PetroSkills®

PetroAcademy™

2023

PetroAcademy Skill Module Catalog

Facilities Online Training

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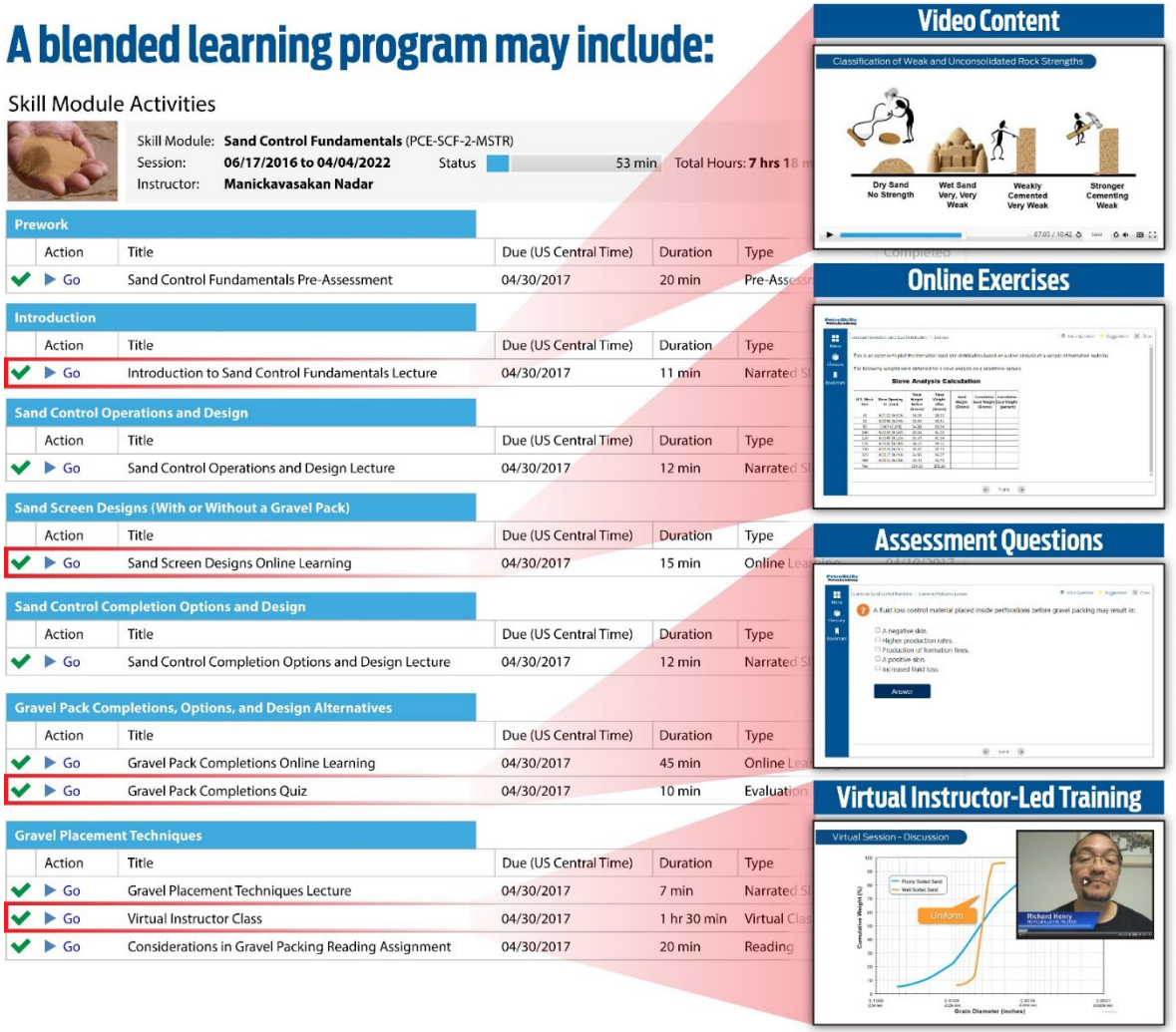
ABOUT PETROACADEMY®

PetroAcademy combines PetroSkills industry knowledge, expertise, content, and technology to develop workforce competency. Each PetroAcademy offering integrates multiple learning activities, such as reading assignments, self-paced e-Learning, virtual instructor-led sessions, discussion forums, group exercises, case studies, quizzes, and experiential activities. This combination of activities serves to increase knowledge retention. PetroAcademy further optimizes time away from work while incurring no travel expense.

PetroSkills Blended Learning Skill Modules™ combine industry knowledge, expertise, content, and technology to develop workforce competency with the added benefit of:

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



Blended Learning Course Catalog

Definitions of Skill Module Levels

Core = Awareness Competency Level, completely self-paced online activities, no instructor-led component.

Fundamental = Fundamental Competency Level, mixture of both self-paced online activities and instructor-led virtual sessions.

Facilities, v.23.13, Dec--06--23

Skill Modules by Discipline

Gas Processing			
GAS-HCP-1	Hydrocarbon Components and Physical Properties Core	Core	Released
GAS-IGC-1	Introduction to Production and Gas Processing Facilities Core	Core	Released
GAS-QPB-1	Qualitative Phase Behavior and Vapor Liquid Equilibrium Core	Core	Released
GAS-WHP-1	Water / Hydrocarbon Phase Behavior Core	Core	Released
GAS-TAE-1	Thermodynamics and Application of Energy Balances Core	Core	Released
GAS-FFC-1	Fluid Flow Core	Core	Released
GAS-SEC-1	Separation Core	Core	Released
GAS-HTE-1	Heat Transfer Equipment Overview Core	Core	Released
GAS-PCC-1	Pumps and Compressors Core	Core	Released
GAS-RNG-1	Refrigeration, NGL Extraction, and Fractionation Core	Core	Released
GAS-CRD-1	Contaminant Removal – Gas Dehydration Core	Core	Released
GAS-CRA-1	Contaminant Removal – Acid Gas and Mercury Removal Core	Core	Released
Process Facilities			
PRS-PSR-1	Process Safety Risk Analysis and Inherently Safer Design Core	Core	Released
PRS-PHA-1	Process Hazards Analysis and Layers of Protection Analysis Core	Core	Released
PRS-LDH-1	Leakage and Dispersion of Hydrocarbons Core	Core	Released
PRS-CBH-1	Combustion Behavior of Hydrocarbons Core	Core	Released
PRS-SIH-1	Sources of Ignition and Hazardous Area Classification Core	Core	Released
PRS-SPS-1	Specific Plant Systems and Equipment Core	Core	Released
PRS-RFS-1	Relief and Flare Systems Core	Core	Released
PRS-HID-1	Historical Incident Databases, Plant Layout, and Equipment Spacing Core	Core	Released
PRS-SIS-1	SIS, Monitoring and Control Core	Core	Released
PRS-FPS-1	Fire Protection Systems Core	Core	Released
PRS-RAI-2	Risk Analysis and Inherently Safer Design Fundamentals	Fundamental	Released
PRS-PHA-2	PHA Techniques and LOPA Fundamentals	Fundamental	Released
PRS-LDC-2	Leakage and Dispersion, Combustion Behavior, Sources of Ignition Fundamentals	Fundamental	Released
PRS-HID-2	HID and Metrics, Bad Actors (Specific Systems) Fundamentals	Fundamental	Released
PRS-RFD-2	Relief, Flare, and Depressurization Fundamentals	Fundamental	Released
PRS-CSI-2	Controls and Safety Instrumented Systems Fundamentals	Fundamental	Released
PRS-SLF-2	Spacing and Layout, Fire Protection Fundamentals	Fundamental	Released
PRS-GOW-1	Gas, Oil, and Water Composition and Properties Core	Core	Released
PRS-OWS-2	Oil-Water Separation Fundamentals	Fundamental	Released
PRS-REF-1	Overview of Reservoir Engineering for Facilities Operations Core	Core	Released

