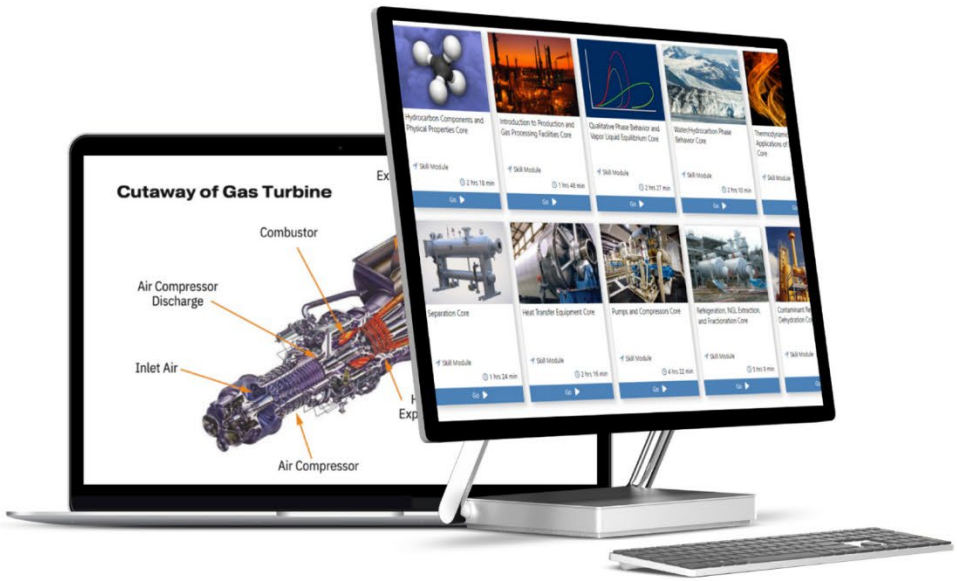
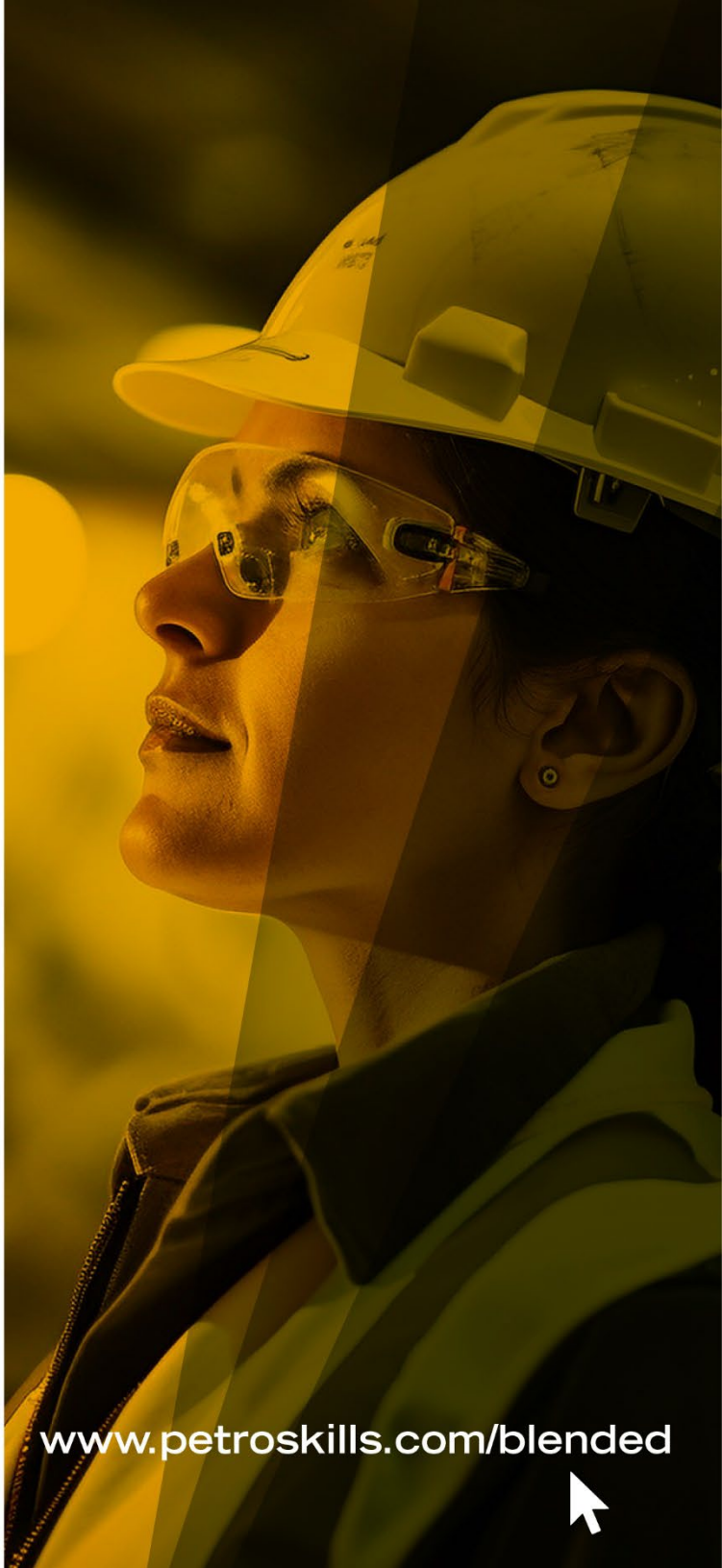
PetroSkills

Petroleum Facilities

eLearning Courses

For Technical Professionals





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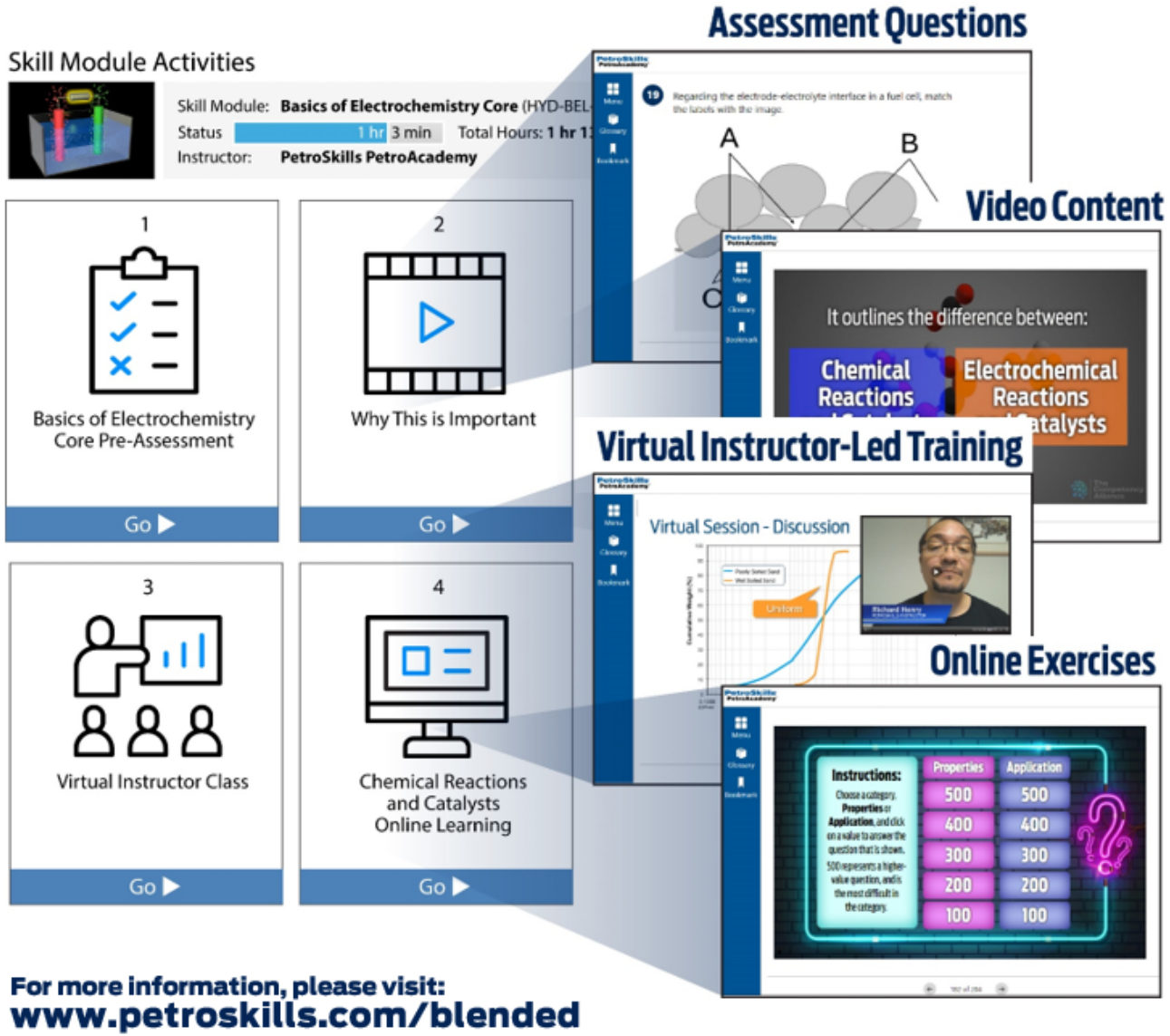
THE COMPETENCY ALLIANCE
ELEARNING SOLUTIONS

The Competency Alliance's eLearning solutions combine industry knowledge, expertise, content, and technology to develop workforce competency. Each eLearning course integrates multiple self-paced learning activities, such as reading assignments, case studies, quizzes, and experiential activities. This combination of activities increases knowledge retention.

The Competency Alliance's eLearning solutions combine industry knowledge, expertise, content, and technology to develop workforce competency with the added benefit of:

- ✓ Reduced time to competency
- ✓ Eliminated travel expenses
- ✓ Flexibility—less time away from work
- ✓ Learning applied at the point of need

eLEARNING COURSES MAY INCLUDE:



For more information, please visit:
www.petroskills.com/blended

eLearning Learning Course Catalog

Definitions of eLearning Course Levels
Basic (Level 1) Competency Level
Foundation (Level 2) Competency Level

v.24.08 Aug-2024

eLearning Courses by Discipline

Facilities

Gas Processing

Basic (Level 1)

GAS-CRA-1	Contaminant Removal - Acid Gas and Mercury Removal	Released
GAS-CRD-1	Contaminant Removal - Gas Dehydration	Released
GAS-FFC-1	Fluid Flow	Released
GAS-HTE-1	Heat Transfer Equipment	Released
GAS-HCP-1	Hydrocarbon Components and Physical Properties	Released
GAS-IGC-1	Introduction to Production and Gas Processing Facilities	Released
GAS-PCC-1	Pumps and Compressors	Released
GAS-QPB-1	Qualitative Phase Behavior and Vapor-Liquid Equilibrium	Released
GAS-RNG-1	Refrigeration, NGL Extraction and Fractionation	Released
GAS-SEC-1	Separation	Released
GAS-TAE-1	Thermodynamics and Application of Energy Balances	Released
GAS-WHP-1	Water Hydrocarbon Phase Behavior	Released

Process Facilities

Basic (Level 1)

PRS-CBH-1	Combustion Behavior of Hydrocarbons	Released
PRS-FPS-1	Fire Protection Systems	Released
PRS-GOW-1	Gas, Oil, and Water Composition and Properties	Released
PRS-HID-1	Historical Incident Databases, Plant Layout, and Equipment Spacing	Released
PRS-LDH-1	Leakage and Dispersion of Hydrocarbons	Released
PRS-REF-1	Overview of Reservoir Engineering for Facilities Operations	Released
PRS-PHA-1	Process Hazards Analysis and Layers of Protection Analysis Techniques	Released
PRS-PSR-1	Process Safety Risk Analysis and Inherently Safer Design	Released
PRS-RFS-1	Relief and Flare Systems	Released
PRS-SIS-1	SIS, Monitoring and Control	Released
PRS-SIH-1	Sources of Ignition and Hazardous Area Classification	Released
PRS-SPS-1	Specific Plant Systems and Equipment	Released

Foundation (Level 2)

PRS-CSI-2	Controls and Safety Instrumented Systems	Released
PRS-FLA-2	Flow Assurance for Surface Facilities	Released
PRS-GLS-2	Gas-liquid Separation	Released
PRS-HID-2	HID and Metrics, Bad Actors (Specific Systems)	Released
PRS-LDC-2	Leakage and Dispersion, Combustion Behavior, Sources of Ignition	Released
PRS-OGS-2	Oil Gathering Systems	Released
PRS-OSV-2	Oil Stabilization, Sweetening, Storage, and VRU Crude	Released

Process Facilities *(continued)*

PRS-OTR-2	Oil Treating and Desalting	Released
PRS-OWS-2	Oil-Water Separation	Released
PRS-OSG-2	Overview of Solution Gas Handling	Released
PRS-PHA-2	PHA Techniques and LOPA	Released
PRS-PWT-2	Produced Water Treatment	Released
PRS-RFD-2	Relief, Flare, and Depressurization	Released
PRS-RAI-2	Risk Analysis and Inherently Safer Design	Released
PRS-SLF-2	Spacing and Layout, Fire Protection	Released
PRS-TCO-2	Transportation of Crude Oil	Released
PRS-WIS-2	Water Injection	Released

Mechanical Engineering

Basic (Level 1)

MEC-CCC-1	Corrosion Control and Protection	Released
MEC-FHB-1	Fired Heaters and Boilers	Released
MEC-GST-1	Gas and Steam Turbines	Released
MEC-MDM-1	Machinery Design, Materials, and Subsystems	Released
MEC-MEC-1	Mechanical Equipment	Released
MEC-MEI-1	Mechanical Equipment Inspection, Operation and Maintenance	Released
MEC-PSW-1	Piping Systems and Welding	Released
MEC-PMC-1	Properties of Materials	Released
MEC-REC-1	Reciprocating Engines for Process Facilities	Released
MEC-STC-1	Storage Tanks	Released
MEC-UPV-1	Unfired Pressure Vessels	Released

Instrumentation & Controls

Basic (Level 1)

INC-CS1-1	Control Systems for Oil and Gas Applications (Part 1)	Released
INC-CS2-1	Control Systems for Oil and Gas Applications (Part 2)	Released
INC-CVO-1	Control Valves for Oil and Gas Applications	Released
INC-ISA-1	Instrumentation Selection for Oil and Gas Applications (Analysis)	Released
INC-ISF-1	Instrumentation Selection for Oil and Gas Applications (Flow)	Released
INC-ISO-1	Instrumentation Selection for Oil and Gas Applications (General)	Released
INC-ISL-1	Instrumentation Selection for Oil and Gas Applications (Level)	Released
INC-ISP-1	Instrumentation Selection for Oil and Gas Applications (Pressure, Temp)	Released

Electrical Engineering

Basic (Level 1)

ELE-EDI-1	Basics of Electrical Safety and Design Standards (U.S. Based Standards)	Released
ELE-MOT-1	Electric Motors and Motor Control in Industrial Facilities	Released
ELE-SAF-1	Electrical Safety in Design for Industrial Facilities	Released
ELE-HAZ-1	Hazardous Area Classification in Oil and Gas Facilities	Released
ELE-DIV-1	Hazardous Area Equipment Selection and Installation in Division-based Facilities	Released
ELE-ZON-1	Hazardous Area Equipment Selection and Installation in Zone-based Facilities	Released
ELE-PR1-1	Principles of Power Systems in Industrial Facilities (Part 1)	Released
ELE-PR2-1	Principles of Power Systems in Industrial Facilities (Part 2)	Released

Pipeline Engineering

Basic (Level 1)

PIP-PIC-1	Pipeline Construction (U.S. Focus)	Released
PIP-PHF-1	Pipeline Hydraulics and Flow Assurance	Released
PIP-POM-1	Pipeline O&M, Leak Detection, Repairs, Alterations, and Abandonment (U.S. Focus)	Released
PIP-PCS-1	Pipeline Pump and Compressor Stations and Terminals (U.S. Focus)	Released
PIP-PRG-1	Pipeline Routing and Geomatics (U.S. Focus)	Released
PIP-PSS-1	Pipeline Strength, Stability, and Environmental Considerations Core (U.S. Focus)	Released

Downstream

Basic (Level 1)

REF-ELE-1	Electrical Topics for Non-Electrical Engineers	Coming soon
REF-RCO-1	Refinery Corrosion Overview	Coming soon
REF-SPC-1	Refinery Separation Processes Corrosion	Coming soon
REF-CPC-1	Refinery Conversion Processes Corrosion	Coming soon
REF-TPC-1	Refinery Treatment Process Corrosion	Coming soon
REF-RSC-1	Refinery Storage Corrosion	Coming soon
REF-SUP-1	Refining and Petrochemical Operation Supervisory Skills	Coming soon
REF-QAC-1	Refining and Petrochemicals QA/QC Laboratory Management	Coming soon
REF-RMP-1	Refining and Petrochemicals Routine Maintenance, Planning, and Control	Coming soon
REF-RPT-1	Refining and Petrochemicals Turnaround Planning and Control	Released
REF-OMS-1	Refining Oil Movement and Storage Operations	Released
REF-RCM-1	Reliability Centered Maintenance (RCM)	Coming soon

Project Management

Basic (Level 1)

PRJ-AGS-1	Acquiring Goods and Services	Released
PRJ-CMC-1	Construction Management	Released
PRJ-CEC-1	Cost Estimating for Facility Projects	Released
PRJ-DEM-1	Design Engineering Management	Released
PRJ-INT-1	Interface Management for Programs and Projects	Coming soon
PRJ-OFD-1	Onshore Field Development Programs and Projects	Released
PRJ-PMC-1	Progress Measurement	Released
PRJ-PGC-1	Project Governance	Released
PRJ-PRO-1	Project Resources and Organization	Released
PRJ-RMC-1	Project Risk Management	Released
PRJ-SCC-1	Scheduling	Released
PRJ-SDC-1	Scope Delivery	Released

Business and Management

Basic (Level 1)

PEB-BUC-1	Budgeting	Released
PEB-CFC-1	Cash Flow	Released
PEB-DAP-1	Decision Analysis Process	Released
PEB-EDT-1	Economic Decision Tools	Released
PEB-FOC-1	Financing and Ownership	Released
PEB-OGP-1	Oil and Gas Pricing	Released
PEB-PIA-1	Petroleum Industry Accounting	Released
PEB-PFC-1	Production Forecasting	Released
PEB-RUC-1	Risk and Uncertainty	Released

Foundation (Level 2)

PEB-DPV-2	Decision Policy and Value Calculations	Released
PEB-JBC-2	Judgments and Biases	Released
PEB-DIS-2	Monte Carlo Simulation and Distributions	Released
PEB-VCC-2	Value of Control	Released
PEB-BRC-2	Value of Information and Bayes' Rule	Released

Data Science and Analytics

Basic (Level 1)

DSA-DFD-1	Data Foundation for the Digital Oilfield	Released
DSA-DOC-1	Digital Oilfield Challenges, Barriers to Adoption, and Risks	Released
DSA-IDW-1	Introduction to Data-driven Workflows	Released
DSA-IDO-1	Introduction to the Digital Oilfield	Released
DSA-OTF-1	Operational Technology and Field Networks	Released
DSA-SML-1	Supervised Machine Learning	Released
DSA-FDO-1	The Future of the Digital Oilfield	Released
DSA-UML-1	Unsupervised Machine Learning and Clustering	Released

eLearning Courses by Series

Gas Conditioning and Processing Principles

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are available in self-paced eLearning courses. These competencies set the base knowledge required for a successful career as an entry-level facilities engineer, seasoned operator, and field supervisor.

This series provides an understanding of common terminology, hydrocarbons and their physical properties, qualitative and quantitative phase behavior, hydrates, and fluid flow. In addition, it offers a systematic approach to understanding the common types of equipment and the primary unit operations in offshore and onshore gas conditioning and processing facilities. Candidates can take the following self-paced eLearning courses individually or as a **55-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Hydrocarbon Components and Physical Properties	Level 1	5 hrs
Introduction to Production and Gas Processing Facilities	Level 1	4 hrs
Qualitative Phase Behavior and Vapor-Liquid Equilibrium	Level 1	4.5 hrs
Water/Hydrocarbon Phase Behavior	Level 1	5 hrs
Thermodynamics and Application of Energy Balances	Level 1	3.5 hrs
Fluid Flow	Level 1	5 hrs
Relief and Flare Systems	Level 1	3 hrs
Separation	Level 1	4 hrs
Heat Transfer Equipment	Level 1	3.5 hrs
Pumps and Compressors	Level 1	4 hrs
Refrigeration, NGL Extraction and Fractionation	Level 1	5 hrs
Contaminant Removal – Gas Dehydration	Level 1	4 hrs
Contaminant Removal – Acid Gas and Mercury Removal	Level 1	4.5 hrs

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 series 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, but advanced topics are available in our other gas processing series.

LEVEL: Basic (Level 1)

Acid Gas Removal – Amine-Focused Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

Acid gas removal is an important gas conditioning step that is required for natural gas streams that contain moderate to large amounts of carbon dioxide and hydrogen sulfide. The treated gas specification depends upon the downstream requirements, for example if it needs to meet a pipeline tariff specification or if it is flowing to a natural gas liquefaction facility where the specifications will be much more stringent.

Amine acid gas removal units are by far the most common technology used to remove these compounds from natural gas streams.

This series covers different acid gas removal technologies, with a strong focus on natural gas amine treating.

The on-demand instructor-led lecture will cover simple methods to estimate the amine circulation rate for treating a gas stream with and without CO2 slip. In addition, maintaining a water balance in this process unit is critical. The method to estimate a water balance will be presented, as well as the key factors that affect the degree of sweetening (or acid gas removal) possible.

The problem assignment will allow the participants to practice the methods presented in the on-demand instructor-led lecture. The problem set will provide additional insight into the practical aspects of amine treating.

The on-demand instructor-led debrief will work through the insights gained in the problem assignment. Common operating problems and potential solutions will be discussed. During the round table discussion, the participants will be able to share their experiences and to ask detailed questions to the group. Participants may test out of the prerequisites.

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 series 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.

		Instructor Led	OR	On Demand
Prerequisites	**Day 1**			
	Basic Conversions Gas and Liquid Physical Properties Introduction to Gas Processing Facilities Multicomponent Phase Behavior Non-Hydrocarbon Components Effect on Phase Envelopes Fundamental Applications of Phase Envelopes Water Content of Sweet and Sour Natural Gas	3 hr 57 min		3 hr 57 min
Required e-Learning	Acid Gas Removal Acid Gas Removal by Amines Types of Internals in Mass Transfer Devices	1 hr 37 min		1 hr 37 min
Optional e-Learning	Sulfur Recovery and Amine Treating Acid Gas Injection NGL Product Treating	[1 hr 23 min]		[1 hr 23 min]
Virtual Instructor-Led or On-Demand	**Day 2**			
	Fundamentals of Amine Treating Lecture Self-Directed Problem Assignment	3 hr		1 hr 30 min
	Day 3			
	Problem Debrief and Experience Round Table	3 hr		2 hr 12 min
	Total Duration:	**12 hr 57 min**		**10 hr 39 min**

Centrifugal Compressors Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

This series covers the fundamentals of centrifugal compressor selection and operations. It also reviews the other types of compressors and their applications. The on-demand instructor-led lecture will prepare the participants to do detailed analysis on centrifugal compressors using the vendors compressor curves. The methods applied will allow one to estimate the required compressor head for a given process operating conditions, estimate the number of impellers required for multistage applications, analyze the effect of changing inlet conditions to centrifugal compressor performance, interpret centrifugal compressor curves, and understand the basics of centrifugal compressor controls.

The problem assignment will review two different centrifugal compressor applications. The first problem assignment involves determining the new operating envelope for a fixed speed centrifugal compressor that was specified for a new field development where the initial production conditions were off from the design conditions of the machine. The second problem investigates a variable speed, multistage centrifugal compressor application and investigates the compressors performance over changing operating conditions, from the initial field start up conditions, through end of life of the plant.

The on-demand instructor-led debrief will provide practical insight regarding options to mitigate operating limitations of centrifugal compressors and discuss common operating problems and potential solutions for both centrifugal and reciprocating compressors. Participants may test out of the prerequisites.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facility engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led	OR	On Demand
Prerequisites	**Day 1**			
	Basic Conversions Gas and Liquid Physical Properties Multicomponent Phase Behavior Thermodynamic Principles and the First Law of Thermodynamics Second Law of Thermodynamics and Energy Balance Equations Using PH Diagrams to Perform Energy Balance Calculations	3 hr 59 min		3 hr 59 min
Required e-Learning	Compressor Applications, Types and Selection Compressor Head, Power Requirements and Discharge Temperature Principles of Centrifugal Compressor Operation	1 hr 18 min		1 hr 18 min
Optional e-Learning	Principles of Reciprocating Compressor Operations Principles of Rotary Screw Compressor Operations	[1 hr 2 min]		[1 hr 2 min]
Virtual Instructor-Led or On-Demand	**Day 2**			
	Fundamentals of Centrifugal Compressors Lecture Self-Directed Problem Assignment	3 hr		1 hr 7 min
	Day 3			
	Problem Debrief and Experience Round Table	3 hr		1 hr 56 min
	Total Duration:	**12 hr 19 min**		**9 hr 22 min**

Centrifugal Pumps Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

This series covers not only the basics of pumps but also covers the fundamental aspects of centrifugal pump selection and operation. The content sets the foundation for a successful study of the practical application of centrifugal pump analysis. This series will prepare the participant to confidently select centrifugal pumps for different process operating conditions and troubleshoot current pumps operating out in the field from a process performance perspective.

