PetroSkills

2024 PetroAcademy Skill Module Catalog

[*Online Training*]

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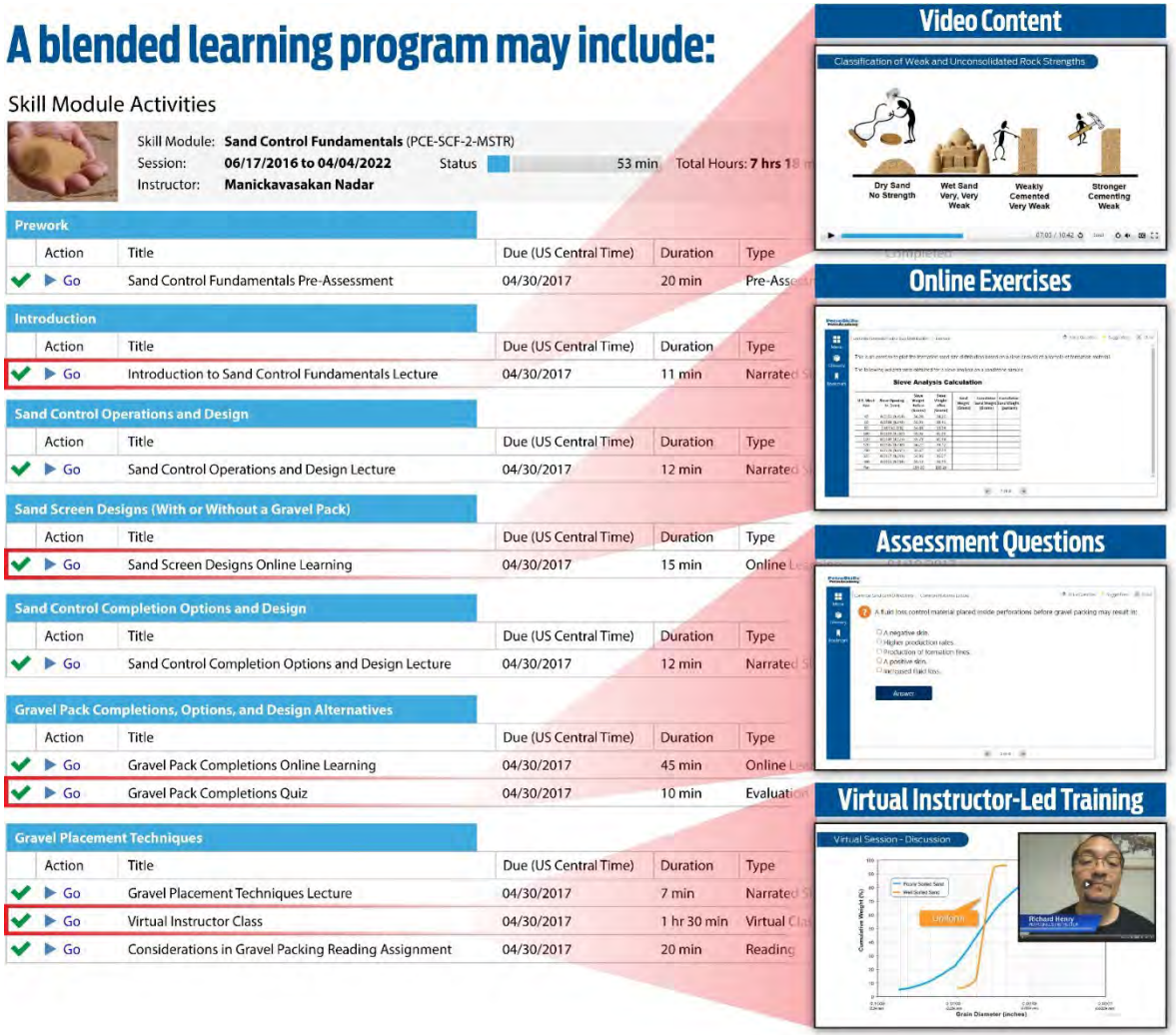
ABOUT PETROACADEMY®

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.

v.24.02 Feb-01-2024

Skill Module Descriptions by Discipline

E&P Industry and Asset Life Cycle Core
[IAM-EIA-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 5 min

In this skill module, you will learn about asset life cycle economics and the phases of the asset life cycle, including exploration; appraisal; development; and production, including mature production and enhanced oil recovery. You will also learn about the historical, geographical, and modern context of the petroleum industry; its organization, the petroleum value chain; and economic drivers.

Designed for

Those who need to achieve a context and understanding of E&P technologies, or the role of technical departments in oil and gas operations, and/or be able to understand and use the language of the oilfield.

You will learn

- Historical petroleum occurrences and usage
- The phases of the E&P asset life cycle
- The objectives and processes of the exploration phase of the E&P asset life cycle
- The objectives, processes, and economic metrics of the appraisal phase of the E&P asset life cycle
- The objectives and processes involved in the development and production phase of the E&P asset life cycle
- The objectives and processes involved in the mature production phase in the E&P asset life cycle
- Basic reserves and production value concepts

Hydrocarbon Reservoirs Core
[IAM-HRC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 10 min

In this skill module, you will learn about basins and plays, unconventional resources, and petroleum systems. You will also learn about structural stratigraphic traps and reservoir mapping.

Designed for

Those who need to achieve a context and understanding of E&P technologies, or the role of technical departments in oil and gas operations, and/or be able to understand and use the language of the oilfield.

You will learn

- Exploration concepts
- Elements of a successful petroleum system
- Key differences between unconventional and conventional petroleum systems
- Different types of structural traps
- Different types of stratigraphic traps
- Features of structural contour and isopach maps

Petroleum Geology Core
[IAM-PGC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 35 min

In this skill module, you will learn about Earth structure and plate tectonics; types of rocks, the rock cycle, clastic, biogenic, and chemical source sedimentary rocks; historical geology depositional environments; and global versus regional stratigraphy.

Designed for

Those who need to achieve a context and understanding of E&P technologies, or the role of technical departments in oil and gas operations, and/or be able to understand and use the language of the oilfield.

You will learn

- The Earth's structure, continental drift, and plate tectonics role in oil and gas exploration
- Rock types and classification in an oil and gas context
- The relationship between depositional environments and geological settings
- The importance of historical geology to finding oil and gas accumulations
- The relative age of rocks and how we date the rocks and understand the paleo climate
- The relationships between global and regional stratigraphy

Production Operations Core
[IAM-POC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs

In this skill module, you will learn about production roles, artificial lift (including beam pumps, gas lift, and submersible pumps), production logging, and workover operations. You will also learn about the integrated production system, fluid separation, emulsion breaking, crude products, gas separation and natural gas processing, NGL usage, and natural gas conversion to LNG and GTL.

Designed for

Those who need to achieve a context and understanding of E&P technologies, or the role of technical departments in oil and gas operations, and/or be able to understand and use the language of the oilfield.

You will learn

- The contrasting roles of reservoir and production engineers
- The different types of artificial lift
- The purpose of production logging and workover operations
- How the integrated production system prepares hydrocarbons for transportation
- About oil separation and processing
- About gas separation and processing
- How natural gas is distributed

Rock and Fluid Properties Core
[IAM-RFP-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 35 min

In this skill module, you will learn about reservoir rock properties: porosity and permeability, grain size, distribution, and sorting. You will also learn about reservoir fluids, physical and chemical properties, and the impact on these properties at reservoir and surface conditions. Reservoir classification and phase diagrams are also discussed. In the Hydrocarbon Recovery section, you will learn about primary recovery drives such as dissolved gas (solution gas) drive, water drive, gas cap expansion drive, and combination drives. You will also learn about enhanced oil recovery, including secondary and tertiary recoveries such as water flood, miscible flood, steam cycle, and steam drive, along with expected recovery efficiencies.

Designed for

Those who need to achieve a context and understanding of E&P technologies, or the role of technical departments in oil and gas operations, and/or be able to understand and use the language of the oilfield.

You will learn

- The basic reservoir rock properties and the significance of core samples
- The factors that affect porosity and how it is measured
- The factors that affect permeability and how it is measured
- How grain size, distribution, and sorting controls reservoir quality
- How to estimate reservoir economic potential
- The fundamental classification of hydrocarbons as paraffin, naphthene, and intermediate series
- API gravity classification and nomenclature for different crudes
- Reservoir conditions and stock tank conditions and their effect on reservoir fluids
- The relationship between fluid properties and phase behavior
- The importance of phase diagrams to understanding reservoir behavior
- How to differentiate conditions expressed on a phase diagram
- How to relate fluid properties and phase diagram conditions to “our reservoir”

Surface/Subsurface Exploration Core
[IAM-SSE-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 10 min

In this skill module, you will learn about basins, plays and risk analysis, mineral ownership, and contracts; and surface exploration technologies, such as gravity, magnetic and geochemical surveys and seismic imaging and interpretation. Subsurface technologies such as mud logging, appraisal wells, coring, well logging, and drill stem testing.

Designed for

Those who need to achieve a context and understanding of E&P technologies, or the role of technical departments in oil and gas operations, and/or be able to understand and use the language of the oilfield.

You will learn

- The roles involved in exploration
- About basins, plays, leads, prospects, and geological risk
- Different types of oil and gas contracts
- The purpose and types of surface exploration technologies
- The purpose and function of seismic surveys
- The basic structural information from a seismic survey
- The role of exploration and appraisal wells
- Formation evaluation tools used during the exploration phase, including mudlogging and LWD, well logging and cores, and well tests (DST)

Basic Petroleum Geology – Introduction Core [GEO-GOC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 55 min

This introductory skill module is an overview of Petroleum Geology and the Petroleum System Concept. The purpose is to familiarize learners with basic aspects of Petroleum Geology and the role of the Petroleum Geologist in the overall process of Petroleum Exploration and Production, for both Conventional and Unconventional Resources.

Designed for

Petroleum industry personnel in need of basic geological training, including engineering, geophysical, technical support, and administrative personnel.

You will learn

- The main elements and processes that comprise the petroleum system
- The basics of reservoir fluids—oil, gas, and water
- The phases and stages of exploration, field development, and production for conventional oil and gas fields
- The main phases of the exploration and development process for unconventional resources
- Key technological developments in the history of the oil and gas industry and their impact on petroleum geology

Basic Petroleum Geology – Foundation Geological Concepts Core [GEO-FGC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 37 min

This skill module introduces basic geological concepts that form the foundation for petroleum geology. There are three sections:

1. The Rock Cycle, focusing on the rocks and minerals that comprise the Earth's crust
2. Geologic Time and Stratigraphy
3. Plate Tectonics and Sedimentary Basin Evolution

Knowledge of these basic geologic concepts is crucial preparation for understanding petroleum geology in the overall process of petroleum exploration and production for both conventional and unconventional resources.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in Petroleum Exploration and Production who needs to understand Petroleum Geology concepts at a basic level or to communicate with others about it.

You will learn

- The Rock Cycle, including the three kinds of rocks and how they form
- How to differentiate between a mineral and a rock, and how to distinguish one mineral from another based on physical properties
- Key concepts of geological time and the difference between relative and radiometric geological time
- Stratigraphic principles and the difference between lithostratigraphy and chronostratigraphy
- How sequence stratigraphic analysis aids in the characterization of petroleum systems
- Key concepts of plate tectonics, including seafloor spreading and plate margin types
- The main types of sedimentary basins and their evolution in the context of plate tectonics

Basic Petroleum Geology – Petroleum System – Examples Core [GEO-EXC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 55 min

To reinforce the petroleum system concepts presented in other Basic Petroleum Geology – Petroleum System skill modules, this skill module describes examples of petroleum systems. The first part focuses on examples of Marine Basin Petroleum Systems, characterized by marine shale source rocks. The second part of the skill module provides an example of a Terrestrial Basin Petroleum System, characterized by a lake or lacustrine shale source rocks.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in petroleum exploration and production who needs to understand petroleum geology concepts at a basic level or to communicate with others about it.

You will learn how to

- Describe the North Sea Central Graben as an example of a vertically drained marine basin petroleum system
- List elements of the North Sea Central Graben petroleum system, explain its timing, and define its critical moment
- Describe the Ekofisk Field as an example of the North Sea Central Graben petroleum system
- Describe the East Venezuela Basin as an example of a laterally drained marine basin petroleum system
- Describe the Songliao Basin, NE China as an example of a terrestrial basin petroleum system
- List elements of the Songliao Basin petroleum system, explain its timing, and define its critical moment
- Describe the Daan Field as an example of the Songliao Basin petroleum system

Basic Petroleum Geology – Petroleum System – Overview and Source Core [GEO-RFS-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 45 min

This skill module is presented in two parts. The first part provides an introduction and overview of the petroleum system concept. The essential elements and processes of a petroleum system are summarized, and the importance of their timing is emphasized and explained. The second part explains the basic concepts of source rock characteristics and quality, as well as the processes of source rock thermal maturation and hydrocarbon generation. The main depositional controls for both siliciclastic shale and carbonate source rocks are also introduced.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in Petroleum Exploration and Production who needs to understand Petroleum Geology concepts at a basic level or to communicate with others about it.

You will learn

- The basic elements and processes of the petroleum system concept
- The characteristics of high-quality source rocks and the concepts to TOC% (Total Organic Carbon Content) and kerogen type
- The differences between oil and gas source rocks
- The different measures for source rock maturity and how these are used to define the hydrocarbon generation history of source rock units
- The main depositional controls for clastic and carbonate source rocks and the importance of anoxic conditions for the accumulation of organic source rock material

Basic Petroleum Geology – Petroleum System – Reservoir and Seal Core [GEO-RSC-1]

STATUS	STATUS	STATUS
Released	Released	Released

This skill module is presented in two parts, focusing on two essential elements of the Petroleum System. The first part explains the basic concepts of reservoir rock characteristics and describes key depositional and post-depositional factors impacting reservoir quality. Clastic, carbonate, and naturally fractured reservoirs are introduced, including field examples. The second part explains the basic concepts of seal rock characteristics and quality. Different types of seals, including fault seals, are considered and depositional controls for examples of key seal lithologies are described.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in Petroleum Exploration and Production who needs to understand Petroleum Geology concepts at a basic level or to communicate with others about it.

You will learn

- The concepts of reservoir porosity and permeability
- Controls on reservoir quality by texture
- Post-depositional and diagenetic processes that affect Reservoir Quality
- Classification systems for clastic and carbonate reservoir rocks
- The concept of net pay
- The different types of naturally fractured reservoirs and the concept of dual porosity systems
- The concepts of seal rock characteristics and quality
- The different types of fault seals, including juxtaposition and fault smear seals

Basic Petroleum Geology – Petroleum System – Trap and Timing Core [GEO-TTC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 50 min

This skill module is presented in two parts, focusing on two essential processes of the Petroleum System. The first part begins by covering basic concepts of structural geology and then explains the essential process of petroleum trap formation. Both structural and stratigraphic traps are described with field examples provided. The second part explains the essential process of hydrocarbon generation and migration, emphasizing the importance of the timing of the process relative to the timing of trap formation.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in petroleum exploration and production who needs to understand petroleum geology concepts at a basic level or to communicate with others about it.

You will learn how to

- Identify, describe, and understand the formation of key geological fold and fault structures
- Describe principle stress configurations and the implications for the orientation of fractures and faults
- Explain the concept of strike and dip for characterizing the orientation of geologic strata and structures
- Explain the difference between structural and stratigraphic trap
- Recognize uncertainties associated with fault trap
- Describe the types of structural traps associated with extensional, compressional, and strike slip tectonic settings
- Explain the meaning of timely maturation and migration and the concept of “critical moment” for a petroleum system

Basic Petroleum Geology – Phases of Conventional Exploration and Development Core [GEO-PCE-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 40 min

This skill module explains the Exploration and Production (E&P) Cycle. In the first part of the skill module, a brief overview of the Exploration and Production (E&P) Cycle is given. In the second part of the skill module, the Exploration Phase of Conventional Projects is described, including the progression from regional basin studies to Exploration Play Concept development, the delineation of Exploration Leads, and the definition of drillable Prospects. The third part of the skill module describes the Conventional Field Development process, which consists of four Stages: 1) Discovery and Initial Appraisal of the accumulation, 2) Full Appraisal, 3) Primary Development of the field, and 4) Enhanced Recovery.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in petroleum exploration and production who needs to understand petroleum geology concepts at a basic level or to communicate with others about it.

You will learn how to

- Explain the concept of the Exploration and Production or E&P Cycle
- Understand the steps in the Exploration Process and the work done in each:
  - Play Concept Definition
  - Lead Identification
  - Prospect Definition
- Describe the four Stages of Conventional Field Development:
  1. Discovery and Initial Appraisal
  2. Full Appraisal
  3. Primary Development
  4. Enhanced Recovery
- Understand the concept of Reservoir Flow Units as the basis for a common industry technique of reservoir zonation

Basic Petroleum Geology – Sedimentary Geology – Depositional Controls for Carbonate Reservoir Rocks Core [GEO-SGD-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 20 min

The basic concepts of Sedimentary Geology, including depositional controls for sedimentary rocks, form an essential part of the foundation for Petroleum Geology. Reservoir Rock is one of the essential elements of a Petroleum System, and because Reservoir Rock quality and thickness attributes are often closely tied to depositional origin, Geologists need to understand the main depositional controls and be knowledgeable of key depositional environments in order to properly characterize Reservoir Rocks and predict their distribution. This skill module introduces depositional controls and the main depositional environments for Carbonate Reservoir Rocks. Important post-depositional diagenetic processes affecting Carbonate Reservoir Rock quality are also introduced.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in Petroleum Exploration and Production who needs to understand Petroleum Geology concepts at a basic level or to communicate with others about it.

You will learn

- The main depositional controls for carbonate (e.g., limestone) reservoir rock distribution and how they differ from clastics (e.g., sandstone)
- Classification system for carbonate rocks
- To describe the models for key depositional environments of carbonate sediments
- To distinguish the textural characteristics of carbonate deposits in different settings and describe the implications for reservoir quality and trends
- The main diagenetic processes affecting carbonate rocks and their impact on reservoir quality

Basic Petroleum Geology – Sedimentary Petroleum Geology – Depositional Controls for Clastic Reservoir Rocks Core [GEO-SGC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 50 min

The basic concepts of Sedimentary Geology, including depositional controls for sedimentary rocks, form an essential part of the foundation for Petroleum Geology. Reservoir Rock is one of the essential elements of a Petroleum System, and because Reservoir Rock quality and thickness attributes are often closely tied to depositional origin, Geologists need to understand the main depositional controls and be knowledgeable of key depositional environments in order to properly characterize Reservoir Rocks and predict their distribution. This skill module introduces depositional controls and the main depositional environments for Clastic Reservoir Rocks, a category that comprises mainly sandstone and conglomerate.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in Petroleum Exploration and Production who needs to understand Petroleum Geology concepts at a basic level or to communicate with others about it.

You will learn

- The main depositional controls for clastic (e.g., sandstone) reservoir rock distribution
- Categories and classification systems for clastic rocks
- To describe the models for key depositional environments of clastic rocks, including onshore river and desert settings, marginal marine beach and delta settings, and deep water submarine fan settings
- To distinguish the grain size characteristics of clastic deposits in different settings and describe the implications for reservoir quality and trends

Basic Petroleum Geology – Tools and Techniques Core [GEO-GTT-1]

STATUS	LEVEL	DURATION
Released	Core	5 hrs 15 min

This skill module explains basic concepts of key tools and techniques used by geoscientists in the exploration and development of petroleum resources. Topics covered include seismic data, drilling and completions, and formation evaluation. The main points of horizontal drilling and hydraulic fracturing, which are widely used in the development of unconventional resource plays, are presented. Also covered in This skill module is the estimation of reserves and resources.

Designed for

Petroleum industry personnel in need of basic geological training, including engineering, geophysical, technical support, and administrative personnel.

You will learn

- The basics concepts of 2D and 3D Seismic Data and how it is used to investigate the subsurface
- How seismic data is acquired, processed, and displayed for visualization and interpretation
- How to identify various types of drilling rigs and key pieces of equipment used in drilling, including bits and how they function
- How to understand the main points of the drilling process, including the basics of horizontal and directional drilling
- The basics of how a well is completed, including through hydraulic fracturing and other techniques of reservoir stimulation
- How rock and hydrocarbon information is gathered during the drilling of a well through mudlogging, coring, wireline logging, and testing
- To basic concepts of reserves and resource estimation
- How to use the Volumetric Method to estimate Hydrocarbons in Place

Basic Petroleum Geology – Unconventional Petroleum Resources Core [GEO-UPR-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 10 min

This skill module introduces the petroleum geology of Unconventional Resources, which are an increasingly important part of the oil and gas industry.

The first part of the skill module explains the basic concepts of unconventional resources, and the key differences between conventional fields and unconventional resources. The geology and technological factors controlling productivity for unconventional resources are described, and essential operational technologies, including horizontal drilling and multistage hydraulic fracturing are discussed.

To highlight and reinforce the basic concepts of unconventional shale resource plays, the second part of the skill module focuses on two case studies; first, the Eagle Ford Shale Play of southeast Texas; and second, the Niobrara Shale Play of Colorado-Wyoming, as an example of a “shale hybrid play.”

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in Petroleum Exploration and Production who needs to understand Petroleum Geology concepts at a basic level or to communicate with others about it.

You will learn how to

- Explain what is meant by an Unconventional Resource and how it differs from a Conventional Field
- List the geologic factors controlling productivity of Unconventional Resource plays
- Recognize the importance of Geomechanical Factors, in particular Stress Field Orientation
- Describe key aspects of Horizontal Drilling and Hydraulic Fracturing technologies as they relate to Shale Resource Plays
- Explain the concept of a Shale Hybrid Play
- Describe key technical developments that have led to increased productivity from Shale Plays and be cognizant of World Oil and Gas Shale Resource Estimates

Interpreting Siliciclastic Environment of Deposition (EOD) for Deltaic Systems Core [GEO-ISE-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 59 min

This skill module takes the participant through the concepts and general workflow of interpreting the environment of deposition (EOD) for siliciclastic deltaic systems using data sets including logs, core, and seismic. The process of interpreting the EOD is one of integrating datasets of varying types, scales, and data density into a holistic understanding of a given stratigraphic interval. An EOD allows one to understand deposition at the field/reservoir scale, but also to predict reservoirs at both the development and exploration scales. The concepts of facies, sequence stratigraphy, log and seismic correlation, depositional controls, and types of deltas are discussed and applied to example data sets from different deltaic systems in the skill module.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in petroleum exploration and production who needs to understand petroleum geology concepts at a basic level or to communicate with others about it.

You will learn how to

- Understand and apply the process of interpreting a deltaic EOD
- Apply concepts and tools to datasets that are typically used for deltaic depositional environments
- Be familiar with typical EODs for different types of deltaic systems and understand their differences
- Apply tools and concepts for assessing appropriateness of an EOD analogue and modifying them to a specific deltaic system
- Apply concepts for developing a data collection strategy to improve the EOD

Introduction and Overview of Development Geology Core [GEO-IDG-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 47 min

This skill module introduces exploration, production cycles, and field development phases from discovery to abandonment.

Designed for

Reservoir, development, and exploration geologists; geophysicists; petrophysicists; log analysts; petroleum engineers; and experienced technicians.

You will learn how to

- Describe the exploration/ production cycle and field development phases
- Explain how geologic properties impact field performance and reservoir energy
- Identify the reservoir characterization properties needed to predict field behavior and optimize field development
- Describe the evolution of reservoir description requirements as the field development matures

Introduction to Geosteering Core [GEO-IGE-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 54 min

This skill module is presented in two parts, focusing on two essential elements of the Petroleum System. The first part explains the basic concepts of reservoir rock characteristics and describes key depositional and post-depositional factors impacting reservoir quality. Clastic, carbonate, and naturally fractured reservoirs are introduced, including field examples. The second part explains the basic concepts of seal rock characteristics and quality. Different types of seals, including fault seals, are considered and depositional controls for examples of key seal lithologies are described.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in Petroleum Exploration and Production who needs to understand Petroleum Geology concepts at a basic level or to communicate with others about it.