Process Facilities (*Continued*)			
PRS-OTR-2	Oil Treating and Desalting Fundamentals	Fundamental	Released
PRS-FLA-2	Flow Assurance Fundamentals for Surface Facilities	Fundamental	Released
PRS-OGS-2	Oil Gathering Systems Fundamentals	Fundamental	Released
PRS-GLS-2	Gas-Liquid Separation Fundamentals	Fundamental	Released
PRS-OSV-2	Oil Stabilization, Sweetening, Storage, and VRU Cruse Fundamentals	Fundamental	Released
Mechanical Engineering			
MEC-MEC-1	Mechanical Equipment Core	Core	Released
MEC-PMC-1	Properties of Materials Core	Core	Released
MEC-PSW-1	Piping Systems and Welding Core	Core	Released
MEC-UPV-1	Unfired Pressure Vessels Core	Core	Released
MEC-FHB-1	Fired Heaters and Boilers Core	Core	Released
MEC-STC-1	Storage Tanks Core	Core	Released
MEC-CCC-1	Corrosion Control and Protection Core	Core	Released
MEC-REC-1	Reciprocating Engines for Process Facilities	Core	Released
MEC-GST-1	Gas and Steam Turbines Core	Core	Released
MEC-MDM-1	Machinery Design, Materials, and Subsystems Core	Core	Released
MEC-MEI-1	Mechanical Equipment Inspection, Operation, and Maintenance Core	Core	Released
Instrumentation and Controls			
INC-CS1-1	Control Systems for Oil and Gas Applications Core (Part 1)	Core	Released
INC-CS2-1	Control Systems for Oil and Gas Applications Core (Part 2)	Core	Released
INC-ISO-1	Instrumentation Selection for Oil and Gas Applications Core (General)	Core	Released
INC-ISF-1	Instrumentation Selection for Oil and Gas Applications Core (Flow)	Core	Released
INC-ISL-1	Instrumentation Selection for Oil and Gas Applications Core (Level)	Core	Released
INC-ISP-1	Instrumentation Selection for Oil and Gas Applications Core (Pressure, Temperature)	Core	Released
INC-ISA-1	Instrumentation Selection for Oil and Gas Applications Core (Analysis)	Core	Released
INC-CVO-1	Control Valves for Oil and Gas Applications Core	Core	Released
Electrical Engineering			
ELE-EDI-1	NEC-Based Electrical Design, Installation, and Safety Codes Core	Core	Released
ELE-PR1-1	Principles of Power Systems in Oil and Gas Applications Core (Part 1)	Core	Released
ELE-PR2-1	Principles of Power Systems in Oil and Gas Applications Core (Part 2)	Core	Released
ELE-HAZ-1	Hazardous Area Classification in Oil and Gas Facilities Core	Core	Released
ELE-DIV-1	Division-based Equipment Selection and Installation in Oil and Gas Facilities Core	Core	Released
ELE-ZON-1	Zone-based Equipment Selection and Installation in Oil and Gas Facilities Core	Core	Released
ELE-SAF-1	Electrical Safety in Design for Oil and Gas Facilities Core	Core	Coming soon
ELE-MOT-1	Electric Motors and Motor Control in Oil and Gas Core	Core	Released
ELE-PSD-1	Industrial Electric Power System Design Core	Core	Coming soon

Electrical Engineering *(Continued)*			
ELE-EQP-1	Electrical Industrial Power System Design Core	Core	Coming soon
Pipeline Engineering			
PIP-POM-1	Pipeline O&M, Leak Detection, Repairs, Alterations, and Abandonment Core (U.S. Focus)	Core	Released
PIP-PRG-1	Pipeline Routing and Geomatics Core (U.S. Focus)	Core	Released
PIP-CPE-1	Compliance and Pollution Events and Environmental Impacts and Assessments Core (U.S. Focus)	Core	Released
PIP-PHF-1	Pipeline Hydraulics and Flow Assurance Core	Core	Released
PIP-PSS-1	Pipeline Strength, Stability, and Environmental Considerations Core (U.S. Focus)	Core	Released
PIP-PCS-1	Pipeline Pump and Compressor Stations and Terminals Core (U.S. Focus)	Core	Released
PIP-PIC-1	Pipeline Construction Core (U.S. Focus)	Core	Released
Net-Zero and Renewables			
CCP-CCU-1-N	Carbon Capture, Utilization, and Storage Core	Core	Released
ALL-AFC-1-C	Alternative Fuels Core	Core	Released
SOL-SPG-1-R	Solar Power Generation Core	Core	Released
WND-WPG-1-R	Wind Power Generation Core	Core	Released
ALL-BAR-1-C	Business Aspects of Global Warming and Alternative Energies Core	Core	Released
GHG-DBN-1-N	The Drivers Behind Net-Zero Core	Core	Released
ALL-EPG-1-C	Existing Power Generation Technologies with Alternative Energies Core	Core	Released
EST-ESC-1-R	Energy Storage Core	Core	Released
ALL-CPF-1-C	Coherent Planning for the Future Core	Core	Released
HYD-HOV-1-N	Hydrogen Overview Core	Core	Released
GHG-GGE-1-N	Introduction to Greenhouse Gas (GHG) Emissions Core	Core	Released
GHG-OPB-1-N	Operational Boundaries for Greenhouse Gas Inventories Core	Core	Released
GHG-ORB-1-N	Organizational Boundaries for Greenhouse Gas Inventories Core	Core	Released
GHG-TRA-1-N	Greenhouse Gas Emissions Tracking Over Time Core	Core	Released
GHG-QUA-1-N	Greenhouse Gas Emissions Sources and Quantification Core	Core	Coming soon
HYD-SAF-1-N	Safety Aspects of Hydrogen Core	Core	Coming soon
HYD-PRO-1-N	Hydrogen Production Core	Core	Coming soon
HYD-COS-1-N	Hydrogen Compression and Storage Core	Core	Coming soon
HYD-DIS-1-N	Distribution Methods of Hydrogen Core	Core	Coming soon
HYD-IFC-1-N	Introduction to Fuel Cells Core	Core	Coming soon
HYD-HUC-1-N	Hydrogen Use Cases Core	Core	Coming soon
HYD-DER-1-N	Hydrogen Derivatives Core	Core	Coming soon
Project Management			
PRJ-OFD-1	Onshore Field Development Programs and Projects Core	Core	Released
PRJ-PGC-1	Project Governance Core	Core	Released
PRJ-PRO-1	Project Resources and Organization Core	Core	Released