The eLearning courses will prepare participants for a review of the centrifugal pump analysis and selection. During the on-demand instructor-led session, you will learn how to determine the required pump head, NPSHR, and NPSHA for a given pump application. We will review how to develop process system hydraulic curves based upon the flowing conditions and facilities layout and apply the process system curve with the pump curve to determine optimal pump selection. In addition, pump process control options will be discussed.

The virtual, instructor-led lecture is followed by two centrifugal pump assignments (case studies), where delegates apply the analysis methods reviewed during the lecture. The problem assignments will be debriefed in detail, giving additional practical insights into pump selection and operation from a process requirement perspective. The round table discussion will explore common operating problems and potential pump damage for off-design pump operations. Troubleshooting and potential solutions to pump operating problems will also be discussed. Participants will have the opportunity to share their experiences and ask specific application questions. Participants may test out of the prerequisites.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led OR On Demand	
Prerequisites	**Day 1**		
	Gas and Liquid Physical Properties Multicomponent Phase Behavior Fundamental Applications of Phase Envelopes	1 hr 41 min	1 hr 41 min
Required e-Learning	Pump Applications, Types and Selection Head vs Pressure Rise and Pump Power Requirements Centrifugal Pumps vs Positive Displacement Pumps Cavitation, NPSHR, NPSHA Principles of Centrifugal Pump Operations Principles of Plunger Pump Operations	2 hr 25 min	2 hr 25 min
Virtual Instructor-Led or On-Demand	**Day 2**		
	Fundamentals of Centrifugal Pumps Lecture Self-Directed Problem Assignment	3 hr	2 hr 24 min
	Day 3		
	Problem Debrief and Experience Round Table	3 hr	2 hr 24 min
	Total Duration:	**10 hr 6 min**	**8 hr 16 min**

Fluid Hydraulic Fundamentals – Multiphase Focus for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

Multiphase flow in offshore subsea pipelines and gathering systems can present significant operating problems in both offshore and onshore facilities due to operating in the slugging flow regime. This series covers fluid flow fundamentals and has a focus on multiphase flow systems. The on-demand instructor-led lecture will cover simple correlations that will give significant insight into the phenomenon of multiphase flow systems, and what the key operating parameters are that determine the flow regime for a given system or pipeline.

The assigned problem will highlight the governing factors that result in total pressure drop in multiphase systems, and the significant reduction in gathering system capacity even with a small amount of liquids present. The on-demand instructor-led problem debrief session will further develop other important considerations in multiphase flow systems, discuss potential slug mitigation methods, and the round table discussion will allow delegates to share their experiences, challenges and solutions to problems involving multiphase flow systems. Participants may test out of the prerequisites.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led OR On Demand	
Prerequisites	**Day 1**		
	Basic Conversions Gas and Liquid Physical Properties Multicomponent Phase Behavior Effect of C6+ Characterization on Phase Behavior Fundamental Applications of Phase Envelopes	2 hr 45 min	2 hr 45 min
Required e-Learning	Estimation and Application of Friction Factors Sizing Piping Systems Pressure Drop in Plant Piping Systems Flow Regimes in Multiphase Flow Systems Difference Between Liquid Holdup and Liquid Volume Fraction Common Slugging Mechanisms Erosional Velocity	2 hr 31 min	2 hr 31 min
Optional e-Learning	Common Gas Transmission Pipeline Flow Correlations and Applications Parameters Affecting Heat Transfer in Piping Systems Newtonian and Non-Newtonian Fluids	[30 min]	[30 min]
Virtual Instructor-Led or On-Demand	**Day 2**		
	Fundamentals of Hydrate Inhibition Lecture Self-Directed Problem Assignment	3 hr	1 hr 45 min
	Day 3		
	Problem Debrief and Experience Round Table	3 hr	1 hr 5 min
	Total Duration:	**11 hr 46 min**	**8 hr 36 min**

Fractionation Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

This series covers fractionation and stabilization of hydrocarbon liquids at both the basic and fundamental levels. Fractionation is one of the most complex processing units in a gas production and processing facility and is often the least understood. This series will prepare a facilities engineer to understand the operating envelop of stabilization and fractionation columns, what sets the operating pressure and bottoms temperature required, typical fractionation column control options and how to troubleshoot fractionation column operations.

The virtual, instructor-led lecture will cover how to estimate the fractionation column operating pressure and bottoms temperature, as well as cover the different column process control options. The problem assignment will reinforce the key operating principles covered in the instructor led session and will lead to more effective column troubleshooting skills.

The problem debrief will include a process simulation tool that will run the participants through a number of what-if scenarios that will deepen their understanding of how these columns separate the components, but also how they respond depending upon changing inlet conditions, such as ambient temperatures, feed composition changes, and feed rate cooling and heating rate changes. With this knowledge, facility engineers will be better equipped to support operations staff, as well as be more proficient in understanding the critical components for system design, troubleshooting and debottlenecking. Participants may test out of the prerequisites.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led	OR	On Demand
Prerequisites	**Day 1**			
	Basic Conversions Hydrocarbon Component Families Gas and Liquid Physical Properties Introduction to Gas Processing Facilities Pure Component Phase Behavior Multicomponent Phase Behavior Vapor Liquid Equilibrium Multi-Stage Stabilization of Crude Oil and Condensate RVP and TVP of Condensate and Crude Oils	5 hr 34 min		5 hr 34 min
Required e-Learning	Pump Applications, Types and Selection Head vs Pressure Rise and Pump Power Requirements Centrifugal Pumps vs Positive Displacement Pumps Cavitation, NPSHR, NPSHA Principles of Centrifugal Pump Operations Principles of Plunger Pump Operations	2 hr 35 min		2 hr 35 min
Virtual Instructor-Led or On-Demand	**Day 2**			
	Fundamentals of Fractionation Lecture Self-Directed Problem Assignment	3 hr		1 hr 6 min
	Day 3			
	Problem Debrief and Experience Round Table	3 hr		1hr 21 min
	Total Duration:	**14 hr 9 min**		**10 hr 36 min**

Gas/Liquid Separation Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

Separators are a critical but often overlooked component in a processing facility. Applications range from bulk separation of fluids to gas scrubbing upstream of compressors and gas polishing upstream of dehydrators and amine systems. Poor separator performance can significantly impair the effectiveness and availability of downstream process equipment, which in turn reduces profitability.

This series covers separation principles, applications, and sizing techniques. We will cover the sizing criteria for 2-phase (gas - liquid) and
3-phase (gas - hydrocarbon liquids - water), separator configurations, components and internal devices. The on-demand instructor-led lecture will cover detailed separator sizing and analysis methods that will allow facilities engineers to do detailed vendor bid package analysis in terms of the proposed separator size, as well as brownfield separator troubleshooting and debottlenecking.

The problem assignments will apply these methods to real-world example problems, and a problem debrief and round table discussion will delve further into practical issues associated with separation equipment, causes of common operating problems, and possible solutions to consider.

This in-depth series is invaluable to facilities engineers that are struggling with operating issues in existing facilities, or for engineers that are currently working on greenfield projects that will be responsible for separator sizing and selection. Participants may test out of the prerequisites.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led	OR	On Demand
Prerequisites	**Day 1**			
	Basic Conversions Gas and Liquid Physical Properties Multicomponent Phase Behavior Effect of C6+ Characterization on Phase Behavior Vapor Liquid Equilibrium	3 hr 7 min		3 hr 7 min
Required e-Learning	Principles of Gas Liquid Separation Two-Phase Separation Mist Extraction Devices Vertical and Horizontal Separators	1 hr 34 min		1 hr 34 min
Optional e-Learning	Multi-Stage Stabilization of Crude Oil and Condensate RVP and TVP of Condensate and Crude Oils	[32 min]		[32 min]
Virtual Instructor-Led or On-Demand	**Day 2**			
	Fundamentals of Gas / Liquid Separation Lecture Self-Directed Problem Assignment	3 hr		1 hr 45 min
	Day 3			
	Problem Debrief and Experience Round Table	3 hr		2 hr 5 min
	Total Duration:	**11 hr 13 min**		**9 hr 3 min**

Heat Transfer Equipment Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

This series covers heat transfer equipment from the principles of heat transfer to the heat exchanger types and common applications. Heat transfer principles are covered, and detailed heat and material balance calculations are reviewed to allow one to estimate the required heat transfer area for a given heat exchanger application. Detailed hand calculation methods will be presented to estimate the sizing of shell and tube heat exchangers which will emphasize the impact of the effective temperature approaches selected. A case study compares the pros and cons of tighter temperature approaches, and heating and cooling curves will be utilized to investigate heat integration.

This series provides insight into the various heat transfer equipment options and includes simple methods to troubleshoot the performance of existing exchangers through an understanding of principles of heat transfer analysis. These methods can also be applied to check conventional shell and tube heat exchanger vendor bid packages to ensure the vendor is quoting an optimal design for the application. During the problem debrief and round table discussion, delegates will have the opportunity to share their experiences and challenges with heat transfer equipment. Participants may test out of the prerequisites.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led OR On Demand	
Prerequisites	**Day 1**		
	Basic Conversions Gas and Liquid Physical Properties Multicomponent Phase Behavior Thermodynamic Principles and the First Law of Thermodynamics Second Law of Thermodynamics and Energy Balance Equations Ethalpy Correlations and Applications of Energy Balance Correlations	3 hr 27 min	3 hr 27 min
Required e-Learning	Types of Heat Exchangers and Their Common Applications Heat Transfer Mechanisms and Parameters Affecting Heat Transfer Coefficient Estimating Exchanger's Heat Transfer Area Shell and Tube Exchanger Types and their Applications Compact Heat Exchanger and Fired Heaters Process Cooling Methods and Air-Cooled Heat Exchangers	1 hr 34 min	1 hr 34 min
Virtual Instructor-Led or On-Demand	**Day 2**		
	Fundamentals of Hydrate Inhibition Lecture Self-Directed Problem Assignment	3 hr	1 hr 45 min
	Day 3		
	Problem Debrief and Experience Round Table	3 hr	1 hr 24 min
	Total Duration:	**11 hr 50 min**	**8 hr 46 min**

Hydrate Inhibition Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

This series describes hydrates and explores conditions favoring hydrate formation. It also describes how to estimate the hydrate formation temperature of a natural gas stream and provides methods to estimate hydrate inhibitor injection requirements. Participants will learn the key differences between low dosage hydrate inhibitors and thermodynamic inhibitors.

The problem assignment will provide technical insight into the differences between methanol and mono-ethylene glycol used as hydrate inhibitors. The problem debrief and round table will explore the advantages and disadvantages of both inhibitors and provide additional depth on practical industry experience regarding hydrate inhibition for both pipeline and NGL extraction plants (such as J-T Valve and Refrigeration facilities) applications.

During the problem debrief and round table discussion, participants will have the opportunity to ask additional questions and share their challenges and experiences with hydrate inhibition.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led	OR	On Demand
Prerequisites	**Day 1**			
	Basic Conversions Gas and Liquid Physical Properties Multicomponent Phase Behavior Water Content of Sweet and Sour Natural Gas	2 hr 41 min		2 hr 41 min
Required e-Learning	What Are Hydrates and How Are They Formed Hydrate Formation Temperature Preventing Hydrate Formation	1 hr 29 min		1 hr 29 min
Optional e-Learning	Low Dosage Inhibitors	[15 min]		[15 min]
Virtual Instructor-Led or On-Demand	**Day 2**			
	Fundamentals of Hydrate Inhibition Lecture Self-Directed Problem Assignment	3 hr		1 hr 23 min
	Day 3			
	Problem Debrief and Experience Round Table	3 hr		1 hr 3 min
	Total Duration:	**10 hr 25 min**		**6 hr 51 min**

Hydrocarbon Phase Behavior Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

John M. Campbell often said, "knowledge of the basic fundamentals is the required foundation for a successful professional practice." This is part 2 of the two series that will set the foundation for a successful facilities engineering career. This series covers the fundamentals of hydrocarbon phase behavior, which is key to understanding gas processing facilities, and sets the foundation of being able to "think inside the pipe" for better insight into processing equipment as operating conditions change. We will cover both qualitative and quantitative phase behavior of hydrocarbons for pure components and for multicomponent streams. Being able to predict the phase condition of a hydrocarbon stream is critical in plant operation, troubleshooting and design. This series will give you the tools to do so with a simple, robust, and easy to use process simulator.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led OR	On Demand
Required e-Learning	**Day 1**		
	Pure Component Phase Behavior Multicomponent Phase Behavior Effect of C6+ Characterization on Phase Behavior Non-Hydrocarbon Components Effect on Phase Envelopes Fundamental Applications of Phase Envelopes Vapor Liquid Equilibrium Multi-stage Stabilization of Crude Oil and Condensate RVP and TVP of Condensate and Crude Oils Asynchronous Problem Assignment	2 hr 58 min	2 hr 58 min
Virtual Instructor-Led or On-Demand	**Day 2**		
	Hydrocarbon Phase Behavior Fundamentals Lecture	2 hr 30 min	1 hr 15 min
	Total Duration:	**5 hr 28 min**	**4 hr 13 min**

Molecular Sieve Dehydration Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

Molecular sieve dehydration is required upstream of cryogenic turbo-expander gas plants and in front of liquefaction (LNG) facilities. The dehydration unit is critical to the performance of these plants as small amounts of water breakthrough can result in freezing in the downstream heat exchangers, typically Brazed Aluminum Plate Fin exchangers for turbo-expander plants, core and keetle, or possibly coil-wound exchangers for LNG facilities.

Molecular sieve dehydration units are sized and serviced by the molecular sieve vendors. However, facilities engineers need to understand how these dehydrators work and what their key parameters are.

The virtual, instructor-led lecture will cover equilibrium loading, define the mass transfer zone, and discuss the life factors that affect operations. The method to apply these principles to molecular sieve performance test runs will be covered, as well as the benefits of utilizing standby time to extend the life of molecular sieve beds. The problem assignment will work through determining the expected life of a molecular sieve bed using these principles with the results of a performance test run, and to investigate options to extend the bed life.

The problem debrief will cover the practical applications learned in the problem assignment. Common operating problems and potential solutions will be discussed, and the participants will be able to share their experiences and ask detailed questions in the round table discussion. Participants may test out of the prerequisites.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led	OR	On Demand
Prerequisites	**Day 1**			
	Basic Conversions Gas and Liquid Physical Properties Introduction to Gas Processing Facilities Multicomponent Phase Behavior Fundamental Applications of Phase Envelopes Water Content of Sweet and Sour Natural Gas	4 hr 27 min		4 hr 27 min
Required e-Learning	Adsorption Dehydration Molecular Sieve Dehydration Performance Parameters Mol Sieve Regeneration Process	1 hr 29 min		1 hr 29 min
Virtual Instructor-Led or On-Demand	**Day 2**			
	Fundamentals of Molecular Sieve Dehydration Lecture Self-Directed Problem Assignment	3 hr		1 hr 36 min
	Day 3			
	Problem Debrief and Experience Round Table	3 hr		57 min
	Total Duration:	**11 hr 56 min**		**8 hr 29 min**

NGL Extraction Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

This series details the processing technology options for hydrocarbon dewpoint control and deep NGL extraction and discusses the considerations that are important to the most optimal process selection for a given field development. The series content will meet the needs of a facilities engineer that is supporting a hydrocarbon dewpoint facility, moderate NGL extraction plants, as well as those assigned to Gas Sub-cooled Process (GSP) or turbo-expander facilities. The key pieces of equipment will be covered, as well as the overall combined processing unit.

The virtual, instructor-led session will review the methods required to analyze the heat and material balance for NGL extraction plants from first principles. The two problem assignments will compare and contrast the differences between two different technologies used for hydrocarbon dewpoint control (mechanical refrigeration and turboexpander plants). These learnings also apply directly to GSP plants.

The problem debrief and round table discussion session will cover the practical learnings gained from the problem assignments. The difference between lean and rich gas processing will be discussed. A deep discussion on the limitations on brazed aluminum heat exchangers and their operating considerations will be held to raise the awareness of the issues associated with this type of heat exchanger. During the round table discussion, common operating problems of refrigeration and turboexpander facilities and their potential solutions will be discussed where the participants will have the opportunity to share their experiences and ask specific questions regarding their specific facilities. Participants may test out of the prerequisites.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led	OR	On Demand
Prerequisites	**Day 1**			
	Basic Conversions Gas and Liquid Physical Properties Introduction to Gas Processing Facilities Multicomponent Phase Behavior Effect of C6+ Characterization on Phase Behavior Fundamental Applications of Phase Envelopes Thermodynamic Principles and the First Law of Thermodynamics Second Law of Thermodynamics and Energy Balance Equations	5 hr 8 min		5 hr 8 min
Required e-Learning	NGL Extraction Compact Heat Exchanger and Fired Heaters Operation of Expansion Refrigeration Devices Common Process Configurations NGL Extractions	2 hr 35 min		2 hr 35 min
Optional e-Learning	Mercury Removal Application of Refrigeration Systems Simple Refrigeration Systems Stage Separation vs Fractionation Types of Internals in Mass Transfer Columns	[1 hr 45 min]		[1 hr 45 min]
Virtual Instructor-Led or On-Demand	**Day 2**			
	Fundamentals of Centrifugal Compressors Lecture Self-Directed Problem Assignment	3 hr		1 hr 46 min
	Day 3			
	Problem Debrief and Experience Round Table	3 hr		2 hr 16 min
	Total Duration:	**15 hr 28 min**		**13 hr 30 min**

Overview of Gas Conditioning and Processing for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format. This series gives a solid understanding of the Natural Gas Value Chain and common terminology in the industry. It discusses the different types of reservoirs and their varying composition. In addition, it will discuss typical contaminants found in produced gas streams, and typical natural gas sales or transportation specifications, including higher heating value and Wobbe number. The products of a typical natural gas processing plant and their associated markets are reviewed.

The primary processing units of gas conditioning and processing are discussed, including NGL extraction. Different NGL extraction recoveries can be achieved depending upon the facilities processing operating objective. For example, hydrocarbon dewpointing of the gas to meet a pipeline tariff specification, or deep NGL recovery to enhance facility profits. Shrinkage is an important consideration for NGL extraction facilities, as it is one of the biggest operating costs. Shrinkage and how it is calculated will also be reviewed.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. By taking the 12 Series, the delegate will essentially complete the Campbell Gas Course®, but in a 3-day class format that allows one to also be available for work assignments.

		Instructor Led OR On Demand	
Required e-Learning	Day 1		
	Introduction to Gas Processing & Facilities NGL Extraction	1 hr 59 min	1 hr 59 min
Virtual Instructor-Led or On-Demand	Day 2		
	The Natural Gas Value Chain Lecture	2 hr 30 min	1 hr 26 min
	Total Duration:	**4 hr 29 min**	**3 hr 25 min**

Process Engineering Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

This is part 1 of the 2 series that will set the foundation for a successful facilities engineering career. John M. Campbell often said, "knowledge of the basic fundamentals is the required foundation for a successful professional practice." This series will set the initial foundation in facilities engineering by covering the initial basic concepts required to deeply understand gas processing and be able to "look inside the pipe."

With this knowledge, you will better understand your facilities inlet stream compositions and the specific challenges that the composition may present. In addition, the necessary conversions required to do any gas processing or equipment calculation will come quickly and easily to you. This is the first part of the training to allow you to quickly troubleshoot plant operations based upon understanding how hydrocarbon gas and liquid physical properties change based upon the current or forecasted operating conditions.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led OR On Demand	
Required e-Learning	Day 1		
	Basic Conversions Hydrocarbon Component Families Gas and Liquid Physical Properties Hydrocarbon Analysis and C6+ Characterization Asynchronous Problem Assignment	2 hr 38 min	2 hr 38 min
Virtual Instructor-Led or On-Demand	Day 2		
	Process Engineering Fundamentals Lecture	2 hr 30 min	1 hr 31 min
	Total Duration:	**5 hr 08 min**	**4 hr 09 min**

Propane Refrigeration Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

Propane refrigeration is likely the most important utility system in refrigeration NGL extraction plants, and in rich gas turbo-expander facilities.

This series covers the basics of refrigeration systems and builds up to the fundamental knowledge that is required for propane refrigeration system sizing, analysis, and troubleshooting.

Once the foundation is laid with the basic principles, the virtual, instructor-led session will take you through the fundamental sizing equations and analysis to determine a facilities propane refrigeration requirements. The problem assignments will give the participants insight into propane refrigeration operating issues, and limitations.

The virtual, instructor-led debrief will cover the practical insights that were gained from working the assigned problem set, as well as cover mechanical refrigeration system controls, common operating issues, and potential solutions. The round table discussion will allow delegates to ask questions regarding their particular systems and share the current problems and experiences. Participants may test out of the prerequisites.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led	OR	On Demand
Prerequisites	**Day 1**			
	Basic Conversions Gas and Liquid Physical Properties Pure Component Phase Behavior Thermodynamic Principles and the First Law of Thermodynamics Second Law of Thermodynamics and Energy Balance Equations Enthalpy Correlations and Applications of Energy Balance Correlations Using PH Diagrams to Perform Energy Balance Calculations Compressor Head, Power Requirements and Discharge Temperature	4 hr 29 min		4 hr 29 min
Required e-Learning	Application of Refrigeration Systems Simple Refigeration Systems Operation of Refigeration Systems Economizers in Mechanical Refrigeration Systems	1 hr 39 min		1 hr 39 min
Optional e-Learning	Factors in Selecting Refrigerants, Cascade and Mixed Refigeration Systems	[26 min]		[26 min]
Virtual Instructor-Led or On-Demand	**Day 2**			
	Fundamentals of Propane Refrigeration Lecture Self-Directed Problem Assignment	3 hr		1 hr 20 min
	Day 3			
	Problem Debrief and Experience Round Table	3 hr		1 hr 30 min
	Total Duration:	**12 hr 34 min**		**9 hr 24 min**

TEG Dehydration Fundamentals for Facilities Engineers

ABOUT THIS SERIES

The Campbell Gas Course® has been the industry standard for more than 50 years, and the core competencies of the Campbell Gas Course® are now available in eLearning format.

Dehydration is the process of removing water from a gas so that no condensed water will be present in the system. Water is the most common contaminant in produced natural gas, and is a source for not only hydrates, but corrosion and erosion problems in equipment and pipelines. TEG Dehydration is by far the most common technology used to dehydrate natural gas. These units are often utilized as field dehydration units to prevent hydrates from forming in gathering systems, and in-plant facilities to meet a pipeline water dewpoint specification. Despite TEG Dehydration being used so frequently, these units are subject to multiple operating conditions and limitations depending upon how the system was specified and built.

The on-demand instructor-led lecture will cover the fundamental application of TEG dehydration calculations and analysis. The key performance parameters of these units will be covered in detail. The problem assignment will give participants insight into the issues and limitation of TEG Dehydration technology.

The problem debrief and round table discussion will delve into common operating problems, potential solutions as well as give participants the opportunity to share their experiences. Participants may test out of the prerequisites.

DESIGNED FOR

Mid-career professionals who need to get quickly up to speed on a facilities engineering topic for a project need, or for a reassignment to a field in which they do not have significant experience. Production and processing personnel involved with natural gas and associated liquids, to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This series 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.

		Instructor Led OR On Demand	
Prerequisites	**Day 1**		
	Basic Conversions Gas and Liquid Physical Properties Introduction to Gas Processing Facilities Multicomponent Phase Behavior Water Content of Sweet and Sour Natural Gas Vapor Liquid Equilibrium	5 hr 14 min	5 hr 14 min
Required e-Learning	Gas Dehydration Processes Glycol Dehydration Methods to Mitigate Emissions Types of Internals in Mass Transfer Columns	2 hr 27 min	2 hr 27 min
Virtual Instructor-Led or On-Demand	**Day 2**		
	Fundamentals of TEG Dehydration Lecture Self-Directed Problem Assignment	3 hr	1 hr 26 min
	Day 3		
	Problem Debrief and Experience Round Table	3 hr	1 hr 20 min
	Total Duration:	**13 hr 41 min**	**10 hr 29 min**

Process Facilities

Introduction to Oil and Gas Production Facilities

ABOUT THIS SERIES

This series introduces oil and gas production facilities at the awareness level. It covers the following topics with self-paced activities. This series is only available as a program.

- Overview of the oil and gas industry
- Overview of qualitative phase behavior and reservoirs
- Important 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

DESIGNED FOR

Those interested in an overview of production facilities, including subsurface professionals, line managers, sales or business development staff, environmental personnel, operations staff, and those new to the industry, such as entry-level (1-2 year) engineers.