You will learn

- The concepts of reservoir porosity and permeability
- Controls on reservoir quality by texture
- Post-depositional and diagenetic processes that affect Reservoir Quality
- Classification systems for clastic and carbonate reservoir rocks
- The concept of net pay
- The different types of naturally fractured reservoirs and the concept of dual porosity systems
- The concepts of seal rock characteristics and quality
- The different types of fault seals, including juxtaposition and fault smear seals

Introduction to Gridding for Computer-based Subsurface Mapping Core [GEO-IGC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 6 min

This skill module is presented in two parts, focusing on two essential processes of the Petroleum System. The first part begins by covering basic concepts of structural geology and then explains the essential process of petroleum trap formation. Both structural and stratigraphic traps are described with field examples provided. The second part explains the essential process of hydrocarbon generation and migration, emphasizing the importance of the timing of the process relative to the timing of trap formation.

Designed for

Geoscience professionals and support staff who generate structure, isochore, and other subsurface maps using interpretation or mapping software.

You will learn how to

- Identify, describe, and understand the formation of key geological fold and fault structures
- Describe principle stress configurations and the implications for the orientation of fractures and faults
- Explain the concept of strike and dip for characterizing the orientation of geologic strata and structures
- Explain the difference between structural and stratigraphic trap
- Recognize uncertainties associated with fault trap
- Describe the types of structural traps associated with extensional, compressional, and strike slip tectonic settings
- Explain the meaning of timely maturation and migration and the concept of “critical moment” for a petroleum system

Structural Interpretation Techniques and Concepts Core [GEO-STI-1]		
STATUS	LEVEL	DURATION
Released	Core	4 hrs 44 min

This skill module introduces structural interpretation as the backbone for evaluating hydrocarbon resources and modeling basins. The skill module examines structural interpretation as fundamental to aspects of development including locating and scoping traps to tracking fluid-flow pathways for hydrocarbon migration through sequential restorations. By completing this skill module, learners will be able to recognize the sound application of interpretive methods to specific structures and features and identify areas where an approach or interpretation may miss the mark or merit reevaluation.

Designed for

Exploration geologists, geophysicists, engineers, and geoscience managers

You will learn

- Explore the concept of the “Structural Family”
- Engage three types of plate tectonic habitats: divergent boundaries, convergent boundaries and transform boundaries or margins
- Examine the faults and other characteristics associated with each habitat
- Identify key terms and concepts including structural inheritance and kinematic compatibility
- Explore the significance of elevation baselines in seismic interpretation
- Review key terminology and definitions regarding faults, including fault types and kinematics, and fault displacement components
- Practice measuring throw, heave, and net slip, and examine the relationships between them for different bed dips
- Examine key the concepts of balance and admissibility in cross-sections
- Recognize the characteristics that make cross-sections viable or valid
- Explore different kinematic models for restoration and when and why they apply

Depth Conversion Fundamentals [GEP-DEC-2]

STATUS	LEVEL	DURATION
Coming soon	Fundamental	~ 4 hs

The intent of this module is to explain the fundamentals needed to convert time to depth in seismic interpretation.

Designed for

Geologists, geophysicists, and engineers who want to use seismic data for petroleum exploration and/or production. Familiarity with geological terminology will be helpful.

You will learn how to

- Identify the different types of velocities used to convert to depth
- Describe the factors that can affect depth conversion
- Recognize the skills needed to convert time to depth
- Explain how time-to-depth conversions are done on a workstation

Direct Hydrocarbon Indicators and Amplitude versus Offset Core [GEP-DHI-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 31 min

This skill module explains that the effect of hydrocarbons as a pore filling material in our seismic data is at the core of seismic interpretation. This skill module also includes a section on rock physics. Amplitude variation with offset is used to modify risk in hydrocarbon prospects. This skill module introduces the concept, process and application of the technology.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in using seismic data that needs to understand and use this data at a basic level or to communicate with others that use it.

You will learn how to

- Explain the effect of hydrocarbons in the seismic data
- Detect hydrocarbons in the seismic data
- Describe rock physics
- Define amplitude variation with offset/angle (AVO/AVA)
- Make approximations to the Zoeppritz equations, including
  - Aki-Richards equation
  - Shuey's equation
- Identify the Rutherford and Williams classification
- Describe slope, intercept, and the fluid line
- Describe the methods for prestack inversion, including
  - Simultaneous Inversion;
  - Elastic Impedance and Extended Elastic Impedance;
  - Lambda Rho and Mu Rho

Extensional Basins Interpretation Fundamentals [GEP-EXB-2]

STATUS	LEVEL	DURATION
Released	Fundamental	3 hrs 11 min

This skill module intends to explain the fundamentals of interpreting seismic data to those unfamiliar with this concept. We will examine the characteristics of extensional basins by looking at the geology and the geophysical signature.

Designed for

Geologists, geophysicists, and engineers who want to use seismic data for petroleum exploration and/or production. Familiarity with geological terminology will be helpful.

You will learn how to

- Determine extensional basins in seismic data
- Associate structural and depositional characteristics with extensional basins
- Interpret seismic data in extensional basins

Seismic Acquisition, Processing and Migration Core [GEP-SAP-1]

STATUS	LEVEL	DURATION
Released	Core	5 hrs 10 min

This skill module explains the seismic data acquisition process and components for marine and land data. Also included is a comparison of the costs of seismic data acquisition for marine and land data. It also explains the concept of seismic processing flow and deconvolution. The skill module also explains what the processors do to produce the seismic image. Finally, we discuss the process of forming the seismic image by migration. There are several ways to migrate the data, including post-stack, pre-stack, time, and depth migration. For this skill module, Kirchhoff migration is used as a word picture for the process of allowing constructive and destructive interference to build the migrated image. Other methods will be discussed with their pros and cons.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in using seismic data that needs to understand and use this data at a basic level or to communicate with others that use it.

You will learn how to

- Describe the marine configuration for a 3D survey including:
  - Components used for data acquisition
  - Arrays to attenuate noise
  - Bin gathering as a CMP assemblage of reflections
- Describe the land configuration for a 3D survey including bin gathering for a land 3D survey
- Compare the costs of 2D and 3D surveys
- Describe processing flow
- Explain the concept of deconvolution
  Identify what the processors do to produce the seismic image

Seismic Image and Geological Association with Seismic Reflections Core [GEP-SIG-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 9 min

This skill module explains at the awareness level how to identify a seismic image and how it relates to geology. Also explained are how seismic images are formed and displayed, and the differences in analyzing seismic images in time and depth domains. This skill module is designed to explain the basics of the seismic process.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in using seismic data that needs to understand and use this data at a basic level or to communicate with others that use it.

You will learn how to

- Differentiate between depth and time
- Identify how a seismic image is displayed
- Describe how a seismic image is formed
- Identify a seismic image
- Explain how a seismic image relates to geology
- Changes in lithology
- Velocity and density
- The influence of porosity and pore filling material

Seismic Interpretation Fundamentals [GEP-SEI-1]

STATUS	LEVEL	DURATION
Released	Fundamental	2 hrs 32 min

The intent of this skill module is to explain the fundamentals of interpreting reflection seismic data to those that are unfamiliar with this concept.

Designed for

Geologists, geophysicists, and engineers who want to use seismic data for petroleum exploration and/or production. Familiarity with geological terminology will be helpful.

You will learn how to

- Identify the skills needed to interpret seismic data
- Identify seismic reflectors and relate to the underlying geology
- Differentiate between faults and horizons on seismic data
- Identify the basics skills required in using workstations
- Display seismic data
- Differentiate between the contouring methods

Seismic Inversion and Attributes Core [GEP-SIA-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 40 min

What is done to the data is very simple, but the impact on our interpretation has become a huge issue. In this skill module, we learn to 'inverse' the seismic data into a rock property, specifically impedance. Also discussed are the types of inversion algorithms and their application.

Seismic data is typically not viewed in frequency or phase domain, but they are becoming popular displays. This skill module introduces the concept of attributes and explains what they are and how they are used to determine prospectivity of hydrocarbons.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in using seismic data that needs to understand and use this data at a basic level or to communicate with others that use it.

You will learn how to

- Explain the seismic inversion processes, both forward and inverse
- Identify relative and absolute impedance in seismic inversion
- Identify the inversion algorithms and their application
- Define attributes
- Identify the importance of attributes
- Describe spectral decomposition attributes
- Explain spectral notching
- Identify the concepts of attenuation and Q
- Describe the Hilbert Transform attributes
- List the multi-trace attributes
- Describe the coherency attribute
- Describe the curvature attribute
- Explain the application of self-organizing maps in predicting reservoir rock properties
- Identify the duplicity of attributes
- Relate how the application of attributes is far more important to know than the different types of attributes

Seismic Mapping Core [GEP-SEM-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 57 min

This interpretation exercise incorporates all aspects, from start to finish, in interpreting a 3D data set, including the final conversion to depth. Several discussion points on tying faults and the style of contouring are included.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in using seismic data that needs to understand and use this data at a basic level or to communicate with others that use it.

You will learn how to

- Identify the layout of a 3D seismic survey
  Turn the interpretation into a data reduction process resulting in an interpretation and a structural map originally in time

Seismic for Unconventional Reservoirs Core [GEP-SUR-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 7 min

This skill module explains why unconventional reservoirs are becoming increasingly important and how we can use conventional geophysical tools for their analysis. We also learn that 'brittleness' is the most important rock physics property and how to perform seismic analysis for unconventional reservoirs properties to contribute to sweetspot highgrading. Finally, the skill module explains the concept of microseismic recording, microseismic monitoring, and explains how the microseismic is interpreted using Hodograms in source orientation determination.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in using seismic data that needs to understand and use this data at a basic level or to communicate with others that use it.

You will learn how to

- Identify rock physics for shale reservoirs
- Describe seismic analysis for unconventional reservoirs
- Describe microseismic, including surface and subsurface recording arrays
- Describe source (event) recording and location detection
- Describe three component recording
- Identify the role of Hodograms in source orientation
- Identify the importance of microseismic monitoring in different stress areas

Wavelets and Seismic Velocities Core [GEP-WSV-1]		
STATUS	LEVEL	DURATION
Released	Core	2 hrs 47 min

This skill module explains why the vertical resolution of the seismic data is a critical issue and how the resolution is controlled by the propagating wavelet that is generated by the acquisition parameters. The skill module also discusses the recorded wavelet and its phases and the data display polarity and display conventions. Also explained is how velocity can be estimated by the seismic image construction and used as an approximation to derive a depth converted geologic model from time imaged seismic or a depth image seismic. It covers how to directly measure depth versus vertical seismic travel time through Check Shot Surveys and Vertical Seismic Profiles and how vertical seismic profiling can be extended to 2, 3, and even 4 dimensions to tie the other direction of velocity to the seismic image.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in using seismic data that needs to understand and use this data at a basic level or to communicate with others that use it.

You will learn how to

- Identify why the vertical resolution of the seismic data is a critical issue
- Explain how the resolution is controlled by the propagating wavelet that is generated by the acquisition parameters
- Identify the recorded wavelet and its phase
- Describe the data display polarity and display conventions
- Identify seismic imaging velocities and how they are used to construct the seismic image
- Describe how imaging velocities are derived from the stacking process
- Describe velocity spectrum and how it applies to stacking and migrating the data
- Explain the relationship between depth and time and the ambiguity between the two domains
- Recognize overpressure in the seismic data
- Identify the jargon associated with anisotropy
- Recognize how a vertical seismic profile directly measures the time to depth relationship at various depths in a well bore and how that facilitates tying it into seismic

Characterization of In-situ Stresses Core [PPH-CIC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 49 min

Probably one of the most important tasks in geomechanical characterization is finding different components of in-situ stresses as discussed in this skill module.

Designed for

Geoscientists, petrophysicists, completion and drilling engineers or anyone involved in unconventional reservoir development.

You will learn how to

- Identify the significance of in-situ stresses in subsurface operations with examples from different subsurface operations such as drilling, hydraulic fracturing, fluid production, and waste disposal
- Identify the in-situ stress components in the Earth and verify the validity of common approaches used to simplify the in-situ stress tensor
- Describe the difference between present-day and paleo stresses and explain how natural phenomena and subsurface operations can disturb in-situ stresses
- Calculate vertical stress (Sv) from density logs and quality control and re-build the density logs when necessary
- Explain and use different methods used for identifying horizontal stress orientation such as drilling indicators, sonic anisotropy analysis, seismology and microseismic data, natural fractures, geological indicators, lab and in-situ stress tests, etc.
- List different methods used for estimation/measurement of minimum in-situ stress (Sh_{min}) such as well tests such as mini-frac, extended leak-off test, DFIT
- Implement poroelastic modeling for estimation of the magnitudes of minimum and maximum horizontal stress (Sh_{min})

Characterization of In-situ Stresses Fundamentals [PPH-CIF-2]

STATUS	LEVEL	DURATION
Coming soon	Fundamental	~ 6 hrs

This skill module continues from the Characterization of In-Situ Stresses Core skill module with focusing on determination of maximum horizontal stress and also using case studies to provide insights on the characterization of full stress tensor.

Designed for

Geoscientists, petrophysicists, completion and drilling engineers or anyone involved in unconventional reservoir development.

You will learn how to

- Recognize the challenges of measurement of maximum horizontal stress (SH_{max}) and list the state-of-art methods for estimation of this in- situ stress component
- Explain and implement an integrated method for characterization of minimum and maximum horizontal stress (Sh_{min} and SH_{max}):
  - Frictional equilibrium
  - Reverse borehole stability using drilling experience and image logs
  - Poroelastic modeling
- Describe case studies for characterization of full stress tensor in well-, field-, and regional-scale (live session)

Core Analysis Core Knowledge [PPH-CAC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 40 min

This skill module introduces the purpose of, processes, and tools for basic core measurements and special core measurements, and overviews Petrography and Mineralogy Data from cores as well as unconventional core analysis.

Designed for

Geoscientists and engineers with less than twelve months experience using petrophysical data, Ideal for other technical staff and non-technical staff (e.g., management, drilling operations, technical support staff, finance, legal, IT, supply chain management, and others) at all experience levels wanting a basic background in the petrophysics discipline. This skill module lays the foundation for effective communications between the Subsurface Team and everyone else in the E&P Industry including Service Company and Government employees.

You will learn how to

- Outline techniques for measurement of porosity, permeability, and saturation from cores
- Identify rules for cutting core plugs, cleaning, and preparing
- Define special core analysis and its application to petrophysics
- Explain the usage of special core analysis to determine electrical properties (m, n, Qv) and procedures to assure quality
- Describe the importance of capillary pressure and wettability; how special core analysis can determine relative permeability curves and residual saturations
- Explain basic concepts of thin section, SEM, and X-ray diffraction
- Describe scanning electron microscopy's purpose
- Define terms of core analysis, the mineralogy of the rocks, and differences when taking measurements
- Identify differences between unconventional and routine measurements and know when to apply each
- Define TOC, Maturity, and Kerogen type of source rocks

Formation Testing Core [PPH-FTC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 15 min

This skill module is designed to teach the fundamental aspects of formation testing; increase familiarity with basic formation testing applications; increase understanding of the objectives, techniques, and equipment associated with reservoir fluid sampling; and explicate the role formation testing plays in assessing formation producibility.

Designed for

Production Operations Staff, Reservoir Engineers, Facilities Staff Drilling and Completion Engineers, Geoscientists, Field Supervisors and Managers, Field Technicians, Service Company Engineers and Managers.

You will learn

- The basics of formation testing, including important terms and concepts
- The specifics of formation testing applications
- How reservoir fluid sampling is conducted
- The role of formation testing for producibility

Gamma Ray and Spontaneous Potential Logging Core [PPH-GRS-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 47 min

This skill module is an introduction to Petrophysical well logging tools and data interpretation. Topics include the Gamma Ray (GR) Log and the Spontaneous Potential (SP) log. The material presented is at the awareness competency knowledge level.

Designed for

Geoscientists and engineers with less than twelve months experience using petrophysical data, Ideal for other technical staff and non-technical staff (e.g., management, drilling operations, technical support staff, finance, legal, IT, supply chain management, and others) at all experience levels wanting a basic background in the petrophysics discipline. This skill module lays the foundation for effective communications between the Subsurface Team and everyone else in the E&P Industry including Service Company and Government employees.

You will learn

- The physics and applications of Gamma Ray and Spontaneous Potential log data
- Concepts of openhole logging in vertical and horizontal wells
- Gamma Ray logging tool function and applications
- Spontaneous Potential logging tool function and applications

Introduction and Overview of Petrophysics Core [PPH-IOP-1]

STATUS	LEVEL	DURATION
Released	Core	5 hrs 1 min

This skill module introduces key concepts in petrophysics and provides an overview of how petrophysics is used in a variety of E & P applications. Topics include types of well data and data gathering, such as mud logs, MWD/LWD logs, wireline logging, coring, and core analysis. This skill module explains how common logging tools work and how they are used. Various petrophysical workflows are reviewed that integrate petrophysical data for common applications, including volumetric assessments. The knowledge gained in This skill module will give you the ability to comfortably work through complex datasets in many petrophysics topics.

Designed for

Geoscientists and engineers with less than twelve months experience using petrophysical data and other technical staff at all experience levels wanting a fundamental background in the petrophysics discipline.

You will learn how to

- Describe petrophysics and explain petrophysical applications in other subsurface specialties (Geology, Geophysics, Reservoir Engineering, Drilling Engineering)
- List and describe important petrophysical properties
- Explain the collection, types, and applications of petrophysical data including
  - Mud logging
  - Measurement while drilling (MWD)
  - Logging while drilling (LWD) and wireline logging, including differences and similarities
  - Core sampling, including the advantages and disadvantages of different types of sampling
  - Routine core analysis (RTA) and special core analysis (SCAL)
  - Fluid sampling and pressure data (wireline)
- Define petrophysical rock types and describe the basic relationships between petrophysical properties and depositional environment
- Define and describe the methodology of determining net sand, net pay, and water saturation for volumetric calculations

Introduction to Reservoir Geomechanics and its Application Core [PPH-IPG-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 55 min

This introductory skill module is designed to familiarize the learners with reservoir geomechanics, its fundamentals and terminology along with exploring methodologies used for solving problems associated with different subsurface operations.

Designed for

Geoscientists, petrophysicists, completion and drilling engineers, or anyone involved in unconventional reservoir development.

You will learn how to

- Recognize the significance of rock mechanics and petroleum geomechanics in development of hydrocarbon resources and other subsurface operations
- Identify applications of geomechanics for optimization and risk mitigation for several different subsurface operations
- Use the basic terminology of petroleum geomechanics e.g., in-situ stresses, pore pressure, failure criteria, constitutive models, fracture networks, and several other terms
- Describe the basic principles of rock mechanics and its problem-solving techniques for different geomechanical problems such as borehole stability, sand production, compaction, and subsidence, caprock integrity, hydraulic fracturing and more

Introduction to the Petrophysical Interpretation for Unconventional Reservoirs Core [PPH-IUR-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 47 min

This skill module introduces the Petrophysical Interpretation of Unconventional Reservoirs. Sources of information for reservoir description are covered and include hydrocarbon generation as a function of temperature and composition, wellsite date, coring, an core analysis, well logs and dynamic testing. Organic-rich shales can be naturally enhanced beyond the initial porosity and permeability. Methods of enhancement and examples are provided.

Designed for

Geoscientists involved with the evaluation and exploitation of unconventional reservoirs including tight gas sands, shale gas, and coal-bed methane.

You will learn to

- Important geochemical concepts of organic-rich shales
- Wellsite information, coring and core analysis, and well logging data application for shale reservoir evaluation
- Recognition of organic-rich shale with log responses
- Shales pore systems and contrasts with conventional reservoir systems
- A volumetric workflow
- Ways in which organic-rich shale porosity and permeability can be enhanced beyond the intrinsic matrix porosity and permeability
- Method for obtaining pressure and mobility on wireline
- Drilling and completion applications of geomechanical properties

Laboratory Measurements of Rock Mechanical Properties Core [PPH-LMB-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 33 min

Laboratory testing is considered one of the most reliable sources for characterization of mechanical rock properties. This skill module provides a profound understanding of the laboratory tests commonly conducted in the practice of petroleum geomechanics. It explains how to efficiently understand, interpret, and use the results of these tests in geomechanical workflows.

Designed for

Geoscientists, petrophysicists, completion and drilling engineers or anyone involved in unconventional reservoir development.

You will learn how to

- List different data sources for geomechanical characterization
- Identify different groups of laboratory tests and their differences
- Recognize the limitations and challenges of laboratory sampling and testing
- Identify the importance of compressive laboratory tests; describe unconfined and confined compressive tests and their procedures
- Determine shear failure criteria from the results of compressive laboratory tests and identify the limitations of conventional triaxial apparatus
- Describe the procedure for conducting other compressive testing apparatuses such as true triaxial and direct shear tests
- Recognize the importance of characterizing tensile strength of rocks and describe the methods used for its measurement.
- Define fracture toughness, recognize its importance, and describe different methods used for the measurement of fracture roughness
- Recognize the influence of rock anisotropy on the results of compressive and tensile laboratory tests

Laboratory and Field Measurement of Special Rock Mechanical Properties Core [PPH-LFM-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 45 min

While conventional laboratory tests provide important basic data, proper geomechanical characterization of rock properties require acquisition of important data from several other sources such as special laboratory tests and field measurements. This skill module introduces these data sources and explains their values and applications for geomechanical characterization.

Designed for

Geoscientists, petrophysicists, completion and drilling engineers or anyone involved in unconventional reservoir development.

You will learn how to

- Recognize the importance of compressibility tests in reservoir geomechanics and identify different types of compressibility coefficients
- Describe procedures of hydrostatic and uniaxial compressibility tests in drained and undrained conditions
- Recognize the influences of (cyclic) production and injection on the mechanical response of rocks
- List the reasons for conducting non-destructive tests and the procedures for some major non-destructive tests including rebound hammer, indentation and scratch tests and list their limitations
- Explain the differences of dynamic and static measurements of elastic rock properties and recognize the importance of comparing static and dynamic elastic properties
- Describe the procedure for the ultrasonic test and calculate dynamic rock properties from the results of this test
- Recognize the influence of rock anisotropy on the results of ultrasonic tests
- Explain how acoustic emission measurements can help with the characterization of failure in rocks
- List different field measurement methods that can be used for the characterization of mechanical rock properties such as wireline logs, seismic surveys, seismic and micro-seismic monitoring and mechanical field tests

Mud Logging, Coring, and Cased Hole Logging Core [PPH-MLC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 21 min

This skill module continues the introduction to a specialized area of E&P called Petrophysics. The field operations and technologies required to identify and quantify oil and gas resources are introduced. Topics include mud logging, coring, and cased hole logging. The material presented is at the awareness competency level.

Designed for

Geoscientists and engineers with less than twelve months experience using petrophysical data, Ideal for other technical staff and non-technical staff (e.g., management, drilling operations, technical support staff, finance, legal, IT, supply chain management, and others) at all experience levels wanting a basic background in the petrophysics discipline. This skill module lays the foundation for effective communications between the Subsurface Team and everyone else in the E&P Industry including Service Company and Government employees.

You will learn

- About acquiring and interpreting mud log data including gas detection and drill cuttings examination to identify prospective oil and gas zones
- How representative rock samples are obtained with coring methods including whole cores and sidewall samples
- The basics of cased hole logging for reservoir monitoring, production logging, and wellbore integrity

Overview of Petrophysical Interpretation Core [PPH-OPI-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 44 min

This skill module provides an overview of petrophysical interpretations, focused on conventional reservoirs. The skill module introduces the goals and data sources of petrophysical interpretation and details the data quality and conditioning processes that are essential to producing reliable interpretations to inform asset development.