Project Management *(Continued)*			
PRJ-SDC-1	Scope Delivery Core	Core	Released
PRJ-DEM-1	Design Engineering Management Core	Core	Released
PRJ-AGS-1	Acquiring Goods and Services Core	Core	Released
PRJ-CMC-1	Construction Management Core	Core	Released
PRJ-RMC-1	Project Risk Management Core	Core	Released
PRJ-CEC-1	Cost Estimating for Facility Projects Core	Core	Released
PRJ-SCC-1	Scheduling Core	Core	Released
PRJ-PMC-1	Progress Measurement Core	Core	Released
Energy Business			
PEB-PFC-1	Production Forecasting Core	Core	Released
PEB-OGP-1	Oil and Gas Pricing Core	Core	Released
PEB-CFC-1	Cash Flow Core	Core	Released
PEB-EDT-1	Economic Decision Tools Core	Core	Released
PEB-RUC-1	Risk and Uncertainty Core	Core	Released
PEB-FOC-1	Financing and Ownership Core	Core	Released
PEB-PIA-1	Petroleum Industry Accounting Core	Core	Released
PEB-BUC-1	Budgeting Core	Core	Released
PEB-DAP-1	Decision Analysis Process Core	Core	Released
PEB-VCC-2	Value of Control Fundamentals	Fundamental	Released
PEB-BRC-2	Value of Information and Bayes' Rule Fundamentals	Fundamental	Released
PEB-JBC-2	Judgements and Biases Fundamentals	Fundamental	Released
PEB-DPV-2	Decision Policy and Value Calculations Fundamentals	Fundamental	Coming soon
PEB-DIS-2	Monte Carlo Simulation and Distribution Fundamentals	Fundamental	Released

Skill Module Descriptions by Discipline

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 18 min

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

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

STATUS	LEVEL	DURATION
Released	Core	1 hr 48 min

This module provides an overview of production and gas processing facilities. The concepts addressed in this module 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 27 min

This skill module describes the phase or phases that exist at given conditions of pressure and temperature of single and multi-component systems. The skill module also explains the concepts of critical point, cricondentherm, cricondenbar, dense phase, and retrograde condensation. In addition, the module 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)

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 10 min

This skill module describes hydrates, explores conditions favoring hydrate formation, and discusses how to prevent hydrates from forming. The skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	1 hr 42 min

This skill module provides an overview of the concepts of thermodynamics, which is the foundation for all processing calculations. This skill module 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

Fluid Flow Core [GAS-FFC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 3 min

This skill module 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

Separation Core [GAS-SEC-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 24 min

This skill module 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 module 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

Heat Transfer Equipment Core [GAS-HTE-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 16 min

This module provides an overview of the heat transfer equipment and mechanisms commonly used in the oil and gas industry. The module 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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 9 min

This skill module explains the concepts of mechanical refrigeration, valve, and turbine expansion, and NGL extraction systems. The skill module 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

Pumps and Compressors Core [GAS-PCC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 22 min

This skill module 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 important focus in this skill module is compressors, including their applications, types, and selection criteria. The skill module 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
- Describe cavitation
- Define NPSHRS and NPSHA
- 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
- Identify types of compressors and common applications in oil and gas processing facilities
- 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 of a centrifugal compressor, and identify the main compressor components
- Describe a centrifugal compressor performance curve, and identify and describe the surge line and stonewall
- Explain the principle of operation of a reciprocating compressor, and identify the main compressor components
- Explain the principle of operation of a rotary screw compressor, and identify the main compressor components
- List common drivers used for each compressor type

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

STATUS	LEVEL	DURATION
Released	Core	3 hrs 31 min

This skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 56 min

This skill module explains the processes of removing mercury and acid gases from a natural gas stream. The skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 47 min

This skill module provides basic concepts and definitions needed to better understand and utilize Process Safety and Inherently Safer Design. This skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	3 hrs 10 min

This skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 11 min

This skill module covers accidental leaks and calculating concentration and dispersion of those leaks. This skill module 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

Combustion Behavior of Hydrocarbons Core [PRS-CBH-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs

This skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 50 min

This skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 26 min

This skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 56 min

In this skill module, 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 45 min

This skill module deals with Historical Incident Databases, Process Safety Metrics, and the layout of operating facilities at the Core 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

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

STATUS	LEVEL	DURATION
Released	Core	3 hrs 32 min

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

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

Fire Protection Systems Core [PRS-FPS-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 20 min

In this skill module, 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

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

STATUS	LEVEL	DURATION
Released	Core	5 hrs 36 min

This module 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
- Practice the concept of relative density of a 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 the 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

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

STATUS	LEVEL	DURATION
Released	Fundamental	3 hrs 3 min

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

- 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 38 min

This skill module 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 skill module 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

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

STATUS	LEVEL	DURATION
Released	Fundamental	5 hrs 24 min

This skill module 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 skill module covers the following topics:

- Oil Treating Overview
- Oil Treating Methods
  - Application of Heat
  - Chemical Demulsifiers
  - Retention Time
  - Electricity
  - Mechanical Devices
- Desalting Crude Oil Overview
- 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