LEVEL: Basic (Level 1)

Oil Production and Processing Facilities Principles for Engineers

ABOUT THIS SERIES

This series emphasizes oil production facilities – from the wellhead to delivering 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 high level. In addition to the engineering aspects of oil production facilities, practical operating problems are covered, including emulsion treatment, sand handling, dealing with wax and asphaltenes, etc. Exercises requiring calculations are utilized throughout the series. The series intended to complement the G-4 Gas Conditioning and Processing series, focused on the gas handling side of the upstream oil and gas facilities area.

Candidates can take the following self-paced eLearning courses individually or as a **48-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Overview of Reservoir Engineering for Facilities Operations	Level 1	3 hrs
Gas, Oil, and Water Composition and Properties	Level 1	5 hrs
Oil Gathering Systems Fundamentals	Level 2	2 hrs
Gas-Liquid Separation Fundamentals	Level 2	3.5 hrs
Oil-Water Separation Fundamentals	Level 2	2.5 hrs
Oil Treating and Desalting Fundamentals	Level 2	5 hrs
Oil Stabilization, Sweetening, Storage, and VRU Crude Fundamentals	Level 2	3 hrs
Water/Hydrocarbon Phase Behavior	Level 1	5 hrs
Flow Assurance Fundamentals for Surface Facilities	Level 2	4 hrs
Transportation of Crude Oil Fundamentals	Level 2	3 hrs
Produced Water Treatment Fundamentals	Level 2	5 hrs
Water Injection Systems Fundamentals	Level 2	4 hrs
Overview of Solution Gas Handling Fundamentals	Level 2	3.5 hrs

DESIGNED FOR

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

LEVEL: Foundation (Level 2)

Process Safety Engineering Principles

ABOUT THIS SERIES

This series provides an overview of process safety engineering fundamentals for hydrocarbon processing facilities. The focus is on the engineering/design aspects of Process Safety Management. Historical incidents and recurring problem areas will be frequently referenced. Techniques for analyzing and mitigating process safety hazards applicable to oil and gas processing will also be reviewed. Integrating the concepts covered to achieve a measured approach to Process Safety Engineering is a key aim of this series.

Candidates can take the following self-paced eLearning courses individually or as a **35-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Process Safety Risk Analysis and Inherently Safer Design	Level 1	5 hrs
Process Hazards Analysis and Layers of Protection Analysis	Level 1	3.5 hrs
Leakage and Dispersion of Hydrocarbons	Level 1	2.5 hrs
Combustion Behavior of Hydrocarbons	Level 1	3 hrs
Sources of Ignition and Hazardous Area Classification	Level 1	3 hrs
Specific Plant Systems and Equipment	Level 1	4.5 hrs
Relief and Flare Systems	Level 1	3 hrs
Historical Incident Databases, Plant Layout, and Equipment Spacing	Level 1	3 hrs
Fire Protection Systems	Level 1	3.5 hrs
SIS, Monitoring and Control	Level 1	3.5 hrs

DESIGNED FOR

Anyone who needs to work with process safety engineers; this would include facilities engineers, operations and maintenance supervisors, project engineers and managers, entry-level process safety engineers, experienced professionals new to oil and gas, and anyone who needs a general understanding of the breadth of the process safety engineering discipline. Technical staff from insurance companies and regulatory agencies have found the series useful.

LEVEL: Basic (Level 1)

Process Safety Engineering Fundamentals

ABOUT THIS SERIES

This series extends the Process Safety Engineering Principles series to the Foundation level. Course material is reinforced using problems, simple calculations, and applications to an example facility. The applications provide an opportunity to integrate the concepts and methods in an oil and gas environment.

Candidates can take the following self-paced eLearning courses individually or as a **43-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Risk Analysis and Inherently Safer Design Fundamentals	Level 2	8.5 hrs
PHA Techniques and LOPA Fundamental	Level 2	8 hrs
Leakage and Dispersion, Combustion Behavior, Sources of Ignition Fundamentals	Level 2	5.5 hrs
Historical Incident Databases, Metrics, and Specific Facilities (Bad Actors) Fundamentals	Level 2	4 hrs
Relief, Flare, and Depressurization Fundamentals	Level 2	6.5 hrs
Controls and Safety Instrumented Systems Fundamentals	Level 2	5.5 hrs
Spacing and Layout, Fire Prevention Fundamentals	Level 2	4.5 hrs

DESIGNED FOR

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

LEVEL: Foundation (Level 2)

Mechanical Engineering

Basics of Rotating Mechanical Equipment

ABOUT THIS SERIES

This series provides an overview of mechanical rotating equipment. The focus is on equipment selection of pumps, compressors, and drivers and their integration into the process scheme and control strategy in upstream and midstream oil and gas facilities. Compressor and pump sizing are addressed, as well as sizing of drivers, including engines, electric motors, and turbines. Commissioning and installation are reviewed to ensure optimal equipment integrity and reliability for the life of the plant. The material of the course is applicable to field production facilities, pipelines, gas plants, and offshore systems.

Candidates can take the following self-paced eLearning courses individually or as an **18-hour online series**. A certificate with Continuing Education Units (CEU) is issued upon completion of each eLearning course.

eLearning Course Name		
Pumps and Compressors	Level 1	4 hrs
Reciprocating Engines for Process Facilities	Level 1	2.5 hrs
Gas and Steam Turbine	Level 1	4.5 hrs
Machinery Design, Materials and Subsystems	Level 1	4.5 hrs
Mechanical Equipment Inspection, Operation and Maintenance	Level 1	2 hrs

DESIGNED 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.

LEVEL: Basic (Level 1)

Basics of Static Mechanical Equipment

ABOUT THIS SERIES

This series provides an overview of mechanical, non-rotating, static equipment. The focus is on equipment selection and integrity of pressure vessels, piping, and heat exchangers and their integration into the process scheme and control strategy in upstream and midstream oil and gas facilities. The series addresses code requirements focusing on ASME Boiler & Pressure Vessel code as well as B31 code and API tank construction codes. This series discusses heat exchanger sizing and TEMA requirements and reviews piping hydraulics and corrosion mechanisms to ensure correct equipment sizing and integrity management. The series applies to field production facilities, pipelines, gas plants, and offshore systems.

Candidates can take the following self-paced eLearning courses individually or as a **31-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Mechanical Equipment	Level 1	3 hrs
Properties of Materials	Level 1	2.5 hrs
Piping Systems and Welding	Level 1	5 hrs
Heat Transfer Equipment	Level 1	3.5 hrs
Unfired Pressure Vessels	Level 1	3 hrs
Fired Heaters and Boilers	Level 1	4 hrs
Storage Tanks	Level 1	1.5 hrs
Corrosion Control and Protection	Level 1	2.5 hrs
Fire Protection Systems	Level 1	4 hrs
Mechanical Equipment Inspection, Operation, and Maintenance	Level 1	2 hrs

DESIGNED 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.

LEVEL: Basic (Level 1)

Instrumentation and Controls

Industrial Automation for Oil and Gas Applications

ABOUT THIS SERIES

This series provides an introduction and overview of electrical systems, instrumentation, control valves, process control, control/safety, and SCADA systems typically encountered in oil and gas facilities. The focus is understanding terminology, concepts, typical equipment configurations, applicable codes and standards, project execution strategies, and common pitfalls to improve communication with electrical and I&C professionals.

Candidates can take the following self-paced eLearning courses individually or as a **48-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Control Systems for Oil and Gas Applications (Part 1)	Level 1	4 hrs
Control Systems for Oil and Gas Applications (Part 2)	Level 1	4.5 hrs
Instrumentation Selection for Oil and Gas Applications (General)	Level 1	5 hrs
Instrumentation Selection for Oil and Gas Applications (Flow)	Level 1	6 hrs
Instrumentation Selection for Oil and Gas Applications (Level)	Level 1	4 hrs
Instrumentation Selection for Oil and Gas Applications (Pressure, Temperature)	Level 1	4.5 hrs
Instrumentation Selection for Oil and Gas Applications (Analysis)	Level 1	4.5 hrs
Control Valves for Oil and Gas Applications	Level 1	5.5 hrs

DESIGNED FOR

Process, chemical, and mechanical engineers (i.e., non-instrumentation and non-electrical disciplines) and other technical and non-technical professionals with little or no background in IC&E systems.

LEVEL: Basic (Level 1)

Electrical Engineering

Introduction to Electrical Engineering

ABOUT THIS SERIES

This series is focused on educating electrical engineers on the essential principles of electrical safety, system design, and maintenance. The series focuses on foundational concepts rather than regional codes and standard requirements. Still, it does cover common international (IEC, EN, BS, etc.) and North American (NEC, IEEE) standards related to design and safe operation.

Candidates can take the following self-paced eLearning courses individually or as a **27-hour online series**. A certificate with Continuing Education Units (CEU) is issued upon completion of each eLearning course.

eLearning Course Name		
Principles of Power Systems in Industrial Facilities (Part 1)	Level 1	3.5 hrs
Principles of Power Systems in Industrial Facilities (Part 2)	Level 1	3 hrs
Electric Motors and Motor Control in Industrial Facilities	Level 1	2 hrs
Hazardous Area Classification and Installation in Oil and Gas Facilities	Level 1	2.5 hrs
Hazardous Area Equipment Selection and Installation in Division-based Facilities	Level 1	2.5 hrs
Hazardous Area Equipment Selection and Installation in Zone-based Facilities	Level 1	2 hrs
Electrical Safety in Design for Industrial Facilities	Level 1	4 hrs
Basics of Electrical Safety and Design Standards (U.S. Based Standards)	Level 1	7 hrs

DESIGNED FOR

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.

LEVEL: Basic (Level 1)

Pipeline Engineering

Pipeline Engineering Principles

ABOUT THIS SERIES

This series integrates the skills associated with planning, evaluation, design, construction, operation, and asset integrity through asset retirement and abandonment, applied to onshore and offshore pipelines.

The series covers typical pipeline life cycle activities, starting with the definition of the need for the pipeline, sizing parameters, route selection, environmental concerns, and protection. It is followed by design requirements, strength requirements, and construction activities through commissioning. The series then covers the operating life of the pipeline, including maintenance and leak detection, monitoring and integrity, repair, replacement, and alteration activities, leading to retirement and abandonment.

The series' design aspect focuses on meeting the pipeline capacity requirements while complying with all strength code requirements and environmental protection codes and regulations. For offshore pipelines, these include on-bottom stability, spanning requirements, shore crossing design, and applying the most suitable construction methods for the challenge encountered.

Candidates can take the following self-paced eLearning courses individually or as a **22-hour online series**. A certificate with Continuing Education Units (CEU) is issued upon completion of each eLearning course.

eLearning Course Name		
Pipeline Routing and Geomatics	Level 1	2 hrs
Pipeline O&M, Leak Detection, Repairs, Alterations, and Abandonment	Level 1	3.5 hrs
Compliance and Pollution Events and Environmental Impacts and Assessments	Level 1	2.5 hrs
Pipeline Hydraulics and Flow Assurance	Level 1	3 hrs
Pipeline Strength, Stability, and Environmental Considerations	Level 1	5 hrs
Pipeline Pump and Compressor Stations and Terminals	Level 1	1.5 hrs
Pipeline Construction	Level 1	4.5 hrs

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, LPG, NGL, chemical, carbon dioxide pipeline engineering, construction, operations, or maintenance.

LEVEL: Basic (Level 1)

Downstream

COMING SOON

Introduction to Refining Operations for Engineers

ABOUT THIS SERIES

This series has been designed for early and mid-career refining engineers and includes a variety of topics of great interest for supporting the refining operation activities. Subject matters as supervision skills, crude and products movement operations, corrosion control, electrical topics for non-electrical engineers, QA/QC lab management, and routine maintenance and turnaround planning are discussed under a friendly platform with the most modern learning tools to ensure the knowledge basis creating for ensure a safety and continuous refining operations.

Candidates can take the following self-paced eLearning courses individually or as a **~46-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Refining and Petrochemical Operation Supervisory Skills	Level 1	~5 hrs
Refining Oil Movement and Storage Operation Skills	Level 1	5 hrs
Refinery Corrosion Overview	Level 1	~1 hr
Refinery Separation Processes Corrosion	Level 1	~1 hr
Refinery Conversion Processes Corrosion	Level 1	~5 hrs
Refinery Treatment Process Corrosion	Level 1	~1 hr
Refinery Storage Corrosion	Level 1	~1 hr
Principles of Power Systems in Industrial Facilities (Part 1)	Level 1	3.5 hrs
Principles of Power Systems in Industrial Facilities (Part 2)	Level 1	3 hrs
Refining and Petrochemicals QA/QC Laboratory Management	Level 1	~5 hrs
Refining and Petrochemicals Turnaround Planning and Control	Level 1	5.5 hrs
Refining and Petrochemicals Routine Maintenance, Planning, and Control	Level 1	~5 hrs
Reliability Centered Maintenance (RCM)	Level 1	~5 hrs

DESIGNED FOR

Process engineers, planning and economics engineers, inspection engineers, HSE engineers, maintenance engineers and supervisors, laboratory managers and supervisors, turnaround planners and operation supervisors.

LEVEL: Basic (Level 1)

Project Management

Facilities Project Management

ABOUT THIS SERIES

This series addresses Conventional and Unconventional (Shale) project management principles and practices related to engineering design, procurement, and construction activities. Upon completing this series, the participant will know the engineering, procurement, and construction phases and how to identify and organize project teams. You will also be able to use fit-for-purpose project management techniques and project control tools to facilitate successful project outcomes. The schedule and cost management training will help the project manager make the best decisions possible. Participants will understand how the project management, drilling and completion, HSE, land, production, and transportation disciplines relate to one another and what tools the project manager can use to ensure interfaces among key stakeholders are managed.

Candidates can take the following self-paced eLearning courses individually or as a **30-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Onshore Field Development Programs and Projects	Level 1	3 hrs
Project Governance	Level 1	3 hrs
Project Resources and Organization	Level 1	2.5 hrs
Scope Delivery	Level 1	2.5 hrs
Design Engineering Management	Level 1	2.5 hrs
Acquiring Goods and Services	Level 1	3 hrs
Construction Management	Level 1	3 hrs
Project Risk Management	Level 1	3 hrs
Cost Estimating for Facility Projects	Level 1	2 hrs
Scheduling	Level 1	2 hrs
Progress Measurement	Level 1	2.5 hrs
Interface Management for Programs and Projects	Level 1	~ 1 hr

DESIGNED FOR

Early career project managers, project engineers, facility engineers, production engineers, project control representatives, and purchasing personnel who plan, manage, or participate on multi-discipline shale field development project teams. Conventional and Unconventional (Shale) projects ranging from $5 MM to $50 MM, including well flow lines, tank batteries, booster compressors, short pipelines, and meter stations, that are a part of a larger field development program.

LEVEL: Basic (Level 1)

Business and Management

Basic Petroleum Economics

ABOUT THIS SERIES

Could you answer the following three questions for your next project? What will it cost? What is it worth? Will it earn sufficient profit? Before undertaking any project, these questions should be answered. This series will provide the fundamentals necessary to enable you to do so. Budgeting and financing, accounting, and contractual arrangements, which also significantly impact the economic viability of a project, are covered. Participants practice cash flow techniques for economic evaluations and investigate frequently encountered situations.

Candidates can take the following self-paced eLearning courses individually or as a **21-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Production Forecasting	Level 1	3 hrs
Oil and Gas Pricing	Level 1	2.5 hrs
Cash Flow	Level 1	2.5 hrs
Economic Decision Tools	Level 1	3.5 hrs
Risk and Uncertainty	Level 1	3 hrs
Financing and Ownership	Level 1	2 hrs
Petroleum Industry Accounting	Level 1	2.5 hrs
Budgeting	Level 1	2 hrs

DESIGNED FOR

Managers, engineers, explorations, field accounting supervisors, and other personnel who need to develop or improve their skills and understanding of basic economic analysis, petroleum exploration, and production profitability. Participants will benefit from taking this series if they have no previous experience in the how and why of project economics, how project sanction and funding decisions are made, and understanding oil and gas project decision-making.

LEVEL: Basic (Level 1)

Petroleum Risk and Decision Analysis

ABOUT THIS SERIES

Good technical and business decisions are based on competent project costs, benefits, and risks analysis. Participants learn the decision analysis process and foundation concepts to participate actively in multi-discipline evaluation teams. The focus is on designing and solving decision models. About half the problems relate to exploration. The methods apply to R&D, risk management, and all capital investment decisions. Probability distributions express professional judgments about risks and uncertainties and are carried through the calculations. Decision trees and influence diagrams provide clear communications and the basis for valuing each alternative. A hand-calculation exercise delivers a detailed experience in Monte Carlo simulation. The mathematics is straightforward and mostly involves only common algebra. The emphasis is on practical techniques for immediate application.

Candidates can take the following self-paced eLearning courses individually or as a **~21-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Decision Analysis Process	Level 1	4.5 hrs
Value of Control Fundamentals	Level 2	4 hrs
Value of Information and Bayes' Rule Fundamentals	Level 2	4 hrs
Decision Policy and Value Calculations Fundamentals	Level 2	6.5 hrs
Monte Carlo Simulation and Distributions Fundamentals	Level 2	2.5 hrs
Judgments and Biases Fundamentals	Level 2	2 hrs

DESIGNED FOR

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

LEVEL: Foundation (Level 2)

Data Science and Analytics

The Impact of Data Analytics on the New Digital Oilfield

ABOUT THIS SERIES

The oil and gas industry is interested in emerging digital technology advances and many, if not most, operators and oilfield service companies are embracing the strategy of digital transformation. This series is an examination of the progress, successes, and challenges the industry is facing. It answers questions like:

- How does "digital" help the industry cope with the headwinds of economic (lower prices) and greater regulatory expectations? Can "digital" help the industry create a niche in a "green" new order?
- How is the industry faring in adopting new "digital" technologies and more efficient ways of doing business? Are we finally overcoming the challenges of a poor data foundation and resistance from an old-school organizational culture?
- Do we understand the impact the new generation of workers will have in digitally transforming the business and the technologies and business changes they will want to implement? Are the best and brightest next-generation talents attracted to the oil patch these days?
- How is the industry doing in shaking off its image of slow adopters and "digital laggards" from the tech community? Have we finally broken out from a long list of pilots and reached enterprise scale?
- Is the industry finding value from "digital" investments? Can we tell a good "digital" story to our investors, CFO, supply chain partners and show them a return on our projects? Is the story in dollars, not just barrels?

Candidates can take the following self-paced eLearning courses individually or as a **24-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Introduction to the Digital Oilfield	Level 1	4.5 hrs
Operational Technology and Field Networks	Level 1	4 hrs
Digital Oilfield Challenges, Barriers to Adoption, and Risks	Level 1	4 hrs
Data Foundation for the Digital Oilfield	Level 1	5 hrs
The Future of the Digital Oilfield	Level 1	6 hrs

DESIGNED FOR

Engineers, geoscientists, and data analysts who need to understand how this field is evolving.

LEVEL: Basic (Level 1)

Introduction to Machine Learning/Data Analytics for Subsurface Engineering and Geoscience Applications

ABOUT THIS SERIES

The interpretation of rich, heterogeneous, and even real-time data has become possible because of recent advances in machine learning and the democratization of computational power. The oil and gas industry invests in this data-driven revolution to create actionable insights from diverse data streams. These include geophysical measurements, geological interpretation, real-time production and drilling data streams, and newer data types such as image data and distributed fiber optic sensing, such as DTS/DAS measurements.

Learning how to synthesize the ingredients of a machine-learning workflow requires an incremental, step-by-step approach, which this series provides. Beginning with the concepts of exploratory data analyses, followed by a discussion of learning algorithms for clustering, classification, and regression, this series explores several data analytics and machine learning use cases for subsurface applications and prepares participants to analyze machine learning workflows.

Candidates can take the following self-paced eLearning courses individually or as a **10-hour online series**. A Continuing Education Units (CEU) certificate is issued upon completion.

eLearning Course Name		
Introduction to Data-driven Workflows	Level 1	3 hrs
Supervised Machine Learning	Level 1	4 hrs
Unsupervised Machine Learning and Clustering	Level 1	2.5 hrs

DESIGNED FOR

Geoscientists, petrophysicists, engineers, or anyone interested in subsurface engineering and geoscience applications of machine learning and data analytics.

LEVEL: Basic (Level 1)

eLearning Course Descriptions by Discipline

Contaminant Removal – Gas Dehydration
[GAS-CRD-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3.5 hrs

This eLearning course provides an overview of processes used to dehydrate natural gas with specific emphasis on (1) absorption using glycol dehydration and (2) adsorption using molecular sieve.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- List the three most common gas dehydration options used in oil and gas processing
- Identify typical applications
- Describe the advantages and disadvantages of each
- Describe the components and process flow in a typical glycol dehydration unit
- State the typical TEG circulation ratios for a glycol dehydration system
- Determine the minimum lean TEG concentration required for a given water removal requirement
- Calculate the volumetric TEG circulation rate based on a given water removal requirement
- Describe the effect of the number of trays or height of packing on the contactor performance
- Describe the sizing parameters for the contactor and regeneration system
- Describe the co-absorption BTEX, H2S, CO2 and the TEG, and list the methods to mitigate emissions
- Explain the process of adsorption
- List the common adsorbents used in gas dehydration
- Describe the typical adsorption dehydration cycle for a molecular sieve unit
- Describe the factors that cause the useful capacity of the sieve to be less than the new equilibrium capacity
- List the parameters that affect the sizing of the adsorber vessels
- Describe the mol sieve regeneration process and factors that affect its design and operation

This eLearning course is included in the Gas Conditioning and Processing Principles eLearning series.

Contaminant Removal – Acid Gas and Mercury Removal
[GAS-CRA-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course explains the processes of removing mercury and acid gases from a natural gas stream. The eLearning course also describes the basic amine process flow diagram (PFD) and explains the advantages of using MDEA for removing H2S but leaving CO2 in the gas stream. Also discussed are when to use a Claus sulfur recovery unit (SRU) and a tail-gas-clean-up unit (TGCU) versus acid gases injection and why liquid product treating may be required.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- Explain why mercury is removed from a natural gas stream, and list two common mercury absorbents
- List the process options for acid gas removal from a natural gas stream
- Describe a basic amine process flow diagram
- Estimate the amine circulation rate, regenerator reboiler duty, and circulation pump power for an AGRU
- State the conditions where a physical solvent may be advantageous over an amine solvent for acid gas removal
- List examples where it may be advantageous to selectively remove H2S from a gas stream but leave some or all of the CO2 in the gas
- Describe the process flow diagram for a standard Claus sulfur recovery unit (SRU)
- Explain why a tail-gas-clean-up unit (TGCU) may be required, and list processes that may be applied
- Describe why liquid product treating may be required, and provide examples of common processes used
- List the advantages of acid gas injection over installation of an SRU and TGCU

This eLearning course is included in the Gas Conditioning and Processing Principles eLearning series.

Fluid Flow
[GAS-FFC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course discusses the flow of fluid through a pipe segment. Single phase and multiphase flow are explored. In addition, simple correlations are used to estimate important fluid flow parameters.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- Explain Bernoulli's equation, including how to estimate and apply the friction factor
- Describe the difference between Newtonian and non-Newtonian fluids
- Explain economic pipe diameter and describe typical velocity and pressure drop guidelines for sizing piping systems
- Calculate fluid velocity and estimate the pressure drop in a plant piping system using simple correlations
- Describe common gas transmission pipeline flow correlations and their applications
- Describe the parameters that affect heat transfer for various piping systems
- Describe the most common flow regimes in multiphase flow systems
- Explain the difference between liquid hold-up and liquid volume fraction and list factors that affect their value
- Describe common slugging mechanisms and list methods to limit or reduce the impact of slugging events
- Describe erosional velocity and explain how it can be estimated for various systems

This eLearning course is included in the Gas Conditioning and Processing Principles eLearning series.

Heat Transfer Equipment
[GAS-HTE-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course provides an overview of the heat transfer equipment and mechanisms commonly used in the oil and gas industry. The eLearning course also provides an overview including advantages, disadvantages, and applications of different types of heat exchangers.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- Identify types of heat exchangers and common applications in oil and gas processing facilities
- Describe heat transfer mechanisms: conduction, convection, and radiation
- Define heat transfer coefficient and describe the primary parameters that affect its value
- Describe the rate equation used to calculate heat transfer area
- Describe the “effective temperature difference” and explain how it affects heat transfer area
- Estimate heat transfer surface area required for a heat exchanger application
- Describe shell and tube exchanger types and applications
- Describe compact heat exchangers and fired heaters
- List the four primary process cooling (heat rejection) methods
- Describe why air-cooled heat exchangers are so frequently used, key operating parameters, and the difference between induced draft and forced draft designs

This eLearning course is included in these eLearning series:
- Gas Conditioning and Processing Principles
- Basics of Static Mechanical Equipment

Hydrocarbon Components and Physical Properties
[GAS-HCP-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course describes the basic terminology and hydrocarbon nomenclature commonly used in the oil and gas industry. This eLearning course also explains methods used to determine hydrocarbon fluid composition and approaches to and implications of the characterization of heavy hydrocarbons (C6+) in mixtures.