Designed for

The content is suitable to anyone wanting to understand the bases for subsurface resource interpretation of conventional reservoirs. Previous exposure to subsurface terminology and concepts is assumed.

You will learn how to

- How petrophysical interpretations address and measure the geochemical properties of conventional reservoirs, linked to the goals of specific projects
- Data sources of petrophysical studies – including why data quality is a perennial concern and how it can be addressed
- Common workflows for petrophysical interpretation and the purposes and features of each
- How volumetric interpretations are formed from petrophysical measurements
- How fluid flow is measured as the basis of dynamic interpretations
- Petrophysical approaches for addressing and quantifying uncertainty

Petrophysical Evaluation Core [PPH-PEC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 52 min

This skill module is an introduction to Petrophysical Evaluation which integrates the concepts and data covered in the previous modules. The porosity and resistivity data are used in the saturation model to calculate oil and gas saturations. By integrating the available mudlog, core and open hole log data, the Petrophysicist determines net pay, net to gross, porosity, and hydrocarbon saturations. These are required inputs to the Geologic (Static) model used to calculate hydrocarbon volumes in the subsurface. Also, the petrophysical evaluation data including permeability is required input into the reservoir dynamic model that is used to plan development wells and facilities and optimize production of oil and gas reservoirs.

Designed for

Geoscientists and engineers with less than twelve months experience using petrophysical data, Ideal for other technical staff and non-technical staff (e.g., management, drilling operations, technical support staff, finance, legal, IT, supply chain management, and others) at all experience levels wanting a basic background in the petrophysics discipline. This skill module lays the foundation for effective communications between the Subsurface Team and everyone else in the E&P Industry including Service Company and Government employees.

You will learn

- How to perform a basic petrophysical evaluation that incorporates Gamma Ray, SP, porosity, and resistivity data
- About the borehole and formation environment and the parameters required for saturation determination
- About the Archie Equations and how to calculate water saturations in any interval of interest
- About the effect of clay minerals on formation resistivity
- About the shaly sand equations used to calculate saturations in shaly sands
- About how to conduct an integrated formation evaluation

Pore Pressure Measurement and Prediction Core [PPH-PPM-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 45 min

Pore pressure is a critical parameter for geomechanical modeling, and its proper characterization has a great importance as will be discussed in this skill module.

Designed for

Geoscientists, petrophysicists, completion and drilling engineers or anyone involved in unconventional reservoir development.

You will learn how to

- Identify the significance of pore pressure in subsurface operations such as drilling, completion, production, etc.
- Define pore pressure in porous rock and describe the mechanical interaction between the rock matrix and fluid and explain the concept of effective stresses
- List different pore pressure regimes and explain their differences
- Recognize and explain different mechanisms that result in overpressure regimes including stress-induced, uplift, buoyancy and pressure difference, and fluid generation and fluid expansion mechanisms
- Identify and describe natural and artificial mechanisms that result in underpressure regimes
- List different methods used for pressure detection and prediction including pre-drilling, while-drilling, and after-drilling methods
- Describe the fundamentals of pore pressure measurement using well testing
- Recognize the influence of pore pressure on different rock properties, petrophysical logs and seismic attributes that can be implemented for identifying overpressuring
- Explain the influence of high pore pressure on different rock properties such as porosity, density, wave velocities, and resistivity
- Explain basic equivalent depth and ratio methods to estimate overpressuring from petrophysical logs
- Explain how drilling indicators (e.g., kicks, tight spots, gas shows, etc.), rock cavings and drilling rate are used for estimation of pore pressure
- Explain the challenges of pore pressure prediction in unconventional plays

Porosity Logging (Density, Neutron and Sonic) Core [PPH-PLC-1]

STATUS	LEVEL	DURATION
Released	Core	5 hrs 33 min

This skill module continues the introduction to Petrophysical well logging tools and data interpretation. Topics include Density, Neutron, and Sonic “Porosity” Logs. The material presented is at the awareness competency level.

Designed for

Geoscientists and engineers with less than twelve months experience using petrophysical data, Ideal for other technical staff and non-technical staff (e.g., management, drilling operations, technical support staff, finance, legal, IT, supply chain management, and others) at all experience levels wanting a basic background in the petrophysics discipline. This skill module lays the foundation for effective communications between the Subsurface Team and everyone else in the E&P Industry including Service Company and Government employees.

You will learn

- The tool physics and data applications of the primary porosity well logs including the Density, Neutron, and Sonic Logs

Resistivity Logging Tools and Interpretation Core [PPH-RLT-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 35 min

This skill module continues the introduction to petrophysical well logging tools and data interpretation. Resistivity logging tools including Induction logs, Laterologs, EWR tools, and Microresistivity devices as well as resistivity data are covered. Topics include depth of investigation and bed resolution, types of resistivity logs, and the effects of different mud systems.

Designed for

Geoscientists and engineers with less than twelve months experience using petrophysical data, Ideal for other technical staff and non-technical staff (e.g., management, drilling operations, technical support staff, finance, legal, IT, supply chain management, and others) at all experience levels wanting a basic background in the petrophysics discipline. This skill module lays the foundation for effective communications between the Subsurface Team and everyone else in the E&P Industry including Service Company and Government employees.

You will learn

- Operating tool physics and data applications of the various resistivity logging tools
- Selection criteria for which tool provides the best resistivity data for different environments (mud types, formation resistivity ranges, etc.)
- The latest Array resistivity tools
- The transverse induction device for highly anisotropic formations
- The Resistivity Logging Tools – Old Electric Logs
- Depth of investigation and bed resolution
- Induction Logs
- Laterologs
- Microresistivity Logs

Rock Mechanics Core [PPH-FRM-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 41 min

This skill module reviews essentials of rock mechanics required for the general practice of petroleum geomechanics and covers basic concepts such as stress, deformation, and failure in rocks.

Designed for

Geoscientists, petrophysicists, completion and drilling engineers, or anyone involved in unconventional reservoir development.

You will learn how to

- Identify three main constituents of geomechanical problems: initial state, disturbing events, and mechanical response in different geomechanical problems
- Define stress tensor, effective stresses, principal stresses, and in-situ stress regimes and visual stresses in the Mohrs coordinate system
- Recognize the significance of deformation in rock mechanics and define strain tensor and different types of strains
- Describe elastic and elastoplastic constitutive models between stress and strain tensors such elastic and elastoplastic and their parameters
- Calculate dynamic elastic parameters and identify the differences between dynamic and static elastic parameters
- Recognize the importance of shear failure criteria in geomechanics and describe different linear and non-linear failure criteria and their advantages and limitations
- Read and use laboratory reports for measurement of elastic parameters and strength properties of rocks

Rock Mechanics for Shale Plays Core [PPH-RMS-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 30 min

Special mechanical properties of shales such as anisotropy, brittleness and fracture toughness have great importance for development of shale plays as will be discussed in this skill module.

Designed for

Geoscientists, petrophysicists, completion and drilling engineers or anyone involved in unconventional reservoir development.

You will learn to

- Identify mechanical anisotropy and its different types and its measurement from lab, log, and seismic data
- Recognize how anisotropy influences the rock response to hydraulic fracturing
- Identify the different types of rock brittleness (elastic, mineralogical and strength-based)
- Describe fracture toughness and its measurement

Special Petrophysical Tools: NMR and Image Logs Core [PPH-SPT-1]		
STATUS	LEVEL	DURATION
Released	Core	2 hrs 5 min

This skill module introduces Nuclear Magnetic Resonance (NMR) Logging, interpretation of Borehole Images and Dip Meter Data, and how permeability is measured in both logs and cores. The skill module covers NMR logging principles and interpretation and the importance and application of borehole image and dipmeter data.

Designed for

Geoscientists and engineers with less than twelve months experience using petrophysical data, Ideal for other technical staff and non-technical staff (e.g., management, drilling operations, technical support staff, finance, legal, IT, supply chain management, and others) at all experience levels wanting a basic background in the petrophysics discipline. This skill module lays the foundation for effective communications between the Subsurface Team and everyone else in the E&P Industry including Service Company and Government employees.

You will learn how to

- Describe NMR principles: proton recession and T1 and T2 relaxation in porous media
- Describe the NMR response to pore size, free fluid, trapped water, permeability, and water cut
- Characterize tool models, similarities, differences, and operational issues
- Define NMR permeability determination and bound water versus free water
- Describe NMR saturation techniques and interpretation, including appropriate applications and limitations
- Determine permeability from conventional wireline logs
- Estimate permeability from empirical relationships
- Apply specialized tools, such as NMR and acoustic logs to estimate permeability
- Determine permeability from cores

Decline Curve Analysis and Empirical Approaches Core [RES-RSA-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 13 min

This skill module introduces the use of statistical methods in reservoir engineering. A range of applications are described, concentrating on decline curve analysis.

Designed for

Reservoir Engineers, and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn how to

- Perform basic statistics
- Calculate decline curve analysis
- Estimate recovery factors

Decline Curve Analysis and Empirical Approaches Fundamentals [RES-RSA-2]

STATUS	LEVEL	DURATION
Released	Fundamental	10 hrs 7 min

This skill module applies basic statistical methods to solve a range of common challenges in reservoir engineering. The emphasis will be on decline curve analysis and curve fitting to measured data such as relative permeability, as an example.

Designed for

Reservoir Engineers, and other professionals tasked with performing basic reservoir engineering functions.

You will learn

- Exponential, Hyperbolic, and Harmonic decline curve application
- Transient versus Pseudosteady State declines
- Effect of crossflow on the performance of layered reservoirs
- Using water-cuts, oil cuts, and water-oil ratios to calculate oil recovery
- Special considerations for gas reservoirs
- Decline curves for low permeability reservoirs
- Variation on the least-squares methods for curve fitting
- Common pitfalls for decline curve analysis

Prerequisite

- Decline Curve Analysis and Empirical Approaches Core [RES-RSA-1]

Enhanced Oil Recovery Core [RES-EOR-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 17 min

This skill module introduces secondary and tertiary recovery process. It describes how many of them work, how you can select the best one for your reservoir, and how simplified models can be used to approximate the behavior of these complex floods.

Designed for

Engineers or Geoscientists who will be working with a reservoir engineer on the development and optimization oil and gas fields. Reservoir engineers looking for an introduction or a refresher on enhanced oil recovery.

You will learn

- The differences between secondary and tertiary recovery
- The comparisons between pattern and peripheral flooding
- The life stages of a waterflood
- The differences between miscible, thermal, and chemical floods
- Screening criteria for different floods
- Rules of thumb for predicting performance
  Simplified models for predicting performance

Improved Oil Recovery Fundamentals [RES-IOR-2]

STATUS	LEVEL	DURATION
Released	Fundamental	5 hrs 20 min

This skill module discusses the reservoir aspects of waterflooding. It builds on the related topics from earlier modules and "fills in the blanks". Reservoir Surveillance and Reservoir Management activities specific to waterfloods are covered and the balance left to later modules to avoid duplication.

Designed for

Engineers or Geoscientists who will be working with a reservoir engineer on the development and optimization of oil and gas fields. Reservoir engineers looking for an introduction or a refresher on enhanced oil recovery.

You will learn

- Waterflood Types
  - Peripheral versus Pattern
  - Above versus Below Bubble Point Pressure
  - Above versus Below Fracture Pressure
  - High versus Low Reserves to Producing ratios
  - Normal versus Enhanced
  - Onshore versus Offshore
- Waterflood Operations
  - Modeling the Reservoir
  - Monitoring Injectors
  - Monitoring Patterns
  - Water Quality

Introduction to Unconventional Reservoirs Core [RES-IUR-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 15 min

This skill module introduces the Unconventional Reservoir Engineering set of skill modules. In This skill module, the basic terminology of all the disciplines is introduced and the fundamental reservoir characterization techniques are discussed. Also covered are the basics of reservoir management and integrated teamwork and how they are essential to proper field development.

Designed for

All petro-technical professionals who have little experience with unconventional reservoirs but who need or desire to start developing some understanding of important basic concepts and methods associated with these resource types.

You will learn

- What types of unconventional reservoirs exist
- How they are different from conventional reservoirs
- How the geologic characterization is different from conventional reservoirs
- How reservoir management is different from conventional reservoirs
- How reservoir enhancement is different from conventional reservoirs
- How reservoir surveillance is different from conventional reservoirs
- How reservoir evaluation is different from conventional reservoirs
- What constitutes a "sweet spot" in unconventional reservoirs

Pressure Transient Analysis Core [RES-PTA-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 30 min

This skill module brings your attention to pressure transient analysis concepts, equations, and terminology. These will get you started in the process of understanding and using this key technology for understanding oil and gas reservoir architecture and near-well parameters.

Designed for

Reservoir Engineers, and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn

- Pressure transient analysis concepts, terminology, equations, and objectives
- Pressure transient analysis in buildup and drawdown tests
- Time period analysis, challenges and objectives
- Semi-log and log-log analysis

Producing versus Injecting Wells Fundamentals [RES-PVI-2]

STATUS	LEVEL	DURATION
Released	Fundamental	5 hrs 23 min

In this skill module, we construct single-well models of both injectors and producers, describe their applications to waterflooding, and discuss their limitations.

Designed for

Reservoir, production, facilities, and operations engineers who are involved with some aspects of a new or existing waterflood project; geoscientists and professionals who want to get a better feel for the entire process of planning, development, management, and recovery optimization of a waterflood project.

You will learn how to

- Estimate the performance of an injection well using analytical methods
- Estimate the performance of an injection well using numerical methods
- Explain the advantages of modeling producing wells together with injection wells
- Compare injection above and below the oil-water contact
- Compare injection above and below bubble point
- Compare injection through vertical and horizontal wells
- Compare injection through hydraulically fractured wells
- Discuss the merits of partial perforation versus full perforation
- Explore perforation strategy differences between injection and producing wells
- Compare and contrast multiple methods of water shut-off in both injection and producing wells
- Compare and contrast multiple artificial lift methods for producing high water-cut wells
- Discuss the advantages and disadvantages of hydraulically fracturing injection and/or producing wells
- Discuss the advantages and disadvantages of gravel-packing injection and/or producing wells
- Calculate the optimal ratio of producing to injecting wells for a waterflood
- Discuss the merits of dry tree versus subsea wells for a waterflood

Rate Transient Analysis Core [RES-RTA-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 39 min

This skill module covers five sections that include the general introduction to Rate Transient Analysis, Traditional Decline Curve Analysis, Modern Rate Transient Analysis, Unconventional Reservoirs, and Integration of Material Balance.

Designed for

Reservoir Engineers, and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn how to

- Define the rate time analysis
- Distinguish between traditional pressure transient analysis and rate time analysis
- Describe the needs of the type of data which are typically used for rate time analysis
- Discuss the application of rate time analysis under transient and pseudo-steady state conditions
- Distinguish between the type of reservoir information we can obtain under transient and pseudo-steady state conditions
- Explain the use of dimensionless variables in rate time analysis
- Describe the limitations of the rate time analysis
- Distinguish between exponential, harmonic, and hyperbolic decline curves
- Explain the different parameters which impact the performance of a well
- Describe how the Economic Ultimate Recovery (EUR) is impacted by the assumptions about the type of decline method
- Identify different flow regimes which are present for multiple fractured, horizontal wells
- Indicate important flow regimes which are typically observed in horizontal, multi-stage, fractured wells
- Determine the type of reservoir parameters we can obtain from evaluating rate time data for unconventional formations
- Indicate how the traditional decline curve analysis can be used for wells producing from unconventional reservoirs
- Describe the relationship between material balance and rate time analysis
- Explain how to combine material balance with rate equations to predict rate as a function of time
- Describe simple cases for single phase gas and oil reservoirs and predict the rates
- Indicate how the simple analysis can be extended to other complex situation

Reserves and Resources Core [RES-RRC-1]

STATUS	LEVEL	DURATION
Released	Core	5 hrs 15 min

This skill module brings your attention to reserves management and the difference between resources and reserves at an awareness competency level.

Designed for

Reservoir Engineers, and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn

- The importance of integration with other disciplines
- Calculations using the volumetric formulas for gas and oil
- The importance of dividing into flow units for dynamic reserves in reservoir simulation
- Reserves management: what it is and how to do it
- The Reservoir Engineer's input to reserves and resources (R & R)
- How a Geoscientist and Reservoir Engineer work together on reserves
- The risk and uncertainty that drive reserves
- Other non-technical factors that influence R & R
- The standardized process between reserve estimates
- The ethical basis underlying R & R estimations

Reservoir Flow Properties Core
[RES-RFP-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 42 min

This skill module discusses the extensions and limitations of Darcy's Law. This skill module also includes the application of Darcy's Law to gas an oil and how the law can be applied to homogenize to calculate effective permeability.

Designed for

Reservoir Engineers and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn how to

- Explain the origin of Darcy's law and how it evolved
- State the difference between gravity and the pressure gradients, and how they play a role in determining the rate of which fluid could flow in the porous medium
- Identify the differences between the equations of Linear versus radial flow when calculating the flow
- Explain how heterogeneities affect the flow in porous medium, and how Darcy's law can be applied to homogenize to calculate effective permeability
- Differentiate between oil and gas flow
- Apply Darcy's law to gas and oil
- Calculate the amount of fluid that is flowing when you have single cell phase vs single phase oil
- Describe the Importance of non-Darcy effect on well performance
- Apply Darcy's law when calculating the rate of the of oil and gas well
- Identify the differences between layers in parallel and layers in series
- Discuss the effective permeability of both layers in parallel and layers in series
- State limitations of Darcy's law
- Assess the differences between gas and oil reservoirs
- Describe the effect of non-Darcy flow

Reservoir Flow Properties Fundamentals
[RES-RFP-2]

STATUS	LEVEL	DURATION
Released	Fundamental	8 hrs 34 min

This skill module covers multiple basic and advanced levels of topics. The topics include but are not limited to Darcy's law, Flow Regimes, Fractured Wells, and Heterogeneous systems and Skin factor. This skill module also includes an interactive virtual phase where the learner works with the instructor virtually to analyze and solve problems.

Designed for

Reservoir Engineers and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn how to

- Apply Darcy's law for radial flows
- Differentiate between oil and gas flows
- Solve simple problems for radial flow across porous medium
- Define and calculate productivity index
- Understand the application of both pseudo-real pressure and pressure squared methods for gas wells in calculating the rates
- Evaluate the end of transient and the beginning of pseudo-steady state flows for circular as well as non-circular reservoirs
- Understand the importance of vertically fractured and horizontal wells
- Calculate the rates and productivity indices for vertically fractured and horizontal wells using the concept of effective well bore radius
- Understand different flow regimes encountered by vertically fractured and horizontal wells
- Evaluate efficacy of horizontal wells and compare the performance to vertically fractured wells
- Evaluate the performance of a well in the presence of skin factor
- Evaluate the performance of the well with limited amount of production data
- Understand the conditions under which non-Darcy flow is important
- Evaluate the performance of gas wells in the presence of non-Darcy flow using both pressure squared and pseudo-pressure equations
- Understand the concept multi-rate test and why it is important
- Evaluate the oil well performance when the well is producing below bubble point
- Analyze and solve basic and advanced level problems

Prerequisite

- Reservoir Flow Properties Core [RES-RFP-1]

Reservoir Fluid Core
[RES-RRC-1]

Released	Core	3 hr 54 min

This skill module reviews fluid properties at the awareness competency level.

Designed for

Reservoir, production, and facilities engineers who have a need to model the flow of oil, gas, and water through reservoirs, wellbores, and surface facilities; geoscientists who need reservoir fluid properties for their interpretations and calculations.

You will learn how to

- Describe how fluids change in response to changes in pressure and temperature
- Define the engineering properties of reservoir fluids
- Describe the make-up of reservoir fluids
- Describe how fluids are sampled
- Describe how fluid properties are measured in the laboratory

Reservoir Fluid Fundamentals [RES-RFF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	9 hrs 35 min

This skill module explores the calculation fluid properties such as formation volume factors, viscosities, and densities for a wide range of fluids under reservoir conditions.

Designed for

Reservoir, production, and facilities engineers who have a need to model the flow of oil, gas, and water through reservoirs, wellbores, and surface facilities; geoscientists who need reservoir fluid properties for their interpretations and calculations.

You will learn

- Volumetrics
- Material Balance
- Fluid Flow using Darcy's Law
- Pressure Transient Analysis
- Rate Transient Analysis
- Fluid Displacement
- Many other types of analysis

Reservoir Fluid Displacement Core [RES-RFD-1]

STATUS		
Released	Core	3 hrs 38 min

This skill module covers immiscible, linear displacement as dispersed and segregated flow. It also discusses aquifers, coning, and vertical layering.

Designed for

Reservoir Engineers and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn

- Fluid displacement as immiscible, linear, and vertical (overcoming gravity)
- Dispersed and segregated flow
- Aquifers models
- Coning in oil/water systems, including when it is most likely to occur, and how to prevent it

Reservoir Fluid Displacement Fundamentals [RES-RFD-2]

Released	Fundamental	10 hrs 34 min

This skill module expands on the topics covered in Reservoir Fluid Displacement Core:

- Immiscible, linear displacement as dispersed and segregated flow
- Aquifers
- Coning
- Vertical layering

Designed for

Engineers or geoscientists who will occupy the position of reservoir engineer, and any other technically trained individual who desires a more in-depth foundation in reservoir engineering.

You will learn how to

- Calculate the breakthrough time for an oil well using a collection of different methods
- Explain how rock and fluid properties as well as reservoir geometry affect the breakthrough time
- Model the flow of two fluids concurrently through the same rock volume
- Recognize how flow rates and pressure drops vary under two phase flow
- Calculate recovery factors for reservoirs experiencing two phase flow as a function of time
- Use correlations to estimate areal and vertical sweep efficiency
- Calculate water influx into hydrocarbon reservoirs using a variety of aquifer models
- Recognize the strengths and weaknesses of popular aquifer models

Prerequisite

- • Reservoir Fluid Displacement Core [RES-RFD-1]

Reservoir Management Core [RES-RMC-1]

STATUS	LEVEL	DURATION
Released	Core	6 hrs

This skill module brings your attention to reservoir management (RM) at an awareness competency level.

Designed for

Reservoir Engineers and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn how to

- Retain flexibility in RM without giving up key principles for depletion
- Build flow units critical to RM of an asset
- Describe how the value of an asset is defined; Explain the roles of risk and uncertainty in that valuation
- Evaluate vertical equilibrium and no-crossflow and how to get the most out of each through integrated technologies from multiple disciplines

Reservoir Management Fundamentals [RES-RMF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	8 hrs 9 min

This skill module covers more advanced treatment of reservoir management principles. We look more thoroughly at special reservoir situations. We will also deal specifically with your own reservoir management asset issues in this skill module.

Designed for

Reservoir Engineers and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn how to

- Manage reservoir management uncertainties throughout phases of field maturity
- Identify the geologic and reservoir parameters that make an opportunity and then the capture techniques to the particularities of that opportunity
- Conduct analysis to determine the most appropriate injectant including EOR techniques (if any) for a particular reservoir situation
- Apply the appropriate well architecture(s) or combination of well architectures to match the combined geology and reservoir drive mechanism
- Adjust and adapt the reservoir management plan for each new phase of field life

Prerequisite

- Reservoir Management Core [RES-RMC-1]

Reservoir Material Balance Core [RES-RMB-1]

STATUS	LEVEL	DURATION
Released	Core	8 hrs 9 min

This skill module covers the basics of material balance. The topics included are drive mechanisms, principles of material balance, how to develop equations, and application of the material balance equation.