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

STATUS	LEVEL	DURATION
Released	Fundamental	4 hrs 7 min

This skill module 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 skill module 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
- 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
- Identify typical problems encountered in desalting operations, their causes, and solutions

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

STATUS	LEVEL	DURATION
Released	Fundamentals	8 hrs 12 min

This skill module builds on risk analysis and inherently safer design from the Process Safety Risk Analysis and Inherently Safer Design Core skill module. 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 lifecycle

Prerequisite

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	8 hrs 5min

This skill module builds on Process Hazards Analysis techniques and Layers of Protection from the Core skill module. 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

Prerequisite

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	7 hrs 8 min

This skill module extends the learning in the corresponding three Core skill modules 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

Prerequisites

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

• Combustion Behavior of Hydrocarbons Core [PRS-CBH-1]

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

HID and Metrics, Bad Actors (Specific Systems) Fundamentals [PRS-HID-2]

STATUS	LEVEL	DURATION
Released	Fundamental	5 hrs 47 min

This skill module extends the learning from the Core modules 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)

Prerequisites

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

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	6 hrs 18 min

This skill module extends the learning from the corresponding Core module 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

Prerequisite

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	5 hrs 21 min

This skill module extends the learning from the SIS, Monitoring, and Control Core module. 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 Core module
- Apply the learning to the example facility

Prerequisite

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	4 hrs 45 min

This skill module extends the learning from the Historical Incident Databases, Plant Layout and Equipment Spacing Core and Fire Protection Systems Core skill modules 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

Prerequisites

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

• Fire Protection Systems Core [PRS-FPS-1]

Oil Gathering Systems Fundamentals [PRS-OGS-2]

STATUS	LEVEL	DURATION
Released	Fundamental	2 hrs 12 min

This module 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

Prerequisite

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	3 hrs 47 min

This skill module 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 skill module 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

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

STATUS	LEVEL	DURATION
Released	Fundamental	2 hrs 53 min

This skill module 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

Mechanical Equipment Core [MEC-MEC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 15 min

This skill module 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
- Outline the concepts of trend analysis, set points, and limit ranges
- Describe typical devices used to monitor rotating equipment
- Describe how to collect accurate, usable vibration data
- 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 how these principles lead to the machine performance
- Describe how these principles affect the efficiency of the machine
- 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

Properties of Materials Core [MEC-PMC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 23 min

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 skill module 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

Unfired Pressure Vessels Core [MEC-UPV-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 55 min

This skill module 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
- List the flange ratings and temperature
- 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 ways to combat corrosion
- Discuss the ramifications of vessel penetrations
- Identify the options available to remedy nozzle penetrations
- Examine the vacuum forces on pressure vessels
- Study the corrosion allowance chart in reference to nozzle sizes
- Discuss the rules for inspection openings and manways
- Identify the Records Retention requirements
- Examine the following vessel appurtenances:
  - Vessel internals, externals, and supports
  - Openings (other than process nozzles)
  - Externals
  - Vessel supports

Piping Systems and Welding Core [MEC-PSW-1]

STATUS	LEVEL	DURATION
Released	Core	5 hrs 17 min

This skill module 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 module 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
- Identify thermal and dynamic effects of pipe sizing and selection criteria
- Describe key code references applicable to piping sizing and selection criteria
- Describe piping sizes, ratings, materials, and design considerations
- Explain pipe and fitting manufacturing codes, standards, and industry specifications
- Identify piping materials for oil and gas and other industrial applications
- Describe and identify basic industry codes and standards that define piping classes, services, and service conditions used in the oil and gas and other industries
- 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
- 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
- Describe joint efficiency and what it means
- Explain the difference between a joint efficiency of 1.0 and full radiography of all pressure containing butt welds
- Identify the 100% radiography requirements from chart UCS-57
- Describe weld joint design and preparation
- Discuss the five types of welding used in pressure vessels and their application
- Review common weld defects
- Explain the differences between Procedure Qualification Record (PQR) and Welding Performance Qualification (WPQ)

Fired Heaters and Boilers Core [MEC-FHB-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 1 min

This skill module 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 skill module discusses the design and operation of fired heaters, economic selection criteria, typical pressure-temperature ratings, materials of construction and limitations. The skill module 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

Storage Tanks Core [MEC-STC-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 32 min

This skill module describes storage tanks used to store liquid or liquefied commodities. Key concepts for storage tanks explained in the skill module 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 basic pressure limitations, contained fluids, venting requirements, maximum / minimum operating pressures and temperatures, and materials of construction that determine tank service conditions
- 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 tanks

Corrosion Control and Protection Core [MEC-CCC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 30 min

This skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 5 min

This skill module 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

Gas and Steam Turbines Core [MEC-GST-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 46 min

This skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs

This skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 35 min

This skill module 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 the related industry codes and standards
- List seal types, categories and the advantages and disadvantages of each
- List the failure mechanisms typically encountered with sealing systems
- Explain the purpose of seal flush plans for pumps
- 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
- Describe why rolling element bearings have a finite life
- Describe the principles of operation of tilting pad bearings and of magnetic bearings
- Show how to calculate clearances for hydrodynamic sleeve and tilting pad bearings
- Describe the fitting procedure for each type of bearing and how those procedures are affected by mechanical clearances
- List the failure mechanisms typically encountered with bearings, how to identify them and how to prevent them
- Describe the lubrication and filtration systems used with the major types of rotating equipment
- Outline the functions of lubrication and filtration systems and the principal design factors for each system and the major component
- List the types of lubricants used for rotating equipment and the properties and limitations of each
- List the key operational and maintenance considerations of lubrication systems
- List the effects of lubricant deterioration on the health of rotating equipment, how these effects may be identified before damage occurs and how damage may be prevented
- Describe the key material and manufacturing considerations
- List the related industry codes and standards

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs

This skill module provides an introduction and overview of control systems typically encountered in the 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 is control, 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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 16 min

This skill module provides an overview of safety instrumented systems and their applications in the oil and gas facilities. The focus is to understand terminology, concepts, and common pitfalls in order 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 lifecycle
- 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)

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

STATUS	LEVEL	DURATION
Released	Core	5 hrs

This skill module introduces the learner to the field of instrumentation and control in the oil and gas industry.

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

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

STATUS	LEVEL	DURATION
Released	Core	5 hrs 57 min

In this module 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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 4 min

This skill module 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 principle of tank strapping

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 25 min

This module 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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 23 min

This module 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 in this module.