This eLearning course also demonstrates how to estimate hydrocarbon physical properties (density and viscosity) for both liquids and vapors, including their purpose and use as applied in facilities engineering calculations.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- Describe the concept of atomic mass, molecular mass, and the mol
- Identify the four main hydrocarbon groups
- Practice the concept of relative density
- Discuss how a gas chromatograph works, the limitations of various analysis methods, and the difference between an extended analysis and a standard gas chromatographic analysis
- Recognize the uncertainties involved with characterizing the C6+ components in a natural gas, condensate or crude oil stream, and describe the relationship of these factors with hydrocarbon liquid composition
- Describe an Equation of State, its purpose and uses
- Define standard (normal) conditions for SI and FPS units, and calculate the molar volume at these conditions
- Describe the gas compressibility factor and use it to calculate gas density
- Define the property “viscosity”, list applications where it is used, and describe correlations that can be used to predict its value
- Estimate the density of a hydrocarbon liquid at a specified temperature and pressure

This eLearning course is included in the Gas Conditioning and Processing Principles eLearning series.

Introduction to Production and Gas Processing Facilities
[GAS-IGC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2 hrs

This eLearning course provides an overview of production and gas processing facilities. The concepts addressed in This eLearning course include: 1) the crude oil and natural gas value chains, 2) common contaminants in production streams, 3) crude oil, produced water and natural gas quality specifications, 4) typical production facility and gas processing schemes, and 5) NGL products the economics of their recovery. Knowledge of these basic concepts is critical to understanding the selection and specification of processing facilities between the wellhead and product markets.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- State typical crude oil and produced water specifications
- Describe process flows for each stream in production facilities
- List problems associated with and strategies to deal with solids production, e.g., sand, wax, asphaltenes
- List the components, including contaminants, found in produced gas streams
- State typical natural gas sales or transportation specifications
- Calculate higher heating value and Wobbe number
- List the products of a typical natural gas processing plant, their associated markets, and describe common terminology
- Describe typical process flows for each stream in gas processing facilities
- Explain the difference between gas conditioning to meet a HCDP specification and gas processing to recover NGLs
- Describe shrinkage and how it is calculated

This eLearning course is included in the Gas Conditioning and Processing Principles eLearning series.

Pumps and Compressors
[GAS-PCC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4.5 hrs

This eLearning course provides an overview of types of pumps and the basic principles and criteria that apply to all pumps. The emphasis is on process-type pumps used in surface facilities. The concepts of cavitation, Net Positive Suction Head Required (NPSHR), and Net Positive Suction Head Available (NPSHA) are also discussed. The second focus of this course is compressors, including their applications, types, and selection criteria. The course ends with a discussion of the principles of operation of the various types of compressors.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- Identify types of pumps and common applications in oil and gas processing facilities
- Describe how a pump selection chart can be used to select pump type
- Explain the relationship between head and pressure
- Calculate the pump power requirement
- Describe the differences in performance characteristics of centrifugal and positive displacement pumps
- Explain the principle of operation of a single stage centrifugal pump, and identify the main pump components
- Describe the system head curve and explain how it affects pump selection
- Explain the principle of operation of plunger pumps, common configurations, and identify the main pump components
- Describe how a compressor selection chart can be used to select compressor type
- Explain the relationship between compressor head and pressure
- Calculate the compressor power requirement
- Estimate the compressor discharge temperature
- Explain the principle of operation and identify the main compressor components of: 1) centrifugal compressor, 2) reciprocating compressor, and 3) rotary screw compressor
- Describe a centrifugal compressor performance curve, and identify and describe the surge line and stonewall

This eLearning course is included in these eLearning series:
- Gas Conditioning and Processing Principles
- Basics of Rotating Mechanical Equipment

Qualitative Phase Behavior and Vapor-Liquid Equilibrium
[GAS-QPB-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course describes the phase or phases that exist at given conditions of pressure and temperature of single and multi-component systems. The eLearning course also explains the concepts of critical point, cricondentherm, cricondenbar, dense phase, and retrograde condensation. In addition, the eLearning course explains how to perform bubble point, dew point, and flash calculations, and describes how to stabilize hydrocarbon liquids using stage separation.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- Describe pure component phase behavior
- Describe multicomponent phase behavior and phase envelopes
- Define critical point, cricondentherm, cricondenbar, dense phase, and retrograde condensation
- Summarize the effect of C6+ characterization on the shape of the phase envelope
- Recognize the effect of various non-hydrocarbon components on the shape of the phase envelope
- List examples of fundamental applications of phase envelopes in facilities design and operations
- Explain the concept of equilibrium vaporization ratio, K
- List the common methods of estimating K values
- Describe flash, bubble point, and dew point calculations and list examples of their application
- Describe the effect of composition on bubble point, dew point, and flash calculations for a hydrocarbon mixture
- Describe stabilization of hydrocarbon liquids using stage separation
- Summarize the differences between Reid Vapor Pressure (RVP) and True Vapor Pressure (TVP)

This eLearning course is included in the Gas Conditioning and Processing Principles eLearning series.

Refrigeration, NGL Extraction, and Fractionation
[GAS-RNG-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5.5 hrs

This eLearning course explains the concepts of mechanical refrigeration, valve, and turbine expansion, and NGL extraction systems. The eLearning course also explains the process of fractionation in oil and gas operations.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- List the most common applications of refrigeration in oil and gas processing
- Review the operation of a mechanical refrigeration system, and describe the effect of condenser and chiller temperature on compressor operation and energy consumption
- Explain why economizers are commonly used in mechanical refrigeration systems
- Describe factors that are considered in selection of a refrigerant, and explain cascade refrigeration and why it is used
- Explain the operation of expansion refrigeration processes (valve and turboexpander)
- List the common process configurations for the different levels of NGL extraction (including HCDP control)
- Understand the difference between stage separation and fractionation
- Define relative volatility and how it affects the difficulty of separation
- Explain how a fractionator (distillation column) separates components, and describe the operation and purpose of the reboiler, condenser, reflux accumulator, and pump
- List types of internals used in fractionators to achieve mass transfer, and describe their advantages and disadvantages

This eLearning course is included in the Gas Conditioning and Processing Principles eLearning series.

Separation
[GAS-SEC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	1.5 hrs

This eLearning course describes separators, their use and application, in the oil and gas industry. The principle of gas-liquid and oil-water separations are discussed along with separator sizing. This eLearning course also explains what emulsions are, how they form, and their influence on separator design. Also discussed are methods and equipment used to destabilize and eliminate emulsions.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- Describe separator applications and common types of separators
- List the sizing criteria for 2-phase and 3-phase separators
- Discuss the principles of gas-liquid separation and how they are applied in separator design
- Describe the effect of inlet piping size and inlet devices on separator sizing
- List the types of mist extractors and describe typical applications
- Estimate separator size based on gas-liquid separation criteria
- Describe emulsions, how they form, and how they influence separator design
- Discuss how emulsions can be destabilized and eliminated
- Estimate the size of an oil dehydrator based on liquid-liquid separation criteria

This eLearning course is included in the Gas Conditioning and Processing Principles eLearning series.

Thermodynamics and Applications of Energy Balances
[GAS-TAE-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2 hrs

This eLearning course provides an overview of the concepts of thermodynamics, which is the foundation for all processing calculations. This eLearning course explains the first and second law of thermodynamics and their application in facilities. Also covered are applications of energy balance equations, the concepts of enthalpy and entropy, and an explanation of how to use P-H diagrams to perform calculations on a simple refrigeration system.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- Define the terms system and surroundings and explain the difference between open and closed systems
- State the first law of thermodynamics and how it is applied to facilities
- Describe the second law of thermodynamics, and explain how it is applied to facilities
- Write the energy balance equations for a heat exchanger, valve, separator, and compressor
- Calculate the duty of a heat exchanger where no phase change occurs and also for an exchanger where a phase change does occur
- List methods used to estimate enthalpy and entropy
- Describe a P-H diagram and use it to perform calculations on a simple refrigeration system

This eLearning course is included in the Gas Conditioning and Processing Principles eLearning series.

Water/Hydrocarbon Phase Behavior
[GAS-WHP-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course describes hydrates, explores conditions favoring hydrate formation, and discusses how to prevent hydrates from forming. The eLearning course also describes how to estimate the hydrate formation temperature of a natural gas stream and the key differences between low dosage hydrate inhibitors and thermodynamic inhibitors.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers, geologists, field supervisors and managers, field technicians, service company engineers and managers.

You will learn how to

- Estimate the water content of sweet and sour natural gas
- Describe the conditions that favor hydrate formation
- Estimate the hydrate formation temperature of a natural gas stream
- Compare and contrast the use of MeOH and MEG to prevent hydrate formation
- Describe the differences between low dosage hydrate inhibitors and thermodynamic inhibitors

This eLearning course is included in the Gas Conditioning and Processing Principles eLearning series.

Combustion Behavior of Hydrocarbons [PRS-CBH-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course covers combustion behavior of hydrocarbons. It will review vocabulary, concepts, and the factors that drive calculations regarding combustion behavior.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn

- The fundamentals of flammability and flammable limits typical of hydrocarbons
- The characteristics of hydrocarbon fires and explosions
- Essential variables in calculations of typical fire and explosion scenarios

This eLearning course is included in the Process Safety Engineering Principles eLearning series.

Controls and Safety Instrumented Systems Fundamentals [PRS-CSI-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	5.5 hrs

This eLearning course extends the learning from the SIS, Monitoring, and Control eLearning course. There will be some sizing calculations and discussion of common instrumentation and types of control valves, with their advantages and disadvantages. Learning will be applied to the example facility. There will be two interactive sessions with discussion of applications chosen by course participants.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn how to

- Explain control valve sizing and selection for some common applications
- Explain the advantages, disadvantages, and typical applications of commonly used instrumentation
- Explain the application of commonly used process control techniques
- Explain how a Safety Instrumented System (Emergency Shutdown System) is applied in facility design, using the logic which was introduced in the eLearning course
- Apply the learning to the example facility

Suggested prerequisite

- SIS, Monitoring and Control [PRS-SIS-1]

This eLearning course is included in the Process Safety Engineering Fundamentals eLearning series.

Fire Protection Systems [PRS-FPS-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3.5 hrs

In this eLearning course, you will learn about the main fire protection strategies, passive and active protection, fire water and foam applications, fireproofing materials, and the use of drainage, containment, and remote impounding in prevention and mitigation of fire and explosion.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn

- The intent of fire protection
- Passive fire protection options
- Active fire protection options
- Basic principles and applications of explosion protection systems

This eLearning course is included in these eLearning series:

- Process Safety Engineering Principles
- Basics of Static Mechanical Equipment

Flow Assurance Fundamentals for Surface Facilities [PRS-FLA-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	4 hrs

This eLearning course reviews the typically employed sand control/ mitigation options, and the key issues associated with the oil desanders. It also discusses what wax, asphaltene, and scales are, the problems caused, and how to mitigate them will be described. This eLearning course covers the following topics:

- Sources of sand and typical characteristics in surface production facilities
- Problems resulting from sand production
- Sand detection equipment options and applications
- Sand control/mitigation and disposal options
- Wax in crude oil systems and associated operational issues
- Asphaltenes in crude oil and associated operational issues
- Scale and scale control options in oil production facilities

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 how to

- Describe what is oil treating and why it is important
- List typical sales oil specifications
- Outline typical emulsion heating methods and their applications
- Describe design parameters, treating temperature, treating flux, heat flux, and heat release density
- Perform basic sizing of a heater treater
- Describe chemical demulsifiers, what are they and how they destabilize and eliminate emulsions
- List the key factors and criteria considered for selection of chemical demulsifiers
- Estimate demulsifiers injection rate and cost
- Explain how electrostatic treaters work and what their advantages are over other treating methods
- List different types and typical configurations
- Perform basic sizing of an electrostatic treater
- Describe the main desalting process configurations, i.e., process flow diagrams, major equipment, etc.
- List the main steps involved with desalting
- Outline the primary applications of the main desalting configurations
- Identify typical problems encountered in desalting operations, their causes, and solutions

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Gas, Oil, and Water Composition and Properties [PRS-GOW-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5.5 hrs

This eLearning course identifies the typical compositions of gas, oil, and produced water and describes how to determine the physical and thermal properties using charts or simple correlations. Knowing compositions and how to estimate thermal and physical properties are essential to size, evaluate, and troubleshoot the required equipment for processing the fluids from the well to meet sales, transportation, or disposal specifications.

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 how to

- Practice the concept of relative density of a gas, liquid
- Practice converting from standard gas volumetric flow to mass flow
- Practice converting liquid volumetric flow to mass flow
- Describe the concept of atomic mass, molecular mass, and mol
- Identify the four main hydrocarbon groups
- Describe an Equation of State, its purpose and uses
- Describe the gas compressibility factor, and use it to calculate gas density
- Define the property “viscosity”, list applications where it is used, and describe correlations that can be used to predict its value
- List the methods available to estimate hydrocarbon liquid density
- Estimate the water content of sweet and sour natural gas
- Discuss the difference between an extended analysis and a standard gas chromatographic analysis
- Recognize the uncertainties involved with characterizing the C6+ components in a natural gas, condensate or crude oil stream, and describe the relationship of these factors with hydrocarbon liquid composition
- Identify the typical compositions of crude oil
- Describe the physical and thermal properties of crude oil that are most used in facilities work and describe how the properties are determined
- Identify the typical composition of brine water
- Describe the physical and thermal properties of brine water that are most used in facilities engineering work, and explain how these properties are determined

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Gas-Liquid Separation Fundamentals [PRS-GLS-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	4 hrs

This eLearning course will review practical aspects of oil gas separation systems, sizing of vertical and horizontal separators, and the key issues associated with gas-liquid separation systems, including feed pipe, inlet devices, mist extractors, etc. This eLearning course covers the following topics:

- Principles of Gas-Liquid Separation
- 2-Phase Separators
- Mist Extraction Devices
- Vertical and Horizontal Separators

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 how to

- Describe the different kinds of gas-liquid separation equipment typically encountered in oil and gas facilities and applications for each type
- Review the various components of different gas-liquid separation equipment types and their function
- Describe typical gas-liquid equipment separation performance criteria and their basis
- List the fluid properties and operating conditions needed to perform gas-liquid separation equipment selection and sizing
- Outline gas-liquid separator sizing fundamentals

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Historical Incident Databases, Plant Layout, and Equipment Spacing [PRS-HID-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course deals with Historical Incident Databases, Process Safety Metrics, and the layout of operating facilities at the basic level.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn

- Terminology related to historical incident databases (HIDs) and process safety metrics
- How process safety metrics are related to HIDs
- Why and how HIDs are used
- Findings from a few readily available HID sources, including Duguid and UKHSE
- Where site selection and layout fit into the normal design sequence
- The main safety considerations and other criteria in site selection and layout
- Application of industry spacing guidelines

This eLearning course is included in the Process Safety Engineering Principles eLearning series.

Historical Incident Databases, Metrics, and Specific Facilities (Bad Actors) Fundamentals [PRS-HID-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	4 hrs

This eLearning course extends the learning from the eLearning courses to the Fundamental level, using applications of the learning to an example facility as the primarily learning reinforcement tool. There are several short evaluations, and two interactive sessions to discuss the applications developed by course participants.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn

- Applications of HID
- Criteria for sizing flare headers
- Identify potential process safety incidents at the example facility by considering specific systems and equipment (Bad Actors)

Suggested prerequisites

- Historical Incident Databases, Plant Layout, and Equipment Spacing [PRS-HID-1]
- Specific Plant Systems and Equipment [PRS-SPS-1]

This eLearning course is included in the Process Safety Engineering Fundamentals eLearning series.

Leakage and Dispersion of Hydrocarbons [PRS-LDH-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course covers accidental leaks and calculating concentration and dispersion of those leaks. This eLearning course also discusses how calculations can be made to keep people safe from exposure to leaks and what the risks are when working around hazardous materials.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn how to

- Detect the conditions in which accidental release can occur, and identify the factors that affect the amount of release
- Assess gas and liquid leak rate equations
- Estimate vapor cloud size
- Describe the factors associated with gas dispersion
- Analyze the risks of hydrogen sulfide and oxygen deficiency on people
- Estimate downwind concentration of a leaked gas
- Estimate probability of fatality from exposure to a material
- Assess probit function and estimate probability of fatality using the function

This eLearning course is included in the Process Safety Engineering Principles eLearning series.

Leakage and Dispersion, Combustion Behavior, Sources of Ignition Fundamentals [PRS-LDC-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	5.5 hrs

This eLearning course extends the learning in the corresponding three eLearning courses to the Fundamental level, using a combination of exercises and readings with two interactive sessions.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn

- Estimation of hydrocarbon behavior on loss containment
- Identification of common ignition sources
- Estimation of hydrocarbon behavior following ignition

Suggested prerequisites

- Leakage and Dispersion of Hydrocarbons [PRS-LDH-1]
- Combustion Behavior of Hydrocarbons [PRS-CBH-1]
- Sources of Ignition and Hazardous Area Classification [PRS-SIH-1]

This eLearning course is included in the Process Safety Engineering Fundamentals eLearning series.

Oil Gathering Systems Fundamentals [PRS-OGS-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	2.5 hrs

This eLearning course describes typical oil gathering system configurations from the wellhead to the central processing facility – onshore and offshore, including well test satellites, piping arrangements, and multiphase flow fundamentals. Also, the Beggs and Brill correlation is utilized to gathering system line sizing, estimate the hydrodynamic slug size using the Scott correlation, and apply the Flannigan correlation to determine the liquid hold up in an oil gathering line.

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 how to

- Describe typical oil gathering system configurations from the wellhead to the central processing facility – onshore and offshore
- Outline typical wellhead piping arrangements – onshore and offshore
- Explain the purpose and operation of a typical well test satellite, and example configurations and components
- Discuss multiphase flow fundamentals, basic flowline sizing methods, and operational issues

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Oil Stabilization, Sweetening, Storage, and VRU Crude Fundamentals [PRS-OSV-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	3 hrs

This eLearning course will provide you with the principles of fractionation stabilization to achieve high quality condensate or crude oil, to maximize the revenue potential of your facility. The options for tank storage of this product will be reviewed to ensure the correct volumes are in place for process upsets, at the lowest capital and operating cost. Emissions from the tanks, a growing concern worldwide will be examined, focusing on vapor recovery units to monetize the gases, while providing safety protection to the tankage from over and under pressure excursions. The Engineering Principles reviewed will help you to examine your facility/design for opportunities to make more revenue, reduce operating costs and reduce fugitive emissions.

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 how to

- Explain what crude oil stabilization is
- Describe the purpose of stabilization
- Identify typical stabilized crude specifications, e.g., RVP/TVP, and their basis
- Describe the commonly used processes for stabilizing crude oil, including the equipment involved and typical operating conditions
- Identify and explain the purpose and operating conditions of the major equipment items used in the various stabilization processes
- Describe typical processes, equipment and operating conditions used for removing H2S from crude oil
- Describe the main types of aboveground storage tanks used for crude oil storage and their applications
- List the different floating roof types and their applications
- Describe the evaporative emissions aspects of the different storage tank types
- Describe the different types of floating roof rim seals and their applications
- Explain how a Vapor Recovery Unit works and where it is used

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Oil Treating and Desalting Fundamentals [PRS-OTR-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	5.5 hrs

This eLearning course reviews the various types of oil treating equipment available and their applications, and the key issues associated with the oil treater systems. It also covers main desalting process configurations, i.e., process flow diagrams, major equipment, etc. This eLearning course covers the following topics:

- Oil treating overview
- Oil treating methods: application of heat, chemical demulsifiers, retention time, electricity, mechanical devices
- Desalting crude oil material
- Desalting crude oil process configurations

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 how to

- Describe what is oil treating and why it is important
- List typical sales oil specifications
- Outline typical emulsion heating methods and their applications
- Describe design parameters; treating temperature, treating flux, heat flux, and heat release density
- Perform basic sizing of a heater treater
- Describe chemical demulsifiers, what are they and how they destabilize and eliminate emulsions
- List the key factors and criteria considered for selection of chemical demulsifiers
- Estimate demulsifiers injection rate and cost
- Explain how electrostatic treaters work and what their advantages are over other treating methods
- List different types and typical configurations
- Perform basic sizing of an electrostatic treater
- Identify the two gravitational treating units
- Describe pros and cons of gravitational treaters
- Explain the purpose of crude oil desalting
- Describe the main desalting process configurations, i.e., process flow diagrams, major equipment, etc.
- List the main steps involved with desalting
- Outline the primary applications of the main desalting configurations

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Oil-Water Separation Fundamentals [PRS-OWS-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	3 hrs

This eLearning course describes the characteristics of three-phase separators and discusses the methods used for oil-water separation. The following key concepts are covered in this eLearning course:

- Emulsions
- Stokes' Law
- Oil dehydrators
- Three-phase separation

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 how to

- Describe emulsions, how they form, and how they influence separator design
- Discuss how emulsions can be destabilized and eliminated
- Describe Stokes' Law and explain the influence of its Key Parameters on the Oil-Water separation
- Estimate the settling velocity of water in three cases of Condensate, Heavy Oil, and Emulsion with different viscosity values
- Discuss how emulsions can be destabilized and eliminated to achieve the Basic Sediment and Water specifications
- Estimate the size of an oil dehydrator based on liquid-liquid separation criteria
- Describe separator applications and common types of 3-phase gas liquid-liquid separators
- List the sizing criteria for 2-phase and 3-phase separators
- Discuss the principles of gas-liquid-liquid separation and how they are applied in separator design
- Compare the residence time and droplet settling methods and discuss their application

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Overview of Reservoir Engineering for Facilities Operations [PRS-REF-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course provides an overview of four topics that describe how petroleum fluids initially flow from within the reservoir porous rocks to the surface facilities naturally and later by using artificial lift when the reservoir pressure declines and leaving a significant amount of petroleum fluids underground.

To maximize oil production rate and minimize operating costs, this eLearning course covers the following topics:

- Reservoir traps, rocks, and drive mechanisms
- Reservoir fluid classification and phase envelopes
- Inflow performance relationship
- Artificial lift

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 how to

- Describe the different types of reservoir traps, different types of rocks, and identify the rock type that normally holds oil and gas, the meaning, significance, and typical values of porosity and permeability
- Estimation of reservoir temperature and pressure, and how this information impacts surface facilities design and operation ·
- Impact of reservoir drive mechanism on production profiles, equipment selection, and sizing
- Describe the five main reservoir fluid types, their typical compositions and characteristics, and provide examples of how the reservoir fluid phase envelopes and impacts surface facilities' design and operation
- Explain how the various reservoir fluids affect the phase envelope for specific reservoirs and their impact on surface facilities
- Define "artificial lift", discuss the different types, their pros and cons, and applications, and provide examples of how artificial lift method selection can impact surface facilities design and operation
- Estimate system pressure losses for "artificial lift" applications

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Overview of Solution Gas Handling Fundamentals [PRS-OSG-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	3.5 hrs

This eLearning course reviews the main gas processing operations; what they are, why they are needed, how they work, and the key issues associated with gas processing systems.

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 how to

- Describe the main compressor types and their applications
- Perform a compressor power calculation
- Outline typical sales gas specifications
- Describe the main gas processing operations, what they are, why they are needed, and how they work for:
  - Gas sweetening
  - Gas dehydration
  - NGL recovery

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

PHA Techniques and LOPA Fundamentals [PRS-PHA-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	8 hrs

This eLearning course builds on Process Hazards Analysis techniques and Layers of Protection from the eLearning course. It includes an in-depth look at each of the topics listed and two interactive sessions.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn how to

- Select appropriate PHA methods, including HAZOP and API 14C
- Identify suitable applications for LOPA

This eLearning course is included in the Process Safety Engineering Fundamentals eLearning series.

Process Hazards Analysis and Layers of Protection Analysis [PRS-PHA-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3.5 hrs

This eLearning course addresses Process Hazards Analysis (PHA) and Layer of Protection Analysis (LOPA). It will cover PHA definitions, concepts, and techniques, as well as the definition and purpose of LOPA and the LOPA procedure.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn

- The purpose, premise, and scope of a PHA
- PHA methodology, including HAZOP and API14C
- The differences between methods, including benefits and disadvantages
- The purpose and steps of a LOPA procedure
- The role of independent protection layers and conditional modifiers in LOPA

This eLearning course is included in the Process Safety Engineering Principles eLearning series.

Process Safety Risk Analysis and Inherently Safer Design [PRS-PSR-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5 hrs

This eLearning course provides basic concepts and definitions needed to better understand and utilize Process Safety and Inherently Safer Design. This eLearning course also includes various models, strategies, and examples to better analyze and reduce risk and apply Inherently Safer Design.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn

- How to analyze and assess different types of risk analyses
- How to utilize models that are associated with risk management
- The importance of building safety into processes
- How Inherently Safer Design can be applied

This eLearning course is included in the Process Safety Engineering Principles eLearning series.