Designed for

Reservoir Engineers and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn how to

- Describe the purpose of the material balance technique to estimate the initial hydrocarbons in place
- Differentiate between volumetric analysis and material balance technique
- State the basic principle of material balance analysis
- Describe the principles behind material balance equation
- Identify the data that is needed to apply the material balance equation and the uncertainties associated with collecting such data
- Identify the purpose of the modified black oil model in material balance equation
- State the assumptions involved in applying the material balance equation
- Identify the limitations of material balance technique
- Develop the material balance equations from the first principle
- Identify and explain the different mechanisms influencing the production of hydrocarbons and how they are incorporated in the material balance equation
- Understand the necessary equations to be used depending on the type of reservoir from which hydrocarbons produce
- Develop appropriate equations for dry gas, wet gas, condensate, volatile oil, and black oil reservoirs
- Describe modifications of material balance equations to estimate the initial oil and gas in place
- Explain the Havlena and Odeh method and the appropriate way to linearize the material balance equations
- Express the importance of water influx and how to detect the presence of aquifer based on production data
- Recognize the uncertainties associated with predicting the water influx as a function of time

Reservoir Material Balance Fundamentals [RES-RMB-2]

STATUS	LEVEL	DURATION
Released	Fundamental	6 hrs 35 min

This skill module reviews and expands on the Material Balance Core module. Included in this skill module is a detailed review of Dry and Wet Gas Reservoirs, Black Oil Reservoir, Volatile Oil and Retrograde Condensate Reservoir, and Water Influx.

Designed for

Reservoir Engineers and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn how to

- Discuss the basic material balance equation and the assumptions
- Understand how the equations can be simplified based on certain assumptions and importance of mechanisms
- Relate material balance equation to different types of reservoirs
- Understand the application of material balance equation for gas reservoirs
- Consider the simplifications of material balance equation for absence or presence of different mechanisms
- Evaluate the uncertainties associated with mischaracterization of different mechanisms
- Apply various straight line manipulations for determining the gas in place for gas reservoirs
- Understand important drive mechanisms for black oil reservoirs
- Estimate the oil in place in oil reservoirs when the reservoir is
  - above bubble point
  - producing below bubble point
  - influenced by gas cap
- Quantify the uncertainties in oil place based on the assumptions in the strength of drive mechanisms
- Quantify the uncertainties in oil place based on the assumptions in the strength of drive mechanisms
- Understand the importance of water influx in the material balance calculations
- Learn how to estimate the water influx using pot aquifer as well as pseudo-steady state methods
- Understand trial and error procedure required to estimate the aquifer influx
- Recognize the uncertainties associated with the estimation of aquifer size and the strength

Prerequisite

Reservoir Material Balance Core [RES-RMB-1]

Reservoir Rock Properties Core [RES-RRP-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs

This skill module reviews the properties of reservoir rocks at the awareness level.

Designed for

Reservoir engineers and geoscientists who need reconcile rock properties with their interpretations of the properties of the reservoir, drilling, production and completion engineers who need to recognize how rock properties affect their respective workflows.

You will learn

- Different types of rocks
- Primary rock properties from a reservoir engineering point of view
- How rock properties are measured
- How rock property values are interpolated/extrapolated throughout the reservoir

Reservoir Rock Properties Fundamentals [RES-RRP-2]

STATUS	LEVEL	DURATION
Released	Fundamental	7 hrs 40 min

This skill module introduces the concepts of wettability, capillary pressure and relative permeability, and discusses how they are measured and modeled for reservoir behavior description.

Designed for

Engineers and Geoscientists who need to understand how fluids compete for space in the reservoir.

You will learn how to

- Describe the concept of fluid contacts
- Describe how saturations change when crossing contacts
- Describe wettability
- Describe interfacial tension
- Describe how residual oil saturation is controlled by the interplay of different forces
- Define capillary pressure
- Explain how capillary pressure is a combination of several related phenomena
- Describe how capillary pressure can be used to explain macroscopic reservoir phenomena
- Show how collecting capillary pressure data can actually save money
- Discuss the various choices available for measuring relative permeability in the laboratory
- Discuss the various choices available for measuring capillary pressure in the laboratory
- Show how reservoir engineers model relative permeability
- Show how reservoir engineers model capillary pressure
- Describe how reservoir engineers define saturations
- Apply concepts discussed in the skill module to build relative permeability and capillary data datasets

Prerequisite

- Reservoir Rock Properties Core [RES-RRP-1]

Reservoir Simulation Core [RES-RSI-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 55 min

This skill module describes how reservoir simulations are used, what goes into them, how they do their calculations, and what comes out of them.

Designed for

Engineers and Geoscientists who interact with reservoir simulation specialists need to evaluate the value of these models to the enterprise.

You will learn how to

- Describe what kind of data is used by a simulation run
- Describe the kinds of information that can be generated from a simulation run
- Explain, at a high level, how reservoir simulators work
- Describe how simulation models differ during the life of the reservoir
- Describe how models are classified, based on:
  - The type of input data used
  - The question the model was designed to answer

Reservoir Surveillance Core [RES-RSC-1]

STATUS	LEVEL	DURATION
Released	Core	6 hrs 25 min

This skill module brings your attention to reservoir surveillance (RS) objectives, activities, and plans and the link to uncertainty.

Designed for

Reservoir Engineers and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn

- A surveillance plan's objectives must be aligned with asset specific tactical details
- Surveillance activities must add value and they do not after reaching a certain optimum
- How to calculate the Value of Information derived from surveillance activities
- How surveillance activities reduce uncertainty
- The surveillance plan must change constantly as asset objectives change
- The impact of the production and well environment, including well construction concepts and how this impacts RS activities
- How production allocation impacts the quality of the data and the impact of data frequency
- Measurement principles behind oil field measurements, including concepts related to precision, accuracy, and repeatability

Reservoir Surveillance Fundamentals [RES-RSF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	9 hrs 20 min

This skill module continues the discussion on reservoir surveillance (RS), with a focus on quality control for baseline and episodic data, data analytics, special techniques, and life of field reservoir surveillance.

Designed for

Reservoir Engineers and other professionals tasked with supplying reservoir description and production data to reservoir engineers.

You will learn how to

- QA/QC baseline and episodic data
- Use data analytics at various scales and from laboratory to the field
- Evaluate special techniques for application in your reservoir
- Prepare your reservoir for life of field reservoir surveillance through observed case studies

Prerequisite

- Reservoir Surveillance Core [RES-RSC-1]

Unconventional Reservoir Analysis Core [RES-URA-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 59 min

In this skill module, you will learn the fundamental ways that various well tests and production analyses are applied to unconventional reservoirs. Diagnostic Fracture Injection Tests (DFITs), Diagnostic Plots, Rate Transient Analysis (RTA), Decline Curve Analysis (DCA) are all historic production rate and pressure analysis tools that are being applied to unconventional reservoirs. The fundamental principles will be reviewed before the application skills are covered in the Unconventional Reservoir Analysis Fundamentals skill module. Additionally, the fundamental principles of Reserves and Resource management will be covered.

Designed for

All petro-technical professionals who have little experience with unconventional reservoirs but who need or desire to start developing some understanding of important basic concepts and methods associated with these resource types.

You will learn

- What a DFIT, RTA, DCA analysis is
- How to read a Diagnostic Plot
- Why the analysis of these techniques is different in unconventional reservoirs

Fundamental principles of reserves and resource management

Unconventional Reservoir Analysis Fundamentals [RES-URA-2]

STATUS	LEVEL	DURATION
Released	Fundamental	9 hrs 32 min

This skill module is designed for professional engineers and geoscientists with a basic understanding of unconventional rocks and fluids and the drilling and completion of horizontal laterals who wish to quickly learn single well analysis techniques, including the key elements of these reservoirs and the technologies to exploit them. Diagnostic plots to identify flow regimes and rate transient analysis (RTA) to understand individual well performance are discussed. Field level topics include field development and reservoir surveillance. Decline curve analysis (DCA) for individual wells is presented followed by Reserves and Resources estimations in unconventionals, primarily under the Petroleum Resources Management System (PRMS) guidance. Attendees should leave this course with the tools to understand individual well behavior as well as field planning and development in the reservoirs which supply an ever increasing fraction of the world's oil and gas, unconventional reservoirs.

Designed for

Subsurface technical professionals, geoscientists, completion engineers, reservoir engineers, petroleum engineers, and drilling engineers.

You will learn how to

- Calculate volumetric estimates in unconventional reservoirs
- Apply material balance analysis with corrections for unconventional reservoirs
- Calculate properties from DFIT's
- Calculate drainage volumes from rate transient analysis
- Match historical data and forecast future production using statistical tools adjusted for unconventional reservoirs

Unconventional Reservoir Properties Core [RES-URP-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 30 min

This skill module works through the key parameters and how they are measured in understanding unconventional reservoir rock properties. Organic, Rock and Mechanical Quality Factors are defined, and various measurement techniques are described plus an understanding of the uncertainty ranges associated with those measurements.

Designed for

Subsurface technical professionals, geoscientists, completion engineers, reservoir engineers, petroleum engineers, and drilling engineers.

You will learn

- Specifics about how Organic, Rock and Mechanical Quality is quantified
- Why each factor is important in the understanding of unconventional reservoirs
- The difference between Tight Gas Sands and Shale Reservoirs

Uncertainties in Well and Laboratory measurements of Rock Properties

Unconventional Reservoir Properties Fundamentals [RES-URP-2]

STATUS	LEVEL	DURATION
Released	Fundamental	6 hrs 30 min

This skill module is Designed for professional engineers and geoscientists with little experience in unconventional reservoirs who wish to quickly learn the key elements of these reservoirs and the technologies to exploit them. Focused on shale (tight) oil, tight gas, and coalbed methane, this course begins with an introduction to unconventionals then reviews geoscience elements from the previous modules and demonstrates their use in unconventional reservoir engineering. Fluid sampling for laboratory tests and fluid property correlations are presented. Drilling and completion of wells in unconventional reservoirs are considered, with a focus on horizontal wells. Stimulation fluid systems and proppants are briefly discussed. A key test for stimulation design, diagnostic fracture injection tests (DFIT's) is presented along with classic test signatures. Attendees should leave this course with a better understanding of the basic physics of unconventional reservoirs and the fluids they hold as well as the basics of placing wells in those reservoirs to drain those fluids.

Designed for

Subsurface technical professionals, geoscientists, completion engineers, reservoir engineers, petroleum engineers, and drilling engineers.

You will learn how to

- Manage the difference between unconventional and conventional fluids
- Develop relationships between rock properties and well performance
- Calculate flow rates under conditions in which fluid models break down
- Use simulated rock volumes and discrete fracture networks

Prerequisite

• Unconventional Reservoir Properties Core [RES-URP-1]

Waterflood Analytical Forecasting Fundamentals [RES-WAF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	6 hrs 4 min

This skill module is a deep dive into a selection of the most popular analytical waterflood models. We provide step-by-step instructions on how to build each one and discuss the mathematics necessary to actually make them work in the 21st century.

Designed for

Reservoir, production, facilities, and operations engineers who are involved with some aspects of a new or existing waterflood project; geoscientists and professionals who want to get a better feel for the entire process of planning, development, management, and recovery optimization of a waterflood project.

You will learn how to

- Predict waterflood performance using the Buckley-Leverett Method
- Predict waterflood performance using the Craig-Geffen-Morse Method
- Predict waterflood performance using the Stiles Method

Waterflood Forecasting Overview Core [RES-WFO-1]

STATUS	LEVEL	DURATION
Released	Core	2 hr 7 min

This skill module is a survey of the most popular methods used to forecast waterfloods. Here we discuss strengths and weaknesses and expose assumptions on which each technique is built.

Designed for

Reservoir, production, facilities, and operations engineers who are involved with some aspects of a new or existing waterflood project; geoscientists and professionals who want to get a better feel for the entire process of planning, development, management, and recovery optimization of a waterflood project.

You will learn how to

- Describe multiple statistical methods of predicting waterflood performance
- Describe multiple analytical methods of predicting waterflood performance
- Describe multiple numerical methods of predicting waterflood performance
- Compare the strengths and weaknesses of these prediction methods

Waterflood Overview Core [RES-WOV-1]

STATUS	LEVEL	DURATION
Released	Core	5 hrs 11 min

In this skill module, we start at the very beginning, describing what waterflooding is, how it works, and the differences between various kinds of waterfloods.

Designed for

Reservoir, production, facilities, and operations engineers who are involved with some aspects of a new or existing waterflood project; geoscientists and professionals who want to get a better feel for the entire process of planning, development, management, and recovery optimization of a waterflood project.

You will learn how to

- Define waterflooding
- Describe how it works
- Explain why waterflooding is applied to some reservoirs
- Explain the differences between patterns
- Describe other ways of typing waterfloods
- Describe how to measure the success of a waterflood

Waterflood Planning Core [RES-WPC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 45 min

This skill module discusses waterflood design, compares traditional and agile approaches to design, and covers data requirements and exit strategies.

Designed for

Reservoir, production, facilities, and operations engineers who are involved with some aspects of a new or existing waterflood project; geoscientists and professionals who want to get a better feel for the entire process of planning, development, management, and recovery optimization of a waterflood project.

You will learn how to

- List the kind of data needed to plan a waterflood
- Explain how to measure the importance of missing data
- Describe how to pay for the collection of important data
- List the choices that need to be considered in creating a robust waterflood design
- Explain why an exit strategy is important
- Describe how to create a waterflood design that will be relevant more than two days after startup

Waterflood Reservoir Heterogeneity Effects Fundamentals [RES-WRH-2]

STATUS	LEVEL	DURATION
Released	Fundamental	4 hrs 30 min

In this skill module, we use models to demonstrate how heterogeneity and anisotropy complicate our understanding of how water displaces oil in the reservoir.

Designed for

Reservoir, production, facilities, and operations engineers who are involved with some aspects of a new or existing waterflood project; geoscientists and professionals who want to get a better feel for the entire process of planning, development, management, and recovery optimization of a waterflood project.

You will learn how to

- Explain why shale continuity is critical to predicting waterflood performance
- Describe how dipping reservoirs behave differently under waterflooding
- Describe how reservoir anisotropy controls waterflood performance
- Explain why reservoir continuity is critical to predicting waterflood performance
- Describe how natural and hydraulic fractures affect waterflood performance
- Explain how reservoir heterogeneity can be measured and compared

Waterflood Optimization Core
[RES-WOP-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 5 min

In this skill module, we survey the kinds of opportunities available to optimize a waterflood and discuss ways to efficiently implement changes.

Designed for

Reservoir, production, facilities, and operations engineers who are involved with some aspects of a new or existing waterflood project; geoscientists and professionals who want to get a better feel for the entire process of planning, development, management, and recovery optimization of a waterflood project.

You will learn how to

- Explain how to search for optimization opportunities by:
  - Measuring deviations from expectations
  - Revisiting design assumptions
  - Deploying new technology intelligently
  - Moving from secondary to tertiary

Waterflood Reservoir Property Effects Fundamentals
[RES-WRP-2]

STATUS	LEVEL	DURATION
Released	Fundamental	5 hrs 21 min

In this skill module, we demonstrate how rock and fluid properties affect the performance of a waterflood using analytical and numerical models. We then explain our observations by describing the physics of water displacing oil in the reservoir.

Designed for

Reservoir, production, facilities, and operations engineers who are involved with some aspects of a new or existing waterflood project; geoscientists and professionals who want to get a better feel for the entire process of planning, development, management, and recovery optimization of a waterflood project.

You will learn

- What a DFIT, RTA, DCA analysis is
- How to read a Diagnostic Plot
- Why the analysis of these techniques is different in unconventional reservoirs
- Fundamental principles of reserves and resource management

Waterflood Surveillance Core
[RES-WSC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 19 min

In this skill module, we assemble and describe a diversified collection of surveillance techniques that have been proven effective for managing waterfloods all over the world.

Designed for

Reservoir, production, facilities, and operations engineers who are involved with some aspects of a new or existing waterflood project; geoscientists and professionals who want to get a better feel for the entire process of planning, development, management, and recovery optimization of a waterflood project.

You will learn how to

- Describe multiple ways to monitor the performance of an injection well
- Describe multiple ways to monitor the performance of a producing well
- Describe multiple ways to monitor the performance of a pattern
- Describe multiple ways to measure the connectivity between injectors and producers

Waterflood Water Sources Core [RES-WWS-1]		
STATUS	LEVEL	DURATION
Released	Core	2 hrs 30 min

In this skill module, we compare water sources, describe how injection water interacts physically and chemically with our reservoir, wells and surface facilities, and discuss how we can change the properties of our injection water on the surface.

Designed for

Reservoir, production, facilities, and operations engineers who are involved with some aspects of a new or existing waterflood project; geoscientists and professionals who want to get a better feel for the entire process of planning, development, management, and recovery optimization of a waterflood project.

You will learn how to

- Identify sources of water for a waterflood
- Identify which properties of the water matter
- Identify which properties of the water source matter
- Describe how impurities can be removed from injection water
- Describe what kinds of materials are added to injection water

Bits and Hydraulics Core
[IAM-BHC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hr 25 min

This skill module addresses roller cone and fixed cutter bit design features and their associated hydraulics programs at an awareness competency level.

Designed for

Technical staff, business professionals, technicians, analysts, and other non-technical staff who are involved with but have limited experience with drilling operations.

You will learn how to

- Identify design features and selection criteria for roller cone bit types
- Explain failure modes for roller cone bits and how this information can be used to improve performance
- Identify design features and selection criteria for fixed cutter bit types
- Explain failure modes for fixed cutter bits and how this information can be used to improve performance
- Explain tool system options which allow wellbore enlargement to a diameter greater than the internal drift diameter of a previously installed casing string
- Discuss situations where this may be required
- Explain rotary coring bit options
- Explain the relationship between cost per foot of a bit run and the cost of a bit, its rate of penetration, footage drilled, and the cost of the drilling operation
- Determine optimum time to pull a used bit based upon its cost per foot trend
- Balance competing objectives for the drilling hydraulics system
- Maintain ECD below fracture pressure of open hole
- Select nozzle sizes for adequate bit hydraulics
- Maintain operating pressure and total pump power demands within rig capabilities

Casing Running Operations Core
[WCD-CRO-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 4 min

Casing is pipe that goes into the wellbore. Casing stays in the well because the outside of the casing is cemented into the earth, providing wellbore integrity. In other words, the casing's primary purpose is to keep the wellbore from caving in or fracturing, to keep unwanted fluids from entering the wellbore, and to keep the desired fluids (hydrocarbons) from leaving the borehole at undesirable places. In This skill module, you will study four topics:

- Handling Casing: This topic introduces the process of getting the casing to the rig floor. It explains the concept of stacking casing in reverse order, numbering casing, and the types of casing you will see at an oil rig.
- Rigging up Casing Running Equipment: This topic overviews the running casing checklist, Job Safety Analysis (JSA) and equipment used for setting casing in a borehole. It explains the purpose and function of spiders, elevators, power tongs, and the stabbing board.
- Making up the Shoe Track: This topic introduces the shoe track and some of the other pieces of a casing string. It explains the purpose of the float shoe, guide shoe, float collar, thread locking compound, and centralizers.
- Running Casing: This topic provides an in-depth explanation of running the casing into the borehole. It describes the "dance"—the set of steps and movements of the casing crew that help to get the casing in the borehole quickly, efficiently, and safely.

Designed for

- Individuals interested in understanding what it takes to run casing
- Members of an extended multidiscipline team

You will learn how to

- Describe the steps of running casing, from getting the casing to the rig to running the casing into the borehole
- Determine safe working practices while running casing on a rig
- Identify responsibilities of and organize all wellsite personnel for normal casing running operations
- Identify the purpose of the basic running casing equipment and key steps used to run casing

Characterizing the Drilling Environment Core
[WCD-CDE-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 45 min

This skill module is the basis for drilling engineering and well planning. It provides an overview of geologic formations and key characteristics which the well planner must incorporate into their design considerations. Included is an overview of petroleum geology along with descriptions of both conventional and unconventional petroleum systems, structures and traps, formation fluids, and rock properties. The relationship between pore pressure and fracture gradient is explained and their application to well design considerations. Provided is a brief description of fluid selections and properties, casing and cementing operations, wellbore stability, and well control. Leak-off tests and/or formation integrity tests are discussed and how they are conducted. An overview of formation evaluation techniques is also addressed, including mudlogging, wireline LWD logging, coring, and testing with the data collected during each activity. An overview of types of drilling rigs and their most suitable application coupled with operational risks is also provided.

Designed for

Operator and service company technical staff including drilling engineers and operations supervisory personnel. A practical basis for non-technical staff involved in supporting drilling operations.

You will learn

- The basis of well planning and how geology and geologic characteristics affect the well plan
- How pore pressure and fracture pressure are critical in well planning and active drilling operations
- Where to source the expertise and information required to form the basis of the well plan
- How to utilize rock types and properties, formation fluid types and properties, and other geoscience information appropriately in well design and operational decisions including: fluid selection, casing points, cementing operations, well control procedures, and risk assessment
- The significance of the leak-off test and formation integrity test data and how to support operational decisions
- What formation evaluation methods are available and how to actively utilize them to support well planning and real time decision-making
- What type of drilling rig is best suited for a particular environment and critical concerns when operating in that particular environment

Defining Well Objectives Core
[IAM-DWO-1]

STATUS	LEVEL	DURATION
Released	Core	1 hrs 5 min

This skill module provides an overview of how various well objectives contribute to the understanding of the asset. Key stakeholders and the activities that impact the well plan are discussed. Also explained in this skill module are why well objectives change over the life of the asset and the commonly used key performance metrics for the drilling discipline.

Designed for

Technical staff, business professionals, technicians, analysts, and other non-technical staff who are involved with but have limited experience with drilling operations.

You will learn how to

- Identify stakeholders in an effort to define well objectives
- Explain how various well objectives contribute to understanding of the asset
- Identify activities focused on achieving well objectives and how they may impact the well plan
- Explain why well objectives change over the life of the asset
- Identify commonly employed performance metrics for the drilling discipline

Directional Drilling and Trajectory Design Core
[IAM-DDC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 33 min

Directional drilling may be considered the “intentional, controlled deflection of a wellbore to intersect pre-determined targets.” In the early days when wooden derricks were erected so close that they touched each other, wellbores that were believed to be vertical occasionally intersected nearby wellbores, proving that the wells were in fact deviating from vertical. This was not directional drilling because this behavior was neither intentional nor controlled. Modern directional drilling is based on an understanding of the reservoir and how the wellbore should be constructed for its proper placement in the reservoir for optimum productivity.

Designed for

Technical staff, business professionals, technicians, analysts, and other non-technical staff who are involved with but have limited experience with drilling operations.

You will learn how to

- Describe the objectives of directional drilling
- Recognize trajectory design options and selection criteria for given surface and downhole requirements
- Clarify trajectory measurement and wellbore position calculation techniques and limitations

Drill String and BHA Core
[IAM-DSB-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 5 min

This skill module explains the various drill string components and their purpose. The skill module also explains the performance properties of drill strings, how to diagnose drill string mechanisms, and the steps to prevent drill string failures.

Designed for

Technical staff, business professionals, technicians, analysts, and other non-technical staff who are involved with but have limited experience with drilling operations.

You will learn how to

- Identify drill string components and their suppliers
- Explain the purposes of the various drill string components
- Determine drill string performance properties
- Diagnose drill string mechanisms
- Identify steps to prevent drill string failures

Drilling Fluids and Solids Control Core
[IAM-DFS-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 35 min

Drilling fluids are the “life-blood” of drilling operations and comprise a wide-range of functions including suspension of formation cuttings, maintaining wellbore integrity, downhole pressure control and others. The proper selection of a drilling fluid can allow optimum performance in each of these areas as well as meeting environmental guidelines and performance objectives. The successful removal of solids from the fluid allows cost-effective maintenance of fluid properties and overall reduced well costs. This skill module addresses these topics at an awareness level.

Designed for

Technical staff, business professionals, technicians, analysts, and other non-technical staff who are involved with but have limited experience with drilling operations.