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

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

STATUS	LEVEL	DURATION
Released	Core	7 hrs 4 min

This skill module provides an overview of the control valves and actuation devices commonly used in oil and gas operations. The focus is to understand terminology, concepts, typical equipment configurations, and common pitfalls in order 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

NEC-Based Electrical Design, Installation and Safety Codes Core [ELE-EDI-1]

STATUS	LEVEL	DURATION
Released	Core	5 hrs 18 min

This skill module is designed to give learners a jump-start in learning how to navigate and apply the National Electrical Code, NFPA 70 for oil and gas installations. Various sections of the code are discussed as they relate to oil and gas 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 module.

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 electrical systems within oil and gas facilities.

You will learn how to

- Describe the need for codes and regulations in the oil and gas industry
- Describe the role of OSHA and enforcement mechanisms for common industry recognized codes and standards
- Identify Codes and Standards used for Sizing, Specification and Installation of Electrical Equipment and infrastructure for Oil and Gas Facilities
- Identify Codes and Standards used for determining the degree and extent of hazardous (explosive) areas in Oil and Gas Facilities
- Describe the purpose and scope of the NEC
- Describe the role of circuit breakers, fuses and overload relays and the code sections that reference their sizing
- Describe the scope, purpose and history of NPFA 70B

Principles of Power Systems in Oil and Gas Applications Core (Part 1) [ELE-PR1-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 24 min

This skill module is the first of two skill modules 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 skill modules.

The skill module 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 modules, 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 skill module covers the following topics:

- Basics of Electricity
- Generating Electricity

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
- List the ways in which Voltage can be produced
- Describe how static electricity is generated and the hazards associated
- Explain equipment power ratings for power sources and consumers
- Define power system efficiency and its effects
- Describe the power requirements of typical power source and distribution equipment
- Define power usage and demand and their impact on electricity costs
- Differentiate DC and AC power systems, and their typical applications
- Describe how AC power is generated using rotating equipment
- Describe the basic characteristics of AC power including sine waves, frequency, and RMS values
- Describe the function of Inductors, Capacitors and their impact on Reactance and Impedance
- Describe Power Factor, its causes, and impact on power system
- List the basic equations used in DC and AC circuits

Principles of Power Systems in Oil and Gas Applications Core (Part 2) [ELE-PR2-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 42 min

This skill module is the second of two skill modules 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 Oil and Gas Applications Core (Part 1) prior to this skill module.

The skill module 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 modules, 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 skill module 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
- List the factors influencing system voltage selection and the implications
- Describe the materials used and basic properties of insulating materials used in cable systems
- Describe the differences between aluminum and copper conductors, and the advantages/disadvantages of each
- Describe how conductor cross-sectional area is measured around the world and its relation to cable sizing
- Summarize the relationship between conductor current carrying capacity, cross-sectional area, insulation design, ambient conditions, and installation methods
- Explain how heat management is related to electrical system design and influences equipment design such as conductors, transformers, motors, and generators
- Describe the causes and issues associated with voltage drop, and the typical design limits used
- Describe the basic components and function of a power transformer
- Describe the role of power distribution equipment, typical construction, and common types used in industrial power systems
- Describe a typical power distribution system in an oil and gas facility, the equipment used, and the purpose of each
- Interpret a single-line diagram
- Define Reliability and Availability targets, and the impact on power system design
- Describe the basic purpose of grounding and bonding systems
- Differentiate between an equipment grounding conductor and a grounded (neutral) conductor
- Describe the hazards associated with Touch and Step potential and how bonding and grounding reduce the risks
- Describe the components used in grounding and bonding systems and their basic characteristics
- Describe the performance measures for grounding and bonding systems
- Describe the grounding and bonding issues associated with control systems
- Explain how independent bonding and grounding of separate systems are connected

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 25 min

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

Hazardous Area Classification in Oil and Gas Facilities Core discusses the process of Hazardous Area Classification, where we determine the risk of ignitable atmospheres being present. This skill module is relevant to both North American Standards (NFPA, NEC, CEC) and International Standards (IEC).
Division-based Equipment Selection and Installation in Oil and Gas Facilities Core covers equipment selection and installation practices for the Division method used primarily in North America.
Zone-based Equipment Selection and Installation in Oil and Gas Facilities Core 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

Division-based Equipment Selection and Installation in Oil and Gas Facilities Core [ELE-DIV-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 16 min

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

Hazardous Area Classification in Oil and Gas Facilities Core discusses the process of Hazardous Area Classification, where we determine the risk of ignitable atmospheres being present. This skill module is relevant to both North American Standards (NFPA, NEC, CEC) and International Standards (IEC).
Division-based Equipment Selection and Installation in Oil and Gas Facilities Core covers equipment selection and installation practices for the Division method used primarily in North America.
Zone-based Equipment Selection and Installation in Oil and Gas Facilities Core 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 Class, Division, Group, and T-Code
- Describe the impact of Division, Group, and T-Code designations on equipment specification
- Describe the role of NRTL's 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

Zone-based Equipment Selection and Installation in Oil and Gas Facilities Core [ELE-DIV-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 7 min

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

Hazardous Area Classification in Oil and Gas Facilities Core discusses the process of Hazardous Area Classification, where we determine the risk of ignitable atmospheres being present. This skill module is relevant to both North American Standards (NFPA, NEC, CEC) and International Standards (IEC).
Division-based Equipment Selection and Installation in Oil and Gas Facilities Core covers equipment selection and installation practices for the Division method used primarily in North America.
Zone-based Equipment Selection and Installation in Oil and Gas Facilities Core 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

Electrical Motors and Motor Control in Oil and Gas Core [ELE-MOT-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs

This skill module 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

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

STATUS	LEVEL	DURATION
Released	Core	3 hrs 24 min

In this skill module, 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 module, 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 correctly abandon 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

- 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 5 min

In this skill module, you will be exposed to the basic terminology, concepts and methods associated with defining a specific location on earth as part of the description of a pipeline route/alignment. This includes basic requirements for surveying, use of advanced techniques like global positioning systems (GPS), remote sensing imagery, and techniques for subsea surveying (bathymetry) applicable for offshore pipelines. The module 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 15 min

In this skill module, you will learn the US legislation, regulations, and compliance requirements for pipelines. Also discussed are environmental impact 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

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

STATUS	LEVEL	DURATION
Released	Core	3 hrs 2 min

This skill module explains the physical properties and fluid flow characteristics of hydrocarbon gas and liquids. 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 for Hydrates, Wax / Paraffinic Fluids, Multiphase Flow, Scale

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 40 min

This skill module 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 in between S-Lay, J-Lay, and Reel Lay
- Define and describe 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