Produced Water Treatment Fundamentals (PRS-PWT-2)

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	5 hrs

This eLearning course introduces the technologies which govern the design and performance of Produced Water Treatment (PWT) systems. An important objective is to provide information and knowledge which a petroleum engineer needs to select and operate effective water treatment equipment. The eLearning course provides the engineer with both fundamental and practical knowledge that is needed to understand how and why specific technologies are included in a water treatment system and to evaluate or improve their performance. An overview of generic onshore and offshore PWT processes provides the focus for summarizing the configuration of "typical" water treatment systems.

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 how to

- Explain the technologies that govern the design and performance of produced water treatment systems
- Explain the basic chemistry and unique characteristics of produced water, dissolved gases, dissolved minerals, dissolved and dispersed hydrocarbons, extraneous chemicals, etc.
- Define retention time, fluid velocity, nozzle sizing, inlet device design (cyclonic inlets), and outlet nozzle vortex control for primary separators
- Identify where, why, and how deoiling hydrocyclones are used for produced water treatment
- Define the designs, operating principles, capabilities, and weaknesses of dissolved gas flotation, induced gas flotation, and mechanical flotation
- Explain the operating principles for nutshell media bed filtration
- Describe the basics of membrane filtration technology
- Define the common methods for oilfield water disposal/injection
- Explain how to use Silt Density Index (SDI), NACE TMO-173 filtration tests, TOG measurements, and/or TSS measurements to define water quality
- Discuss the purposes and capabilities for the seawater injection system's front-end technologies
- Identify the basic configuration of the media bed filter's internals and the operating parameters for multi-media and nutshell media filters

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Relief and Flare Systems [PRS-RFS-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

In this eLearning course, you will learn about causes of overpressure, the different types of relief valves and their applications, depressurization, and flare systems.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn how to

- Understand the typical causes of overpressure
- Identify the different types of relief devices and their applications
- Describe the purpose and operation of a depressurization system
- Identify major components of a flare system and describe their purpose

This eLearning course is included in the Process Safety Engineering Principles eLearning series.

Relief, Flare, and Depressurization Fundamentals [PRS-RFD-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	6.5 hrs

This eLearning course extends the learning from the corresponding eLearning course to the Fundamental level. There are quantitative and non-quantitative exercises, and proposed applications at the example facility. There will be two interactive sessions that will include discussions of applications developed by the course participants.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn how to

- Size a relief valve for vapor service
- Size a relief valve for liquid service
- Describe how to calculate the relief load due to full bore failure of a heat exchanger tube
- Calculate inbreathing and outbreathing for atmospheric tanks
- Identify the key sizing parameters for flare headers and depressuring systems

Suggested prerequisite

- Relief and Flare Systems [PRS-RFS-1]

This eLearning course is included in the Process Safety Engineering Fundamentals eLearning series.

Risk Analysis and Inherently Safer Design Fundamentals [PRS-RAI-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	8.5 hrs

This eLearning course builds on risk analysis and inherently safer design from the Process Safety Risk Analysis and Inherently Safer Design eLearning course. It includes an in-depth look at each of the topics listed and two interactive sessions.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn how to

- Select and apply common methods of risk analysis
- Identify opportunities for use of ISD at different stages of facility life cycle

Suggested prerequisite

- Process Hazards Analysis and Layers of Protection Analysis [PRS-PHA-1]

This eLearning course is included in the Process Safety Engineering Fundamentals eLearning series.

SIS, Monitoring and Control [PRS-SIS-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3.5 hrs

This eLearning course is comprised of two sections, Safety Instrumented Systems (SIS) and Monitoring and Control. Within this eLearning course, you will find multiple control method examples and the concepts of SIL and SIF, and a case study that highlights the eLearning course.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn how to

- Define and explain process control
- Identify the process safety instrumentation goals
- Identify and discuss the methods of control
- Describe the elements of feedback, cascade, and feedforward control
- Explain control modes and the elements of alarm philosophy
- Discuss the application of SCADA, DCS, MVC, MIS
- Describe Safety Instrumented Systems
- Illustrate when and why Safety Instrumented systems are used with reference to some key aspects of IEC 61511/ISA S84
- Define Safe Integrated Levels (SIL) and its assessment
- Discuss the effects of Test Frequency on Risk Reduction and Safe Integrated Levels

This eLearning course is included in the Process Safety Engineering Principles eLearning series.

Sources of Ignition and Hazardous Area Classification [PRS-SIH-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course covers two main sections, Sources of Ignition and Hazardous Area Classification. The Sources of Ignition section looks at electrical and non-electrical sources along with their controls. Non-power ignition is also included as an independent section regarding the sources of ignition. The Hazardous Area Classification section illustrates the fundamental purposes of HAC and the standards that are available.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn how to

- Identify the ignition characteristics of fuel
- Explain the probability of leak ignition by release rate category
- Identify common non-electric sources of ignition
- Indicate the primary controls for non-electric sources of ignition
- Describe how electrical equipment can become a source of ignition
- Describe Hazardous Area Classification and design alternatives
- Identify the purpose of Hazardous Area Classification
- Compare IEC and US standards of Gas groups
- Describe the correlation between area classification and risk assessment
- Identify and describe non-power electrical ignition sources
- Identify non-power ignition controls

This eLearning course is included in the Process Safety Engineering Principles eLearning series.

Spacing and Layout, Fire Protection Fundamentals [PRS-SLF-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	5 hrs

This eLearning course extends the learning from the Historical Incident Databases, Plant Layout, and Equipment Spacing and Fire Protection Systems eLearning courses to the Fundamental level. Specific exercises will reinforce learning of the principles and will apply them to the example facility. There will be two interactive sessions in which those applications will be reviewed. Additional material will discuss some of the more complex fire and explosion control situations which may exist in downstream facilities.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn how to

- Explain the logic of facility and process area layout
- Explain the reasons for selection of a fire prevention philosophy
- Explain how the selected fire control facility can be implemented
  Illustrate those learnings using the example facility

Suggested prerequisites

- Historical Incident Databases, Plant Layout, and Equipment Spacing [PRS-HID-1]
- Fire Protection Systems [PRS-FPS-1]

This eLearning course is included in the Process Safety Engineering Fundamentals eLearning series.

Specific Plant Systems and Equipment [PRS-SPS-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4.5 hrs

This eLearning course covers several sections, including piping systems, storage facilities, pumps and compressors, heat exchangers, and pressure vessels.

Designed for

Facilities/process engineers, as well as engineers and operations staff involved in process safety and asset integrity.

You will learn how to

- Define the piping system and identify the components associated with it
- Explain why piping systems have a high incident rate and identify its failure modes
- Identify different types of flanges and their main types of failures
- Analyze an incident to determine its failure modes and how they could have been eliminated
- Discuss the main issues that arise from storage tanks
- Classify the different types of storage facilities
- Explain the vapor recovery system from roof tanks and issues that can arise with floating roof tanks
- Classify the different types of atmospheric storage tanks and the potential types of fires that can arise from each type
- Identify the types of pressurized storage and the main issues associated with it
- Illustrate how loading trucks and rail cars are used to prevent loss of containment
- Identify the causes of pump release
- Classify and analyze the two main types of pumps and their issues
- Discuss mechanical single seals and tandem seals and explain their functions
- Identify the three main types of compressors and issues that can arise
- Identify the main types of fired heaters
- Discuss the issues that can occur with direct fired heaters
- Explain how furnace tube failure can occur
- Compare firetube and furnace fired heaters in regard to ignition and explosion
- Identify the main types of heat exchangers and issues that can arise
- Identify types of equipment within pressure vessels
- List and explain the causes of pressure vessel release

This eLearning course is included in the Process Safety Engineering Principles eLearning series.

Transportation of Crude Oil Fundamentals [PRS-TCO-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	2.5 hrs

This eLearning course reviews transportation of crude oil utilizing hydraulic grade line (HGL), and the key issues associated with the pumping systems. Also, the operating principles of centrifugal pumps including NPSH requirements and how to determine the temperature profile along a pipeline will be described. This eLearning course covers the following topics:

- Overview of crude oil transportation options
- Centrifugal pumps
- Pipeline pump stations
- Pipeline pumps

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 how to

- Identify the most common oil transportation methods
- Describe the typical tanker size classes used for crude oil transport
- Discuss the applications and pros/cons of rail transport of crude oil
- Explain Bernoulli's equation, including how to estimate and apply the friction factor
- Perform pipeline/piping friction loss calculations
- Construct the Hydraulic Grade Line for an oil pipeline application, including location of the pump stations, pump type selection, and pumping power estimation
- Explain economic pipe diameter and describe typical velocity and pressure drop guidelines for sizing piping systems
- Describe the basic layout of a pipeline pump station
- Describe the operating principles of centrifugal pumps, including NPSH requirements
- Outline the commonly used plant and pipeline piping grades
- List codes and standards applicable to oil pipeline and plant piping applications
- Perform wall thickness calculations for pipeline and plant piping applications

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Water Injection Systems Fundamentals [PRS-WIS-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	3.4 hrs

This eLearning course reviews the water injection facilities commonly used as a function of the application and the purpose and operation of the various components, and the key issues associated with water injection systems. Also, the main compressor types and applications and compressor power calculation will be described. This eLearning course covers the following topics:

- Overview of water injection systems
- Basic principles of sea water injection
- Water deaeration and sulfate removal
- Water injection pumps

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 how to

- Describe injection water quality specifications
- Define the common methods for oilfield water disposal/injection
- Identify the key characteristics that define water quality for injection or disposal
- Explain how to use Silt Density Index (SDI), NACE TMO-173 filtration tests, TOG measurements, and/or TSS measurements to define water quality
- Discuss the seawater injection system equipment's purpose and capabilities
- Discuss the purposes and capabilities for the seawater injection system's front-end technologies
- Identify the basic configuration of the media bed filter's internals and the operating parameters for multi-media and nutshell media filters
- Describe the basic operating principles and limitations for multi-media bed filters and nutshell bed filters
- Describe how vacuum extraction towers and gas stripping towers remove dissolved oxygen from injection water
- Describe the potential for the development of alternate technologies to simplify and reduce costs for dissolved oxygen removal from injection water
- Describe the process for removing sulfate from injection water to reduce the potential for scale formation and reduce the possibility for SRBs to convert sulfate in the injection water to corrosive sulfides

This eLearning course is included in the Oil Production and Processing Facilities Principles for Engineers eLearning series.

Corrosion Control and Protection
[MEC-CCC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course covers the main causes of corrosion in upstream oil and gas operations, as well as monitoring and mitigation methods. The various corrosion mechanisms give rise to a number of different forms of corrosion damage, which will be reviewed. Participants will be introduced to the design principles of simple cathodic protection systems and the basics of utilizing corrosion inhibitors.

Designed for

Managers, engineers, chemists, and operators who need to understand corrosion and its control management in oil and gas production and processing.

You will learn how to

- Define corrosion
- List the different forms of corrosion
- Describe the likely effects of corrosion on safety, environment, and business issues
- Describe the basic aspects of electrochemical corrosion
- Describe the four necessary elements to form an electrochemical corrosion cell
- Identify the different forms of corrosion encountered in oil and gas facilities
- Define the basic corrosion principles which apply to cathodic protection
- Describe the galvanic series of metals and its significance
- Identify methods of corrosion control
- Recognize the use of coatings, corrosion inhibitors, biocides and cleaning pigs and scrapers as forms of corrosion protection

This eLearning course is included in the Basics of Static Mechanical Equipment eLearning series.

Fired Heaters and Boilers
[MEC-FHB-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4 hrs

This eLearning course describes the types of fired heaters used in oil and gas processing, their common applications and service conditions along with the organizations that provide codes and standards for fired heaters. In addition, the eLearning course discusses the design and operation of fired heaters, economic selection criteria, typical pressure-temperature ratings, materials of construction and limitations. The eLearning course finishes discussion with types of boilers, applicable service conditions, materials of construction and limitations for boilers and water quality considerations.

Designed for

Facilities engineers, process engineers, senior operations personnel, field supervisors, engineers who select, design, install, evaluate, or operate gas processing plants and related facilities.

You will learn how to

- Describe the types of fired heaters used in oil and gas processing, most common applications, and service conditions
- Identify organizations that provide codes and standards for fired heaters
- Describe major code requirements that affect design, material selection, inspection, and safe practices
- Describe design and operation of fired heaters, economic selection criteria, typical pressure-temperature ratings, materials of construction, and limitations
- Describe types of burners, applicable service conditions, construction materials, and limitations
- Describe how Nox emissions are monitored and controlled
- Describe the purpose of coatings, linings, and heat insulation
- Identify basic types of boilers, applicable service conditions, materials of construction and limitations for boilers, and water quality considerations
- Describe the corrosion processes and protection requirements

This eLearning course is included in the Basics of Static Mechanical Equipment eLearning series.

Gas and Steam Turbines
[MEC-GST-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5 hrs

This eLearning course describes the basic types of gas and steam turbine engines used as prime movers/drivers in oil and gas applications and explains their key components, sizing, standards and specifications, and control systems.

Designed for

Facilities engineers, process engineers, senior operations personnel, field supervisors, engineers who select, design, install, evaluate, or operate gas processing plants and related facilities.

You will learn how to

- Describe how a gas turbine works
- Identify the types of gas turbines, major components, and common applications
- Describe the main factors that affect gas turbine performance
- List the options for heat recovery from gas turbines
- Explain the differences in the design and application of heat recovery from gas turbines
- Describe inlet air filtration systems and air-cooling options
- List common fuel gas specifications for natural gas
- List common pollutants in exhaust emissions and describe their mitigation methods
- Describe gas turbine control systems
- List common steam turbine applications as prime movers in oil and gas facilities
- Describe the types of steam turbines used, key mechanical components, and auxiliary systems
- List applicable company standards and industry codes for steam turbine driven equipment
- Describe types of rotors used and differences in their performance
- Describe the relationship between power output, steam inlet, and exhaust conditions and how this impacts facility design and operation
- Describe common steam turbine control strategies
- List typical steam turbine damage mechanisms and maintenance and repair techniques
- Outline the key steps in supplier selection and materials sourcing
- Describe procedures for over-speed testing

This eLearning course is included in the Basics of Rotating Mechanical Equipment eLearning series.

Machinery Design, Materials and Subsystems [MEC-MDM-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4.5 hrs

This eLearning course describes the principal materials used for the components for major types of rotating equipment. It also explains how each of the following are used with major types of rotating equipment along with applicable standards and codes: gears, transmission systems, couplings, seals, lubrication, and filtration systems.

Designed for

Facilities Engineers, Process Engineers, Senior Operations Personnel, Field Supervisors, Engineers who select, design, install, evaluate, or operate gas processing plants and related facilities.

You will learn how to

- Describe the principal materials used for the components for each major type of rotating equipment
- Outline the criteria that are used in the selection of these materials
- List how materials can affect operations and maintenance
- List applicable codes and standards for materials related to rotating machinery
- Describe the gearing transmission systems used with the major types of rotating equipment
- Describe how couplings transmit power and explain the difference between a rigid and a flexible coupling and under which circumstances each is used
- Outline the functions of gearing and coupling systems and the principal design factors for each system
- Identify the key properties of lubricating oil that are special to gearing systems
- List the failure modes typically encountered in gear and coupling systems and how to identify them before they become failures
- List the key operational and maintenance considerations of gearing and coupling systems
- Describe the key material and manufacturing considerations
- List seal types, categories and the advantages and disadvantages of each
- Describe the key mechanical and operational differences between mechanical contact seals and dry gas seals
- List the codes and standards used for seals in the energy industry
- List the various types of bearings, describe the principles of lubrication for the different bearing types, and list under what conditions they would be used

This eLearning course is included in the Basics of Rotating Mechanical Equipment eLearning series.

Mechanical Equipment [MEC-MEC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3.5 hrs

This eLearning course describes the principles and application of thermodynamic work and energy, primarily the principles of dynamic response, the structural and foundation concepts and its impact on equipment performance, and the cause and effect of different types of vibrations.

Designed for

Facilities engineers, process engineers, senior operations personnel, field supervisors, engineers who select, design, install, evaluate, or operate gas processing plants and related facilities.

You will learn how to

- Define the terms “system” and “surroundings” and explain the difference between open and closed systems
- State the first law of thermodynamics, and how it is applied to facilities
- Describe the second law of thermodynamics and explain how it applies to facilities
- Write the energy balance equations for a heat exchanger, valve, separator, and compressor
- List the various types of foundations
- List the determining factors during foundation selection
- Describe the importance of equipment leveling
- Define offset alignment, rotational alignment, and soft foot
- Discuss the process of grouting and potential issues
- List alignment guidelines
- List piping installation and support considerations
- Describe the concepts of equipment condition monitoring, and performance analysis of rotating equipment
- List the parameters typically monitored for pumps and compressors
- Identify the causes and effects of machinery vibrations in pumps and compressors
- Define the techniques typically used to mitigate vibration
- Define the basic principles of centrifugal action in kinetic pumps and compressors
- Describe the basic approach to characterizing a pumping/ compression system
- Define the system curve and describe how to develop it
- Determine the operating point of the system and the pump/ compressor
- Describe how to use pump/compressor selection charts for the selection of the proper pump/compressor type

This eLearning course is included in the Basics of Static Mechanical Equipment eLearning series.

Mechanical Equipment Inspection, Operation and Maintenance Core [MEC-MEI-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2 hrs

This eLearning course describes the key considerations, specifications, and codes and standards for inspection, operation, and maintenance of non-rotating equipment.

Designed for

Facilities engineers, process engineers, senior operations personnel, field supervisors, engineers who select, design, install, evaluate, or operate gas processing plants and related facilities.

You will learn how to

- Define the type of equipment that constitute Non-Rotating Equipment (N-RE)
- Outline the common processes of startup and shutdown of Non-Rotating Equipment (N-RE)
- List common problems that occur during startup and shutdown that can affect equipment integrity
- Describe operating N-RE as units and part of a station
- Describe operational processes and their shutdown parameters that control unit and station operation
- Describe the basic activities and functions of SCADA systems for N-RE systems
- List routine maintenance activities for N-RE in oil and gas facilities
- Define concepts of inspection, routine maintenance, preventive maintenance, repairs and planned major overhauls
- List considerations for sparing of N-RE in oil and gas facilities
- Describe the concepts of stand-by units, spare units and spare capacity
- Describe the process of inspection planning for N-RE
- List the inspection techniques used on N-RE
- Describe RBI and identify associated codes and standards
- List the principal safety issues with N-RE
- Define concepts of equipment reliability and availability related to N-RE
- Describe the concept of risk when applied to N-RE

This eLearning course is included in the Basics of Static Mechanical Equipment eLearning series.

Piping Systems and Welding [MEC-PSW-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5.5 hrs

This eLearning course describes the material and construction methods and piping system codes, including industry requirements and principles related to piping system operation, safety, reliability, and availability outlining applicable codes/standards and statutory requirements. The eLearning course also explains the purpose of welding, codes, types of weld processes, welding metallurgy, filler materials, shield materials, testing practices, and quality control.

Designed for

Facilities engineers, process engineers, senior operations personnel, field supervisors, engineers who select, design, install, evaluate, or operate gas processing plants and related facilities.

You will learn how to

- Describe the processes for manufacturing industrial pipe for high pressure and hazardous material containment
- Describe industry design, material, and construction methods
- Define piping specifications, economic selection criteria, and project specific requirements
- Identify pressure, temperature, and weight factors, and describe how they are applied to piping systems
- Define pipe sizing criteria and equations, outlining loads/limits
- Describe key code references applicable to piping sizing and selection criteria
- Explain pipe and fitting manufacturing codes, standards, and industry specifications
- Describe the physical properties of the fluid and the pipeline that affect liquid flow
- Define the application and importance of conservation of energy, conservation of mass to determining hydraulic behavior
- Determine flow friction coefficients and calculate proper line size/pressure drop relationship for hazardous liquids pipelines
- Define issues related to piping system layout and integration with other equipment
- Discuss the five types of welding used in pressure vessels and their application
- Explain the differences between Procedure Qualification Record (PQR) and Welding Performance Qualification (WPQ)

This eLearning course is included in the Basics of Static Mechanical Equipment eLearning series.

Properties of Materials [MEC-PMC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

With time, significant improvements have been made to metal compositions to ensure increased safety, operability, and reliability of the finished product in the field. These improvements have been documented in standards such as American Society of Mechanical Engineers (ASME). Knowledge of these standards is crucial to understanding design and fabrication specifications. This eLearning course provides an overview of the standards that impact the design and fabrication of pressure vessels.

Designed for

Facilities engineers, process engineers, senior operations personnel, field supervisors, engineers who select, design, install, evaluate, or operate gas processing plants and related facilities.

You will learn how to

- Recognize the basic materials used in pressure vessels
- Define what materials are acceptable and which are not for vessels as compared with piping
- Compare the chemical and physical characteristics of plates, forgings, and piping materials
- Name the most common steel making process for fine grain pressure vessel steel
- Describe the difference between “as rolled” and normalized plate grain structure
- Discuss the iron carbon phase diagram
- Discuss the characteristics of Austenitic Stainless and Martensitic Stainless Steels
- Identify uses of Austenitic Stainless in low temperature applications
- Discuss uses of Martensitic Stainless
- Describe an overview of Duplex Stainless materials
- Discuss Low Alloy Chrome Moly materials for high temperature applications
- Define the types of cladding
- Discuss the advantages of each type
- Review the steps necessary to produce a clad plate in each process

This eLearning course is included in the Basics of Static Mechanical Equipment eLearning series.

Reciprocating Engines for Process Facilities [MEC-REC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2 hrs

This eLearning course describes the basic types of reciprocating engines, including key operational aspects, characteristics, performance, design, fuel and aspiration systems, codes and standards, testing, and sizing for engines used as prime movers/drivers in oil and gas applications.

Designed for

Facilities engineers, process engineers, senior operations personnel, field supervisors; engineers who select, design, install, evaluate or operate gas processing plants and related facilities.

You will learn how to

- Describe the basic types of reciprocating engines
- List key performance criteria
- Outline the sizing process for reciprocating engines
- Describe the contents of project mechanical specifications typical for reciprocating engines
- Describe the types of fuels and the type of aspiration systems used in reciprocating engines
- List applicable company/industry codes and standards for reciprocating engines
- Describe systems for starting, lubricating oil, and cooling water
- Describe the inspection and testing of reciprocating engine emissions and performance
- Describe maintenance and repair techniques

This eLearning course is included in the Basics of Rotating Mechanical Equipment eLearning series.

Storage Tanks
[MEC-STC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	1.5 hrs

This eLearning course describes storage tanks used to store liquid or liquefied commodities. Key concepts for storage tanks explained in the eLearning course include:

- Types and their limitations
- Factors influencing basic engineering design, material selection, fabrication, inspection and testing, operation, and safe practices
- Environmental and safety considerations
- Industry codes and standards

Designed for

Facilities engineers, process engineers, senior operations personnel, field supervisors, engineers who select, design, install, evaluate, or operate gas processing plants and related facilities.

You will learn how to

- Describe a high-level classification of types of storage tanks used to store liquid or liquefied commodities
- Describe the types of storage facilities and the products that can be stored in each
- Identify industry codes and standards that cover different tank types
- Identify terminals as intermodal and logistics nodes
- Describe the classification of types of storage tanks
- Describe the factors that distinguish storage tanks
- Describe the selection process of storage tanks
- Identify economic factors used to size and select storage tanks
- Describe the factors that influence the design, construction, operation, and maintenance of above ground (AST) and underground storage tanks (UST)
- Explain environmental and safety considerations and containment requirements for ASTs and USTs
- Describe process facilities and how they affect storage tanks
- Identify typical products or product contaminants that can cause loss of structural or operational integrity of storage tanks
- Identify organizations that develop and provide codes and standards for the design and construction of storage tanks
- Describe the code requirements that affect the basic engineering design, material selection, fabrication, inspection and testing, operation, and safe practices of storage tanks
- Identify codes that govern field-welded, shop-welded bolted atmospheric, and low-pressure storage tank

This eLearning course is included in the Basics of Static Mechanical Equipment eLearning series.

Unfired Pressure Vessels
[MEC-UPV-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course explains the industry pressure vessel design and specifications, including the organizations that provide the applicable codes and standards.

Designed for

Facilities Engineers, Process Engineers, Senior Operations Personnel, Field Supervisors, Engineers who select, design, install, evaluate or operate gas processing plants and related facilities

You will learn how to

- Identify the purpose of the code
- Identify the sections of the Boilers and Pressure Vessels (B&PV) Code
- Learn the major components of Section VIII, Div. 1
- Differentiate between an ASME Section VIII, Div. 1 vessel and B31.3 piping
- List the bodies and regulations that govern pressure vessel design and operations
- Describe all design criteria items for pressure vessels
- Differentiate between design pressure, maximum allowable working pressure, and maximum allowable pressure
- Discuss design stress levels according to temperatures
- Differentiate between operating and design temperatures and pressures
- Calculate wall thicknesses of shells, heads, and cones using the formulas from ASME Section VIII, Div. 1
- List corrosion allowances for process nozzles and minimum nozzle neck thicknesses
- State the differences in types of heat treatment
- Compare the results of each type of heat treatment
- Discuss requirements for Post Weld Heat Treatment, methods, and cooling procedures
- Explain the basics of corrosion including rust
- Determine corrosion allowance (CA) for general hydrocarbon use and natural gas service
- Identify the corrosive elements in hydrocarbon processing
- Discuss the ramifications of vessel penetrations
- Identify the options available to remedy nozzle penetrations
- Discuss the rules for inspection openings and manways
- Identify the Records Retention requirements
- Examine vessel appurtenances: vessel internals, externals, and supports; openings (other than process nozzles), externals, vessel supports

This eLearning course is included in the Basics of Static Mechanical Equipment eLearning series.

