

# PetroSkills®

2016 Operations & Maintenance Training Guide



**OGCI®**

**John M. Campbell**

**RDC**



# Operations & Maintenance

## Course Progression Matrix

Operations & Maintenance (O&M) provides training designed to help your team perform safely and efficiently.

Skilled technicians are safe technicians.

PetroSkills O&M courses offer:

- Customized courses based on your PFDs
- Improve the technical communication between operators and engineers
- Develop in-depth understanding of process operations
- Flexible course topics from a bank of course content
- Flexible course lengths (3-, 5-, and 10-day courses available)
- Flexible and adaptable to shift schedules
- Non-mathematical courses available
- Advanced level courses available

The following instructors have been selected and approved by the PetroSkills Curriculum Network:

MR. JIMMY CLARY  
MR. BILL KEETER

MR. PERRY LOVELACE  
MR. ALAN ROYER

MR. BUCK TITSWORTH  
MR. DANNY VAN SCHIE

MR. COLIN WATSON  
MR. STUART WATSON

	Operator Training	Process Safety	Operations Management
FOUNDATION	LNG FACILITIES FOR OPERATIONS AND MAINTENANCE – OT-43 (PAGE 3)		
	NGL FRACTIONATION & CRYOGENIC NGL RECOVERY FOR OPERATIONS & MAINTENANCE – OT-42 (SEE WEBSITE)		
	GAS DEHYDRATION AND AMINE SWEETENING FOR OPERATIONS & MAINTENANCE – OT-41 (SEE WEBSITE)	PROCESS SAFETY ENGINEERING – PS-4 (PAGE 3)	
	GAS PRODUCTION/PROCESSING FOR OPERATIONS & MAINTENANCE – OT-3 (PAGE 2)	FUNDAMENTALS OF PROCESS SAFETY – PS-2 (PAGE 3)	MAINTENANCE PLANNING AND WORK CONTROL – OM-41 (PAGE 3)
BASIC	OIL AND GAS PROCESSING FACILITIES FOR OPERATIONS AND MAINTENANCE – OT-1 (PAGE 2)	RISK BASED PROCESS SAFETY MANAGEMENT – HS45 (PAGE 2)	APPLIED MAINTENANCE MANAGEMENT – OM-21 (PAGE 2)



## Oil and Gas Processing Facilities for Operations and Maintenance – OT-1

### BASIC

This course will provide the basic knowledge required for understanding processes and operating issues common to gas processing facilities. Course content is customizable to client needs.

#### DESIGNED FOR

Facility operators who require a working knowledge of the various processes used in production fluid conditioning and processing, including the common operational difficulties that may arise and operational tactics used to resolve them. Also suitable for maintenance technicians, supervisors, and managers, as well as other non-engineering personnel who would benefit in an understanding of gas processing techniques that can be applied in their daily work activities.

#### YOU WILL LEARN

- About the effects of produced fluid (OGW) compositions on facility design and operation
- About various separation and conditioning processes for meeting specifications on oil, gas, and produced water streams
- Refrigeration 4-cycle process and application of economizers to the refrigeration process
- To understand how to operate facilities so as to minimize processing costs
- How to apply course material to troubleshooting gas conditioning and process anomalies

#### COURSE CONTENT

Basic chemistry and physical principles related to hydrocarbons • Quick overview of gas processing • Phase behavior fundamentals • Mass transfer operations • Amine gas sweetening • Water-hydrocarbon behavior, including hydrate formation • TEG gas dehydration • Solid bed adsorbers • Mechanical refrigeration • Gas expansion NGL recovery (turbo expanders and Joule-Thompson effect) • NGL stabilization and fractionation • Claus sulfur recovery • Specific to Geographical Regions: • Stavanger/Aberdeen - Typical North Sea oil and gas producing operations, produced water treating, seawater treating, and other offshore topics of general interest • Brisbane - Gas processing and introduction to liquefied natural gas (LNG) processes • Midland - Gas conditioning and processing, sour gas treating, and sulfur recovery • Pittsburgh - Mechanical refrigeration principles and equipment, NGL fractionation, and cryogenic NGL recovery

## Risk Based Process Safety Management – HS45

### FOUNDATION

This course introduces process safety management in the oil and gas industry, the elements and benefits of process safety management systems, and tools for implementing and managing a system. In this course the participant will learn to use tools and techniques for managing process safety. The Center for Chemical Process Safety's (CCPS) book titled "Guidelines for Risk Based Process Safety" or "RBPS Guidelines" will be the text for this course. Participant centered exercises and selected case studies will be used to build on the concepts that CCPS advocates for risk based process safety.