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

STATUS	LEVEL	DURATION
Released	Core	1 hr 36 min

In this skill module, you will learn the important role played by pumps and compressors in transporting hydrocarbons in pipelines. The module 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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 19 min

In this skill module, 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 responsibilities during the construction phase onshore pipelines in the US
- Describe the options for contracting the major pipeline projects onshore and the factors that determine which method is used
- Describe the key activities during onshore pipeline construction
- Describe the major tasks during each major construction activity
- Describe the key activities during onshore pipeline construction
- Describe the major tasks during each major construction activity
- Describe the Company and Contractor responsibilities during the construction phase offshore pipelines
- Describe the options for constructing offshore pipeline projects and the factors that determine method used
- Describe the key activities and major tasks during offshore pipeline construction
- Define the challenges and solutions for shore crossings, including Horizontal Directional Drilling, and riser installations

The Drivers Behind Net-Zero Core [GHG-DBN-1-N]

STATUS	LEVEL	DURATION
Released	Core	1 hr 36 min

This skill module covers the following topics:

- Global warming – the case for and against
- Greenhouse gases – what are they and what do they do?
- Paris Accord / International Energy Agency / Intergovernmental Panel on Climate Change
- Environmental, Social, and Governance Risks (ESG)

Designed for

This course is useful for senior and middle management and for anyone involved in the integration of low carbon power generation technologies into existing and future infrastructure.

You will learn how to

- Define the terms "Climate Change" and "Global Warming"
- Explain the history of global temperature and carbon dioxide levels
- Describe the difference between 20 year and 100 year global warming effects
- Identify who are the authorities and governmental agencies
- Describe the effect of greenhouse emissions and associated risks to the environment

Business Aspects of Global Warming and Alternative Energies Core [ALL-BAR-1-C]

STATUS	LEVEL	DURATION
Released	Core	54 min

This skill module covers the following topics:

- How big is big – how much hydrocarbon usage do we need to displace?
- Carbon net-zero
- Energy costs
- Life Cycle Assessment

Designed for

This course is useful for senior and middle management and for anyone involved in the integration of low carbon power generation technologies into existing and future infrastructure.

You will learn how to

- Gain an insight into how global business is affected by climate change policies
- Quantify the impact of CO2 reduction and the predicted infrastructure requirements, through the lens of power generation
- Describe the Life Cycle Assessment (LCA) process

Existing Power Generation Technologies with Alternative Energies Core [ALL-EPG-1-C]

STATUS	LEVEL	DURATION
Released	Core	1 hrs 48 min

This skill module covers the following topics:

- Coal, Oil, Gas
  - Traditional Power Generation
  - Integrated Gas Turbine Combined Cycle
- Hydroelectric
  - Nuclear Power Generation
  - Generation I, II, III, IV
- Nuclear Safety
- Geothermal
- Ocean
  - Mechanical
  - Thermal

Designed for

This course is useful for senior and middle management and for anyone involved in the integration of low carbon power generation technologies into existing and future infrastructure.

You will learn how to

- List the various power production alternatives
- Describe traditional power generation techniques
- Describe turbines and boilers
- Describe waste heat recovery processes

Carbon Capture, Utilization, and Storage Core [CCP-CCU-1-N]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 28 min

This skill module provides a 30,000-foot view of the emerging field of CO_2 capture from stationary industrial emissions sources – primarily combustion operations. CO_2 capture is part of the so-called "CCUS" chain – CO_2 Capture, Utilization, and Storage – wherein CO_2 is prevented from entering the atmosphere by removing it from flue gas or other vent streams, transported to an appropriate location, and injected deep underground into secure geologic formations or utilized.

The content parallels the information covered in depth in the course PF-82 Carbon Capture from Stationary Industrial Sources. The focus of PF-82 is on CO_2 Capture technology – both commercial and emerging – and the background science.

Designed for

This course is useful for senior and middle management and for anyone involved in the integration of low carbon power generation technologies into existing and future infrastructure.

You will learn

- Describe the scale of CO2 emissions and their impact
- Identify the major industrial emissions sources and their characteristics
- Explain the meaning of CCUS
- Recognize the major technology approaches to CO2 capture and which are deployed
- Identify the CCS value chain
- Review the drivers and restrainers to deployment

Alternative Fuels Core [ALL-AFC-1-C]

STATUS	LEVEL	DURATION
Released	Core	1hr 21 min

This skill module covers the following topics:

- The hydrogen rainbow
- Electrolysis and Pyrolysis
- Biomass
- Ammonia

Designed for

This course is useful for senior and middle management and for anyone involved in the integration of low carbon power generation technologies into existing and future infrastructure.

You will learn how to

- Identify and explain the various methods of hydrogen production
- Describe the various hydrogen production concepts and practices
- Identify hydrogen transportation and storage, integrity, and safety issues
- Discuss biomass fuel origins, and associated emissions

Solar Power Generation Core [SOL-SPG-1-R]

STATUS	LEVEL	DURATION
Released	Core	1 hr 16 min

This skill module covers the following topics:

- Concentrated Solar Energy
- Concentrated Tower
- Parabolic Trough
- Stirling Engine
- Photovoltaics

Designed for

This course is useful for senior and middle management and for anyone involved in the integration of low carbon power generation technologies into existing and future infrastructure.

You will learn how to

- Understand the application and development of solar thermal power plants
- Understand the development of Photovoltaic (PV) technology over time
- Be able to discuss the practical usage of Solar Power technologies in industrial and domestic application

Wind Power Generation Core [WND-WPG-1-R]

STATUS	LEVEL	DURATION
Released	Core	1 hr 42 min

This skill module covers the following topics:

- Horizontal and Vertical Axis Wind Turbines
- Siting
- Sizing

Designed for

This course is useful for senior and middle management and for anyone involved in the integration of low carbon power generation technologies into existing and future infrastructure.

You will learn how to

- Be able to discuss the design and application of HAWT and VAWT wind turbines
- Calculate required wind turbine capacity based on power needed
- Calculate power available from the wind
- Choose appropriate sites for wind turbine installations
- Identify the key differences between onshore and offshore wind turbine installations

Energy Storage Core [EST-ESC-1-R]

STATUS	LEVEL	DURATION
Released	Core	1 hr 29 min

This skill module covers the following topics:

- Battery storage
- Thermal energy storage
- Compressed and liquid air storage
- Pumped hydro-power storage
- Gravity

Designed for

This course is useful for senior and middle management and for anyone involved in the integration of low carbon power generation technologies into existing and future infrastructure.