You will learn how to

- Identify functions of drilling fluids
- Explain fluid types and their selection criteria
- Identify fluid properties, how they are measured, and additives used to control them

Explain benefits of solids control, solids control equipment function, and system configuration

Drilling Operations and Well Completions Core
[IAM-DOW-1]

STATUS	LEVEL	DURATION
Released	Core	3 hr 25 min

In this skill module, you will learn about well function, onshore and offshore drilling, drilling programs, drilling rig components, and drilling systems (including drilling, rotating, fluid, and blowout prevention systems). You will also learn about casing and cementing, wellhead installation, types of well completions, formation damage, well perforation, sand control strategies, and well stimulation.

Designed for

Those who need to achieve a context and understanding of E&P technologies, or the role of technical departments in oil and gas operations, and/or be able to understand and use the language of the oilfield.

You will learn

- The advantages and disadvantages of early and modern types of drilling styles
- Rig type classification and selection for onshore and offshore drilling
- Types of platforms and techniques used for offshore rigs
- The purpose and function of non-vertical drilling, including directional and horizontal drilling
- The components of a drilling system
- The components of a drilling rig
- The drilling systems of a rig
- The purpose and function of the rotating system
- Drilling fluid properties and function
- Purpose and function of blowout preventers
- Purpose of casing and cementing
- Purpose and function of the wellhead
- Overview of different types of well completions
- Formation damage
- Methods of well perforation
- Sand production problems and control strategies in reservoirs
- Common well stimulation strategies

Oilfield Casing Core
[WCD-OCC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 33 min

Casing is pipe that goes into the wellbore and stays in the well because the outside of the casing is cemented to the earth which provides wellbore integrity. In other words, casing’s primary purpose is to keep the wellbore from caving in or fracturing, to keep unwanted fluids from entering the wellbore, and to keep the desired fluids (hydrocarbons) from leaving the borehole at undesirable places. In this skill module, you will study five topics:

- The Drilling Process: This topic introduces the process of drilling an oil well, showing how casing, mud, and cement are used
- API/ISO Standards: This topic overviews the naming conventions for casing. It explains how to identify casing by its properties
- The Casing Manufacturing Processes: This topic introduces the two major methods of making casing, Seamless and Electric Resistance Weld (ERW). It explains the processes by which both types of casing are made, from generating the steel to the formation of the finished casing products
- Casing Properties and Dimensions: This topic provides an in-depth explanation of each casing property. It describes, in detail, each dimension listed in the API/ISO naming convention
- Casing Strings: This topic overviews the four casing strings—conductor, surface, intermediate, and production—and how these casing strings work together in an oil field well

Designed for

Individuals interested in the basic use of casing in oil fields and members of an extended multidiscipline team

You will learn how to

- Describe the purpose of casing in an oilfield well
- State how joints of casing are connected together
- Recognize the steps in the process for drilling and cementing casing in an oil/gas well
- Demonstrate knowledge of the API/ISO casing naming convention
- Discuss the advantages and disadvantages to casing produced with seamless and ERW properties
- Identify casing descriptions and dimensions and, when appropriate, describe the correlation between them
- Identify where the four different casing applications are in a wellbore schematic

Primary and Remedial Cementing Core [PCE-PRC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 55 min

This skill module presents an overview of the planning and execution required to achieve the quality primary cementing of well casing strings to successfully isolate a wellbore's geological column, including the well's productive zone(s). Equipment and cement displacement practices are illustrated and described as well as methods to assess the resultant cement sheath surrounding casing following a cementing job. Preliminary lab work to formulate primary cement blends is described. Various methods are presented in the remedial repair of poorly cemented zones which can lead to life of the well production problems. Several different cement squeeze techniques are explained, and recommended practices are described.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn

- The manufacturing processes to blend composite materials that make up oilfield cement
- The various uses of additives to modify cement properties
- The cementing tools at the surface and downhole and the related cement displacement process to achieve a quality primary cement job to isolate a casing string
- The casing cement evaluation tools and methods to assess cement job quality
- The various practices that comprise options to attempt repair of primary cementing jobs that are referred to as cement squeeze operations
- How to calculate typical casing string cement volume requirements
- How to evaluate a cement bond log and make recommendations
- How to conduct plug and abandonment operations, what they are, basic equipment used and expected results to securely isolate the wellbore from the environment and human interaction for the future

Prerequisite

Onshore Unconventional Well Completions Core [PCE-OUW-1]

Stuck Pipe Prevention Core [WCD-SPP-1]

STATUS	LEVEL	DURATION
Released	Core	5 hrs 10 min

This skill module specifically addresses the basis for understanding and preventing stuck pipe situations during drilling operations. It provides a general overview of geological formations and how these formations can become unstable during a drilling operation. Likewise, drilling fluids are discussed and how they can impact the stability of the wellbore. This skill module also covers the mechanisms for pipe sticking, how to diagnose stuck pipe situations, and how to implement recovery efforts. Information is also given on how long to devote to fishing efforts. Lastly, This skill module covers drill string operating limits and gives calculations on how much pull can be on the drill string.

Designed for

Operator, drilling contractor, and service company technical and non-technical staff, including drilling engineers, drilling technicians, drilling supervisors, tool pushers, and drillers.

You will learn

- The contributing factors to wellbore stability and how pore pressure and fracture pressure change during the drilling operation
- The primary requirements of the drilling fluid and what the desired performance fluid properties should be
- All the factors and forces that affect hole cleaning efforts within vertical and horizontal wells
- How to diagnose stuck pipe situations by determining the specific sticking mechanism and how to implement recovery efforts
- About the different industry fishing tools available and how they function
- How to make good decisions about how much time a drilling operation should devote to a fishing operation
  The limits of a drill string and how much can be pulled

Well Construction Supply Chain Management Core [WCD-WCS-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 35 min

This is an introductory module that reviews the basic concepts of personnel relationships at the well site, supplier management, technical and HSE inspections at the well site, third party contracting, and logistics pertaining to the well construction operation.

Designed for

This skill module is Designed for anyone who desires a basic overview of these topics as they pertain to the supply chain processes at the well site.

You will learn how to

- Explain the basic objectives and working relationships between operators, drilling contractors, and service companies at the well site
- Describe the purposes of rig and service company inspection programs as they pertain to equipment, personnel, and HSE adherence at the well site
- Describe the basic process of rig contracting and acquisition
- Describe "third party" rig service contracting
- Identify goals to supply drilling rig operations with the necessary tools, equipment, and services as required

Well Performance Management Core [WCD-WPM-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 25 min

Performance improvement illustrates several process, organization, and leadership approaches and tools utilized to make drilling more effective and efficient. Activities are identified in both the planning phase and the operational phase. Opportunities are targeted that focus on making individual tasks safer, more efficient, and more consistent and, where appropriate, on moving tasks off the critical path of the rig to shorten well delivery time. Critical leadership and team skills are reviewed to reinforce desired behaviors and establish working culture. Finally, non-productive time mechanisms, including stuck pipe prevention, are addressed in detail with case studies.

Designed for

Operator and service company technical staff including drilling engineers and operations supervisory personnel.

You will learn

- Explain the concepts and benefits of a performance improvement process for drilling
- Explain what an AFE is, and its components
- Explain the purpose of After-action reviews and why they are relevant to future operations
- Recognize the importance of governmental approvals and permits as required by the drilling business
- Recognize the importance of safety management plans in the drilling environment
- Explain what comprises an “oil spill” and the importance of having a spill remediation plan
- Recognize the critical role of waste management at the well site
- Recognize why safety is everyone’s responsibility at the wellsite
- Describe what constitutes Job Safety Analysis

Well Site Management Core Part 1 – Logistics, Communication, and Safety Core [WCD-WSM-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 55 min

Rigsite Logistics Management focuses on the management and administrative functions of the well site supervisor. These include supervision and quality control of the data collection process during daily operations, ensuring drilling contractor, drilling fluids, directional drilling, and other service company-provided information. Discussions also address planning and prioritizing work, along with various work controls such as JSAs, Permit to Work, 24-hrs and 72-hrs lookaheads, pre-job safety meetings, toolbox talks, effective handovers, SIMOPS, and stop work authority. Other activities outlined include managing supplier relationships by communicating work requirements and schedules, approving invoices.

Designed for

Operator and service company technical staff including drilling engineers and operations supervisory personnel.

You will learn how to

- Manage wellsite logistics
  - Supplier management
  - Data collection and reporting
  - People movements
- Manage wellsite operations
  - Prioritize and schedule work
  - Supervise task preparation and execution
  - Control workflow with JSAs, Permit to Work, SIMOPS
- Implement scheduling, lookaheads, handovers

Well Site Management Part 2 – Planning, Operations, and Continuous Improvement Core [WCD-WS2-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 30 min

Rigsite Logistics Management focuses on the management and administrative functions of the well site supervisor. These include supervision and quality control of the data collection process during daily operations, ensuring drilling contractor, drilling fluids, directional drilling, and other service company-provided information. Discussions also address planning and prioritizing work, along with various work controls such as JSAs, Permit to Work, 24-hrs and 72-hrs lookaheads, pre-job safety meetings, toolbox talks, effective handovers, SIMOPS, and stop work authority. Other activities outlined include managing supplier relationships by communicating work requirements and schedules, approving invoices.

Designed for

Operator and service company technical staff including drilling engineers and operations supervisory personnel.

You will learn how to

- Manage wellsite logistics
  - Supplier management
  - Data collection and reporting
  - People movements
- Manage wellsite operations
  - Prioritize and schedule work
  - Supervise task preparation and execution
  - Control workflow with JSAs, Permit to Work, SIMOPS
- Implement scheduling, lookaheads, handovers

Well Construction Supply Chain Management Core [WCD-WCS-1]		
STATUS	LEVEL	DURATION
Released	Core	2 hrs 35 min

This is an introductory module that reviews the basic concepts of personnel relationships at the well site, supplier management, technical and HSE inspections at the well site, third party contracting, and logistics pertaining to the well construction operation.

Designed for

This skill module is Designed for anyone who desires a basic overview of these topics as they pertain to the supply chain processes at the well site.

You will learn how to

- Explain the basic objectives and working relationships between operators, drilling contractors, and service companies at the well site
- Describe the purposes of rig and service company inspection programs as they pertain to equipment, personnel, and HSE adherence at the well site
- Describe the basic process of rig contracting and acquisition
- Describe “third party” rig service contracting
- Identify goals to supply drilling rig operations with the necessary tools, equipment, and services as required

Advanced Nuclear Production Logging Fundamentals [PCE-ANP-2]

STATUS	LEVEL	DURATION
Released	Fundamental	10 hrs 7 min

The goal of production logging is to obtain an accurate interpretation of downhole tool measurements of temperature, pressure, fluid holdups, and fluid velocities to determine flow rates of each phase. These measurements provide the only way to know for sure what is happening downhole. This skill module focuses on interpretation of multiple-phase flow in vertical to high angle and horizontal wells using advanced nuclear production logging techniques. Pulsed neutron capture, pulsed neutron spectroscopy, and oxygen activation measurement principles are reviewed with emphasis on those measurements that have production logging applications. Unlike conventional and array production logging measurements that can only sense what is happening inside the casing, nuclear measurements can also sense some of what is happening behind the casing.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn

- How pulsed neutron capture, pulsed neutron spectroscopy, and oxygen activation tools work
- How to identify formation and borehole fluid contacts and distinguish between the two
- Which measurements are used to identify formation properties versus completion effects
- How to use a pulsed neutron capture tool to log down and identify hydrocarbon/water contacts in the casing and annulus with the well shut-in
- How to interpret data and estimate flow rates from oxygen activation measurements
- How to use a pulsed neutron capture tool with gadolinium tracers to estimate oil and water flow rates
- How to determine gas and oil holdup from pulsed neutron spectroscopy measurements

*It is recommended that the learner have previous knowledge of basic open hole logging principles.

Completion Design Fundamentals [PCE-DEF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	10 hrs 18 min

This skill module will take you through multiple facets of completion design Fundamentals. The topics that are covered in This skill module include an extensive look at conduits, circulating and killing wells, inflow and outflow along with well barriers and well servicing fluids, and a few more.

Designed for

Engineers within the first two years of a completions and/or workover role, Production operations staff, Service company engineers and managers, Drilling engineers, Reservoir Engineers, Field supervisors and managers, other asset team members who routinely work with completion or workover staff.

You will learn how to

- Recognize the various design concepts which will be covered throughout the skill module
- Identify the most common sandface completion options
- Explain the advantages and disadvantages of each option
- Describe the different conduit options
- Explain the benefits or disadvantages of each option
- Differentiate between “killing” and “offloading” the well
- Explain the various options for displacement or circulating in a completion
- Describe the difference between bullheading and circulating
- Describe where to locate the primary circulating device
- Differentiate between the various circulating path options
- Explain the relationship between inflow and outflow
- Explain how this relationship impacts completion design
- Describe the most common method of determining inflow – Darcy’s law
- Define a barrier
- Explain why barriers are critical to well operations
- State the normal industry practice for the number of barriers required during an operation
- Determine a hydrostatic barrier density requirement
- Describe the functions of well intervention fluids
- List the main types of completion fluids
- Describe common additives
- Differentiate between completion fluids, packer fluids, kill fluids, perforating fluids, and others
- Explain several of the most important interface points between drilling and completions
- Critique a well sketch
- Describe selection criteria for elastomers

Conventional Production Logging: Temperature and Single-Element Spinners Fundamentals [PCE-TSE-2]

STATUS	LEVEL	DURATION
Released	Fundamental	9 hr 15 min

The goal of production logging is to obtain an accurate interpretation of downhole tool measurements of temperature, pressure, fluid holdups, and fluid velocities to determine flow rates of each phase. Achieving this goal requires understanding the measurements made by various production logging tools and how these tools make those measurements. This skill module focuses on interpretation of single-phase flow. It covers temperature logs and single-element spinner-type flow meters and how to use them to determine flow rates for single-phase flow.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn

- How to identify fluid entries on a temperature log run in a flowing well and how to distinguish gas entries from liquid entries due to the Joule-Thompson cooling response
- How formation thermal conductivity affects the shape of the geothermal gradient
- How formation thermal diffusivity affects the rate of wellbore warm back when shutting in a flowing or injecting well
- How to calculate relative flow rates from a flowing temperature log
- How fluid heat capacity affects the shape of a flowing or an injecting temperature log
- How to identify injection intervals on an injecting temperature log and how to calculate their relative injection rates using the Ramey equation
- The different types of spinner flow meter tools and how they make their measurements
- How to identify fluid entry/fluid injection rates on flowing/injecting spinner surveys and how to calculate flow rates from a multiple-pass spinner logging survey

* It is recommended that the learner have previous knowledge of basic open hole logging principles.

Conventional Production Logging: Two-Phase Flow Fundamentals [PCE-TPF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	9 hrs 34 min

The goal of production logging is to obtain an accurate interpretation of downhole tool measurements of temperature, pressure, fluid holdups, and fluid velocities to determine flow rates of each phase. These measurements provide the only way to know for sure what is happening downhole. Achieving this goal requires understanding the measurements made by various production logging tools and how these tools make those measurements. This skill module focuses on interpretation of two-phase flow. It covers pressure, differential pressure, capacitance, focused gamma fluid density, non-focused gamma, and backscattered gamma holdup measurements, the definition and description of two-phase flow regimes, and how to use them to determine flow rates for two-phase flow.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn

- How to identify fluid entries on pressure, differential pressure, capacitance, focused gamma density, non-focused density, and backscattered gamma logs acquired in a flowing well and how to calculate fluid holdups from these measurements
- Which measurements can be used in deviated and high angle-horizontal wells and how to interpret those measurements that can be used in these conditions
- The basic flow regimes for two-phase flow and how to estimate when each might be occurring down hole
- How two-phase flow affects a spinner log, how to correct for it when this can be done, and when one needs measurements in addition to the conventional spinner measurements
- How to calculate two-phase flow rates from a multiple-pass spinner logging survey using one or more types of fluid holdup measurements when fluids are well mixed

*It is recommended that the learner have previous knowledge of basic open hole logging principles.

Design Process for Completion and Workovers Core [PCE-DEC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 25 min

This skill module focuses upon three main work products of a typical completion or workover design – the proposed well sketch, the proposed procedure, and then the underlying basis of design. In addition, field/rig morning reports are introduced and reviewed in view of the original design plans.

Designed for

Engineers within the first two years of a completions and/or workover role, Production operations staff, Service company engineers and managers, Drilling engineers, Reservoir Engineers, Field supervisors and managers, other asset team members who routinely work with completion or workover staff.

You will learn how to

- Explain the work product of a completions engineer
- Describe an initial completion procedure and sketch
- Translate chronological steps from a procedure to a well sketch
- Recognize and describe morning reports
- Recognize the engineering that is required for developing a procedure
- Explain and provide an example of Basis of Design (BOD)
- Compare and contrast design and BOD
- Illustrate and explain the link between management systems and the engineering design process
- Identify the objectives of a completion
- Identify and describe each aspect that is to be considered to achieve the two objectives
- Compare the different drive mechanisms

Electric Submersible Pumps (ESP) Core [PCE-ESP-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 37 min

An electric submersible pump is a specialized device used in the oil and gas industry. It's essentially an electrically powered pump designed to operate deep within an oil well. This pump is submerged in the wellbore and is responsible for lifting crude oil and other fluids from the reservoir to the surface. By using electricity to power the pump, it efficiently moves the petroleum to the surface for further processing and distribution. Electric submersible pumps are a crucial technology in the oil industry, ensuring the efficient but costly extraction of oil from deep underground reservoirs.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn

- Identify the three critical electric submersible pump design challenges: solids (sand), gas, and dependable power to maximize ESP run life (as the average industry ESP run life is approximately 2.4 years)
- Understand the principles of downthrust, upthrust, pump efficiency, total dynamic head (TDH), number of stages required, and pump horsepower required to successfully operate ESPs
- Recognize the characteristics of ESP electrical cable, variable speed drive, and controller components in a functioning ESP

Electric Submersible Pumps (ESP) Fundamentals [PCE-ESP-2]

STATUS	LEVEL	DURATION
Released	Fundamental	6 hrs

This skill module explains how to conduct inflow performance analysis and select the appropriate electric submersible pump (ESP) configuration to achieve production rate targets in wells in conventional and unconventional resources plays and document equipment failure data when 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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in artificial lift design and operations.

You will learn how to

- Calculate the production rate and the pump intake pressure from inflow performance analysis
- Calculate the free gas and fluid viscosity at pump intake conditions
- Determine the pump capacity and motor horsepower required to deliver the desired flow or rate limited by the ESP equipment
- Determine the power cable type and gauge based on formation parameters
- Ensure ESP equipment failure data is properly documented
- Review failure trends
- For an ESP design, select the appropriate protector for a given application
- Calculate the production rate and pump intake pressure using widely accepted techniques applicable to unconventional resource wells
- Determine the pump capacity and motor horsepower required to deliver the desired production rate in unconventional resource wells

Prerequisite

• Electric Submersible Pumps (ESP) Core [PCE-ESP-1]

Flow Assurance and Production Chemistry Core [PCE-FAP-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 50 min

The term “Flow Assurance” and the tools of “Production Chemistry” comprise this skill module’s content to examine the identification, remediation, and preventive aspects of common wax, asphaltene, scale, and corrosion problems common to most all hydrocarbon production scenarios in one manner or another. Each of these problems requires the application of varied principles and practices of production chemistry in various ways to directly address the control and removal of these complications which negatively impact production. Pictures, illustrations, and examples of typical field problems and challenges faced are developed with the singular goal of presenting proven, least cost, safe remedies to return production to its initial, expected rate.

Designed for

Petroleum engineers, production operations staff, reservoir engineers, facilities staff, drilling and completion engineers; field supervisors; field technicians, service company engineers, and especially engineers starting a work assignment in production engineering and operations or other engineers wanting a foundation in the principles of managing the identification, treatment, prevention, and overall control of oilfield waxes, asphaltenes, inorganic scales, and corrosion.

You will learn

- Typical oilfield “flow assurance” issues and problems due to waxes, asphaltenes, inorganic scales, and corrosion
- How to interpret revealing signs of corrosion and erosion failure, scale formation, and related downhole deposits and how to prevent or minimize their production loss effects
- How formations become damaged due to related flow assurance and production chemistry issues
- The importance of collecting data to categorize options to choose an optimum well prevention and treatment plans
- How to recognize, prevent, remove, and manage organic paraffin and asphaltene field deposits
- How to recognize, prevent, remove, and manage typical common soluble and insoluble scales in oil and gas operations
- The importance of using oilfield production chemistry to resolve production problems
- The conditions required for the formation of gas hydrates
- How ice crystals and methane in pipelines can lead to severe plugging of lines if not prevented from occurring or regularly removed by pigging operations

Formation Damage and Matrix Stimulation Core [PCE-FDC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 3 min

This skill module addresses less than expected production results following initial completion or any well intervention operation and the many possible causes involved. Characteristics of formation damage are explained. Matrix acidizing (acidizing operations conducted at treatment pressures less than fracture pressure) is developed for both limestone and sandstone formations to improve production. Important principles of candidate selection and job planning, and execution are addressed.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn

- The basic causes of oilfield formation damage and how they are recognized
- The concept of “True Formation Damage” and the principles of formation remediation once it has been correctly identified as being the cause of lost production
- How “pseudo” damage and differs from True Formation Damage
- The principles of limestone matrix acidizing and the chemistry and reactions involved
- The principles of sandstone matrix acidizing and the chemistry and reactions involved
- Formation damage identification and the positive results achieved by successfully conducting matrix acidizing jobs

Prerequisite

• Perforating Core [PCE-PEC-1]

Formation Damage and Matrix Acidizing Fundamentals [PCE-FDF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	9 hrs 40 min

This skill module addresses the complex oilfield phenomena that studies and attempts to resolve production loss or less than expected production rate following initial completion or any well workover or intervention activity. Formation damage is a term often used to describe the cause of production loss; its use is commonly misunderstood or misused as many factors and circumstances may be the cause of reduced rate. The set of circumstances referred to as "True" Formation Damage is described in detail; production loss caused by these circumstances may often be remediated as long as causes are properly defined, and appropriate remedial steps are taken. Other causes of production shortfall, also grouped into the formation damage term to describe lost production, are identified in the skill module along with recommended remedial steps to address them.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in artificial lift design and operations.

You will learn how to

- Illustrate the impact of formation damage upon production
- Explain the wide variety of reasons, sources, depositional environments, and routine operations' activities that result in production limitations
- Assess formation damage "skin" values
- Calculate production rates with various levels of formation damage as well as no formation damage
- Describe how TFD is recognized and how PD is recognized and present the characteristics and elements of each
- Illustrate clay stabilization through the use of positively charged cation exchange to stabilize negatively charged clays to limit clay migration, hydration, and other damaging mechanisms

Prerequisite

Formation Damage and Matrix Stimulation Core [PCE-FDC-1]

Gas Lift Core [PCE-GLC-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 23 min

Gas lift is a common technique used in the oil and gas industry to enhance the production of oil or natural gas from a well. It involves injecting gas into the well to reduce the hydrostatic pressure of the fluid column in the wellbore, which helps lift the oil or gas to the surface. Gas lift is a simple but effective method for increasing the production rate of oil wells, especially in situations where there is already a high gas/liquid ratio. It can be adjusted by controlling the rate of gas injection and the depth at which gas is injected to optimize oil production from the well.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn

- Understand the concept of gas lift in both unloading mode and operating mode to start up a gas lift completion and operate the completion over its life
- Identify the principles of gas lift valve performance and the proper location of the operating valve and unloading valves
- Recognize the characteristics of lift gas performance analysis to properly establish the most efficient gas lift completion performance conditions

Prerequisite

• Perforating Core [PCE-PEC-1]

Gas Lift Fundamentals [PCE-GLF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	6 hrs 29 min

This skill module describes when best to use gas lift, run inflow performance analysis sensitivity cases, and select optimum tubing size to achieve production rate targets in wells in conventional and unconventional resources plays. It describes the gas lift theory, equipment and covers the best practices of gas lift design, surveillance, and optimization.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in artificial lift design and operations.

