# Facilities Course Progression Map

## Basic
- **Introduction to Oil and Gas Production Facilities** – PF2
- **Overview of Gas Processing** – G2

## Foundation
- **Applied Water Technology in Oil and Gas Production** – PF21
- **Oil Well Pad Facilities (For Facilities Engineers)** – OWPF-FE
- **Fundamental and Practical Aspects of Produced Water Treating** – PF23

## Intermediate
- **Gas Treating and Sulfur Recovery** – G6
- **Practical Computer Simulation Applications in Gas Processing** – GS
- **Onshore Gas Gathering Systems: Design & Operation** – PF45
- **Troubleshooting Oil and Gas Processing Facilities** – PF49

## Specialized
- **CO₂ Surface Facilities** – PF81
- **Separation Equipment - Selection & Sizing** – PF42
- **Relief and Flare Systems** – PF44

## Oil and Gas Processing
- **Gas Conditioning and Processing** – G4
- **Gas Conditioning and Processing - LNG Emphasis** – G4LNG

## Instrumentation, Controls & Electrical
- **Electrical Engineering Fundamentals for Facilities Engineers** – IC3
- **Electricity Engineering Fundamentals** – E3
- **Instrumentation and Controls Fundamentals for Facilities Engineers** – IC4
- **Fundamentals of Process Safety** – PS2
- **Process Safety Engineering** – PS4
- **Risk Based Process Safety Management** – HS45

## Offshore & Subsea
- **Flow Assurance for Offshore Production** – FAOP
- **Fundamentals of Offshore Systems: Design and Construction** – OS4
- **Offshore Pipeline Design and Construction** – PL43
- **Offshore Pipeline Facilities: Design, Construction and Operations** – PL42
- **Onshore Pipeline Facilities: Design, Construction and Operations** – PL42
- **Pipeline Engineering**

## Process Safety
- **Process Safety Engineering Principles** – PSE Virtual/Blended Course
- **Choosing the Right Facilities Equipment for the Reservoir** – PF3
- **Instrumentation, Controls and Electrical Systems for Facilities Engineers** – ICE21
- **Overview of Subsea Systems** – OS22
- **Overview of Offshore Systems** – OS22
- **LNG Short Course: Technology and the LNG Chain** – G20

## Pipeline Engineering
- **Flow Assurance**
- **Corrosion Management in Production/Processing Operations** – PF22
- **Offshore Pipeline Design and Construction** – PL43
- **Terminals and Storage Facilities** – PL44

## Additional Courses
- **Introduction to Oil and Gas Production Facilities**
- **Choosing the Right Facilities Equipment for the Reservoir** – PF3
- **Fundamentals of Process Safety** – PS2
- **Process Safety Engineering** – PS4
- **Risk Based Process Safety Management** – HS45
- **Electrical Engineering Fundamentals for Facilities Engineers** – IC3
- **Instrumentation and Controls Fundamentals for Facilities Engineers** – IC4
- **Fundamentals of Offshore Systems: Design and Construction** – OS4
- **Offshore Pipeline Design and Construction** – PL43
- **Offshore Pipeline Facilities: Design, Construction and Operations** – PL42
- **Onshore Pipeline Facilities: Design, Construction and Operations** – PL42
- **Pipeline Engineering**
### Facilities Course Progression Map

#### Mechanical Engineering

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#### Operations & Maintenance

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#### Additional courses available in:

- Production & Completions
- Health, Safety, Environment
- Petroleum Business
- Professional Petroleum Development
- Multi-Discipline Training

- Basics of Static Mechanical Equipment – BSM
- Basics of Rotating Mechanical Equipment – BRM
- Applied Maintenance Management – OM21
- Oil & Gas Processing Facilities for Operations & Maintenance – OT1
- Maintenance Planning and Work Control – OM41
- LNG Facilities for Operations & Maintenance – OT43
- NGL Extraction, Stabilization and Fractionation for Operations & Maintenance – OT42
- Crude Oil Pipeline Operations – OT50
- Petroleum Project and Program Management Essentials – P3ME
- Effective Materials Management – SC42
- Contracts and Tenders Fundamentals – SC41
- Managing Brownfield Projects – FPM42
- Project Management for Engineering and Construction – FPM22
- Project Controls for Capital Projects – PC21
- Petroleum Project Management: Principles and Practices – PPM
- Inside Procurement in Oil & Gas – SC61
- Supplier Relationship Management – SC63
- Strategic Procurement and Supply Management in the Oil and Gas Industry – SC62
Overview of Offshore Systems – OS21

BASIC 5-DAY

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

DESIGNED FOR

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

YOU WILL LEARN HOW TO

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

COURSE CONTENT

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

Overview of Subsea Systems – SS2

BASIC 5-DAY

An overview of subsea components and how they are integrated into field architecture is provided during this five-day course. Individuals will develop a basic understanding of the various subsea components used in all water depths, from relatively shallow to ultra-deepwater. The participants will all learn how the components are integrated into subsea field developments, which will accelerate learning and productivity. Installation and flow assurance are emphasized as key drivers in subsea design. The course emphasizes a systems approach to design. Individual and group exercises are used throughout the course, including a case study to develop field architecture recommendations, basic component selection, and high level project execution plans for a subsea development. Course instructors are experienced offshore managers.

DESIGNED FOR

Technical staff who are beginning or transitioning into the design, construction, and operation of subsea systems. Non-technical staff working with a subsea development team will benefit by developing an awareness of subsea systems.