You will learn how to

- Identify the various methods of energy storage for peak saving and capacity optimization
- Describe electric battery energy storage
- Describe grid storage considerations
- Describe liquid air energy storage
- Discuss compressed air energy storage
- Describe pumped power energy storage
- Describe gravity energy storage

Coherent Planning for the Future Core [ALL-CPF-1-C]

STATUS	LEVEL	DURATION
Released	Core	1 hr 14 min

This skill module covers the following topics:

- Learning from planning failures
- The future of fossil fuel production
- Integrating electrical generation
- Predicting the cost of generation

Designed for

This course is useful for senior and middle management and for anyone involved in the integration of low carbon power generation technologies into existing and future infrastructure.

You will learn how to

- Describe the factors behind recent blackouts and high cost of energy across Europe and California
- Explain the concept of energy density, capacity, and total life cycle
- Explain the ‘real’ cost of renewable energy
- Describe power supply and demand
- Describe planning and costing of renewable energy

Hydrogen Overview Core [HYD-HOV-1-N]

STATUS	LEVEL	DURATION
Released	Core	1 hr 57 min

This skill module provides an overview of Hydrogen and discusses its properties and characteristics, the current hydrogen industry, and the history of hydrogen.

Designed for

Anyone interested in an awareness of what Hydrogen is and how it can be used in various industries to assist in the energy transition to a lower carbon-emitting future.

You will learn how to

- Determine the key properties and characteristics of Hydrogen
- Indicate the main uses for Hydrogen currently
- Explain the history of how Hydrogen was discovered and developed for use over time
- Identify some of the areas where Hydrogen may provide opportunities to decarbonize the industry sector

Introduction to Greenhouse Gas (GHG) Emissions Core [GHG-GGE-1-N]

STATUS	LEVEL	DURATION
Released	Core	1 hr 47 min

This skill module introduces the factors contributing to climate change and the science behind greenhouse gas (GHG) emissions. It delves into the anthropogenic greenhouse gas effect, the Kyoto Protocol GHGs, the concept of global warming potential (GWP), GHG normalization to carbon dioxide equivalence, sources of GHGs, the GHG Protocol, key definitions, base-year selection, and fundamental principles for GHG quantification and reporting.

Designed for

Anyone wanting to commence their learning or further consolidate their fundamental knowledge and competence regarding Greenhouse Gas (GHG) management.

You will learn how to

- Identify the Kyoto Protocol GHGs and recognize their sources
- Explain global warming potentials (GWP)
- Appreciate that GHG emissions are reported in tonnes of carbon dioxide equivalence (tCO2e)
- Describe the GHG Protocol
- Consider the base-year
- Identify the principles of GHG management and accounting

Operational Boundaries for Greenhouse Gas Inventories Core [GHG-OPB-1-N]

STATUS	LEVEL	DURATION
Released	Core	52 min

This skill module introduces operational boundaries in GHG emissions accounting, including the categorization of GHG emissions into scopes 1, 2, and 3. It provides a clear understanding of the sources of both direct and indirect emissions.

Designed for

Anyone wanting to commence their learning or to further consolidate their fundamental knowledge and competence with regard to Greenhouse Gas (GHG) management.

You will learn

- Define and distinguish between control and equity share operational boundaries
- Apply different greenhouse gas (GHG) emissions inventory consolidation approaches
- Account for GHG emissions within these different boundaries
- Interpret the various associated financial and equity definitions

Organizational Boundaries for Greenhouse Gas Inventories Core [GHG-ORB-1-N]

STATUS	LEVEL	DURATION
Released	Core	1 hr 13 min

This skill module provides a comprehensive understanding of the critical role that organizational boundaries play in GHG emissions reporting. You will be able to navigate the complexities of control and equity share boundaries, apply relevant consolidation methods, and interpret financial and equity definitions.

Designed for

Anyone wanting to commence their learning or to further consolidate their fundamental knowledge and competence with regard to Greenhouse Gas (GHG) management.

You will learn how to

- Distinguish between control and equity share organizational boundaries
- Identify different greenhouse gas (GHG) emissions inventory consolidation approaches
- Explain GHG emissions within these different boundaries
- Review the various associated financial and equity definitions

Greenhouse Gas Emissions Tracking Over Time Core [GHG-TRA-1-N]

STATUS	LEVEL	DURATION
Released	Core	47 min

This skill module illustrates how greenhouse gas (GHG) emissions are tracked over time. It introduces the concept of a base year, its selection, justification, and recalculation. Furthermore, it explains significance thresholds and when a base-year recalculation is permissible. It also provides the opportunity to undertake an actual base-year recalculation.

Designed for

Anyone wanting to commence their learning or to further consolidate their fundamental knowledge and competence with regard to Greenhouse Gas (GHG) management.

You will learn how to

- Assess an organization’s greenhouse gas (GHG) emissions over time
- Explain the concept of a base year
- Clarify the rules for recalculation of base-years
- Select a base year
- Justify the selection
- Establish a base-year recalculation policy and process
- Consider significance thresholds
- Identify structural and organizational changes
- Undertake actual base-year recalculations

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 45 min

This skill module 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 are a combination of 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 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 controls 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

Project Governance Core [PRJ-PGC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 43 min

This skill module introduces the business and organization context that frames petroleum projects development. Project governance dictates how program and project management decision making is to occur. This module 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 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 controls 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

Project Resources and Organization Core [PRJ-PRO-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 30 min

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

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 controls 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

Scope Delivery Core [PRJ-SDC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 28 min

This skill module describes how to validate a scope of work for a project and the coordinate the discipline plans necessary to complete the execution stage. The module 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 module includes preparations tips for the PEP.

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 controls 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

Design Engineering Management Core [PRJ-DEM-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 53 min

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

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 controls 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

Acquiring Goods and Services Core [PRJ-AGS-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 33 min

This skill module is an introduction to procurement and contracting for the equipment, materials and services needed for development of petroleum projects. One module 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 module addresses the contracting process and factors for successful contract placement.

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 controls 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

Construction Management Core [PRJ-CMC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 34 min

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

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 controls 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

Project Risk Management Core [PRJ-RMC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 41 min

This skill module 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 module describes how to use a risk register for assigning accountability and monitoring mitigation progress.

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 controls representatives, and supply chain personnel.

You will learn

- How volatility, uncertainty, complexity and ambiguity make managing petroleum project 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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 32 min

This skill module 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. Module coverage includes selected topics in labor productivity, owner's costs, and contingency management.