You will learn how to

- Explain situations when gas lift is appropriate
- Calculate the production rate and the flowing bottom-hole pressure from inflow performance analysis in a well completed with a gas lift system
- Calculate the gas lift rate and pressure required to produce the well at a stable flow for various tubing sizes
- Select the appropriate tubing size for a well to be completed with a gas lift system
- Calculate the production rate and flowing bottom-hole pressure using widely accepted techniques applicable to unconventional resources wells completed with a gas lift system
- Design a gas lift installation with the required number of unloading mandrels, charge pressure, and orifice size lift valves at the appropriate spacing based on available gas lift pressure and required lift rate for conventional and unconventional resources
- Operate, troubleshoot and optimize gas lifted wells and network systems

Prerequisite

• Gas Lift Core [PCE-GLC-1]

Hydraulic Fracturing Core [PCE-HFC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs

The reality is that the industry began fracking conventional gas wells in 1947 in the Hugoton Field in southwest Kansas. What is relatively new is the technology and tools which allow us to place multiple hydraulic fracture stimulations along a single lateral in a horizontally drilled unconventional well.

This skill module covers basic rock mechanics, stimulation design considerations, and optimum fracture length at the core level. It covers both fracture acidizing and propped hydraulic stimulations. It reviews propped hydraulic fracturing for both the conventional sandstone reservoirs and unconventional shale reservoirs and explains why the techniques are different.

Designed for

Production Operations Staff, Reservoir Engineers, Facilities Staff Drilling and Completion Engineers, Geoscientists, Field Supervisors and Managers, Field Technicians, Service Company Engineers and Managers.

You will learn how to

- Describe the significance of rock mechanics in all relevant production engineering operations
- Describe the most common non-chemical stimulation methods, their objectives and limitations in conventional resources plays
- Describe the most common non-chemical stimulation methods, their objectives and limitations in unconventional resources plays
- Describe the basic principles of hydraulic fracturing in conventional plays, the difference between acid and proppant treatments, and how to select optimum stimulation candidates
- Describe the basic principles of hydraulic fracturing in unconventional resource plays, the difference between slickwater and cross-linked treatments, and how to select optimum stimulation candidates

Prerequisite

• Formation Damage and Matrix Stimulation Core [PCE-FDC-1]

Onshore Conventional Well Completions Core [PCE-OCW-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 5 min

This skill module describes the major tools, techniques, and processes for completing wells in conventional situations.

Designed for

Production Operations Staff, Reservoir Engineers, Facilities Staff Drilling and Completion Engineers, Geoscientists, Field Supervisors and Managers, Field Technicians, Service Company Engineers and Managers

You will learn

For conventional plays in onshore situations:

- The purpose and basic operational aspects of wellhead, flow control equipment, and the major components used in a basic well completion in conventional plays
- The impact that drilling practices may have on reservoir productivity
- Specify the production target of a well and describe the type of completion or workover design components required to achieve the target
- Describe the basic properties and function of tubing
- Describe which fluid systems are the most important for implementing successful completions and workovers in wells in conventional plays
- Describe the most common equipment components used in conventional wells and what they are used for
- Describe the most relevant steps for implementing completion procedures in wells in conventional resources plays and the proper interaction with all parties involved required
- Describe the most relevant aspects of HSE in completion operations
- Describe how a well flows, the impact of well control on fluid flow, and the most common control and monitoring devices
- Describe the basic requirements to abandon conventional wells Specify the production target of a horizontal well, and describe how this differs from a typical vertical well

Prerequisite

• Well Performance and Nodal Analysis Fundamentals [PCE-WPN-2]

Onshore Unconventional Well Completions Core [PCE-OUW-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 44 min

The term “Unconventional Resources” cuts a wide swath and encompasses many different and unrelated hydrocarbon resources. They have constituted a small but relevant segment of the oil and gas industry for many decades. However, since only about 1998, with the development of shale drilling and completion methodologies, have Unconventionals become front page news. Although most relevant in North America, shale plays are being probed and tested in many regions of the world.

This skill module addresses both the completion process and the physical completion design of unconventional shale wells at the core level. The strongest focus of the skill module is on horizontal shale wells but also includes a section on Coalbed Methane and one on Heavy Oil as well.

Designed for

Production Operations Staff, Reservoir Engineers, Facilities Staff Drilling and Completion Engineers, Geoscientists, Field Supervisors and Managers, Field Technicians, Service Company Engineers and Managers.

You will learn how to

- Describe the purpose and basic operational aspects of wellhead and flow control equipment in wells in unconventional plays
- Describe the purpose of each of the major components used in a basic well completion in unconventional resources plays, and the impact that drilling practices have on reservoir productivity
- Describe the function and limitations of each surface and subsurface component of a basic onshore completion in unconventional resources plays
- Describe the basic properties of completion components materials and their limitations in unconventional resources plays
- Describe which fluid systems are the most important for implementing successful completions and workovers in wells in unconventional resources plays
- Describe the most relevant steps for implementing completion procedures in wells in unconventional resources plays, and the proper interaction with all parties involved required
- Describe the most common techniques used to drill, complete, stimulate, and produce typical wells in coalbed methane reservoirs

Prerequisite

• Onshore Conventional Well Completions Core [PCE-OCW-1]

Perforating Core [PCE-PEC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 27 min

This skill module illustrates the tools and processes for establishing communication between a well and the productive formation(s) accessed by the well. The evolution of shaped charges is presented and the means for delivering perforating charges into a well using various gun configurations is illustrated. The importance of understanding charge performance to select the appropriate charge for a particular set of well conditions is discussed.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in artificial lift design and operations.

You will learn

- The various shaped charges, their design, performance, shot phasing and shot density options, and their advantages and limitations
- The three primary perforating gun conveyance systems and the various gun types available and their individual features Concepts like perforation tunnel damage, gun standoff, underbalance, gun correlation on depth, and other engineering input requirements for each perforation job design

Prerequisite

• Onshore Unconventional Well Completions Core [PCE-OUW-1]

Primary and Remedial Cementing Core [PCE-PRC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 55 min

This skill module presents an overview of the planning and execution required to achieve the quality primary cementing of well casing strings to successfully isolate a wellbore's geological column, including the well's productive zone(s). Equipment and cement displacement practices are illustrated and described as well as methods to assess the resultant cement sheath surrounding casing following a cementing job. Preliminary lab work to formulate primary cement blends is described. Various methods are presented in the remedial repair of poorly cemented zones which can lead to life of the well production problems. Several different cement squeeze techniques are explained, and recommended practices are described.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn

- The manufacturing processes to blend composite materials that make up oilfield cement
- The various uses of additives to modify cement properties
- The cementing tools at the surface and downhole and the related cement displacement process to achieve a quality primary cement job to isolate a casing string
- The casing cement evaluation tools and methods to assess cement job quality
- The various practices that comprise options to attempt repair of primary cementing jobs that are referred to as cement squeeze operations
- How to calculate typical casing string cement volume requirements
- How to evaluate a cement bond log and make recommendations
- How to conduct plug and abandonment operations, what they are, basic equipment used and expected results to securely isolate the wellbore from the environment and human interaction for the future

Prerequisite

• Onshore Unconventional Well Completions Core [PCE-OUW-1]

Production Logging Core [PCE-PLC-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 12 min

Experience indicates that surface fluid measurements are not adequate enough to describe the efficiency of the downhole production system. In new completions, production logging services are used both to ensure optimum ultimate recovery and to investigate production problems brought to light by surface performance. In older wells, the logs aid in identifying mechanical issues and thus assist in planning remedial work for declining producers. If properly planned and executed, production logging is an intrusive measurement method which will help to diagnose the health of producer or injector wells.

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, as an introduction to Production Logging within the frame of a production engineering curriculum.

You will learn

- The principles of cased-hole evaluation tools
- The typical applications and justification for running cased-hole evaluation tools
- The conveyance methods for running cased-hole evaluation tools in the field
- The principles of wireline-run cased hole evaluation tools
- The principles and operation of
  - the logging tools associated with flowmeter tools
  - basic temperature logs
  - basic radioactive tracer logs
  - basic spinner flowmeter logs
  - the gradiomanometer log
- The performance of cased hole logs in single phase flow
- The advantages of running multiple tools within a Production Combination Tool
- Discuss the added value of running a downhole video log in addition to production logs

Prerequisite

• Production Problem Diagnosis Core [PCE-PPD-1]

* It is recommended that the learner have previous knowledge of basic Inflow and outflow concepts, fluid behavior and completion downhole equipment.

Production Logging Fundamentals [PCE-PLF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	6 hrs 15 min

From the awareness wells through intelligent completions, the goal of Production Logging is to achieve an accurate interpretation of downhole tool measurements.

This skill module focuses on the description of physical behavior of single and two-phase flow in wells and introduces the conventional interpretation methods and their limitations.

The latest developments of production logging tools for application in multiphase flow and highly deviated/horizontal wells are covered in the last section. These tools provide a more detailed and reliable picture of fluid distributions and flow rates and overcome the limitations of conventional tools, which still remain applicable.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn

- Calibration principles of flowmeter tools
- The principles involved in interpreting production logging tool data
- The performance of cased hole logs in multi-phase flow
- The application of cased hole logs in deviated wells
- The application of recent advances in cased hole logs in deviated and horizontal wells
- Actual field applications of production logs in three-phase flow
- How production logs can assist water shut-off decisions

Prerequisite

- Production Logging Core [PCE-PLC-1]

*It is recommended that the learner have previous knowledge of basic Inflow and outflow concepts, fluid behavior and completion downhole equipment.

Production Logging in High-Angle/Horizontal Wells Fundamentals [PCE-PLH-2]

STATUS	LEVEL	DURATION
Released	Fundamental	7 hrs 55 min

The goal of production logging is to obtain an accurate interpretation of downhole tool measurements of temperature, pressure, fluid holdups, and fluid velocities to determine flow rates of each phase. These measurements provide the only way to know for sure what is happening downhole. This skill module focuses on interpretation of multiple-phase flow in high-angle to horizontal wells. Basic flow regime principles are reviewed and the effects on flow regime due to increasing well deviation are discussed. Because high-angle flow tends to be stratified in most cases, array logging tools that make multiple measurements across the wellbore profile are introduced. Two basic approaches for calculating multiple-phase flow rates in high-angle wells are presented.

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, and petrophysicists who need to be able to interpret production logs or understand the production log interpretations done by others.

You will learn

- How increasing wellbore deviation increases slip velocity and heavier phase fluid holdup as well deviation increases to 90°
- Why center-weighted production logging measurements are not suitable for calculating fluid holdup and flow rates in high-angle to horizontal wells
- How gas holdup optical probes, water holdup resistance probes, and multiple-phase holdup capacitance probes work
- How array mini-spinners work
- How to calculate two-phase flow rates from a single-pass logging program using multiple holdup and spinner array measurements

* It is recommended that the learner have previous knowledge of basic open hole logging principles.

Production Logging Wellsite and Downhole Environment Core [PCE-WDH-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 50 min

The goal of production logging is to obtain an accurate interpretation of downhole tool measurements of fluid holdups and fluid velocities. Achieving this goal requires an understanding of the equipment used at the well site to make these measurements and the equipment used to deploy the tools downhole. It is important to know where the tools are in the well with relation to the well components described in the well schematic. Because most production logging tools only measure what is inside the innermost casing string, it is also necessary to know when the primary cement job may be seriously degrading permitting flow behind pipe. This skill module covers well site equipment, gamma ray, casing collar and depth measurements, and acoustic methods to determine cement quality behind pipe.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn

- The basic components of surface equipment used to log a flowing well
- The basic methods used to flow a well
- The fundamental types of completions used in typical wells and the problems associated with acquiring and interpreting production log data in these types of completions
- The basic information shown in a wellbore sketch and how to use this when planning production logging jobs
- How gamma ray and casing collar tools work and how to use them to depth align production logs to open hole logs
- How wireline depth measurements are made and how they compare with pipe tallies and coiled tubing depth measurements
- How conventional cement bond and ultrasonic cement bond logging tools work, what they measure, and how to do a qualitative interpretation of cement bond quality

* It is recommended that the learner have previous knowledge of basic open hole logging principles.

Production Principles Core [PCE-PPC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 57 min

This skill module introduces four characteristics of optimum oil and gas depletion production principles, namely:

1. Effects of Geological and Reservoir Properties
2. Inflow and Outflow Performance
3. Tubing Strings, Outflow, and Lift Mechanics
4. Field Development Planning

Each is examined to illustrate the importance of up-front data acquisition to perform studies to understand target design objectives for both conventional oil and gas reservoirs and unconventional shale oil and shale gas reservoirs and unconventional coal bed methane reservoirs.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in artificial lift design and operations.

You will learn

- Effects of depositional environment and the rock cycle in the formation of hydrocarbon accumulations
- Reservoir engineering principles that guide optimum conventional and unconventional reservoir development
- The important characteristics of oilfield Inflow and Outflow and their related mathematical flow equations and applied principles required for system modeling
- Why a well flows on natural flow and the eventual requirement for artificial lift to maximize overall recovery as reservoir depletion occurs and reservoir energy diminishes
- Special considerations for tubing regarding erosional velocity and critical flow condition
- Key field development parameters that are common to all well designed hydrocarbon exploitation systems

Production Problem Diagnosis Core [PCE-PPD-1]

STATUS	LEVEL	DURATION
Released	Core	9 hrs 40 min

The early detection of “Problems” in producing and injection wells is one of a Production Engineer’s primary responsibilities. The earlier that one recognizes a problem exists, the less severe the problem, the sooner the problem can be corrected, and the sooner the production rate will be restored. This skill module focuses on four primary aspects of “Problem Wells”: 1) Causes, 2) Effects, 3) Detection, and 4) Prevention.

Designed for

Production Operations Staff, Reservoir Engineers, Facilities Staff, Drilling and Completion Engineers, Geoscientists, Field Supervisors and Managers, Field Technicians, Service Company Engineers and Managers.

You will learn how to

- Identify the characteristics of “Problem Wells”
- Recognize that the term “Problem Well” can be applied to both producing and injection wells
- Recognize the many different causes of “Problem Wells”
- Recognize how these different causes manifest themselves in either productivity reductions or operational problems associated with our wells
- Recognize the various diagnostic methods available to determine that a problem(s) exists
- Understand the various Production Logging Tools (PLT) available to determine the causes of our well problems
- Determine the “Problem Wells” based on a table
- Properly diagnose a “Problem Well” based on information given in a table
- Understand the importance of complying with well component requirements to ensure the integrity of a well though the life of the well
- Understand the process of Root Cause Failure Analysis as it applies to ESP failures
- Recognize many of the methods available to us to prevent wells from becoming “Problem Wells”

Prerequisite

• Formation Damage and Matrix Stimulation Core [PCE-FDC-1]

Production Technology Applications Core [PCE-PTA-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 49 min

This skill module addresses selected applications which may be put into practice in designing and operating a hydrocarbon asset.

Both conventional limestone and sandstone reservoir examples and situations as well as unconventional shale oil and gas reservoirs and various real world applications are presented for discussion. Among various technologies presented are an overview of subsea development, well completion equipment, smart wells and smart field know-how and hardware and software, expandable tubulars, swellable elastomers, produced water shut off chemistry, surveillance practices, and other contemporary production technology advancements regularly utilized in contemporary developments throughout the oilfield.

Designed for

Exploration and production technical professionals, asset team members, team leaders, line managers, IT department staff who work with data and support production applications, data technicians, executive management, and all support staff who require a more extensive knowledge of production technology and engineering.

You will learn how to

- Describe examples of proven, established, historical oilfield industry Production Technology application and practices
- Describe examples of more recently developed proven, established, oilfield industry Production Technology application and practices
- Justify establishing superior oilfield data gathering practices and related data quality control, data organization, and data access methods
- Recall the history of and present day application and advancement of digitalization in the oilfield
  Explain the diversity of downhole well completion tool applications and the proper selection of completion equipment

Reciprocating Rod Pumps Fundamentals [PCE-RRP-2]

STATUS	LEVEL	DURATION
Released	Fundamental	8 hrs 21 min

The skill module focuses upon understanding the three main components of a rod pump well completion, namely, the surface unit, the rod string, and the downhole pump. Each pump component is examined and investigated to define specific rod pump completion loading and design parameters. Related overall rod pump design considerations necessary for optimizing pump design and operation are presented. Different types of surface unit configuration geometries are presented with the positives and negative attributes of each discussed. The API rod string design method is reviewed, and two rod string designs are then conducted as exercises. Steel and fiberglass rods as well as continuous rod (Weatherford Corod™) designs are illustrated with positive and negative features highlighted. Surface dynamometer data gathering for rod pump optimization is presented.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in artificial lift design and operations.

You will learn how to

- Apply the working principles and operating characteristics of oilfield reciprocating rod pump artificial lift technology
- Employ the steps necessary to design, maintain, and service rod pump surface unit equipment, rode strings, and downhole pumps
- Develop engineering and operating skills to successfully design, properly set up, maintain, and provide overall service for implementing and applying reciprocating rod pump artificial lift technology
- Design a rod pump rod string using the Modified Goodman method
- Highlight the considerations and adjustments being reviewed by API regarding standards for proper consideration of rod fatigue and related corrosion effects upon rod string design
- Work several rod pump design exercises to assess maximum and minimum pump load, minimum and maximum rod stress, motor selection, strokes per minute, stroke length, and related overall rod pump design parameter selection

Rod, PCP, Jet Pumps, and Plunger Lift Core [PCE-RPJ-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs 17 min

This skill module will specifically describe the engineering design and operational requirements of Rod Pump, Progressing Cavity Pump (PCP), Jet Pump, and Plunger Lift well completion types.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in production engineering.

You will learn how to

- How to evaluate reservoir and well conditions to choose the appropriate artificial lift system for each set of conditions
- How rod pump, PCP pump, jet pump, and plunger lift artificial lift systems work
- How to design and optimize rod pump, PCP pump, jet pump, and plunger lift completions
- Why surveillance and monitoring of artificial lift systems is essential
- Various API and related design standards and practices that represent key, proven artificial lift system performance fundamentals

Prerequisite

- Primary and Remediate Cementing Core [PCE-PRC-1]
- Perforating Core [PCE-PEC-1]

*It is recommended that the learner have previous knowledge of basic Inflow and Outflow concepts and related Nodal™ Analysis principles and applications. The Production Principles Core skill module covers Inflow and Outflow at the awareness competency level.

*"NODAL Analysis" is a trademark of Flopetrol Johnston, a division of Schlumberger Technology Corporation, and is protected by U.S. Patent #4,442.710.

Sand Control Core [PCE-SCC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 28 min

This skill module illustrates various causes of sand production and its related effect upon producing systems. Alternatives that range from simply tolerating minimal sand production volumes to complex downhole and surface equipment and practices to mitigate the negative effects of sand production are presented. Basic gravel pack design is discussed, and a design problem is presented. Expandable sand screens are illustrated.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in artificial lift design and operations.

You will learn how to

- Identify the need for sand control
- Recognize the causes of sand movement
- Define what consolidated sand is, and what it is not
- Identify both non-mechanical and mechanical methods of sand control
- Recognize that rate restriction is a valid practice to manage sand production
- Recognize that minor sand volume produced may be tolerated
- Identify various screen types for sand control
- Outline aspects of pre-packed screens for sand control
- Describe the principles of sand control screen and gravel completions
- Identify the three steps comprising a gravel pack completion design
- Describe various fluid options for pumping gravel slurry into a gravel pack completion
- Outline the function of a gravel pack "crossover tool"
- Outline the function of a gravel pack "shunt tube"
- Describe the function of a frac pack completion
- Outline the frac pack completion well performance results
- Outline the function of an expandable sand screen completion
- Identify the components of an expandable screen and possible benefits resulting from the use of expendable

Prerequisite

- Formation Damage and Matrix Stimulation Core [PCE-FDC-1]

Sand Control Fundamentals [PCE-SCF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	7 hrs 18 min

This skill module begins by discussing both the causes of sand production and the effects that sand production can have on our oil and gas wells. The subsequent sections describe the methods and the equipment used to control sand production. All the major types of sand control completions are discussed, along with their strengths, weaknesses and the conditions under which they can be applied. Many new technologies have been introduced in the last several years, such as FracPacking and Expandable Screens. This skill module will discuss several that have been successfully applied. We will also discuss many of the more common problems encountered and how to avoid these problems.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in artificial lift design and operations.

You will learn how to

- Outline the completion options for sand control
- Recognize completions with no direct downhole mechanical control devices
- Identify equipment installed downhole to control the sand
- Describe chemical methods to control sand production
- Describe many different types of screen designs used in sand control completions, with or without a gravel pack
- Describe the use of gravel packs in both openhole and cased hole completions
- Determine formation sand size distribution and why it is required to perform a successful gravel pack
- Describe the completion equipment required to place a tight gravel pack in a well
- Recognize the benefits of using horizontal wells to reduce sand production and improve well productivity
- Describe how to gravel pack horizontal wells using brines or gels
- Describe how alternate path technology can be used to ensure successful gravel packs when using gel carrier fluids
- Identify the common mistakes that reduce productivity in gravel packed wells
- Apply Darcy's law calculations to determine the effects of a positive skin

Special Purpose Production Logging Fundamentals [PCE-SPP-2]

STATUS	LEVEL	DURATION
Released	Fundamental	7 hrs 18 min

This skill module focuses on interpretation of special purpose production logging techniques, namely noise logging, radioactive tracer logging, and distributed temperature surveys using fiber optic cables. Noise logging principles are covered and examples of using noise logs to identify fluid entry/exit points and leaks and to distinguish single-phase from two-phase flow are given. Radioactive tracer techniques are presented, and examples are shown for calculating flow rates in shut-in and flowing wells using slug tracking and velocity shot techniques. Instrumentation is covered for fiber optic temperature measurements and some examples showing how this works are given. This skill module concludes with a lecture and an exercise on designing an integrated production logging program. Unlike conventional and array production logging measurements that can only sense what is happening inside the casing, noise, radioactive tracer, and temperature measurements can also sense some of what is happening behind the casing.

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, and petrophysicists who need to be able to interpret production logs or understand the production log interpretations done by others.

You will learn

- How noise and radioactive tracer logging tools work
- How to use a noise log to distinguish between single-phase flow and two-phase flow
- How to use noise and radioactive tracer log measurements to estimate flow rates, find leaks, and find fluid entry and exit points
- Know the benefits of a spectral noise log over a conventional noise log
- How fiber optic temperature measurements are made and how to interpret them to find fluid entries and fluid exits
- How to design an integrated production logging program to solve a basic production logging problem
- How to determine oil and gas holdup in the completion from pulsed neutron spectroscopy carbon/oxygen and inelastic count rate ratio measurements

* It is recommended that the learner have previous knowledge of basic open hole logging principles.

The Role of Production Technology Core [PCE-TRP-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 55 min

Any oil and gas operation has certain key, fundamental aspects and "things that must happen" for the producing asset to be properly developed or re-developed initially and to continue to perform at its optimum efficiency and profitability throughout its life. Well-defined practices and processes must be put in place. The project team and its cumulative skill set necessary to conceive and execute what must happen are essential and indispensable for any oil and gas industry organization.

This skill module addresses the concept of Production Technology and the production technologists who define and implement the details of managing a hydrocarbon asset. Production technologists (PTs) are subject matter experts (SMEs) across all oilfield disciplines who contribute both formally and semi-formally throughout an asset's life. Their teamwork and focus continually brings both proven oilfield practices as well as prototype emerging and new technology to fruition in a hydrocarbon exploitation development.