Control Systems for Oil and Gas Applications (Part 1) [INC-CS1-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4 hrs

This eLearning course provides an introduction and overview of control systems typically encountered in oil and gas facilities.

Designed for

Process, chemical, and mechanical engineers, (i.e., non-instrumentation and non-electrical disciplines), as well as other technical and non-technical professionals with little or no background in IC&E systems.

You will learn how to

- Describe the relationship between current, voltage, and resistance
- Differentiate between self-powered and loop-powered devices
- Explain the nature of backup AC and DC power
- Describe what control is, types of control, and its purpose and architecture
- Identify the nature of analog and digital input and output signals
- Describe signals, the use of pneumatic actuators and control systems, and managing noise
- Identify various signal converters and types of wiring and cabling
- Describe instrument tag numbers, PID symbols, and documentation

This eLearning course is included in the Industrial Automation for Oil and Gas Applications eLearning series.

Control Systems for Oil and Gas Applications (Part 2) [INC-CS2-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4.5 hrs

This eLearning course provides an overview of safety instrumented systems and their applications in oil and gas facilities. The focus is on understanding terminology, concepts, and common pitfalls to improve communication with electrical and I&C professionals.

Designed for

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

You will learn how to

- Explain Safety Instrumented System (SIS) and their uses
- Recognize the importance of identifying risks and hazards, and conducting assessments and analysis to address them
- Differentiate between BPCS and SIS
- Recognize the importance of SIL 1 to SIL 4 classifications
- Describe the SIS life cycle
- Identify the need for product and application diagnostics
- Define management of change (MoC)
- Identify the need for a safety requirement specification
- Identify the purpose of an uninterruptible power supply (UPS)

This eLearning course is included in the Industrial Automation for Oil and Gas Applications eLearning series.

Control Valves for Oil and Gas Applications [INC-CVO-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5.5 hrs

This eLearning course provides an overview of the control valves and actuation devices commonly used in oil and gas operations. The focus is on understanding terminology, concepts, typical equipment configurations, and common pitfalls to make proper selection that is fit for application.

Designed for

Process, chemical, and mechanical engineers, (i.e., non-instrumentation and non-electrical disciplines), as well as other technical and non-technical professionals with little or no background in IC&E systems.

You will learn how to

- Provide an overview of valve construction
- Briefly discuss the various methods of valve actuation
- Discuss the relevance of the vena contracta
- Compare the difference between flashing and cavitation
- Describe the various types of control valves
- Describe the various types of actuation devices
- Provide a basic overview of pressure regulators and their applications

This eLearning course is included in the Industrial Automation for Oil and Gas Applications eLearning series.

Instrumentation Selection for Oil and Gas Applications (Analysis) [INC-ISA-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4.5 hrs

This eLearning course focuses on an analysis of the composition of the oil and gas product. Analysis of process streams is common in many industries and can be performed using numerous methods, some of which are covered.

Designed for

Process, chemical, and mechanical engineers, (i.e., non-instrumentation and non-electrical disciplines), as well as other technical and non-technical professionals with little or no background in IC&E systems.

You will learn how to

- Describe the basic elements of an analysis system
- Review the need for basic sediment and water (BS&W) measurement
- Explain the need to measure pH in the oil and gas industry
- Describe the basis of Thin Layer Chromatography (TLC)
- Describe the basis of colorimetry
- Describe the working principle of UV fluorescence
- Select an instrument suitable to measure H2S in a gas stream
- Describe the technologies available for oxygen measurement

This eLearning course is included in the Industrial Automation for Oil and Gas Applications eLearning series.

Instrumentation Selection for Oil and Gas Applications (Flow) [INC-ISF-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	6 hrs

In this eLearning course, we discuss various types of flow meters, including their technology, components, features, use, and technology in the oil and gas industry.

Designed for

Process, chemical, and mechanical engineers, (i.e., non-instrumentation and non-electrical disciplines), as well as other technical and non-technical professionals with little or no background in IC&E systems.

You will learn how to

- Review the basics of flow profiles
- Discuss the different technologies used for flow switches
- Identify the working principle, and advantages and disadvantages of the following positive displacement meters
- Identify the working principle, advantages, and disadvantages of the following head loss meter technologies
- Describe the basic working principle of a turbine meter
- Explain Faraday's law and how this may be applied to the measuring liquid flow
- Describe the working principle of Doppler-based meters
- Review the working principle of transit-time meters
- Explain the working principles of clamp-on meters
- Review some of the tube arrangements used in Coriolis measurement
- Describe the phenomenon of vortex shedding and the formation of vortices
- Explain how the Strouhal factor varies with the bluff body shape and Reynolds number
- Describe the working principle of a typical vortex meter
- Discuss the role of a three-phase separator
- Identify the need for multiphase flow metering (MPFM)
- Explain the differences between calibration, verification, proving, and validation
- Discuss some of the on-site open and closed tank prover systems
- Explain the working principle of a bidirectional pipe prover
- Describe the working principle of eight unidirectional pipe prover
- Review the use and working principle of piston provers
- Describe the role of a LACT system
- Discuss the role of environmental influences
- Identify some common selection criteria

This eLearning course is included in the Industrial Automation for Oil and Gas Applications eLearning series.

Instrumentation Selection for Oil and Gas Applications (General) [INC-ISO-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5 hrs

This eLearning course introduces the learner to the field of instrumentation and control in the oil and gas industry. Other topics included are fluid properties, material selection, material compatibility end, operation of switches, relays, and solenoids, basic principles underlying the 4-20 mA instrument signal control loop, instrumentation documentation, and instrument connections.

Designed for

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

You will learn how to

- Identify fluid properties as they relate to instruments selection in the oil and gas industry
- Describe the material selection criteria in instrument selection
- Gain guidance on some of the material compatibility requirements within the industry
- Discuss the operation of switches, relays and solenoids
- Describe the basic principles underlying the 4-20 mA instrument signal control loop
- Describe typical instrumentation documentation
- Describe the three main types of instrument connections

This eLearning course is included in the Industrial Automation for Oil and Gas Applications eLearning series.

Instrumentation Selection for Oil and Gas Applications (Level) [INC-ISL-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4 hrs

This eLearning course explains the reason for measuring level and the various technologies available to measure level.

Designed for

Process, chemical, and mechanical engineers, (i.e., non-instrumentation and non-electrical disciplines), as well as other technical and non-technical professionals with little or no background in IC&E systems.

You will learn how to

- Review basic reasons for measuring level
- Discuss the pros and cons of using a bridle
- Explain the basic functions of a stilling well
- Describe how a simple sight glass is used to monitor the level
- Review how float systems can provide direct reading outputs
- Examine the use of hydrostatic pressure measurement in an open tank level measurement
- Describe the use of electronic remote diaphragm seals
- Discuss the working principle of ultrasonic gap point level meter
- Examine the working principles of conventional pulse radar
- Describe a simple laser-based level measuring system
- Examine the working principle of a Geiger Muller tube
- Explain the principle of tank strapping

This eLearning course is included in the Industrial Automation for Oil and Gas Applications eLearning series.

Instrumentation Selection for Oil and Gas Applications (Pressure, Temperature) – [INC-ISP-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4.5 hrs

This eLearning course focuses on temperature and pressure devices that are critical in detecting and preventing abnormal conditions, which may result in a loss of containment and/or safety events.

Designed for

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

You will learn how to

- Review the fundamental principles of temperature measurement
- Describe the correct application and installation of RTDs, thermocouples, and thermistors
- Describe the requirements for specifying thermowells
- Review the basics of radiation thermometry
- Describe the working principles of the main types of mechanical pressure measurement and their applications
- Describe the features of multi-variable pressure transmitters

This eLearning course is included in the Industrial Automation for Oil and Gas Applications eLearning series.

Basics of Electrical Safety and Design Standards (U.S. Based Standards) [ELE-EDI-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	7 hrs

This eLearning course is designed to give learners a jump-start in navigating and applying U.S. based electrical safety, and design codes/standards such as the National Electrical Code (NEC, NFPA 70), and many others, in industrial installations which may include explosive (hazardous) atmospheres. An overview of various codes/standards with highlights of key sections and requirements are discussed as they relate to industrial facilities. Though not required, learners will get a richer experience if they can obtain a copy of the National Electrical Code, NFPA 70, to review in conjunction with this eLearning course.

You will learn how to

- Describe the need for codes and regulations in the electrical industry
- Explain the basic hazards of electricity, common risk reduction methods used, and codes and standards that apply to various aspects of electrical safety
- Describe the role of OSHA and enforcement mechanisms for common industry-recognized codes and standards including the role of NRTL's
- Identify codes and standards used for sizing, specification, and installation of electrical equipment and infrastructure for industrial facilities
- Identify codes and standards used for determining the degree and extent of hazardous (explosive) areas in industrial facilities
- Describe some of the common mistakes individuals make in learning, interpreting and applying common codes and standards
- Describe the purpose and scope of the NEC, its layout, and how to navigate it
- Apply the basic requirements of the NEC including conductor sizing, grounding
- Describe the role of circuit breakers, fuses, and overload relays and the code sections that reference their sizing
- Describe the scope, purpose, and key articles of NPFA 70B, NFPA 70E, NESC C2, NFPA 780, API RP 2003
- Describe the articles and basic requirements for installations in explosive (hazardous) atmospheres and the use of NFPA 497 and API RP 500 in the classification of hazardous areas
- Describe the basic process of hazardous area classification per API RP 500, terms used, and considerations to determine risk level
- Describe the importance of well-designed lighting systems and the application of industry standards such as IES RP-7-17

This eLearning course is included in the Introduction to Electrical Engineering eLearning series.

Electric Motors and Motor Control in Industrial Facilities [ELE-MOT-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2 hrs

This eLearning course explains electric motor drivers including electric power generation fundamentals, basic AC motor types used in oil and gas, selection criteria, efficiency and performance standards, mechanical and electrical design aspects, typical accessories, motor starting techniques, and typical maintenance, inspection, and commissioning activities.

Designed for

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 how to

- Describe a motor driver and its key operational aspects
- Describe differences in operation between induction and synchronous motors and how to select between the
- Identify key design and operating parameters of electric motors
- Identify electric motor de-rating factors
- Describe the relationship between motor torque and speed
- List available motor accessories and their functions
- Describe the typical data shown on the motor nameplate
- Describe the methods of motor starting and their pros/cons
- Describe the operation of variable speed drives and their effects on electrical equipment
- Describe items generally covered in optional Factory Acceptance Testing
- Describe common steps in commissioning motors
- List typical motor maintenance activities and typical failure modes

This eLearning course is included in the Introduction to Electrical Engineering eLearning series.

Electrical Safety in Design for Industrial Facilities [ELE-SAF-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4 hrs

This eLearning course focuses on the design elements of industrial facility power systems common in the energy industry that relate to Electrical Safety. By understanding the effects, causes and factors associated with Shock and Arc Flash hazards, engineers have the opportunity to design and configure power distribution systems to be inherently as safe as possible. Good design achieves a high degree of safety performance while also achieving high reliability, as well as the ability to perform maintenance and additions while equipment is de-energized but maintaining continuity of service to the facility.

Designed for

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 how to

- Describe how design, installation, operation, and maintenance work together to achieve safety results
- Identify electrical hazards in the workplace and how to avoid them
- Describe the Hierarchy of Risk Control
- Explain the role of design and engineering in electrical safety
- Describe the causes and effects of shock on the human body
- List techniques used to protect people from electric shock
- Explain the causes and effects of Arc Flash/Blast and the factors that impact Arc Flash Incident Energy
- List methods that operations and engineering can use to reduce arc flash risk
- Describe the potential trade-offs between achieving electrical safety and reliability and methods to achieve both
- Explain the importance of working on electrical equipment in a "De-energized" or "Dead" state
- List the limited situations that could justify "Energized Work"
- Describe the design elements that impact electrical safety with the goal of an inherently safe operation
- Describe the operational considerations for electrical work, including 1) Temporary power equipment, 2) Risks of working around overhead power lines, 3) Preventative and predictive maintenance strategies
- Safety impact of unlabeled or mislabeled equipment

This eLearning course is included in the Introduction to Electrical Engineering eLearning series.

Hazardous Area Classification in Oil and Gas Facilities [ELE-HAZ-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course is part of a three-part series that introduces the principles and concepts used for the installation of electrical equipment in hazardous (explosive) atmospheres.

Hazardous Area Classification in Oil and Gas Facilities discusses the process of Hazardous Area Classification, where we determine the risk of ignitable atmospheres being present. This eLearning course is relevant to both North American Standards (NFPA, NEC, CEC) and International Standards (IEC).

Hazardous Area Equipment Selection and Installation in Division-based Facilities covers equipment selection and installation practices for the Division method used primarily in North America.

Hazardous Area Equipment Selection and Installation in Zone-based Facilities covers equipment selection and installation practices for the Zone method used internationally (including North America).

Designed for

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

You will learn how to

- Describe the conditions required for an explosion
- Explain the risk that electrical equipment represents in the presence of ignitable atmospheres
- Describe the four elements of safely installing electrical equipment in hazardous areas
- Describe the risk factors we encounter in hazardous locations and protective layers applied
- List the industry standards related to area classification
- Describe the various hazardous substances commonly encountered and their key properties related to hazardous location installations
- Describe the roles and responsibilities for various disciplines related to hazardous area classification, installation, and operations
- Define the terms used in hazard area classifications
- List the considerations that lead to determining area classification
- Describe how area classifications are documented, and how to interpret these documents

This eLearning course is included in the Introduction to Electrical Engineering eLearning series.

Hazardous Area Equipment Selection and Installation in Division-based Facilities [ELE-DIV-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course is part of a three-part series that introduces the principles and concepts used for the installation of electrical equipment in hazardous (explosive) atmospheres.

Hazardous Area Classification in Oil and Gas Facilities discusses the process of Hazardous Area Classification, where we determine the risk of ignitable atmospheres being present. This eLearning course is relevant to both North American Standards (NFPA, NEC, CEC) and International Standards (IEC).

Hazardous Area Equipment Selection and Installation in Division-based Facilities covers equipment selection and installation practices for the Division method used primarily in North America.

Hazardous Area Equipment Selection and Installation in Zone-based Facilities covers equipment selection and installation practices for the Zone method used internationally (including North America).

Designed for

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

You will learn how to

- Describe how electrical engineers and designers use electrical area classification drawings to specify electrical equipment and installation practices in hazardous locations
- List the four aspects of hazardous location installations
- List the standards related to electrical installations in hazardous locations
- Define the common terms used in area classification including Class, Division, Group, and T-Code
- Describe the impact of Division, Group, and T-Code designations on equipment specification
- Describe the role of NRTLs as they apply to hazardous area rated equipment
- Explain the principles, pros, and cons of various protection methods commonly used in hazardous area rated electrical equipment
- Describe the basic installation requirements for equipment in hazardous locations
- Compare Division and Zone rated equipment

This eLearning course is included in the Introduction to Electrical Engineering eLearning series.

Hazardous Area Equipment Selection and Installation in Zone-based Facilities [ELE-ZON-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course is part of a three-part series that introduces the principles and concepts used for the installation of electrical equipment in hazardous (explosive) atmospheres.

Hazardous Area Classification in Oil and Gas Facilities discusses the process of Hazardous Area Classification, where we determine the risk of ignitable atmospheres being present. This eLearning course is relevant to both North American Standards (NFPA, NEC, CEC) and International Standards (IEC).

Hazardous Area Equipment Selection and Installation in Division-based Facilities covers equipment selection and installation practices for the Division method used primarily in North America.

Hazardous Area Equipment Selection and Installation in Zone-based Facilities covers equipment selection and installation practices for the Zone method used internationally (including North America).

Designed for

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

You will learn how to

- Describe how Electrical Area Classification Drawings are used by Electrical Engineers and Designers to specify electrical equipment and installation practices in hazardous locations
- List the four aspects of hazardous location installations
- List the standards related to electrical installations in hazardous locations
- Define the common terms used in area classification including Zone, Group, and T-Code
- Describe the impact of Zone, Group, and T-Code designations on equipment specification and installation
- Describe the role of Certified and Notified Bodies as they apply to hazardous area rated equipment
- Explain the principles, pros, and cons of various protection methods commonly used in hazardous area rated electrical equipment
- Describe the basic installation requirements for equipment in hazardous locations
- Compare Division and Zone rated equipment

This eLearning course is included in the Introduction to Electrical Engineering eLearning series.

Principles of Power Systems in Industrial Facilities (Part 1) [ELE-PR1-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3.5 hrs

This eLearning course is the first of two eLearning courses intended for those with little or no background in electrical theory or the practical application of those principles to power systems in typical oil and gas or industrial facilities. We strongly encourage taking both eLearning courses. This eLearning course covers the basics of electricity and generating electricity.

The eLearning course avoids the typical academic approach and instead focuses on explaining complex concepts using easy-to-understand analogies. These analogies are then immediately extended to describe how the concepts are used in the design of industrial power systems. Once the basic equipment principles are described, examples are given of how they are applied to affect the safety, reliability, efficiency and cost of power systems.

By the end of these two eLearning courses, the learner should be able to interpret the basic elements of simple one-line diagrams, identify the equipment voltage, power, and current ratings, relate them to the physical equipment installed and understand facility power consumption and energy cost factors.

Designed for

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

You will learn how to

- Describe electricity and its role in energy
- Explain the general structure of a power system
- Describe the roles and materials used for conductors, insulators and semiconductors
- Describe how magnetic fields and electric fields are related
- Define the common electrical properties of Voltage, Current, Resistance, and Power
- Describe how these properties impact electrical equipment design such as conductors, transformers, motors, and generators
- Describe a basic AC and DC electrical circuit and its components
- Use Ohm's Watt's and Kirchhoff's Laws to solve basic electrical problems
- Describe how basic series and parallel circuits behave and how they are wired
- Describe how static electricity is generated and the hazards associated

This eLearning course is included in the Introduction to Electrical Engineering eLearning series.

Principles of Power Systems in Industrial Facilities (Part 2) [ELE-PR2-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course is the second of two eLearning courses intended for those with little or no background in electrical theory or the practical application of those principles to power systems in typical oil and gas or industrial facilities. We strongly encourage taking Principles of Power Systems in Industrial Facilities (Part 1) first.

The eLearning course avoids the typical academic approach and instead focuses on explaining complex concepts using easy-to-understand analogies. These analogies are then immediately extended to describe how the concepts are used in the design of industrial power systems. Once the basic equipment principles are described, examples are given of how they are applied to affect the safety, reliability, efficiency, and cost of power systems.

By the end of these two eLearning courses, the learner should be able to interpret the basic elements of simple one-line diagrams, identify the equipment voltage, power, and current ratings, relate them to the physical equipment installed and understand facility power consumption and energy cost factors.

This eLearning course covers the following topics:

- Three-Phase Power Systems and Harmonics
- Conductor Design
- Overview of Industrial Power Distribution Systems
- Grounding (Earthing) and Bonding

Designed for

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

You will learn how to

- Describe 3-phase power systems, their characteristics, applications, and advantages
- List the basic equations used for DC, AC single phase, and 3-phase power systems
- Describe harmonics, their sources, and their impact on power systems
- Explain the basics of conductor construction, selection, and sizing
- Summarize the relationship between conductor current carrying capacity, cross-sectional area, insulation design, ambient conditions, and installation methods

This eLearning course is included in the Introduction to Electrical Engineering eLearning series.

Compliance and Pollution Events and Environmental Impacts and Assessments (U.S. Focus) [PIP-CPE-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

In this eLearning course, you will learn the US legislation, regulations, and compliance requirements for pipelines. Also discussed are environmental impacts statements and assessment.

Designed for

Engineers or Facilities Engineers involved in design, operation, maintenance or construction of pipelines or pipeline facilities.

You will learn how to

- Explain the background of US environmental legislation, especially the National Environmental Policy Act, and similar legislation around the world
- Describe some of the history and politics behind the creation of environmental policy
- Compare and contrast US environmental policy and legislation with that of other energy producing nations
- Explain how US environmental legislation is implemented by regulating agencies
- Describe the major aspects of environmental assessments and environmental impact studies
- Describe the impact of environmental protection laws on pipeline design, permitting, construction, and operations
- Describe the process in producing an EIS – Environmental Impact Statement in compliance with NEPA
- Describe from historic cases studies how
  - Accidents and incidents drive development of codes and regulations in the pipeline business
  - Role of media reporting and public perception of incidents may drive responses both short and long term
  - Events affect the general public, the operator, the industry and regulators
  - Being a linear facility often of considerable length and in multiple jurisdictions, renders control of pipeline facilities more difficult
  - Transparent and exposed pipeline activities are subject to public scrutiny

This eLearning course is included in the Pipeline Engineering Principles eLearning series.

Pipeline Construction (U.S. Focus) [PIP-PIC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4.5 hrs

In this eLearning course, you will learn a brief history of pipelines and the Company and Contractors' responsibilities during pipeline construction. Also discussed are key onshore and offshore construction activities.

Designed for

Engineers or Facilities Engineers involved in design, operation, maintenance or construction of pipelines or pipeline facilities.

You will learn how to

- Describe the Company and Contractor's responsibilities during the construction phase of onshore and offshore pipelines in the U.S.
- Describe the options for contracting the major onshore and offshore pipeline projects and the factors that determine which method is used
- Describe the key activities during onshore and offshore pipeline construction
- Describe the major tasks during each major construction activity
  Define the environmental effects of construction in the short-term and long-term
- Define the differences in welding and inspection between onshore and offshore pipelines
- Describe the need for and basic processes of trenching and burial
- Define the challenges and solutions for shore crossings, including horizontal directional drilling and riser installations

This eLearning course is included in the Pipeline Engineering Principles eLearning series.

Pipeline Hydraulics and Flow Assurance [PIP-PHF-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course explains hydrocarbon gas and liquids' physical properties and fluid flow characteristics. Topics also covered are friction flow, volumetric flow, multiphase flow, and flow assurance considerations for pipeline systems.

Designed for

Engineers or Facilities Engineers involved in design, operation, maintenance or construction of pipelines or pipeline facilities.

You will learn how to

- Describe the physical properties and fluid flow characteristics of hydrocarbon gas and liquid
- Apply volumetric flow equations for natural gas & liquid flows
- Define the key parameters for pump station locations based on hydraulic profile & compressor station locations
- Describe the impact of system pressure on volumetric flow rate, diameter, friction losses, and compression power in gas pipelines
- Describe multiphase flow characteristics
- Describe the importance of temperature management, uses of insulation, and the challenges of design, installation and operation of insulation/heat tracing systems
- Describe the fluid characteristics, flow assurance issue, and methods to manage hydrates, wax/paraffinic fluids, multiphase flow, scale

This eLearning course is included in the Pipeline Engineering Principles eLearning series.

Pipeline O&M, Leak Detection, Repairs, Alterations and Abandonment (U.S. Focus) [PIP-POM-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3.5 hrs

In this eLearning course, you will learn the key aspects of daily operations and maintenance of pipeline systems. You will recognize the reasons for monitoring pipelines, how to detect leaks, and common systems that are used for leak detection. Also covered in this eLearning course are key actions and components of pipeline emergency response programs and primary methods to debottleneck a pipeline system. You will learn about the code requirements for asset integrity management, primary onshore and offshore pipeline repair methods, and the general principles behind SIMOPS procedures. Lastly, you will learn about the issues that must be addressed when reactivating an idled pipeline and the requirements to abandon a pipeline correctly.

Designed for

Engineers or Facilities Engineers involved in design, operation, maintenance or construction of pipelines or pipeline facilities.

You will learn how to

- Describe the risks and consequences of pipeline incidents by type of service and location
- Define High Consequence Area [HCA] and list the impacts on pipeline design and operation
- List the primary pipeline defects and the required repair methods for each
- List the specialized materials, supplies, and equipment that may be required for emergency repairs
- Explain the variety of definitions for decommissioning, idling, and abandoning pipeline facilities

This eLearning course is included in the Pipeline Engineering Principles eLearning series.

Pipeline Pump and Compressor Stations and Terminals (U.S. Focus) [PIP-PCS-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2 hrs

In this eLearning course, you will learn the important role played by pumps and compressors in transporting hydrocarbons in pipelines. The eLearning course also covers meter stations, launcher and receiver stations, storage facilities, and valve stations.

Designed for

Engineers or Facilities Engineers involved in design, operation, maintenance or construction of pipelines or pipeline facilities.

You will learn how to

- Describe the equipment and facilities that constitute, along with the pipeline, a pipeline system, including:
  - Pump and compressor stations
  - Storage
  - Metering
  - Launchers and receivers
  - Valve stations
  - Utilities
- List facilities/components that would typically be found in:
  - Field gathering systems, field injection systems, Crude oil systems, Natural gas systems
  - Refined product systems, NGL products systems, distribution systems

This eLearning course is included in the Pipeline Engineering Principles eLearning series.