Throughout the course, participants will be challenged to think how their process safety management system can be enhanced and modified to meet the concepts of risk-based decision making. An individual action plan will be developed to apply the information from the course to the workplace.

#### DESIGNED FOR

HSE professionals, operations and maintenance technicians, engineers, supervisors and project managers requiring a basic foundation in developing and managing process safety. The more technical aspects of process safety engineering are covered in PS-4, Process Safety Engineering.

#### YOU WILL LEARN HOW TO

- Identify processes applicable to Process Safety Management (PSM) and describe relevant terms used
- Identify which standards are to be applied for managing process hazards
- Apply programs and tools for managing a PSM system
- Choose appropriate decision making methods and tools to identify process hazards
- Describe and use techniques available for control of hazards associated with process designs
- Describe the criteria and methods of selecting equipment and safe guarding controls
- Research and apply the performance parameters for the safety systems in operations
- Explain the role of all disciplines and their contribution to the management of potential HSE hazards

#### COURSE CONTENT

Process safety culture and competency • Compliance with standards • Understand hazards and risk • Operating procedures and safe work practices • Asset integrity and reliability • Management of change • Conduct of operations • Incident investigation (associated with plant failures) • Measurement and metrics • Management review and continuous improvement

## Applied Maintenance Management – OM-21

### BASIC

No matter the price of oil, safe, efficient operations require well managed, integrated asset management. Effective, well organized maintenance management is the key. In this course, participants will receive a sound, integrated, basic knowledge of the maintenance function and how to progress towards world-class performance. Individual action plans will carry course learning into the work environment. Better utilization of Computerized Maintenance Management Systems (CMMS) will also be covered in this course. A pre and post seminar self-assessment will be given to indicate delegates' competency improvements. The assessment is taken from the PetroSkills industry standard competency map for Maintenance Management.

#### DESIGNED FOR

Maintenance supervisors, team leaders, or managers needing to improve their maintenance programs. This course is a broad survey of essential aspects of maintaining a safe, efficient, and reliable facility asset.

#### YOU WILL LEARN

- World class maintenance standards and how to apply them
- Key performance indicators for your dashboard
- Essential elements of work planning and scheduling
- Optimization of preventive and predictive maintenance
- To focus your resources on critical equipment
- How to work with contractors more effectively
- Development of organizational competence

#### COURSE CONTENT

World class standards • Maintenance strategies • Planning and scheduling • Optimizing preventative and predictive maintenance • Identifying critical equipment • Utilizing your CMMS Supplier certification • Developing organizational competence • Presenting your action plan

## Gas Production / Processing for Operations and Maintenance – OT-3

### FOUNDATION

This course will provide a more detailed examination of the processes found in gas production facilities, including the important theoretical aspects that must be mastered before operators can truly understand their processes and become proficient at avoiding problems and troubleshooting the technical problems that do arise. This course prepares operations personnel to communicate better and work more closely with professional engineering staff. A problem set consisting of practical calculations that will be useful to operators beyond the classroom will be administered during the course. A high-quality scientific calculator is issued to all participants of the OT-3 course. Course content is customizable to client needs. This course is also available in non-mathematical, basic version of five day duration.

#### DESIGNED FOR

Plant and facility operations and maintenance technicians, supervisors, and managers.

#### YOU WILL LEARN

- Advanced level physical principles, hydrocarbon properties, and hydrocarbon phase behavior
- Practical thermodynamics, including mass and energy balances
- Principles of fluid dynamics and application to pumps, compressors, and turboexpanders
- To understand process equipment, including heat exchangers, fired heaters, separators, piping, and towers with trays or packing
- To understand process unit operations, including gas conditioning and processing, gas dehydration, NGL extraction processes, stabilization/fractionation, and sulfur recovery

#### COURSE CONTENT

Hydrocarbons basic principles • Units of measurement • Process drawings • Overview of oil and gas processing • Important properties of hydrocarbons • Phase behavior fundamentals • Practical thermodynamics: mass and energy balances • Heat transfer and fired heaters • Mechanical refrigeration • Introduction to process control • Basic principles of fluid flow • Centrifugal pumps • Centrifugal compressors • Reciprocating compressors • Introduction to gas turbines • Production separators and oil dehydration • Water treating • Corrosion and corrosion monitoring • Amine gas sweetening • Sulfur recovery • Mass transfer operations • Water-hydrocarbon behavior • TEG gas dehydration • Mole sieve dehydration • Gas expansion NGL recovery (valve and turboexpander) • Crude oil, condensate, and NGL stabilization • NGL fractionation • Process troubleshooting

#### 2016 Schedule and Tuition / 5 Days

HOUSTON, US	16-20 MAY	US\$3880
MIDLAND, US	7-11 NOV	US\$3840
WASHINGTON (PA), US	6-10 JUN	US\$3840

#### 2016 Schedule and Tuition / 5 Days

DUBAI, UAE	4-8 SEP	US\$5090
HOUSTON, US	18-22 APR	US\$4040
LONDON, UK	27 JUN-1 JUL	US\$4670+VAT

#### 2016 Schedule and Tuition / 5 Days

HOUSTON, US	22-26 FEB	US\$3860
ORLANDO, US	12-16 DEC	US\$3920

To arrange an in-house session of this course, visit [www.petroskills.com/inhouse](http://www.petroskills.com/inhouse).