This skill module develops the context of what PTs do, how they interact, how they function in leadership roles, and presents many types of production technology applications that are envisioned, initiated, developed in detail, implemented, and managed.

Designed for

Exploration and production technical professionals, asset team members, team leaders, line managers, IT department staff who work with data and support production applications, data technicians, executive management, and all support staff who require a more extensive knowledge of production technology and engineering.

You will learn to

- Define the oilfield term "Production Technology"
- Describe the technical qualities and character of subject matter experts in oil and gas organizations who are referred to as "production technologists"
- List various common responsibilities of an industry "production technologist"
- Recall two cases of well completion design (one for an unconventional shale well and the other for a conventional sandstone well) and the generic routines that a production technologist might follow in making completion design decisions

Well Completions Fundamentals [PCE-WCF-2]

STATUS	LEVEL	DURATION
Released	Fundamental	9 hrs 22 min

This skill module covers five sections, including well completion equipment, packers, landing nipple and lock mandrel systems, safety valves, and circulation devices.

Designed for

Engineers within the first two years of a completions and/or workover role, Production operations staff, Service company engineers and managers, Drilling engineers, Reservoir Engineers, Field supervisors and managers, other asset team members who routinely work with completion or workover staff.

You will learn how to

- Identify the functionality linked to downhole equipment
- Recognize the full suite of equipment to be further covered in This skill module
- Describe the difference between wellheads and Christmas trees
- Describe the functions of a wellhead
- Analyze a video of a wellhead, identifying the various annuli and various seals
- Describe the function of a Christmas tree
- Analyze a video of a Christmas tree video, and identify the various valves and their functions
- Identify the appropriate API standards to reference
- Identify the various characteristics of a tubing string, including weight/internal diameter, outside diameter, metallurgy, and associated properties
- Describe the main differences between API connections and premium connections
- Explain the results from a torque/turn chart
- Describe tubing and connection selection criteria
- Describe several packer setting methods
- Explain the main options for connecting the tubing to the packer
- Describe the physical basis for tubing length changes
- Calculate a simple tubing length change
- Describe the components of a landing nipple and lock mandrel system and explain why this system is used
- Identify the primary function of a safety valve
- Differentiate between a surface controlled and a subsurface controlled valve
- Design a completion, incorporating equipment, reservoir data, fluid data, etc.

Well Intervention Core [PCE-WIC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 45 min

This skill module describes the operating capabilities of the main types of intervention techniques, including bullheading, slickline, electric line, coiled tubing, hydraulic workover units, and workover rigs. The general relative costs of each type of method will be discussed as well as the main operational abilities of circulating, rotating, pushing/pulling, and entering a “live” well.

Designed for

Engineers within the first two years of a completions and/or workover role, Production operations staff, Service company engineers and managers, Drilling engineers, Reservoir Engineers, Field supervisors and managers, other asset team members who routinely work with completion or workover staff.

You will learn how to

- Describe the main components of a/an:
  - Slickline unit
  - Braided wireline unit
  - Electric line unit
  - Conventional workover (completion) unit
  - Snubbing (hydraulic workover) unit
  - Coiled tubing unit
- Compare the critical operational benefit and/or constraints of each of these methods

Well Performance and Nodal Analysis Fundamentals [PCE-WPN-2]

STATUS	LEVEL	DURATION
Released	Fundamental	9 hrs

This skill module explains the key principles in analyzing well performance parameters of any production (or injection) well using the principles and practices of NODAL™ analysis, also referenced as system analysis. Inflow and outflow equations are developed, multiphase hydraulics are reviewed, the building blocks of NODAL™ analysis are expanded, and several exercises are worked.

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, and especially engineers starting a work assignment in production engineering and operations or other engineers seeking a well-rounded foundation in artificial lift design and operations.

You will learn how to

- Collect and validate required data to evaluate well performance using computer modeling, performance history matching and predict potential problems
- Calculate productivity index and estimate basic reservoir parameters by interpreting a simple pressure buildup analysis in conventional and unconventional resources plays
- Identify flow restrictions from basic inflow performance analysis, recommend actions to improve well productivity, and describe how to use choke equation calculations and its limitations

*“NODAL Analysis” is a trademark of Flopetrol Johnston, a division of Schlumberger Technology Corporation, and is protected by U.S. Patent #4,442.710.

Prerequisite

- Production Principles Core [PCE-PPC-1]

Workover Fundamentals [PCE-WOF-2]		
STATUS	LEVEL	DURATION
Released	Fundamental	8 hrs 50 min

The Workover Fundamentals skill module is designed to help you follow a workover process to solve well problems. It will allow you to witness how the process is being applied by using the process against a well problem. After understanding how the workover process is applied, you will have the opportunity to use the process with other resources and apply it to a given problem.

Designed for

Engineers within the first two years of a completions and/or workover role, Production operations staff, Service company engineers and managers, Drilling engineers, Reservoir Engineers, Field supervisors and managers, other asset team members who routinely work with completion or workover staff.

You will _ how to

- Explain the differences between a workover and intervention
- Provide examples of simple interventions
- Understand the purpose behind and importance of conducting workovers
- Identify the three general steps of a workover
- Identify tools used to recognize if well problems exist
- Understand the three basic classes of well problems with regard to their location
- Understand the “8 Basic Steps” to a workover
- Recognize the General Workover Design Sequence
- Recognize that the number of barriers and type of barriers can change during the course of a workover
- Recognize the more common workover problems
- Express questions and considerations that are needed to identify best workover solutions
- Understand an example thought process of design decisions behind correcting a casing leak
- Apply the general workover sequence to a well problem example to develop a workover procedure by utilizing techniques learned in previous sections
- Identify the methods utilized in performing the basic procedures in most workover designs, including killing a well, releasing and re-setting packers, and offloading the well
- Recognize blending of the workover checklist, the general workover sequence, and general workover principals to assist in the design of a workover
- Explain the necessity for contingency planning

Basic Petroleum Geology – Unconventional Petroleum Resources Core [GEO-UPR-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 10 min

This skill module introduces the petroleum geology of Unconventional Resources, which are an increasingly important part of the oil and gas industry.

The first part of the skill module explains the basic concepts of unconventional resources, and the key differences between conventional fields and unconventional resources. The geology and technological factors controlling productivity for unconventional resources are described, and essential operational technologies, including horizontal drilling and multistage hydraulic fracturing are discussed.

To highlight and reinforce the basic concepts of unconventional shale resource plays, the second part of the skill module focuses on two case studies; first, the Eagle Ford Shale Play of southeast Texas; and second, the Niobrara Shale Play of Colorado-Wyoming, as an example of a "shale hybrid play."

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in Petroleum Exploration and Production who needs to understand Petroleum Geology concepts at a basic level or to communicate with others about it.

You will learn how to

- Explain what is meant by an Unconventional Resource and how it differs from a Conventional Field
- List the geologic factors controlling productivity of Unconventional Resource plays
- Recognize the importance of Geomechanical Factors, in particular Stress Field Orientation
- Describe key aspects of Horizontal Drilling and Hydraulic Fracturing technologies as they relate to Shale Resource Plays
- Explain the concept of a Shale Hybrid Play
- Describe key technical developments that have led to increased productivity from Shale Plays and be cognizant of World Oil and Gas Shale Resource Estimates

Hydraulic Fracturing Core [PCE-HFC-1]

STATUS	LEVEL	DURATION
Released	Core	4 hrs

The reality is that the industry began fracking conventional gas wells in 1947 in the Hugoton Field in southwest Kansas. What is relatively new is the technology and tools which allow us to place multiple hydraulic fracture stimulations along a single lateral in a horizontally drilled unconventional well.

This skill module covers basic rock mechanics, stimulation design considerations, and optimum fracture length at the core level. It covers both fracture acidizing and propped hydraulic stimulations. It reviews propped hydraulic fracturing for both the conventional sandstone reservoirs and unconventional shale reservoirs and explains why the techniques are different.

Designed for

Production Operations Staff, Reservoir Engineers, Facilities Staff Drilling and Completion Engineers, Geoscientists, Field Supervisors and Managers, Field Technicians, Service Company Engineers and Managers.

You will learn how to

- Describe the significance of rock mechanics in all relevant production engineering operations
- Describe the most common non-chemical stimulation methods, their objectives and limitations in conventional resources plays
- Describe the most common non-chemical stimulation methods, their objectives and limitations in unconventional resources plays
- Describe the basic principles of hydraulic fracturing in conventional plays, the difference between acid and proppant treatments, and how to select optimum stimulation candidates
- Describe the basic principles of hydraulic fracturing in unconventional resource plays, the difference between slickwater and cross-linked treatments, and how to select optimum stimulation candidates

Prerequisite

• Formation Damage and Matrix Stimulation Core [PCE-FDC-1]

Introduction to Reservoir Geomechanics and its Application Core [PPH-IPG-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 55 min

This introductory skill module is designed to familiarize the learners with reservoir geomechanics, its fundamentals and terminology along with exploring methodologies used for solving problems associated with different subsurface operations.

Designed for

Geoscientists, petrophysicists, completion and drilling engineers, or anyone involved in unconventional reservoir development.

You will learn how to

- Recognize the significance of rock mechanics and petroleum geomechanics in development of hydrocarbon resources and other subsurface operations
- Identify applications of geomechanics for optimization and risk mitigation for several different subsurface operations
- Use the basic terminology of petroleum geomechanics eg, in-situ stresses, pore pressure, failure criteria, constitutive models, fracture networks, and several other terms
- Describe the basic principles of rock mechanics and its problem-solving techniques for different geomechanical problems such as borehole stability, sand production, compaction and subsidence, caprock integrity, hydraulic fracturing and more

Introduction to Unconventional Reservoirs Core [RES-IUR-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 15 min

This skill module introduces the Unconventional Reservoir Engineering set of skill modules. In This skill module, the basic terminology of all the disciplines is introduced and the fundamental reservoir characterization techniques are discussed. Also covered are the basics of reservoir management and integrated teamwork and how they are essential to proper field development.

Designed for

All petro-technical professionals who have little experience with unconventional reservoirs but who need or desire to start developing some understanding of important basic concepts and methods associated with these resource types.

You will learn

- What types of unconventional reservoirs exist
- How they are different from conventional reservoirs
- How the geologic characterization is different from conventional reservoirs
- How reservoir management is different from conventional reservoirs
- How reservoir enhancement is different from conventional reservoirs
- How reservoir surveillance is different from conventional reservoirs
- How reservoir evaluation is different from conventional reservoirs
- What constitutes a “sweet spot” in unconventional reservoirs

Seismic for Unconventional Reservoirs Core [GEP-SUR-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 52 min

This skill module is designed to familiarize anyone using seismic data with how seismic data is used to explore and develop unconventional reservoirs. One of the key goals of the PetroAcademy short course is to explain the large and confusing amount of jargon that is used by the geophysical community when they use seismic data.

Designed for

Geoscientists, engineers, team leaders, geoscience technicians, asset managers, and anyone involved in using seismic data that needs to understand and use this data at a basic level or to communicate with others that use it.

You will learn how to

- Identify rock physics for shale reservoirs
- Describe seismic analysis for unconventional reservoirs
- Describe microseismic, including surface and subsurface recording arrays
- Describe source (event) recording and location detection
- Describe three component recording
- Identify the role of Hodograms in source orientation
- Identify the importance of microseismic monitoring in different stress areas

Unconventional Reservoir Analysis Core [RES-URA-1]

STATUS	LEVEL	DURATION
Released	Core	1 hr 59 min

In this skill module, you will learn the fundamental ways that various well tests and production analyses are applied to unconventional reservoirs. Diagnostic Fracture Injection Tests (DFITs), Diagnostic Plots, Rate Transient Analysis (RTA), Decline Curve Analysis (DCA) are all historic production rate and pressure analysis tools that are being applied to unconventional reservoirs. The fundamental principles will be reviewed before the application skills are covered in the Unconventional Reservoir Analysis Fundamentals skill module. Additionally, the fundamental principles of Reserves and Resource management will be covered.

Designed for

All petro-technical professionals who have little experience with unconventional reservoirs but who need or desire to start developing some understanding of important basic concepts and methods associated with these resource types.

You will learn

- What a DFIT, RTA, DCA analysis is
- How to read a Diagnostic Plot
- Why the analysis of these techniques is different in unconventional reservoirs
- Fundamental principles of reserves and resource management

Unconventional Reservoir Analysis Fundamentals [RES-URA-2]

STATUS	LEVEL	DURATION
Released	Fundamental	9 hrs 32 min

This skill module is designed for professional engineers and geoscientists with a basic understanding of unconventional rocks and fluids and the drilling and completion of horizontal laterals who wish to quickly learn single well analysis techniques, including the key elements of these reservoirs and the technologies to exploit them. Diagnostic plots to identify flow regimes and rate transient analysis (RTA) to understand individual well performance are discussed. Field level topics include field development and reservoir surveillance. Decline curve analysis (DCA) for individual wells is presented followed by Reserves and Resources estimations in unconventionals, primarily under the Petroleum Resources Management System (PRMS) guidance. Attendees should leave this course with the tools to understand individual well behavior as well as field planning and development in the reservoirs which supply an ever-increasing fraction of the world's oil and gas, unconventional reservoirs.

Designed for

Subsurface technical professionals, geoscientists, completion engineers, reservoir engineers, petroleum engineers, and drilling engineers.

You will learn how to

- Calculate volumetric estimates in unconventional reservoirs
- Apply material balance analysis with corrections for unconventional reservoirs
- Calculate properties from DFIT's
- Calculate drainage volumes from rate transient analysis
- Match historical data and forecast future production using statistical tools adjusted for unconventional reservoirs

Unconventional Reservoir Properties Core [RES-URP-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 30 min

This skill module works through the key parameters and how they are measured in understanding unconventional reservoir rock properties. Organic, Rock and Mechanical Quality Factors are defined, and various measurement techniques are described plus an understanding of the uncertainty ranges associated with those measurements.

Designed for

Subsurface technical professionals, geoscientists, completion engineers, reservoir engineers, petroleum engineers, and drilling engineers.

You will learn

- Specifics about how Organic, Rock and Mechanical Quality is quantified
- Why each factor is important in the understanding of unconventional reservoirs
- The difference between Tight Gas Sands and Shale Reservoirs
- Uncertainties in Well and Laboratory measurements of Rock Properties

Unconventional Reservoir Properties Fundamentals [RES-URP-2]

STATUS	LEVEL	DURATION
Released	Fundamental	6 hrs 30 min

This skill module is Designed for professional engineers and geoscientists with little experience in unconventional reservoirs who wish to quickly learn the key elements of these reservoirs and the technologies to exploit them. Focused on shale (tight) oil, tight gas, and coalbed methane, this course begins with an introduction to unconventionals then reviews geoscience elements from the previous modules and demonstrates their use in unconventional reservoir engineering. Fluid sampling for laboratory tests and fluid property correlations are presented. Drilling and completion of wells in unconventional reservoirs are considered, with a focus on horizontal wells. Stimulation fluid systems and proppants are briefly discussed. A key test for stimulation design, diagnostic fracture injection tests (DFIT's) is presented along with classic test signatures. Attendees should leave this course with a better understanding of the basic physics of unconventional reservoirs and the fluids they hold as well as the basics of placing wells in those reservoirs to drain those fluids.

Designed for

Subsurface technical professionals, geoscientists, completion engineers, reservoir engineers, petroleum engineers, and drilling engineers.

You will learn how to

- Manage the difference between unconventional and conventional fluids
- Develop relationships between rock properties and well performance
- Calculate flow rates under conditions in which fluid models break down
- Use simulated rock volumes and discrete fracture networks

Prerequisite

- Unconventional Reservoir Properties Core [RES-URP-1]

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

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

Heat Transfer Equipment Core [GAS-HTE-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 16 min

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

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

Pumps and Compressors Core [GAS-PCC-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 18 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 _ how to

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

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 skill 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)

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

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 skill 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

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

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

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

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]

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

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
- 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

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

STATUS	LEVEL	DURATION
Released	Core	5 hrs 36 min

This skill 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

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

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	4 hrs 7 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]

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	5 hrs 24 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]

Oil Gathering Systems Fundamentals [PRS-OGS-2]

STATUS	LEVEL	DURATION
Released	Fundamental	2 hrs 12 min

This skill 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

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

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 Material
- Desalting Crude Oil Process Configurations

Designed for

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

You will learn how to

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	3 hrs 3 min

This skill 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 skill 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

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

STATUS	LEVEL	DURATION
Coming soon	Fundamental	~ 4 hrs

This skill module reviews the main gas processing operations; what they are, why they are needed, how they work, and the key issues associated with gas processing systems. This skill module covers the following topics:

- Compressor Head, Power Requirements, and Discharge Temperature
- Principles of Centrifugal Compressor Operations
- Principles of Reciprocating Compressor Operations
- Principles of Rotary Screw Compressor Operations
- Sales Gas Specifications and Safety Requirements
- Acid Gas Removal
- Gas Dehydration Processes
- NGL Extraction

Designed for

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	8 hrs 5 min

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

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

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

Produced Water Treatment Fundamentals (PRS-PWT-2)

STATUS	LEVEL	DURATION
Coming soon	Fundamental	~ 6 hrs

This skill module reviews the purpose(s) of produced water treatment, the treating equipment types, combinations of equipment, performance and applications, and the key issues associated with produced water treating system. This skill module covers the following topics:

- Produced Water Treating Overview
- Primary Treatment Options and Performance
- Secondary Treatment Options and Performance
- Tertiary Treatment Options and Performance

Designed for

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

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

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]

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

STATUS	LEVEL	DURATION
Released	Fundamental	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]

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 skill 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

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

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]

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	2 hrs 7 min

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

- Overview of Crude Oil Transportation Options
- Centrifugal Pumps
- Pipeline Pump Stations
- Pipeline Pumps

Designed for

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

You will learn how to

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

Water Injection Systems Fundamentals [PRS-WIS-2]

STATUS	LEVEL	DURATION
Coming soon	Fundamental	~ 4 hrs

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

- Overview of Water Injection Systems
- Basic Principles of Sea Water Injection
- Water Deaeration and Sulfate Removal
- Water Injection Pumps

Designed for

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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 12 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

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

STATUS	LEVEL	DURATION
Released	Core	4 hr 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

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

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 seal types, categories and the advantages and disadvantages of each
- Describe the key mechanical and operational differences between mechanical contact seals and dry gas seals
- List the codes and standards used for seals in the energy industry
- List the various types of bearings, describe the principles of lubrication for the different bearing types and list under what conditions they would be used

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
- Identify the causes and effects of machinery vibrations in pumps and compressors
- Define the techniques typically used to mitigate vibration
- Define the basic principles of centrifugal action in kinetic pumps and compressors
- Describe the basic approach to characterizing a pumping/ compression system
- Define the system curve and describe how to develop it
- Determine the operating point of the system and the pump/ compressor
- Describe how to use pump/compressor selection charts for the selection of the proper pump/compressor type

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

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 skill 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
- Describe key code references applicable to piping sizing and selection criteria
- Explain pipe and fitting manufacturing codes, standards, and industry specifications
- Describe the physical properties of the fluid and the pipeline that affect liquid flow
- Define the application and importance of conservation of energy, conservation of mass to determining hydraulic behavior
- Determine flow friction coefficients and calculate proper line size/pressure drop relationship for hazardous liquids pipelines
- Describe the physical properties of the fluid and the pipeline that affect liquid flow
- Define the application and importance of conservation of energy, conservation of mass to determining hydraulic behavior
- Determine flow friction coefficients and calculate proper line size/pressure drop relationship for hazardous liquids pipelines
- Define issues related to piping system layout and integration with other equipment
- Discuss the five types of welding used in pressure vessels and their application
- Explain the differences between Procedure Qualification Record (PQR) and Welding Performance Qualification (WPQ)

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

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

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 typical products or product contaminants that can cause loss of structural or operational integrity of storage tanks
- Identify organizations that develop and provide codes and standards for the design and construction of storage tanks
- Describe the code requirements that affect the basic engineering design, material selection, fabrication, inspection and testing, operation, and safe practices of storage tanks

Identify codes that govern field-welded, shop-welded bolted atmospheric, and low-pressure storage tank

Unfired Pressure Vessels Core [MEC-UPV-1]

STATUS	LEVEL	DURATION

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
- Calculate wall thicknesses of shells, heads, and cones using the formulas from ASME Section VIII, Div. 1
- List corrosion allowances for process nozzles and minimum nozzle neck thicknesses
- State the differences in types of heat treatment
- Compare the results of each type of heat treatment
- Discuss requirements for Post Weld Heat Treatment, methods, and cooling procedures
- Explain the basics of corrosion including rust
- Determine corrosion allowance (CA) for general hydrocarbon use and natural gas service
- Identify the corrosive elements in hydrocarbon processing
- Discuss the ramifications of vessel penetrations
- Identify the options available to remedy nozzle penetrations
- Discuss the rules for inspection openings and manways
- Identify the Records Retention requirements
- Examine vessel appurtenances: vessel internals, externals, and supports; openings (other than process nozzles), externals, vessel supports

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)

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

STATUS	LEVEL	DURATION
Released	Core	5 hrs 18 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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 23 min

This skill 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 skill 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

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

STATUS	LEVEL	DURATION
Released	Core	5 hrs 57 min

In this skill 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 (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 (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 skill 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

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

Electric 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

Electrical Safety in Design for Oil and Gas Facilities Core [ELE-SAF-1]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 4 hrs

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

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 skill 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. This skill module covers the basics of electricity and generating electricity.

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.

Designed for

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

You will learn how to

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

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) first.

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
- Summarize the relationship between conductor current carrying capacity, cross-sectional area, insulation design, ambient conditions, and installation methods

Zone-based Equipment Selection and Installation in Oil and Gas Facilities Core [ELE-ZON-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

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 impacts statements and assessment.

Designed for

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

You will learn how to

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

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

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

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 skill 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

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

Electrical Topics for Non-Electrical Engineers Core [REF-ELE-1]

STATUS	LEVEL	DURATION
Coming soon	Core	~4 hrs

This skill module is designed to meet today's demands for more integration of engineering disciplines in industrial design, construction, and maintenance. It teaches you communicate effectively with engineers and contractors who are designing or building, upgrading, or expanding your plant's electrical distribution.

Instruction contained in this skill module will assume that you have no prior electrical engineering education but are currently involved with electrical equipment and systems.

Designed for

Process Engineers, Planning and Economics Engineers, Inspection Engineers, HSE Engineers, Maintenance Engineers and Supervisors, Laboratory Managers and Supervisors, Turnaround Planners and Operation Supervisors.

You will learn

- Electrical Basic Concepts
- Grounding Concepts
- Electrical Power Generation, Transmission and Distribution
- System Design Philosophy
- Standards, Recommended Practices, Guides and Codes
- Electrical Construction Materials
- Design Procedures for Lighting and Non-Motor Branch Circuits
- Motor Branch Circuit Design
- Feeder Circuit Design
- Arc Flash Hazard and Electrical Safety

Refinery Corrosion Control and Monitoring Core [REF-CCM-1]

STATUS	LEVEL	DURATION
Coming soon	Core	~4 hrs

This program will teach the basics of the corrosion process in the refining industry, the methods used to monitor the rate of corrosion and the control techniques used to protect equipment in the most important process units that conform a refinery installation.

By successfully controlling corrosion, the destructive effects can be minimized, increasing the process units operating cycles, optimizing the maintenance expenses, and ensuring a more safety and profitable operation of the process and storage installations.

Designed for

Process Engineers, Planning and Economics Engineers, Inspection Engineers, HSE Engineers, Maintenance Engineers and Supervisors, Laboratory Managers and Supervisors, Turnaround Planners and Operation Supervisors.