Pipeline Routing and Geomatics (U.S. Focus) [PIP-PRG-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2 hrs

In this eLearning course, you will learn basic terminology, concepts, and methods associated with defining a specific location on Earth as part of a pipeline route/alignment description. This includes basic requirements for surveying, the use of advanced techniques like global positioning systems (GPS), remote sensing imagery, and techniques for subsea surveying (bathymetry) applicable for offshore pipelines. The eLearning course further covers key considerations for pipeline route selection and exclusion zones, as well as the impact population density may have on the design of a pipeline.

Designed for

Engineers or Facilities Engineers involved in design, operation, maintenance or construction of pipelines or pipeline facilities.

You will learn how to

- Define monument, benchmark, longitude and latitude
- Define basic requirements of surveying and describe how points on the earth are uniquely defined relative to the rest of the world
- Define how global positioning systems (GPS) and remotely sensed imagery have modernized surveying techniques over the last 20 years
- Describe methods and inherent difficulties for subsea surveying
- Describe the basic surveys required for pipeline design, construction, and operations
- Describe the impact of geographic information systems (GIS) on pipeline surveys, drawings, and maps
- Describe the functionality of Web/internet resources (such as Earth/Map) for the pipeline engineer and operator
- Describe the critical issues in routing a pipeline
- Compile a list of critical route selection criteria, and identify potential “fatal flaw” situations including:
  - Public safety aspects of pipeline construction, operations, and maintenance
  - Environmental considerations of pipeline construction, operations and maintenance
- Describe the role GIS plays incurred pipeline route selection and how Web/internet resources can assist
- Describe advantages/disadvantages of using existing corridors
- Define the why population/occupied building density must be consider in pipeline routing

This eLearning course is included in the Pipeline Engineering Principles eLearning series.

Pipeline Strength, Stability and Environmental Considerations (U.S. Focus) [PIP-PSS-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5 hrs

This eLearning course explains the strength, stability, and environmental considerations in building and operating pipelines on land and in the sea. Topics covered include longitudinal stress, pipelay operations, thermal and pressure effects, and hydrodynamic and soil resistance.

Designed for

Engineers or Facilities Engineers involved in design, operation, maintenance or construction of pipelines or pipeline facilities.

You will learn how to

- Describe the similarities and differences between the ASME 31.4, ASME B31.8, and ISO 13623 with respect to calculating and determining acceptance of pressure-related stresses
- Define the contributing factors for longitudinal stress and where these would likely occur based on pressure, bending, axial loads, thermal/pressure expansion
- Describe the stresses occurring during offshore pipelay operations and the differences and similarities between S-Lay, J-Lay, and Reel Lay Define and describe the application of tie-in/installation temperature, ground temperature, pressure end effects, soil/support frictional resistance
- Describe the hydrodynamic and soil resistance model for pipeline stability
- Define the differences between point and body stability, static stability, dynamic stability
- Define the issues for pipe stability and integrity when in a free (unsupported) span in water and in air

This eLearning course is included in the Pipeline Engineering Principles eLearning series.

Principles of Power Systems in Industrial Facilities (Part 1) [ELE-PR1-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3.5 hrs

This eLearning course is the first of two eLearning courses intended for those with little or no background in electrical theory or the practical application of those principles to power systems in typical oil and gas or industrial facilities. We strongly encourage taking both eLearning courses. This eLearning course covers the basics of electricity and generating electricity.

The eLearning course avoids the typical academic approach and instead focuses on explaining complex concepts using easy-to-understand analogies. These analogies are then immediately extended to describe how the concepts are used in the design of industrial power systems. Once the basic equipment principles are described, examples are given of how they are applied to affect the safety, reliability, efficiency and cost of power systems.

By the end of these two eLearning courses, the learner should be able to interpret the basic elements of simple one-line diagrams, identify the equipment voltage, power, and current ratings, relate them to the physical equipment installed and understand facility power consumption and energy cost factors.

Designed for

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

You will learn how to

- Describe electricity and its role in energy
- Explain the general structure of a power system
- Describe the roles and materials used for conductors, insulators and semiconductors
- Describe how magnetic fields and electric fields are related
- Define the common electrical properties of Voltage, Current, Resistance, and Power
- Describe how these properties impact electrical equipment design such as conductors, transformers, motors, and generators
- Describe a basic AC and DC electrical circuit and its components
- Use Ohm's Watt's and Kirchhoff's Laws to solve basic electrical problems
- Describe how basic series and parallel circuits behave and how they are wired
- Describe how static electricity is generated and the hazards associated

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Principles of Power Systems in Industrial Facilities (Part 2) [ELE-PR2-1]

STATUS	LEVEL	DURATION
Coming soon	Basic (Level 1)	3 hrs

This eLearning course is the second of two eLearning courses intended for those with little or no background in electrical theory or the practical application of those principles to power systems in typical oil and gas or industrial facilities. We strongly encourage taking Principles of Power Systems in Industrial Facilities (Part 1) first.

The eLearning course avoids the typical academic approach and instead focuses on explaining complex concepts using easy-to-understand analogies. These analogies are then immediately extended to describe how the concepts are used in the design of industrial power systems. Once the basic equipment principles are described, examples are given of how they are applied to affect the safety, reliability, efficiency, and cost of power systems.

By the end of these two eLearning courses, the learner should be able to interpret the basic elements of simple one-line diagrams, identify the equipment voltage, power, and current ratings, relate them to the physical equipment installed and understand facility power consumption and energy cost factors.

This eLearning course covers the following topics:

- Three-Phase Power Systems and Harmonics
- Conductor Design
- Overview of Industrial Power Distribution Systems
- Grounding (Earthing) and Bonding

Designed for

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

You will learn how to

- Describe 3-phase power systems, their characteristics, applications, and advantages
- List the basic equations used for DC, AC single phase, and 3-phase power systems
- Describe harmonics, their sources, and their impact on power systems
- Explain the basics of conductor construction, selection, and sizing
- Summarize the relationship between conductor current carrying capacity, cross-sectional area, insulation design, ambient conditions, and installation methods

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Refinery Corrosion Overview [REF-COV-1]

STATUS	LEVEL	DURATION
Coming soon	Basic (Level 1)	~1 hr

This eLearning course aims to educate on the sources of corrosion coming from the type of crude oil processed in a specific refining installation.

A brief discussion is held to relate the quality of the crude oil processed and the potential corrosion impacts in the process units where the crude oil is processed. Afterwards, downstream process streams are produced, treated, and blended to get the typical final products from the refining industry.

Corrosion in oil refineries is caused by contaminants present in the crude like salts containing chlorides, sulfur, nitrogen, organic (naphthenic) acids, oxygen, water, metals (V, Ni, Na), by-products formed during processing like heat stable salts, and amines used to eliminate CO2 and H2S. Detailed discussions of each one of the types of corrosion produced by each one of these contaminants are held along the eLearning course.

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Refinery Separation Processes Corrosion [REF-RFP-1]

STATUS	LEVEL	DURATION
Coming soon	Basic (Level 1)	~1 hr

This eLearning course aims to educate on the sources of corrosion, types of corrosion and mechanisms for preventing or mitigate the impact on Crude Distillation and Vacuum Distillation process units.

Detailed discussion on the corrosion mechanisms and the impact on equipment and instruments taking place at Crude and Vacuum Distillation Units are held.

Corrosion preventing actions that can be applied during the design stage and control actions during normal operation, routine and special maintenance activities are discussed along the eLearning course.

Effective corrosion control minimizes its destructive impact, thereby enhancing operating cycles of process units, optimizing maintenance costs, and ensuring safer and more profitable operations of the refining installations.

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Refinery Conversion Processes Corrosion [REF-RCP-1]

STATUS	LEVEL	DURATION
Coming soon	Basic (Level 1)	~5 hrss

Detailed discussions on the corrosion mechanisms and the impact on equipment and instruments taking place at each one of the refining process units listed above are held.

Corrosion-preventing actions that can be applied during the design stage and control actions during normal operation, routine, and special maintenance activities are discussed for each process unit along the eLearning course.

Effective corrosion control minimizes its destructive impact, thereby enhancing the operating cycles of process units, optimizing maintenance costs, and ensuring safer and more profitable operations of refining installations.

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Refinery Treatment Process Corrosion [REF-RTP-1]

STATUS	LEVEL	DURATION
Coming soon	Basic (Level 1)	~1 hr

This eLearning course aims to educate on the sources of corrosion, types of corrosion and mechanisms for preventing or mitigate the impact on the following process units: Amine Treatment and Merox Treatment.

Detailed discussions on the corrosion mechanisms and the impact on equipment and instruments taking place at each one of the treatment refining process units listed above are held.

Corrosion preventing actions that can be applied during the design stage and control actions during normal operation, routine and special maintenance activities are discussed for each process unit along the eLearning course.

Effective corrosion control minimizes its destructive impact, thereby enhancing operating cycles of process units, optimizing maintenance costs, and ensuring safer and more profitable operations of the refining installations.

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Refinery Storage Corrosion [REF-RSC-1]

STATUS	LEVEL	DURATION

This eLearning course aims to educate on the sources of corrosion, types of corrosion and mechanisms for preventing or mitigate the impact on most of the storage facilities existing in an oil refinery installation.

Detailed discussions on the corrosion mechanisms and the impact on equipment and instruments taking place at the storage facilities are held.

Corrosion preventing actions that can be applied during the design stage and control activities during normal operation, routine and special maintenance activities are discussed for each type of tank and their associated facilities along the eLearning course.

Effective corrosion control minimizes its destructive impact, thereby enhancing operating cycles of process units, optimizing maintenance costs, and ensuring safer and more profitable operations of the refining installations and their storage facilities.

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Refining and Petrochemical Operation Supervisory Skills [REF-SUP-1]

STATUS	LEVEL	DURATION
Coming soon	Basic (Level 1)	~4 hrs

This eLearning course describes the generic skills that an operational supervisor should possess to develop a successful performance in leading the daily operational work within a refining or petrochemical installation. These skills include the following items: leading and mentoring, safety, planning, procedures preparation and written and oral communication, among others.

Study cases resolution will be included in this eLearning course to reinforce the provided theoretical knowledge.

Designed for

Process engineers, planning and economics engineers, inspection engineers, HSE engineers, maintenance engineers and supervisors, laboratory managers and supervisors, turnaround planners and operation supervisors.

You will learn

- Supervisory Skills: Conflict resolution, communication, diversity management, teamwork, motivation, coaching and mentoring, change management, mechanical integrity
- Safety Skills per OSHA 3918-08 2017: Safe work practices, including work permits, Log Out/Tag Out, response before emergencies (fire, explosion, leaks, etc.), Personal access to process units
- Planning Skills: Operators and supervisory staff training requirements, operational staff number determination and profile, maintenance planning, operational shift planning
- Basic skills to prepare and review operational procedures and instructions
- Basic skills to prepare written and verbal presentations, daily instructions, and reports in general

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Refining and Petrochemicals QA/QC Laboratory Management [REF-QAC-1]

STATUS	LEVEL	DURATION
Coming soon	Basic (Level 1)	~4 hrs

Refinery laboratories manage the testing of crude oil, gases & fuels, petrochemicals, and a variety of other refining industry feedstocks, byproducts, and final products for the market. Due to the highly flammable nature of petroleum products, refinery labs must be operated with the utmost caution and care.

Through this eLearning course, a general vision of the activities commonly developed in a QA/QC lab is revised, providing orientation on the best practices to execute them in a safe and optimal way.

This eLearning course provides a comprehensive knowledge of the activities and constraints developed in a refining lab, emphasizing the importance of good communication and interaction among the different parties that uses the information herein generated for operational decision making.

Designed for

Process engineers, planning and economics engineers, inspection engineers, HSE engineers, maintenance engineers and supervisors, laboratory managers and supervisors, turnaround planners and operation supervisors.

You will learn

- Objectives of a QA/QC Lab inside a Downstream facility
- Lab Information Management System (LIMS)
- Industry standards used in QA/QC Lab
- Lab Equipment Management (testing, gauging, metering, calibration, among others)
- Most common test methods used in the refining industry.
- Sampling process management
- Outsourcing test management
- Management of Lab Sections:
  - Physical Chemistry
  - Chromatography
  - Analytical Chemistry
- Test Results Reporting
- Complaints Management
- HSE topics in a QA/QC Lab

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Refining and Petrochemicals Routine Maintenance, Planning, and Control [REF-RMP-1]

STATUS	LEVEL	DURATION
Coming soon	Basic (Level 1)	~4 hrs

All mechanical and automated equipment in a refining installation needs periodic maintenance or repairs. Unscheduled repairs can be very disruptive and costly.

In an oil refinery, cost efficiency and safety are maximized by planning, organization, and having the right personnel in place. Routine maintenance programs can be efficiently planned and executed.

In this eLearning course, you will learn about the different types of routine maintenance, the relations between the stakeholders, the communication flows, the critical elements to ensure a successful routine maintenance, the use of CMMS (Computerized Maintenance Management System) and the safety aspects related to the routine maintenance, among other related subjects.

Designed for

Process engineers, planning and economics engineers, inspection engineers, HSE engineers, maintenance engineers and supervisors, laboratory managers and supervisors, turnaround planners and operation supervisors.

You will learn

- Types of maintenance concepts review: reactive, preventive, condition-based, and proactive
- Routine Maintenance Organization Chart and stakeholders' definition
- Communication flow chart among stakeholders
- Critical elements to ensure a successful routine maintenance: design and engineering, critical equipment and spare part philosophy, maintenance function KPIs, inspection plans, among others
- Use of CMMS (Computerized Maintenance Management System) for routine maintenance and control: backlog follow-up, work orders emission and control, historical maintenance data, reports generation, among others
- RCM (Reliability Centered Maintenance) basic elements review: decision, analysis, and action
- Routine maintenance safety aspects
- Routine maintenance optimization

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Refining and Petrochemicals Turnaround Planning and Control [REF-RPT-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5.5 hrs

In petroleum refining, turnaround (TA) means a scheduled large-scale maintenance activity where an entire process unit, several of them or the overall refinery are taken off stream for an extended period for comprehensive maintenance and equipment or technology renewal. Once the TA is completed, it is expected that the processing unit will operate in a safe way until the next outage. However, the efficiency and throughput can also be improved, and a reduction in routine maintenance costs can be achieved.

TA operation involves months and sometimes years of planning and requires knowledge, skill, and familiarity with the unique systems and operations of the refinery to ensure the duration of TA per the plan and to have a safe and controlled back to operation process (startup and stabilization).

This eLearning course describes the complex relationships between the team planning the TA and the rest of the refinery organization. The detailed planning process of TA and pre-TA activities are also discussed.

Designed for

Process engineers, planning and economics engineers, inspection engineers, HSE engineers, maintenance engineers and supervisors, laboratory managers and supervisors, turnaround planners and operation supervisors.

You will learn

Basic Concepts (TA Definition, Communication issues, Staff requirements and organization chart, Software implementation, Contracting aspects and constraints, Financial approval levels)

Turnaround Planning (Scope definition, Risk analysis, Execution strategy setup, Timeline definition, critical path definition, Spare parts and materials/chemicals acquisition, Safety aspects, Communication flow chart)

Pre-Turnaround Planning (Scope definition, Execution strategy definition, Timeline definition, Spare parts and materials/chemicals acquisition, Safety aspects, Communication flow chart)

Turnaround Execution (Execution plan updating, Communication flow during TA, Follow up to activities accomplished and pending, Lock out/Tag Out execution, Pre-Commissioning and commissioning activities, Contractors' demobilization, HSE aspects)

Turnaround Close out (HSE statistics analysis, Cost analysis, Duration analysis, Lessons Learned, Contractor evaluations/appraisals)

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Refining Oil Movement and Storage Operations [REF-OMS-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5 hrs

A typical refinery has billions of dollars' worth of liquid assets (crude oil, intermediate process streams and final products) in hundreds of storage tanks. The inventory of these assets is monitored in real-time and moved within and across refinery boundaries in hundreds of movements on a daily basis.

The management of these assets is crucial not only from a safety point of view but also for reconciliation of receipts and dispatches to avoid discrepancies and thereby avoid huge losses of revenue or overpaid for less than ordered delivered products.

This eLearning course will provide the basis information for developing the daily operations associated with the storage and handling of the liquid and gaseous material associated to a typical oil refinery.

Basic principles to handling the different stored hydrocarbon and chemical materials are provided. Measurement of the volumes contained in tanks and transferred from one location to another is also discussed. The characteristics of the information systems to manage the refining oil and storage movements together with associated safety are also discussed.

Designed for

Process engineers, planning and economics engineers, inspection engineers, HSE engineers, maintenance engineers and supervisors, laboratory managers and supervisors, turnaround planners and operation supervisors.

You will learn

- Basic principles and controls for having a safe and continuous operation in feedstocks tanks, intermediate tanks, product tanks, marine dock facilities – loading and unloading operations
- Volume and mass measurement principles in tanks and transference operations
- Characteristics of the information systems associated to the refining oil movement and storage: 1) Tanks Information System (TIS), Oil Movement Management System (OMM)
- Oil Logistics, Accounting and Shipping Management System (OAS), Custody transfer operations principles, Storage effluents disposition
- Safety associated to the refining oil movement and storage: 1) Fire, 2) Explosion
- Products spillage

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Reliability Centered Maintenance (RCM) [REF-RCM-1]		
STATUS	LEVEL	DURATION
Coming soon	Basic (Level 1)	~4 hrs

Reliability-Centered Maintenance (RCM) is a complete framework that always attempts to extend equipment lifespans and decrease downtime, in the most cost-efficient way possible.

Essentially, Reliability-Centered Maintenance (RCM) provides a roadmap to analyze and act upon the root causes of equipment failures (technology, culture, design, and maintenance strategy inefficiencies) in pursuit of affordable asset reliability.

This eLearning course contains the basis to successfully implement an RCM program in a Refinery or Petrochemical installation. The steps to implement an RCM program, failure modes review, and consequences of failure assessment are discussed in detail.

Designed for

Process engineers, planning and economics engineers, inspection engineers, HSE engineers, maintenance engineers and supervisors, laboratory managers and supervisors, turnaround planners and operation supervisors.

You will learn

- Basic Concepts: Reliability and Maintenance, Types of Maintenance, SAE JA1011 Standard, RCM advantages and disadvantages, among others
- Steps to run an RCM Program:
  - Select and asset RCM analysis
  - Outline the functions of the system for the selected asset
  - Define the failure modes
  - Assess the consequences of failure:
    - Failure Modes and Effects Analysis (FMEA)
    - Failure, Mode, Effect, and Criticality Analysis (FMECA)
    - Hazard and Operability Studies (HAZOPS)
    - Fault Tree Analysis (FTA)
    - Risk-based Inspection (RBI)
  - Determine a maintenance strategy for each failure mode: condition-based maintenance (CBM), reactive maintenance, preventive maintenance, and predictive maintenance
  - Implement the strategy and perform regular reviews

This eLearning course is included in the Introduction to Refining Operations for Engineers eLearning series.

Acquiring Goods and Services
[PRJ-AGS-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course is an introduction to procurement and contracting for the equipment, materials, and services needed for the development of petroleum projects. One subsection addresses procurement by owner organizations, including sourcing, transportation, and materials management. Additionally, participants become familiar with the distinct types of contracts used for project development. The course addresses the contracting process and factors for successful contract placement.

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- The five major procurement functional areas and how each area facilitates procurement of quality equipment, materials, and supplies in a timely manner for a project
- The key activities of each of the following procurement topics and describe the activities associated with each one: procurement planning, purchasing, tracking manufacturing, logistics management, site materials handling
- Describe the major activities in the joint service buyer and seller contracting process

This eLearning course is included in the Facilities Project Management eLearning series.

Construction Management
[PRJ-CMC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course is an introduction to construction planning and site management for projects associated with petroleum developments. The eLearning course introduces key aspects of construction planning and contractor selection. Subsections address advanced work packaging, site HSE management, quality control and project closeout.

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- How to effectively manage the construction initiation and execution process
- How the structured development of work packages helps maintain good jobsite labor productivity
- How to maintain good jobsite labor productivity through the structured development of work packages
- The benefits of construction quality control tools and techniques

This eLearning course is included in the Facilities Project Management eLearning series.

Cost Estimating for Facility Projects
[PRJ-CEC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course introduces key aspects of cost estimating, including estimate preparation and uncertainty assessment. Participants learn about the types of cost estimates, along with their uses and requirements at each succeeding stage of project development. Coverage includes selected topics in labor productivity, owner's costs, and contingency management.

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- For each phase of project development, the name the estimate produced, its use, and the methodology used to create it
- How to guide the development of the definitive cost estimate that needed to secure full funding for a petroleum project
- Describe what estimate assurance is and briefly describe the steps in the assurance process

This eLearning course is included in the Facilities Project Management eLearning series.

Design Engineering Management
[PRJ-DEM-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course describes how completion of key engineering deliverables, careful design control, and the use of value-improving techniques result in facility designs that meet the needs of key business and operations stakeholders.

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- How engineering design progresses through each development stage of the project development system
- How to improve the value of a project by selecting Value Improving Practices that focus on key value drivers such as cost, schedule, operability, and maintainability
- Explain why validation and verification of design engineering deliverables is a best practice
- Techniques for controlling the facility engineering design effort

This eLearning course is included in the Facilities Project Management eLearning series.

Interface Management for Programs and Projects
[PRJ-INT-1]

STATUS	LEVEL	DURATION
Coming soon	Basic (Level 1)	~1 hr

This eLearning course introduces interface management skills to establish a common framework of boundaries and communications among program or project stakeholders. Interface Management methodology starts with planning and continues with interface collaboration workshops. It includes an interface register, a communication plan, and a checklist of things to do (gathering all disciplines based on design statements or feed studies, planning the project on paper, and identifying interface areas, etc.).

Designed for

Project managers, project engineers, project control representatives, and purchasing personnel who plan, manage, or participate in project teams.

You will learn

Techniques for controlling the facility engineering design effort

- Explain Interface Management Terminology
- List the four major types of interfaces and give examples of each
- Describe the differences in managing internal and external interfaces
- Describe key components of an interface management plan
- Describe key components of an interface management process
- Develop an interface chart that characterizes the directness of an interface between the owner organization and key contractors for a multi-project program

This eLearning course is included in the Facilities Project Management eLearning series.

Onshore Field Development Programs and Projects
[PRJ-OFD-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course introduces onshore petroleum development programs and projects in the upstream, midstream, and downstream segments of the petroleum industry. Development programs can span 5-10 years and are often composed of annual campaigns. These campaigns combine drilling and completion activities, infrastructure projects, and surface facility projects. The material presented is at the basic competency level.

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- What each of the petroleum industry development segments are
- The process, characteristics, and challenges associated with petroleum program management
- How project teams use the stage-gate petroleum project development system used in the industry today

This eLearning course is included in the Facilities Project Management eLearning series.

Progress Measurement
[PRJ-PMC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course describes how to establish project progress measurement, track it regularly, and report performance to key stakeholders. It covers the five methods used to assess design engineering and field construction progress and introduces the concept of earned value analysis (EVA).

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- How to describe the different approaches used to measure project progress and give examples of their use
- The concept of earned value analysis, including how it to determine schedule and cost variance
- How to estimate the final cost of a project given the project budget, earned value and actual costs to date

This eLearning course is included in the Facilities Project Management eLearning series.

Project Governance
[PRJ-PGC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course introduces the business and organizational context that frames petroleum project development. Project governance dictates how program and project management decision-making occurs. This course demonstrates how project managers scale a company's program and project governance framework to match the type, size, and complexity of its projects.

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- What good governance is
- How governance guides programs and projects, including the seven elements necessary for effective management.
- How you can adjust the stage-gate project development system using project complexity criteria

This eLearning course is included in the Facilities Project Management eLearning series.

Project Resources and Organization
[PRJ-PRO-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course discusses how you can select and organize resources in each stage of development. Key issues that affect organization design and personnel selection are examined. We will also explore competency and how to build high-performing teams.

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- The key roles and responsibilities of the project sponsor, project manager, decision board, and integrated team members
- Explain what an organization breakdown structure is and describe the advantages & disadvantages of the matrix- and task-force types of project organizations
- Explain the concept of project manager competence and describe the skills needed in the technical, business, and leadership skill areas
- List the characteristics of a high-performing team and describe the key steps in a conflict resolution process

This eLearning course is included in the Facilities Project Management eLearning series.

Project Risk Management
[PRJ-RMC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course introduces techniques and tools needed to identify and manage risks typical of petroleum projects. Topics include the risk management process: identifying, characterizing, and ranking risks and developing mitigation strategies. The course also describes how to use a risk register for assigning accountability and monitoring mitigation progress.

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- How volatility, uncertainty, complexity, and ambiguity make managing petroleum projects extremely challenging
- How to use a five-step process to identify and manage petroleum project risks
- When best to use qualitative and quantitative risk assessments

This eLearning course is included in the Facilities Project Management eLearning series.

