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**Subsurface**
- Introductory and Multi-Discipline
- Geology
- Geophysics
- Petrophysics
- Reservoir Engineering
- Well Construction/Drilling
- Production and Completions Engineering
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- Integrated - Heavy Oil
- Petroleum Data Management

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- Process Facilities
- Offshore & Subsea
- Pipeline Engineering
- Mechanical Engineering
- Reliability Engineering
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**Health, Safety, Environment**

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- Gas Conditioning and Processing
- NODAL Analysis Workshop
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- Production Operations 1
- Production Technology for Other Disciplines
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