You will learn

- Refining Corrosion Overview
- Corrosive Constituents in Crude Oil
- Corrosion Mechanisms and location in Process Units:
  - Crude Distillation/ Vacuum
  - Naphtha Reforming
  - FCC
  - Alkylation (HF and H_2SO_4)
  - Amine Treatment
  - Merox Treatment
  - Distillates Hydrotreating
  - Sulfur Recovery
  - Delayed Coker
  - Hydrogen Production
  - Feedstocks and Products Storage
- Corrosion Control and Monitoring in Process Units:
  - Crude Distillation/ Vacuum
  - Naphtha Reforming
  - FCC
  - Alkylation (HF and H_2SO_4)
  - Amine Treatment
  - Merox Treatment
  - Distillates Hydrotreating
  - Sulfur Recovery
  - Delayed Coker
  - Hydrogen Production
  - Feedstocks and Products Storage

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

STATUS	LEVEL	DURATION
Coming soon	Core	~4 hrs

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

Study cases resolution will be included in this skill module to reinforce the provided theoretical knowledge.

Designed for

Process Engineers, Planning and Economics Engineers, Inspection Engineers, HSE Engineers, Maintenance Engineers and Supervisors, Laboratory Managers and Supervisors, Turnaround Planners and Operation Supervisors.

You will learn

- Supervisory Skills (conflict resolution, communication, diversity management, teamwork, motivation, coaching and mentoring, change management, mechanical integrity)
- Safety Skills per OSHA 3918-08 2017 (Safe Work Practices including work permits, log out/tag out, response before emergencies (fire, explosion, leaks, etc.), personal accessing to process units)
- Planning Skills (Operators and Supervisory Staff training requirements, Operational Staff number determination and profile, maintenance planning, operational shift planning)
- Basic skills to prepare and review operational procedures and instructions
- Basic skills to prepare written and verbal presentations, daily instructions, and reports in general

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

STATUS	LEVEL	DURATION
Coming soon	Core	~4 hrs

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

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

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

Designed for

Process Engineers, Planning and Economics Engineers, Inspection Engineers, HSE Engineers, Maintenance Engineers and Supervisors, Laboratory Managers and Supervisors, Turnaround Planners and Operation Supervisors.

You will learn

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

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

STATUS	LEVEL	DURATION
Coming soon	Core	~4 hrs

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

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

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

Designed for

Process Engineers, Planning and Economics Engineers, Inspection Engineers, HSE Engineers, Maintenance Engineers and Supervisors, Laboratory Managers and Supervisors, Turnaround Planners and Operation Supervisors.

You will learn

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

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

STATUS	LEVEL	DURATION
Released	Core	5 hrs 30 min

In petroleum refining, turnaround (TA) means a scheduled large-scale maintenance activity where an entire process unit, several of them or the overall refinery are taken off stream for an extended period for comprehensive maintenance and equipment or technology renewal.

Once the TA is completed, it is expected the process unit operates in a safe way until next outage, but also the efficiency and throughput can be improved, and a reduction in routine maintenance costs can be achieved.

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

This skill module describes the complex relationships between the team planning the TA and the rest of the refinery organization. The detailed planning process of TA and pre-TA activities are also discussed. Main activities of planning and control during the execution of the TA and once it is accomplished are also discussed.

Designed for

Process Engineers, Planning and Economics Engineers, Inspection Engineers, HSE Engineers, Maintenance Engineers and Supervisors, Laboratory Managers and Supervisors, Turnaround Planners and Operation Supervisors.

You will learn

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

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

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

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

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

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

STATUS	LEVEL	DURATION
Coming soon	Core	~4 hrs

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

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

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

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

Designed for

Process Engineers, Planning and Economics Engineers, Inspection Engineers, HSE Engineers, Maintenance Engineers and Supervisors, Laboratory Managers and Supervisors, Turnaround Planners and Operation Supervisors.

You will learn

- Basic principles and controls for having a safe and continuous operation in Feedstocks Tanks, Intermediate Tanks, Product Tanks, Marine Dock Facilities - Loading Operations, Marine Dock Facilities - Unloading Operations
- Volume and mass measurement principles in tanks and transference operations
- Characteristics of the information systems associated to the refining oil movement and storage:
  - Tanks Information System (TIS)
  - Oil Movement Management System (OMM)
  - Oil Logistics, Accounting and Shipping Management System (OAS)
- Custody transfer operations principles
- Storage effluents disposition
- Safety associated to the refining oil movement and storage:
  - Fire
  - Explosion
  - Products spillage

Reliability Centered Maintenance (RCM) Core [REF-RCM-1]

STATUS	LEVEL	DURATION
Coming soon	Core	~4 hrs

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

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

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

Designed for

Process Engineers, Planning and Economics Engineers, Inspection Engineers, HSE Engineers, Maintenance Engineers and Supervisors, Laboratory Managers and Supervisors, Turnaround Planners and Operation Supervisors.

You will learn

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

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

STATUS	LEVEL	DURATION
Released	Core	1 hr 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

Basic Analytical Electrochemical Techniques Core
[HYD-BAN-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~2 hrs

This skill module introduces the basic techniques such as current interruption for measuring ionic conductivity and ohmic loss, and how more advanced techniques can open up understanding of electrochemical processes. The skill module covers the following topics:

- Measurement methods using the potentiostat
- Current interruption
- Electroanalytical chemistry: voltammetry and coulometry
- Cyclic voltammetry
- Survey of advanced techniques such as Impedance Spectroscopy and surface science techniques

Designed for

Process engineers, non-electrical engineers, technical subject matter experts and technical managers interested in electrochemical engineering, electrolyzers, and fuel cells.

You will learn how to

- Use data from electrochemical measurements to help with the reviewing of processes and systems
- Identify suitable measurement techniques to use
- Define the advanced techniques that may be employed

Basics of Electrochemistry Core
[HYD-BEL-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~2 hrs

This skill module covers basic nomenclature like anode, cathode, electrodes, electrolyte, current density, polarization, open circuit voltage, and influences of operating pressure and temperature. The skill module covers the following topics:

- Definitions and concepts - atomic and molecular structure and the nature of ions
- Explanation of electrodes and electrolytes, and ionic mobility
- The transition from electronic to ionic conductivity in an electrochemical cell
- Redox reactions in terms of ion exchange
- Faradays laws; potential and voltage
- Free energy and its relation to the equilibrium cell voltage

Designed for

Process engineers, non-electrical engineers, technical subject matter experts and technical managers interested in electrochemical engineering, electrolyzers, and fuel cells.

You will learn how to

- Define the terms used in electrochemistry
- Determine the basic processes occurring in electrochemical systems
- Calculate equilibrium cell voltage from thermodynamic data

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

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

STATUS	LEVEL	DURATION
Released	Core	1 hr 48 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 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 CO_2 emissions and their impact
- Identify the major industrial emissions sources and their characteristics
- Explain the meaning of CCUS
- Recognize the major technology approaches to CO_2 capture and which are deployed
- Identify the CCS value chain
- Review the drivers and restrainers to deployment

Climate Change Risk and Opportunities Assessment Core [GHG-CCR-1-N]

STATUS	LEVEL	DURATION
Released	Core	1 hr 24 min

Organizations must fully appreciate how to identify and respond to the risks and opportunities that global climate change presents. If these are not understood and planned for, an organization will not be resilient to future changes such as extreme weather events, resource scarcity, and regulatory changes. There are also opportunities inherent in the transition to a low carbon future that an organization will need to capitalize on to remain competitive.

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

- Consider the risks and opportunities of climate change for an organization
- Review transition and physical risks for a company
- Review the need for scenario analysis
- Consider the GHG management hierarchy of eliminate, reduce, substitute and compensate
- Review GHG emission reduction approaches
- Appreciate planning for net zero

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

- 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

Direct Use Applications of Geothermal Core
[GEO-DUA-1-R]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module describes direct use applications and the technology and components required to do this.

Designed for

Professionals seeking to acquire fundamental knowledge in geothermal energy and its primary applications (awareness level) will find this program particularly valuable.

You will learn how to

- Define the geologic settings and temperature range of direct use applications
- Describe district heating and cooling applications, components, and installations
- Describe geothermal heat pumps and installation

Distribution Methods of Hydrogen Core
[HYD-DIS-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module covers the following topics:

- Transportation via land transportation
- Distribution via pipeline
- Transportation via ship

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

- Identify the various methods of Hydrogen distribution
- Describe the advantages and disadvantages of each method of distribution
- Explain the benefits and limitations of Hydrogen blending into natural gas networks

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

Electrochemical Processes Core
[HYD-ELP-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~2 hrs

This skill module covers the processes occurring within cells - ion transport, diffusion of gases and liquid, mass transfer, electron transfer and electron conductivity. The skill module covers the following topics:

- The meaning of Exchange Current Density and the asymmetry Parameter
- Tafel Equation
- Electrode reactions and electron transfer
- Activation parameters and temperature dependence
- Ionic mobility and diffusion
- Hydrodynamics in electrochemical systems
- Mass transfer within gas phases
- Influence of mass transfer on V/I curve

Designed for

Process engineers, non-electrical engineers, technical subject matter experts and technical managers interested in electrochemical engineering, electrolyzers, and fuel cells.

You will learn how to

- Recognize the different processes that occur in electrochemical cells
- Define how processes impact on the performance of electrochemical
- Explain how different materials can influence the performance of electrocatalysts and electrodes

Electrochemistry of Electrolyzers Core
[HYD-EEL-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~2 hrs

This skill module compares and contrasts the principal types of electrolyzer, and their characteristics in terms of electrochemical behavior. The skill module covers the following topics:

- Alkaline electrolyzers
- AEM electrolyzers
- PEM electrolyzers
- Solid oxide electrolyzers
- Membrane-free electrolyzers

Designed for

Process engineers, non-electrical engineers, technical subject matter experts and technical managers interested in electrochemical engineering, electrolyzers, and fuel cells.

You will learn how to

- Explain the advantages of electrolyzers technologies
- Define the key disadvantages of the different types of electrolyzers
- List the key factors that affect the choice of electrolyzer

Electrochemistry of Fuel Cells Core [HYD-EFC-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~2 hrs

This skill module compares and contrasts the principal types of fuel cells and their characteristics in terms of electrochemical behavior. The skill module covers the following topics:

- Comparison of principal types of fuel cell
- PEMFC and the liquid fuel variants
- AFC – Alkaline Fuel Cell
- PAFC – Phosphoric Acid Fuel Cell
- MCFC – Molten Carbonate Fuel Cell
- SOFC – Solid Oxide Fuel Cell

Designed for

Process engineers, non-electrical engineers, technical subject matter experts and technical managers interested in electrochemical engineering, electrolyzers, and fuel cells.

You will learn how to

- Identify the different types of fuel cell
- Define which types of fuel cells would suit certain applications
- Explain how operating characteristics influence fuel cell deployment

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 storage

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

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

STATUS	LEVEL	DURATION
Released	Core	1 hr 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

Galvanic Cells, Electrolysis Cells, Fuel Cells, and Standard Electrode Potentials Core [HYD-GAL-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module covers the different types of galvanic cells and the evolution of battery, fuel cell and electrolyzer technologies. The skill module covers the following topics:

- Properties, components, and characteristics of batteries
- Examples of primary and secondary battery types and their application
- Flow batteries
- Important reactions such as hydrogen evolution and oxygen reduction reactions as applied to electrolyzers and fuel cells
- Principle types of electrolysis cells and their application
- Principle types of fuel cell and their application

Designed for

Process engineers, non-electrical engineers, technical subject matter experts and technical managers interested in electrochemical engineering, electrolyzers, and fuel cells.

You will learn how to

- Distinguish between the different types of electrochemical cells that are in everyday use, especially in the energy industry
- Identify the main characteristics of different battery types, electrolyzers and fuel cells
- Match the cell type with application

Geothermal Energy Benefits and Applications Core [GEO-EBA-1-R]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module discusses the origin of geothermal energy and its history, identification of the various low and high enthalpy applications, and their respective benefits.

Designed for

Professionals seeking to acquire fundamental knowledge in geothermal energy and its primary applications (awareness level) will find this program particularly valuable.

You will learn

- How the Earth's internal heat drives geothermal energy and main notions of the domain
- The origin and benefits of geothermal energy
- How to define low enthalpy geothermal energy and its direct use
- How to define high enthalpy geothermal and production of electricity

Geothermal Electricity Production Core [GEO-ELP-1-R]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module describes geothermal production of electricity for conventional and Enhanced Geothermal Systems (EGS).

Designed for

Professionals seeking to acquire fundamental knowledge in geothermal energy and its primary applications (awareness level) will find this program particularly valuable.

You will learn how to

- Define conventional geothermal through various examples of active geothermal fields
- Define Enhanced Geothermal System (EGS) for hot dry rocks environment
- Characterize the specific challenges of each kind of geothermal field and define their advantages and disadvantages
- Explain the different types of geothermal power plants, including dry steam, flash steam, and binary cycle systems

Greenhouse Gas Emissions Inventory Quality Management Core [GHG-INV-1-N]

STATUS	LEVEL	DURATION
Released	Core	1 hr 41 min

This skill module discusses quality management for greenhouse gas (GHG) emissions inventories produced by organizations. This is critical for the accuracy, reliability, and consistency of such inventories. It is important that organizations make strategic decisions and publish disclosures using data with high integrity.

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

- Identify the risk areas within GHG data management
- Consider the principles of GHG data accounting
- Identify what processes and procedures are required
- Identify how and where GHG data errors arise
- Apply sense checking and vertical and horizontal checks
- Differentiate between GHG data auditing, validation and verification
- Characterize types of GHG data audits
- Design a GHG data audit process

Greenhouse Gas Emissions Reporting Requirements Core [GHG-RPT-1-N]

STATUS	LEVEL	DURATION
Released	Core	1 hr 10 min

This skill module discusses greenhouse gas (GHG) emissions reporting requirements and their context. Disclosure requirements might include mandatory or voluntary obligations imposed by governments, regulatory bodies, or industry standards that compel organizations to disclose GHG data.

Reporting GHG emissions with veracity and transparency is fundamental to an organization's integrity and reputation.

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

- Recognize the importance of reporting with integrity
- Identify what is mandatory to report
- Recognize the GHG Protocol reporting requirements
- Appreciate the complex Scope 2 reporting obligations
- Identify the different GHG reporting frameworks and standards
- Describe ratio indicators
- Explain how to construct a good (practice) GHG report

Greenhouse Gas Emissions Sources and Quantification Core [GHG-QUA-1-N]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 7 min

This skill module discusses GHG emission sources and their quantification which is crucial in understanding, addressing and reducing their environmental impact. In sectors such as the oil and gas industry, emissions arise from diverse activities, including extraction, production, transportation, and refining processes. The quantification of these emissions involves standardized methods to provide reliable information. The integrity of GHG emissions quantification is vital to ensure that organizations implement viable strategies to reduce their impact.

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

- Consider oil and GHG emissions, including those from combustion, venting, and fugitive sources
- Identify sources and sinks
- Follow a robust quantification process
- Manage exclusions
- Evaluate and use emission factors
- Consider other calculation factors required
- Apply GHG emissions calculations
- Consider assurance
- Evaluate the characteristics of activity data
- Identify the risks during the quantification process
- Decide upon aggregation strategies
- Appreciate the level of uncertainty

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

Hydrogen Compression and Storage Core [HYD-COS-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module covers the following topics:

- Compression overview
- Methods of Hydrogen compression
- Methods of Hydrogen storage

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 most suitable method of compression
- Identify typical compression pressures
- Identify various methods of Hydrogen storage

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

Hydrogen Process Safety Core
[HYD-HPS-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module covers the following topics:

- Process safety overview
- Difference between process safety and occupational safety
- Process safety incidents
- Process safety specific to Hydrogen context

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

- Describe key factors relating to process safety
- Identify typical causes of historical process safety events
- Determine the process safety areas of concern for Hydrogen facilities

Hydrogen Production Core
[HYD-PRO-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module covers the following topics:

- Hydrogen production overview
- Steam methane reforming
- Electrolysis
- Other methods of Hydrogen production

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

- Identify and explain the various methods of hydrogen production
- Define the colors of Hydrogen Production and what they mean
- Discuss the benefits and drawbacks of different production methods
- Describe the Balance of Pant systems required to operate an Electrolyzer

Hydrogen Use Cases and Derivatives Core
[HYD-HUC-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module covers the following topics:

- Hydrogen for transportation
- Hydrogen for power systems
- Hydrogen for industrial uses
- Liquid organic Hydrogen carriers

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

- Describe where Hydrogen is used in Industrial processes
- Describe how Hydrogen can be used in power systems
- Identify other potential Hydrogen use cases and associated pros and cons
- Outline how Hydrogen derivatives are produced
- Explain the benefits of liquid organic Hydrogen carriers

Industrial Electrochemical Systems Design Core
[HYD-PES-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module illustrates how electrochemical cells are stacked and how the stacks are built into real systems with integrated balance of plant components. The skill module covers the following topics:

- Industrial engineering applications: electrolysis, metal winning and refining
- Solving corrosion problems with electrochemical engineering
- Basic stack topologies – planar and tubular with examples from different suppliers
- Balance of plant components, water purification, gas purification, compressors and pumps
- Integration of components in terms of process and control

Designed for

Process engineers, non-electrical engineers, technical subject matter experts and technical managers interested in electrochemical engineering, electrolyzers, and fuel cells.

You will learn how to

- Identify the main industrial applications of electrochemical engineering
- Explain the design of complete fuel cell or electrolysis systems
- Identify the unit operations that are needed for the balance of plant

Introduction to Fuel Cells Core
[HYD-IFC-1-N]

STATUS	LEVEL	DURATION
Coming soon	Core	~ 2 hrs

This skill module covers the following topics:

- Types of fuel cells
- How fuel cells work
- Use cases for fuel cells

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

- Describe the inputs and outputs to/from fuel cells
- Explain the principles of fuel cells
- Explain the how a fuel cell works

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

Nature and Dynamics of Geothermal Systems Core [GEO-NDG-1-R]

STATUS	LEVEL	DURATION
Coming soon	Core	~2 min

This skill module discusses heat transfer mechanisms in Earth's crust, geological formation properties, and development of geothermal systems.

Designed for

Professionals seeking to acquire fundamental knowledge in geothermal energy and its primary applications (awareness level) will find this program particularly valuable.

You will learn

- The three primary mechanisms of heat transfer: conduction, convection, and radiation
- How these mechanisms operate within the Earth and influence geothermal gradients in various tectonic contexts
- How different geological layers have varied thermal properties
- The importance of porosity and permeability in the characterization of potential geothermal reservoirs
- The methods used to identify potential geothermal plays, including geological surveys, geophysical studies, and exploratory drilling

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

Safety Aspects of Hydrogen Core [HYD-SAF-1-N]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 33 min

This skill module covers the following topics:

- Hydrogen hazards and risks
- Hydrogen hazard controls
- Hydrogen incidents and emergency response

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

- Describe Hydrogen risks and associated risks
- Describe the potential consequences of Hydrogen risks
- Explain material embrittlement

Scope 1 and 2 Greenhouse Gas Emissions – An Introduction Core [GHG-SCO-1-N]

STATUS	LEVEL	DURATION
Released	Core	1 hr 46 min

This skill module provides an overview of scope 1 and 2 greenhouse gas (GHG) emissions.

Scope 1 encompasses direct emissions from sources that are owned or controlled by an organization. Measuring and managing scope 1 emissions is fundamental to an organization's GHG accounting and is integral to the evaluation of emission reduction strategies.

Scope 2 are indirect emissions associated with the generation of purchased energy consumed by an organization. These arise from the production of electricity, heat, or steam that an organization acquires from external sources. Scope 2 emissions quantification is essential for an organization's GHG inventory, but this is complicated by energy supply characteristics. Reliable carbon intensity data for these energy sources gives organizations opportunities to improve efficiency and transition to lower carbon alternatives.

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

- Identify the main oil and gas sector scope 1 GHGs and understand their sources
- Identify and consider the different sources of Scope 2 GHG emissions
- Apply the GHG Protocol
- Appreciate the various complications with Scope 2 GHG emissions quantification
- Understand the sources of generation
- Quantify Scope 2 GHG emissions
- Appraise the sources of grid factors
- Differentiate and understand the location-based and market-based methods of Scope 2 quantification
- Consider electricity transmission and distribution losses
- Calculate Scope 2 GHG emissions
- Ensure a complete scope 1 and 2 GHG inventory

Scope 3 Greenhouse Gas Emissions – An Introduction Core [GHG-SC3-1-N]

STATUS	LEVEL	DURATION
Released	Core	1 hr 14 min

This skill module provides an overview of scope 3 greenhouse gas (GHG) emissions. These are indirect emissions that occur in the value chain of an organization, extending beyond its immediate control or ownership boundaries. Scope 3 emissions from upstream or downstream activities are diverse, complex, and often challenging to quantify. They do however often represent the largest part of an organization's GHG inventory, so it is important for an organization to consider their scope 3 emissions during the transition to a low-carbon world.

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

- Identify and consider the different sources of Scope 3 GHG emissions
- Apply the GHG Protocol
- Appreciate the importance of Scope 3 emissions across the value chain
- Consider upstream and downstream Scope 3 categories
- Calculate specific Scope 3 GHG emissions categories
- Apply a structured quantification strategy
- Appraise different Scope 3 data sources
- Prioritize data collection
- Appreciate the specificity of the calculation method
- Consider disclosure requirements and net zero
- Identify Scope 3 reduction measures

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

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 skill 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 skill 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

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

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

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

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 skill 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

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 skill 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

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 skill 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

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

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 coordinate the discipline plans necessary to complete the execution stage. The skill 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 skill 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

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 sure the process is clarified.

Designed for

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

You will learn how to

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

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

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

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

- 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.

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

STATUS	LEVEL	DURATION
Coming soon	Fundamental	~4 hrs

This skill module mostly focuses on maximizing shareholder value, measured as expected monetary value (EMV), which is risk-weighted (expected value) NPV. This skill module introduces value of information and Bayes' rule, and covers the following topics:

- Decision Policy Components
- Time Preference
- Social Factors in Decision Policy
- Establishing a Risk Tolerance Coefficient for Risk Policy

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

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

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

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

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

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

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

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

STATUS	LEVEL	DURATION
Released	Fundamental	2 hrs 26 min

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

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

Designed for

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

You will learn

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

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

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

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

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 skill 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

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

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

- 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)
- Set up and solve a decision tree to evaluate the value of a control-adding alternative
- Apply Monte Carlo to optimize one or multiple control decision variables
- Calculate the expected value (EV) cost of an accident
- Set up a decision tree to evaluate the EV cost of an accident vs amount spent on maintenance
- Calculate the EV cost of an accident with Low Maintenance plus Insurance

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

STATUS	LEVEL	DURATION
Released	Fundamental	4 hrs 1 min

This skill module introduces value of information and Bayes' rule, and covers the following topics:

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

Designed for

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

You will learn how to

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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 35 min

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

Designed for

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

You will learn

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

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

STATUS	LEVEL	DURATION
Released	Core	3 hrs 36 min

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

Designed for

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

You will learn

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

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

STATUS	LEVEL	DURATION
Released	Core	5 hrs 35 min

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

Designed for

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

You will learn

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

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

STATUS	LEVEL	DURATION
Released	Core	2 hrs 56 min

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

Designed for

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

You will learn

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

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

STATUS	LEVEL	DURATION
Released	Core	4 hrs 8 min

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

Designed for

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

You will learn

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

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

STATUS	LEVEL	DURATION
Released	Core	3 hrs 53 min

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

Designed for

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

You will learn

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

Enterprise system thinking and design

Supervised Machine Learning Core
[DSA-SML-1]

STATUS	LEVEL	DURATION
Released	Core	3 hrs 59 min

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

Designed for

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

You will learn

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

Unsupervised Machine Learning Core
[DSA-UML-1]

STATUS	LEVEL	DURATION
Released	Core	2 hrs 6 min

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

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

Designed for

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

You will learn

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