YOU WILL LEARN HOW TO

• Recognize the integrated nature of field architecture, system design, and component selection
• Identify appropriate applications for subsea systems
• Identify the main subsea components, their functions, strengths, weaknesses, and interfaces from the well to the production facility
• Understand key design, construction, and installation issues
• Describe basic operating and maintenance considerations
• Understand the key steps, from drilling through startup, for the design, fabrication, testing, installation, and operation
• Understand the importance of an integrated approach to design, flow assurance, installation, and life-cycle considerations

COURSE CONTENT

Applications for subsea systems • Flow assurance considerations in system design and configuration • Field architecture considerations • Subsea component descriptions and functions • Fabrication, testing, installation, commissioning, and operational issues • Production, maintenance, and repair considerations

Fundamentals of Offshore Systems Design and Construction – OS4

FOUNDATION 10-DAY

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

DESIGNED FOR

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

YOU WILL LEARN HOW TO

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

COURSE CONTENT

Offshore systems overview and field architecture selection • Well construction and servicing equipment and operation • Flow assurance • Topside facilities • Oil and gas transportation facilities • Riser systems • Subsea systems • Production operations • Infrastructure impact on design and operations • Effects of the ocean environment • Introduction to naval architecture • Structural design processes and tools • Construction plans and execution • and more...

Flow Assurance for Offshore Production – FAOP

INTERMEDIATE 5-DAY

Flow assurance is a critical component in the design and operation of offshore production facilities. This is particularly true as the industry goes to deeper water, longer tiebacks, deeper wells, and higher temperature and pressure reservoirs. Although gas hydrate issues dominate the thermohydraulic design, waxes, asphaltens, emulsions, scale, corrosion, erosion, solids transport, slugging, and operability are all important issues which require considerable effort. The participant will be presented with sufficient theory/correlation information to be able to understand the basis for the applications. This intensive five-day course has considerable time devoted to application and design exercises to ensure the practical applications are learned.

DESIGNED FOR

Engineers, operators, and technical managers who are responsible for offshore completions, production, and development; technical staff needing a foundation in principles, challenges, and solutions for offshore flow assurance. The course is also appropriate for persons involved in produced fluids flow in onshore production operations.

YOU WILL LEARN HOW TO

• Identify the components of a complete flow assurance study and understand how they relate to the production system design and operation
• Interpret and use sampling and laboratory testing results of reservoir fluids relative to flow assurance
• Understand the basic properties of reservoir fluids and how they are modeled for the production flow assurance system
• Understand the thermodynamic modeling of steady state and transient multiphase flow in offshore production systems
• Evaluate and compare mitigation and remediation techniques for: gas hydrates, paraffin (waxes), asphaltens, emulsions, scale, corrosion, erosion and solids transport, and slugging
• Understand the elements of an operability report for subsea production facilities, flowlines, and export flowlines

COURSE CONTENT

Overview of flow assurance • PVT analysis and fluid properties • Steady state and transient multiphase flow modeling • Hydrate, paraffin, and asphaltene control • Basics of scale, corrosion, erosion, and sand control • Fluid property and phase behavior modeling • Equations of state • Fugacity and equilibrium • Viscosities of oils • Thermal modeling • Multiphase pressure boosting • Slugging: hydrodynamic, terrain induced, and ramp up • Commissioning, start-up, and shutdown operation

2019-2020 Schedule and Tuition (USD)

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

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

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

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

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The Campbell Gas Course® has been the standard of the industry for more than 52 years. Tens of thousands of engineers have attended our G4 program, considered by many to be the most practical and comprehensive course in the oil and gas industry.

The Campbell Gas Course® textbooks, Volumes 1 and 2, are routinely updated to reflect evolving technologies in this broad industry. Both hand-methods and computer-aided analysis are used to examine sensitivities of technical decisions. To enhance the learning process, about 30 problems will be assigned, reviewed, and discussed throughout the course. Problems will be solved individually and in teams.

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

**COURSE CONTENT**
- Gas processing systems
- Physical properties of hydrocarbons
- Thermodynamics and application of energy balances
- Process control and instrumentation
- Relief and flare systems
- Fluid hydrillas, two-phase flow
- Separation equipment
- Heat transfer equipment
- Pumps
- Compressors and drivers
- Refrigeration in gas conditioning and NGL extraction facilities
- Fractionation
- Glycol dehydration; TEG
- Adsorption dehydration and hydrocarbon removal
- Gas treating and sulfur recovery
- Overview and summary

**2019-2020 Schedule and Tuition (USD)**

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For more information, visit petroskills.com/g3online
**Onshore Pipeline Facilities - Design, Construction and Operations – PL42**

**FOUNDATION  5-DAY**

Successful onshore pipeline businesses require personnel competent in fully integrated approaches to evaluation, planning, design, construction, operations, and asset integrity management. This intensive, 5-day foundation level course explores best practices for developing and maintaining pipeline systems that maximize life cycle reliability; employee, public, and environmental safety; and cost effectiveness. Design and team exercises are an integral part of this course.

**DESIGNED FOR**

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

**YOU WILL LEARN HOW TO**

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

**COURSE CONTENT**

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

**Fundamentals of Pump and Compressor Systems – ME44**

**INTERMEDIATE  5-DAY**

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

**DESIGNED FOR**

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

**YOU WILL LEARN**

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

**COURSE CONTENT**

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

**2019-2020 Schedule and Tuition (USD)**

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