Scheduling
[PRJ-SCC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course introduces planning and scheduling for petroleum development projects. It describes how to create the distinct levels of critical path schedules needed to meet the project planning, control, and reporting needs of various stakeholders.

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- The difference between planning and scheduling
- The process for developing a critical path schedule and the purpose of each step
- How to use only validated and approved information to read and create an informative, high-quality schedule
- Describe what a baseline schedule is, including who prepares it, when to prepare it, and how the PM can use it

This eLearning course is included in the Facilities Project Management eLearning series.

Scope Delivery
[PRJ-SDC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course describes how to validate a scope of work for a project and coordinate the discipline plans necessary to complete the execution stage. The eLearning course addresses the project execution plan (PEP) contents, including the Staffing plan, HSE Plan, Scope of Work, Risk Management Plan, Budget, Schedule, and EPC phase details. The eLearning course includes preparations tips for the PEP.

Designed for

Personnel working on development projects in the petroleum industry's upstream, midstream, downstream, and transportation segments. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- How to create a plan for developing a scope of work for your project
- The process for developing a sound project scope statement using the project charter and the preliminary scope statement
- How to verify a scope of work using a work breakdown structure
- Explain what a project execution plan is and how the team uses it to deliver the scope of work
- How to use the project execution plan to facilitate scope delivery

This eLearning course is included in the Facilities Project Management eLearning series.

Budgeting
[PEB-BUC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2 hrs

This eLearning course is a guide through the most important activity an oil and gas company undertake. More important than exploring for oil or operating existing assets? Yes, and this eLearning course explains why that is true. When it comes to the big picture of economics, budgeting suddenly takes center stage and displays its power to drive economic success. Budgeting is where economic success is incubated. In this eLearning course, budgeting methodology is explained, and the contribution economic evaluation tools make sure the process is clarified.

Designed for

Managers, engineers, explorationists, field accounting supervisors and other personnel who need to develop or improve their skill and understanding of basic economic analysis and profitability of petroleum exploration and production.

You will learn how to

- Screen projects for inclusion into the capital budget allocation
- Economically rank projects
- Accommodate legal, safety and regulatory impacts to capital budgets
- Think like an executive when evaluating capital budget allocation to projects and corporate functions

This eLearning course is included in the Basic Petroleum Economics eLearning series.

Cash Flow
[PEB-CFC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course forms the skeleton for understanding how a project will be valued. Forecasts for oil and gas volumes, price forecasts, inflation are incorporated to forecast how much money a project will generate. From calculating oil and gas revenue this eLearning course addresses royalties, operating expenses, capital expenses, operating taxes and other expenses.

Designed for

Managers, engineers, explorationists, field accounting supervisors and other personnel who need to develop or improve their skill and understanding of basic economic analysis and profitability of petroleum exploration and production.

You will learn how to

- Construct a revenue model
- Develop a full cash flow model
- Calculate net cash flow
- Distinguish between cash flow for concessions and production sharing contracts
- Produce robust flexible cash flow forecasts

This eLearning course is included in the Basic Petroleum Economics eLearning series.

Decision Analysis Process
[PEB-DAP-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4.5 hrs

Is there anything more important to success than good decision making? This introductory topic provides an overview of the discipline and problem-solving approach of decision analysis. The most common business application is the capital investment decision. Back-of-the-envelope calculations are sufficient for most everyday decisions, such as whether and how to spend money and time.

Designed for

Personnel working on development projects in the upstream, midstream, downstream, and transportation segments of the petroleum industry. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- Decision Analysis Process
  This lesson recommends a 10-step process, ranging from identifying a decision opportunity to the post-decision review. This is much like a typical problem-solving process as in engineering design. The added feature is formal value calculations using stochastic (probabilistic) methods.
- Expected Value Calculation Tools
  Decision trees and Monte Carlo simulation are the principal tools for calculating expected values. Though both methods solve for expected values, they do so in very different ways. Each method has its advantages and disadvantages, and often both methods serve different parts of an analysis.
- Influence Diagrams and Structural Decision Trees
  Developing a structural decision model is a good practice and is often an output of decision framing.

This eLearning course is included in the Petroleum Risk and Decision Analysis eLearning series.

Decision Policy and Value Calculations Fundamentals
[PEB-DPV-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	6.5 hrs

This eLearning course mostly focuses on maximizing shareholder value, measured as expected monetary value (EMV), which is risk-weighted (expected value) NPV. This eLearning course introduces value of information and Bayes' rule, and covers the following topics: 1) Decision Policy Component, 2) Time Preference, 3) Social Factors in Decision Policy, 4) Establishing a Risk Tolerance Coefficient for Risk Policy

Designed for

Personnel working on development projects in the petroleum industry. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- To decompose decision policy into objective(s), time preference, and risk preference
- An attribute-scoring approach to multi-criteria decision making (MCDM)
- Using lotteries to elicit trade-offs between time, risk, and conflicting metrics
- Historical development of present value discounting and discount rates used
- The present value (PV) formula that always works
- Why to not risk with the PV discount rate
- Correct attention to detail in the "Present Value Challenge"
- How to apply cashflow or NPV-equivalents for non-monetary criteria, such as CO2 emissions and Lost-Time Incidents
- Issues in trading-off social metrics for money
- About Quality-Adjusted Life Years (QALYs) and value differences across the world
- To view spending (time and money) on HSE as an optimization problem
- How decisions with significant potential for loss are difficult decision without a risk policy
- To select the best alternative as the one with the greatest expected utility or certainty equivalent (both criteria produce the same choices)
- To use the Utility Elicitation Program to practice making risky decisions and settling on a value for the risk tolerance coefficient

This eLearning course is included in the Petroleum Risk and Decision Analysis eLearning series.

Economic Decision Tools
[PEB-EDT-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3.5 hrs

This eLearning course addresses the need for economic evaluation criteria for petroleum projects. How can one project be compared to another when the projects are in different regions or offshore versus onshore or gas versus oil? In the purest sense, economic evaluations are independent of the details of a project and focus on the particular economic inputs such as capital investment needed, operational expenses, royalty rates, and ultimately, the economic outcomes using comparative economic metrics to evaluate projects and make decisions.

Designed for

Managers, engineers, explorationists, field accounting supervisors and other personnel who need to develop or improve their skill and understanding of basic economic analysis and profitability of petroleum exploration and production.

You will learn how to

- Calculate compound interest
- Determine present values for future cash flows
- Evaluate NPV, DROI, IRR
- Choose the right economic metric
- Use economic decision tools to evaluate projects

This eLearning course is included in the Basic Petroleum Economics eLearning series.

Financing and Ownership
[PEB-FOC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2 hrs

This eLearning course explores financial aspects of how oil and gas companies manage the business of funding projects. Where do oil companies get the capital to explore for oil and gas? Do oil companies borrow money to develop projects? How much interest do they pay? What is the hurdle rate and why is it similar for almost all oil companies regardless of whether it is a large integrated company or an independent upstream company? These are some of the financial issues covered in this eLearning course.

Designed for

Managers, engineers, explorationists, field accounting supervisors and other personnel who need to develop or improve their skill and understanding of basic economic analysis and profitability of petroleum exploration and production.

You will learn how to

- Calculate the average cost of capital for a typical oil company
- Recognize the drivers for a company's hurdle rate
- Determine the opportunity cost of capital

This eLearning course is included in the Basic Petroleum Economics eLearning series.

Judgments and Biases Fundamentals
[PEB-JBC-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	2 hrs

This eLearning course introduces judgments and biases. Analysis quality depends mainly on the quality of inputs, and some of the inputs may be highly subjective. We rely upon subject matter experts (SMEs) to judge input probabilities and input distributions. We also ask SMEs to describe relationships (perhaps physical laws) so that we can model correlations. The following topics are also discussed.

Designed for

Personnel working on development projects in the upstream, midstream, downstream, and transportation segments of the petroleum industry. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- Causes and characteristics of common motivational and cognitive biases
- To recognize indications of bias
- About the winner's curse bias experienced found in competitive bidding and how to adjust your bids
- About the optimizer's curse bias in developing an asset or project portfolio to temper your expectations
- How to design confidence interval tests for judging P90-P10 ranges
- How to use True/false questions and judging the quality of answers
- To self-appraise your personal calibration
- An approach for eliciting a continuous distribution function in stepped ranges
- To clearly and unambiguously define the event of interest
- What biases the SME might have, and to recognize and test for such biases
- Ways to capture the distribution from the SME's answers
- To ask the SME to describe how the subject parameter relates (correlates) to others in the model

This eLearning course is included in the Petroleum Risk and Decision Analysis eLearning series.

Monte Carlo Simulation and Distribution Fundamentals
[PEB-DIS-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	2.5 hrs

Quality technical and business decisions require competent analyses of costs, benefits, and risks. You will learn a decision analysis process and foundation concepts so you can actively participate in multi-discipline evaluation teams. The focus is on designing and solving decision models.

Probability distributions express professional judgments about risks and uncertainties. These judgments carry through the calculations. Decision trees and influence diagrams provide clear communications and the basis for valuing each alternative. Monte Carlo simulation is a superior calculation alternative for some problems. Project modeling fundamentals and basic probability concepts provide the foundation for the calculations. Familiarity with Microsoft® Excel® is required.

Designed for

Personnel working on development projects in the upstream, midstream, downstream, and transportation segments of the petroleum industry. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn

- Name four discrete and four continuous probability distributions with an example of each
- Describe the correlation coefficient formula and provide three correlation examples
- Describe the Monte Carlo method
- Describe how to obtain a conditional probability from field data or Monte Carlo simulation (MCS) recordsets
- Describe at least two statistical MCS stopping rules
- Explain the improved efficiency of MCS using Latin hypercube sampling
- Compare payoff tables, decision trees, and MCS, identifying the strengths and weaknesses of each
- Explain optimization with MCS
- Describe two sensitivity analysis methods when using MCS
- Calculate deterministic variance and stochastic variance from a summary of deterministic and stochastic model results

This eLearning course is included in the Petroleum Risk and Decision Analysis eLearning series.

Oil and Gas Pricing
[PEB-OGP-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course demystifies oil and gas pricing. Is that possible? The answer is yes, and this eLearning course clarifies the factors contributing to how oil and gas pricing is determined. The tools and methods in common use for managing oil and gas pricing are described and participants will practice developing and applying pricing models. These models will contribute to the basis for an economic analysis and understanding of projects as companies make decisions in the real world.

Designed for

Managers, engineers, explorationists, field accounting supervisors and other personnel who need to develop or improve their skill and understanding of basic economic analysis and profitability of petroleum exploration and production.

You will learn how to

- Calculate crude prices taking into account API gravity and sulfur content
- Apply quality bank methods to forecast relative prices
- Inflate prices over the life of a project
- Apply marker crude methodology to forecast oil prices

This eLearning course is included in the Basic Petroleum Economics eLearning series.

Petroleum Industry Accounting
[PEB-PIA-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course explores the difference between accounting and economics – and there is a world of difference. Oil and gas companies need both accountants and economists to run their businesses and they serve different functions within a company. But even beyond serving different functions they speak different languages and live in different worlds. In this eLearning course, we gain an appreciation for accounting terms, methodology and, most importantly, clarify the differences between accounting and economics.

Designed for

Managers, engineers, explorationists, field accounting supervisors and other personnel who need to develop or improve their skill and understanding of basic economic analysis and profitability of petroleum exploration and production.

You will learn how to

- Interpret the financial accounting section of annual reports
- Calculate depreciation, depletion, and amortization (DD&A)
- Separate cash flow from profit
- Recognize non-cash charges
- Focus on cash flow when selecting economic metrics for project evaluation

This eLearning course is included in the Basic Petroleum Economics eLearning series.

Production Forecasting
[PEB-PFC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course sets the stage for understanding the business of making decisions in the oil and gas business. Key to making economic decisions is understanding how much oil and gas are anticipated to be produced each year of a project. Using multiple methods, this eLearning course demonstrates and develops the understanding of how oil and gas production behaves over time, and how to forecast the levels of production over time.

Designed for

Managers, engineers, explorationists, field accounting supervisors and other personnel who need to develop or improve their skill and understanding of basic economic analysis and profitability of petroleum exploration and production.

You will learn how to

- Forecast annual oil and gas production using exponential and constant percentage decline methods
- Forecast total production over the life of a project
- Calculate the economic limit when analyzing a project
- Use multiple methods to accurately forecast well and field production

This eLearning course is included in the Basic Petroleum Economics eLearning series.

Risk and Uncertainty
[PEB-RUC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course addresses how to handle risk and uncertainty, which are always factors to consider when forecasting production, cash flow or economic outcomes. It provides clear definitions of risk and uncertainty, enabling the audience to identify different types of risk. The eLearning course demonstrates how probabilistic analysis works and how the modeling methods provide means for describing scenarios with a variety of possible outcomes.

Designed for

Managers, engineers, explorationists, field accounting supervisors and other personnel who need to develop or improve their skill and understanding of basic economic analysis and profitability of petroleum exploration and production.

You will learn how to

- Identify different types of risk
- Model risk and uncertainty
- Use mathematical methods to quantify risk
- Handle sunk costs and tax credits when considering risk
- Recognize and use probabilistic uncertainty models
- Recognize uncertainty in economic analysis

This eLearning course is included in the Basic Petroleum Economics eLearning series.

Value of Control Fundamentals [PEB-VCC-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	4 hrs

This eLearning course introduces value of control and covers the following topics:

- **Decision Trees – Expanded**. Decision trees are the most recognizable feature of decision analysis. So, many people think these are synonymous.
- **Value of Control I**. Investing to reduce project and operations risk are typical value of control (VOC) problems. Improving "control" means taking action to improve the probability and/or outcomes of a chance event.
- **Value of Control II.** An oil tanker has a heightened risk of collision accidents and oil spills if it loses its steering or propulsion power system. This exercise is to develop a decision model to decide whether to spend additional money on maintaining the tanker's steering and propulsion systems.

Designed for

Personnel working on development projects in the upstream, midstream, downstream, and transportation segments of the petroleum industry. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn how to

- When it is okay to put costs and benefits on branches when realizing those values
- Low- to moderate-cost software tools
- Advantages and disadvantages of decision trees compared to Monte Carlo simulation
- The distinction between threats and opportunities in project management terminology
- About the risk matrix (useful to illustrate the VOC concept, though not recommended for decision making)
- Set up and solve a decision tree to evaluate the value of a control-adding alternative
- Apply Monte Carlo to optimize one or multiple control decision variables
- Calculate the expected value (EV) cost of an accident
- Set up a decision tree to evaluate the EV cost of an accident vs amount spent on maintenance
- Calculate the EV cost of an accident with Low Maintenance plus Insurance

This eLearning course is included in the Petroleum Risk and Decision Analysis eLearning series.

Value of Information and Bayes' Rule Fundamentals [PEB-BRC-2]

STATUS	LEVEL	DURATION
Released	Foundation (Level 2)	4 hrs

This eLearning course introduces value of information and Bayes' rule, and covers the following topics:

- **Probability Types, Venn Diagrams, and Probability Rules**. Venn diagrams and probability trees are good ways to explain the foundation probability rules.
- **Bayes' Rule –** Bayesian analysis is central to information applications. Machine learning and variants are central to popular artificial intelligence methods, such as natural language processing. Typical investment decisions seldom have much data and rely instead on expert judgments. Bayes' rule calculates revised probabilities based on new information.

Designed for

Personnel working on development projects in the upstream, midstream, downstream, and transportation segments of the petroleum industry. This includes project managers, project engineers, facility engineers, production and operations engineers, wellsite supervisors, project control representatives, and supply chain personnel.

You will learn how to

- To draw Venn diagrams showing discrete outcomes of one to several events
- How to explain the addition and multiplication rules with Venn diagram or probability trees
- To extract conditional probabilities from Venn Diagrams and probability trees
- How using intuition to revise probabilities based on new information typically produces horrible results
- To set up a decision tree model with an alternative to acquire additional information before making a significant capital investment decision
- About the value of information (VOI), both perfect/imperfect
- To solve Bayes' rule calculations by formula, inspecting a Venn diagram, or (recommended) joint probability table
- To set up a probability tree for a typical oilfield equipment problem
- How to analyze the value of possibly corrupt information
- How to use Monte Carlo simulation to optimize a safety or quality threshold
- To set up and solve a decision tree to optimize the Platform Size with today's information

This eLearning course is included in the Petroleum Risk and Decision Analysis eLearning series.

Data Foundation for the Digital Oilfield
[DSA-DFD-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	5 hrs

Data is an often-neglected aspect of Petroleum Data Analytics projects. We are excited to get started building a predictive model given the new artificial intelligence/ machine learning techniques but if we rush over the data profiling steps, not understanding the possible inherent bias of our data sets, we can create very sophisticated but not very useful models. Remember the old adage "garbage-on, garbage-out." Effective data visualization techniques can help us tell an important story with the data and highlight new insights into operational systems. But on the other hand poor data visualization methods can allow an unsuspecting analysts to "lie with data."

Designed for

This is not a course for new data scientists but focuses on the rest of the engineers, geoscientists and data analysts who want to understand how this field is evolving.

You will learn

- Current data management practices, silos, clouds and lakes
- The truth about drilling and field sensors
- Data visualization and communications challenges (data storytelling)
- Current data management practices, silos, clouds and lakes
- The truth about drilling and field sensors
- Data visualization and communications challenges (data storytelling)

This eLearning course is included in The Impact of Data Analytics on the New Digital Oilfield eLearning series.

Digital Oilfield Challenges, Barriers to Adoption, and Risks
[DSA-DOC-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4 hrs

In this eLearning course, we cover the enabling technology and IT infrastructure aspects of the digital oilfield through an understanding of the history of how the digital oilfield evolved (5 stages of digitization), the importance of a good data foundation, challenges in the adoption of digital solutions, and the threat from cybersecurity malware.

Designed for

Geoscientists, petrophysicists, engineers, or anyone interested in subsurface engineering and geoscience applications of machine learning and data analytics.

You will learn

- Five stages of digitization of the oilfield
- Challenge to adoption and lessons learned
- Physical and cybersecurity challenges

This eLearning course is included in The Impact of Data Analytics on the New Digital Oilfield eLearning series.

The Future of the Digital Oilfield
[DSA-FDO-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	6 hrs

There will be many factors that will influence the future of oil and gas operations, including technology trends, economics, market forces and demand for oil and gas products. What will the future digital oilfield look like? What will be the role of the future petroleum engineer? There are no right or wrong answers to this question and many factors that today are uncertain. But the best way to predict the future is to invent it.

Designed for

This is not a course for new data scientists but focuses on the rest of the engineers, geoscientists and data analysts who want to understand how this field is evolving.

You will learn

- Describe industrial Internet of Things (IoT)
- Explain automation and autonomy as emerging trends in digital technology
- Recognize the importance of using robots and drones in oil and gas operations
- Describe blockchain and digital supply chain
- Describe what are remote decision support centers
- Explain the importance of measuring what matters
- Recognize the future of production facilities – offshore and onshore
- Describe what is a digital twin
- Recognize the role of artificial intelligence (AI) and machine learning in oil and gas operations
- Recognize the role of data science and advanced engineering analytics in oil and gas operations
- Identify the five concerns in industrial artificial intelligence (AI)

This eLearning course is included in the Introduction to Machine Learning/Data Analytics for Subsurface Engineering and Geoscience Applications eLearning series.

Introduction to Data-driven Workflows
[DSA-IDW-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	3 hrs

This eLearning course introduces data-driven modeling, including its connection to machine learning. We will examine the rising applications of machine learning in different sectors of the economy and how this impacts daily life. Learners will then see how the principles and effects of machine learning are transforming work in the oilfield, focusing on the various applications of data-driven modeling and where this can make operations more efficient and profitable.

Designed for

This is not a course for new data scientists but focuses on the rest of the engineers, geoscientists and data analysts who want to understand how this field is evolving.

You will learn

- Define and describe machine learning
- Discuss the adoption of machine learning and data-driven modeling in our industry, including potential strengths and obstacles
- Identify the modes of machine learning and what distinguishes each
- Recognize the main forms of supervised learning
- Conceptualize applications of supervised learning
- Describe unsupervised learning and what distinguishes it from supervised learning
- Conceptualize applications of unsupervised learning
- Identify different data types
- Recognize sampling methods and their pitfalls
- Be able to interpret various measures of univariate statistics
  - Measures of central tendency
  - Measures of spread
  - Visual representations of data
  - Handling of outliers

This eLearning course is included in the Introduction to Machine Learning/Data Analytics for Subsurface Engineering and Geoscience Applications eLearning series.

Introduction to the Digital Oilfield
[DSA-IDO-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4.5 hrs

We will start by introducing the Digital Oilfield, what it is, how it developed and what the future of digital technology and data analytics in the oilfield might bring. The Digital Oilfield is a reality, but it is taking on new forms shaped by emerging digital technologies, improved data visualization and advanced analytics techniques.

Designed for

This is not a course for new data scientists but focuses on the rest of the engineers, geoscientists and data analysts who want to understand how this field is evolving.

You will learn

- Physics, statistics, and explainable AI
- Digital oilfield 2.0 (what's different this time)
- What's the big deal about big data and data science

This eLearning course is included in The Impact of Data Analytics on the New Digital Oilfield eLearning series.

Operational Technology and Field Networks
[DSA-OTF-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4 hrs

The digital oilfield has brought together systems in the field with corporate financial systems and headquarters engineering experts to improve the overall performance of the producing asset from reservoir to surface production facilities to the sales or export market. The field systems grew up in a different environment than the corporate IT systems, so the integration of these disciplines is taking some time to perfect, and some interesting challenges present themselves along the way.

Designed for

This is not a course for new data scientists but focuses on the rest of the engineers, geoscientists and data analysts who want to understand how this field is evolving.

You will learn

- The convergence of OT and IT
- Digital field instrumentation and control system networks (SCADA)
- Enterprise system thinking and design

This eLearning course is included in The Impact of Data Analytics on the New Digital Oilfield eLearning series.

Supervised Machine Learning
[DSA-SML-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	4 hrs

This eLearning course introduces supervised learning as a key type of machine learning that drives data-driven analysis across economic sectors and impacts the experiences of consumers. The eLearning course focuses on the emerging uses of supervised learning in the oil and gas industry as an important complement to other forms of analysis, as well as subject matter expertise, in solving diverse problems and providing reliable data streams

Designed for

Geoscientists, petrophysicists, engineers, or anyone interested in subsurface engineering and geoscience applications of machine learning and data analytics.

You will learn

- Distinguish between two forms of supervised learning: regression and classification
- Recognize use cases for regression and classification
- Identify why an iterative approach is essential in supervised learning
- Recognize covariance and correlation as key aspects of data pre-processing, and track their importance for supervised learning
- Recognize a generalized workflow for supervised learning
- Identify and explain the steps involved in exploratory data analysis
- Recognize the need for, and some of the nuances involved in, handling outliers
- Identify how to apply both the Standard and Min-Max methods
- Recognize how performance metrics are used to evaluate regression models
- Recognize that there is no universal algorithm that can be effectively used to evaluate machine learning models
- Describe how to determine training and testing sets from a single dataset
- Examine method for overcoming overfitting
- Examine validation techniques, including 3-fold cross-validation and K-fold cross-validation
- Follow and explain an end-to-end workflow for regression
- Identify the purpose of non-parametric regression
- Follow and explain an end-to-end workflow for classification problems
- Follow the workflow for several use cases involving supervised learning in the oilfield

This eLearning course is included in the Introduction to Machine Learning/Data Analytics for Subsurface Engineering and Geoscience Applications eLearning series.

Unsupervised Machine Learning
[DSA-UML-1]

STATUS	LEVEL	DURATION
Released	Basic (Level 1)	2.5 hrs

This eLearning course introduces unsupervised learning as a key type of machine learning that streamlines the extraction of information from raw data that can be very high dimensional, noisy, and heterogeneous. The eLearning course begins by placing unsupervised learning among the three forms of machine learning and explaining its distinguishing qualities. Unsupervised data analyses are shown to primarily comprise two goals: either pattern identification or dimensionality reduction. In the case of pattern identification, the objectives can be two-fold. The most common application is to condense large datasets into meaningful clusters that contain data points that share similar characteristics.

A second application is related to anomaly detection. This eLearning course shows that this can be challenging when dealing with multivariate data. In either case, tuning the algorithm to choose the appropriate number of clusters and balancing cluster homogeneity with inter-cluster differences is important. The eLearning course also discusses data pre-processing steps, including exploratory data analysis and scaling. A discussion of one of the approaches to clustering is provided to enable the participant to see unsupervised learning in action. Finally, the eLearning course reviews the uses of supervised learning in the oilfield. A case study approach shows basic and more complex applications, including studies from leading experts in the field.

Designed for

Geoscientists, petrophysicists, engineers, or anyone interested in subsurface engineering and geoscience applications of machine learning and data analytics.

You will learn

- Increase awareness of the purposes and benefits of unsupervised learning
- Dig into how unsupervised learning works, including clustering and dimensionality reduction
- Assess the requirements for proper clustering or grouping of data
- Recognize how unsupervised learning and clustering is applied in the oilfield

This eLearning course is included in the Introduction to Machine Learning/Data Analytics for Subsurface Engineering and Geoscience Applications eLearning series.