## LNG Facilities for Operations and Maintenance – OT-43

### FOUNDATION

This is a five day, LNG-industry version of our popular OT-1 Gas Production/Processing for Operations & Maintenance course, with expanded coverage on refrigeration, liquefaction, and utilities. The course includes in-depth information on basic LNG mixed refrigerant processing. Instructors will explain contaminant removal processes employed in LNG processes. Relevant details of the APCI LNG liquefaction processes are described. Class exercises/problems focus on application of theory to operational trends, so operators can understand their processes and become proficient at identifying issues and troubleshooting problems before production suffers. Course content is customizable to client needs.

#### DESIGNED FOR

LNG facility operators who require a working knowledge of the various processes used in production fluid conditioning and processing, including the common operational difficulties that may arise and operational tactics used to resolve them. Also suitable for maintenance technicians, supervisors, and managers, as well as other non-engineering personnel who would benefit from an understanding of gas processing techniques that can be applied in their daily work activities.

#### YOU WILL LEARN

- Basic chemistry and physical principles related to hydrocarbons
- Fundamentals of gas processing and conditioning for the LNG industry
- Important specifications for gas, LNG, NGLs, and condensate
- Phase behavior fundamentals
- Practical thermodynamics: mass and energy balances
- Important topics of H<sub>2</sub>S and CO<sub>2</sub> removal before liquefaction
- Processes used to sweeten and dehydrate produced fluids
- Mechanical refrigeration principles
- Other contaminants in LNG feed-gas
- NGL stabilization and fractionation
- Introduction to APCI LNG process

#### COURSE CONTENT

Basic chemistry and physical principles related to hydrocarbons • Introduction to LNG facilities • Phase behavior fundamentals • Mechanical refrigeration • Production separators and oil dehydration • Mass transfer operations • Amine sweetening • Water-hydrocarbon behavior • Solid bed adsorbers • Gas expansion NGL recovery • Fractionation fundamentals • Basic LNG mixed refrigerant process

#### 2016 Schedule and Tuition / 5 Days

BRISBANE, AUSTRALIA	25-29 JUL	US\$5210+GST
HOUSTON, US	28 NOV-2 DEC	US\$3860

## Fundamentals of Process Safety – PS-2

### FOUNDATION

The course will cover the fundamentals of process safety for all staff levels of processing facilities in the upstream and downstream oil, gas, and petrochemical industry. To identify how different disciplines and roles can have an impact on process safety performance, there is a rolling case study (Project COLEX) throughout the course that involves the installation of a separator vessel, and the process safety considerations and implications are explored and discussed at the various stages, from design to full operation.

#### DESIGNED FOR

The course will benefit all staff associated with the operation, maintenance, and governance in production and processing facilities and is relevant to roles, including senior management, project and engineering support teams, HSE support, supervisors, and operator and maintenance technicians. It provides an understanding of the design basis and essentials for safe operations, without addressing the more detailed calculation aspects covered in Process Safety Engineering – PS-4.

#### YOU WILL LEARN HOW TO

- Identify the systems and processes required to create process safety in a high hazard installation
- Identify and choose appropriate techniques and tools to qualitatively assess process hazards
- Determine appropriate risk reduction strategies and identify effective risk reduction measures to prevent, control, and mitigate process safety risk
- Recognize and develop systems to manage process safety in operations through operating procedures and operating limits, ensuring plant integrity through maintenance and inspection
- Use a management of change process to minimize risk of change
- Identify and monitor key performance measures and verifications to maintain and improve safety performance

#### COURSE CONTENT

Business context for process safety • Risk assessment [hazard identification, hazard scenarios, consequence and likelihood analysis, and risk analysis and tools and techniques] • Risk reduction measures (barriers) [types and hierarchy of risk reduction measures (barriers)] • Management of process safety in operations [operating procedures, design and operating limits, human factors, inspection and maintenance, and emergency response] • Management of change • Learning from previous incidents and near misses • Self-verification and measurement • Process safety key performance indicators • Management review and auditing • Process safety leadership [governance and culture]