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 controls 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

Scheduling Core [PRJ-SCC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 33 min

This skill module is an introduction to planning and scheduling for petroleum development projects. It describes how to create the distinct levels of critical path schedules needed to meet project planning, control, and reporting needs for a variety of stakeholders.

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 controls 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 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

Progress Measurement Core [PRJ-PMC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 11 min

This skill module describes how to establish project progress measurement, tracked it on a regular basis, and report performance to key stakeholders. The module covers the five methods used to assess design engineering and field construction progress. It also introduces the concept of earned value analysis (EVA).

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 controls 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

Production Forecasting Core [PEB-PFC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 37 min

This skill module 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 skill module 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

Oil and Gas Pricing Core [PEB-OGP-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 26 min

This skill module demystifies oil and gas pricing. Is that possible? The answer is yes, and this skill module 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

Cash Flow Core [PEB-CFC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 32 min

This skill module 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 skill module 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

Economic Decision Tools Core [PEB-EDT-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 12 min

This skill module 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

Risk and Uncertainty Core [PEB-RUC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 40 min

This skill module 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 module 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

Financing and Ownership Core [PEB-FOC-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 55 min

This skill module 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 a large integrated company or an independent upstream company? These are some of the financial issues covered in this skill module.

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

Petroleum Industry Accounting Core [PEB-PIA-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 31 min

This skill module 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 skill module, 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

Budgeting Core [PEB-BUC-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 47 min

This skill module 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 skill module 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 skill module, budgeting methodology is explained, and the contribution economic evaluation tools make to 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

Decision Analysis Process Core [PEB-DAP-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 15 min

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

Geologists, engineers, geophysicists, managers, team leaders, economists, and planners.

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.

Value of Control Fundamentals [PEB-VCC-2]

STATUS	LEVEL	DURATION
Released	Fundamental	4 hrs 4 min

This skill module 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

Geologists, engineers, geophysicists, managers, team leaders, economists, and planners.

You will learn

- To properly sequence decision tree nodes
- To back-solve the decision tree for node-branch expected values
- When it is okay to put costs and benefits on branches when realizing those values
- Exercise: Plant expansion decision
- 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)
- To set up and solve a decision tree to evaluate the value of a control-adding alternative
- How to apply Monte Carlo to optimize one or multiple control decision variables
- To calculate the expected value (EV) cost of an accident
- How to 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

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

STATUS	LEVEL	DURATION
Released	Fundamental	4 hrs 1 min

Probability Types, Venn Diagrams, and Probability Rules

Venn diagrams and probability trees are good ways to explain the foundation probability rules. 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. Becoming comfortable with Bayes' rule calculations requires practice for most people to develop a deep intuition about how the calculations work.

Designed for

Geologists, engineers, geophysicists, managers, team leaders, economists, and planners.

You will learn how to

• Explain causes of correlation between variables and ways to discover from data

• Perform Bayes' Rule calculations for conditional probabilities using the formula or equivalent methods

• Explain marginal, joint, and conditional probabilities and illustrate with Venn diagrams and probability trees

• Explain how Bayes' rule is valuable even with noisy or sometimes corrupt information

• Develop decision trees to value imperfect information (VII)

• Extend a VOI analysis to include a flexibility option and calculate the value of flexibility (VOF)

Judgments and Biases Fundamentals [PEB-JBC-2]

STATUS	LEVEL	DURATION
Released	Fundamental	2 hrs 5 min

This skill module 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

Geologists, engineers, geophysicists, managers, team leaders, economists, and planners.

You will learn

- Describe intuition and its strengths and weaknesses in decision-making
- Name the several motivational biases the most important of the many cognitive biases
- Describe the Delphi process tool for anonymous forecasting and estimation
- Plan an elicitation interview to elicit an assessment from one or multiple SMEs
- Use calibration exercises for improving judgment
- Explain some of the causes of correlation and ways to discover this from data
- Explain how to calculate deterministic and stochastic variances to explain the difference between forecast and actual values
- Describe two or more auction types
- Describe tail estimate, winner's curse, and optimizer's curse biases

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

STATUS	LEVEL	DURATION
Coming soon	Fundamental	~8 hrs

Designed for

Geologists, engineers, geophysicists, managers, team leaders, economists, and planners.

You will learn

- Decision Policy Components
  This course mostly focuses on maximizing shareholder value, measured as expected monetary value *(EMV)*, which is risk-weighted (expected value) *NPV*. See Social Factors, below, about adding-in non-monetary metrics.
- Time Preference
  When costs and benefits occur across time, the time value of money is an important consideration. Present value discounting converts future cashflows into an equivalent amount today or the reference time of investment. Price escalation and inflation work similarly. Most people—even professional analysts—do the calculations incorrectly. PV discounting applies also to non-monetary metrics where the company has time preference.
- Social Factors in Decision Policy
  A multi-criteria decision policy may include metrics for non-monetary criteria in such areas as Health, Safety, and Environment (HSE), Corporate Social Responsibility (CSR), and Environment, Social, and Governance (ESG).
- Establishing a Risk Tolerance Coefficient for Risk Policy
  The exponential utility function is an easy-to-use representation of risk policy. Expressing risk policy in this form requires only assessing the risk tolerance coefficient for the company or individual decision maker. Risk policy facilitates logical, consistent trade-offs between value and risk.

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

STATUS	LEVEL	DURATION
Released	Fundamental	5 hrs 51 in

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.

Most examples and exercises relate to the petroleum industry. The methods apply to R&D, risk management, operating, and capital investment decisions.

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. The mathematics in this course is straightforward and involves mostly common algebra. The emphasis is on practical techniques for immediate application.

Designed for

Engineers, geoscientists, economists, planners, managers, and team leaders.

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

Exploration VOI Simulation Fundamentals [PEB-EVS-2]

STATUS	LEVEL	DURATION
Coming soon	Fundamental	~8 hrs

Designed for

Geologists, engineers, geophysicists, managers, team leaders, economists, and planners.

You will learn

- Exploration Risk Simulation Exercise
  This is the capstone exercise for the course. You are to evaluate a prospect with two potential pay zones. Solve the first part using tree analysis. The second part is to solve by hand or with computer assistance (e.g., spreadsheet) with at least 25 trials of Monte Carlo simulation.
- Monte Carlo Simulation – Expanded
  Monte Carlo Simulation is better than a decision tree suited for some problem types. For practical purposes, MCS requires a computer.
- Portfolio Modeling and Management
  Ideally, we could evaluate candidate projects individually and without regard to other projects or operations. A project's cashflow forecasts the incremental cashflow of the company. Often, real world complications get in the way. This module addresses portfolio effects and other challenges.