#### 2016 Schedule and Tuition / 5 Days

HOUSTON, US	20-24 JUN	US\$4150
KUALA LUMPUR, MY	25-29 JUL	US\$5460
LONDON, UK	5-9 DEC	US\$4780+VAT

## Process Safety Engineering – PS-4

### FOUNDATION

This course provides an overview of process safety engineering fundamentals for hydrocarbon processing facilities, with emphasis on the upstream oil and gas sector. The focus of this course is on the engineering/design aspects of Process Safety Management. Frequent reference will be made to historical incidents and recurring problem areas. Techniques for analyzing and mitigating process safety hazards applicable to oil and gas processing will also be reviewed. Integration of the concepts covered to achieve a measured approach to Process Safety Engineering is a key aim of this course as well. Exercises and group projects will be utilized to emphasize the key learning points.

#### DESIGNED FOR

Facilities, process, and design engineers, as well as new safety/loss prevention engineers who require an overview of Process Safety Engineering.

#### YOU WILL LEARN

- Types of equipment and process systems that have historically been problematic in the Upstream – Midstream oil and gas industry
- Basics of risk analysis
- Thinking in terms of "Inherently Safer Design"
- Most common process hazard analysis methods and where they are used
- "Layers of Protection" concept—what the different layers are and how they are applied
- Detection and mitigation methods for different types of hazards

#### COURSE CONTENT

Historical incidents and problem areas • Risk analysis basics • Process hazards analysis techniques - overview • Layers of protection • Inherently safer design • Hazards associated with process fluids • Leakage and dispersion of hydrocarbon releases • Combustion behavior of hydrocarbons • Sources of ignition • Hazards associated with specific plant systems • Plant layout and equipment spacing • Pressure relief and disposal systems • Corrosion and materials selection • Process monitoring and control • Safety instrumented systems • Fire protection principles • Explosion protection

#### 2016 Schedule and Tuition / 5 Days

BRISBANE, AUSTRALIA	5-9 SEP	US\$6350+GST
CALGARY, CANADA	25-29 JUL	US\$4350+GST
DUBAI, UAE	11-15 DEC	US\$5490
HOUSTON, US	12-16 SEP	US\$4350
LONDON, UK	9-13 MAY	US\$5060+VAT
	17-21 OCT	US\$5060+VAT
PERTH, AUSTRALIA	4-8 APR	US\$6350+GST

## Maintenance Planning and Work Control

– OM-41

### FOUNDATION

No matter what the price of oil is, safe facilities operations require effective maintenance work control. ISO 55000 (PAS 55) is the asset management standard everyone is moving towards. This course is designed to build competency in Work Control as a primary skill set required to achieve these new standards. It will focus on the six phases of work management: work identification, planning, prioritization, scheduling, execution, and history capture. These essential skills are the key components of integrity management, safety, efficient resource utilization, and reliable operation. A pre and post self-assessment will be used to measure competency improvement. In order to improve facility asset management, each participant will develop an action plan to help their organizations in the long-term effort to become more efficient and safe.

#### DESIGNED FOR

Maintenance managers, superintendents, supervisors, team leaders, and planners engaged in work management, planning, and scheduling.

#### YOU WILL LEARN

- To develop world class planning and work control
- To employ business process analysis techniques in work control
- How to use a gap analysis on your work management system
- Step-by-step work control from identification through using work history
- Optimization of preventive and condition-monitoring activities
- Techniques: critical equipment analysis, critical spares control, and emergency response work

#### COURSE CONTENT

Work identification • Planning prioritization • Scheduling execution • History records • Optimizing preventive maintenance • Predictive maintenance planning • Critical equipment focus • Emergency response

#### 2016 Schedule and Tuition / 5 Days

HOUSTON, US	18-22 APR	US\$3860
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# TO VIEW OUR COURSES IN OTHER DISCIPLINES, VISIT:

## Subsurface

- Introductory/Multi-Discipline
- Geology
- Geophysics
- Petrophysics
- Reservoir Engineering
- Well Construction/Drilling
- Production & Completions Engineering
- Unconventional Resources
- Integrated - Heavy Oil
- Petroleum Data Management

## Facilities

- Gas Processing
- Process Facilities
- Water & Corrosion
- Offshore
- Pipeline
- Instrumentation, Controls, & Electrical
- Mechanical
- Reliability Engineering
- Procurement/Supply Chain Management
- Refining

## Operations & Maintenance

## Health, Safety, Environment

## Petroleum Business and Professional Development

- Petroleum Professional Development
- Petroleum Business
- Project Management

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## PetroAcademy™ Blended Learning

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- ✓ **Eliminated travel expense**
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