PetroSkills®

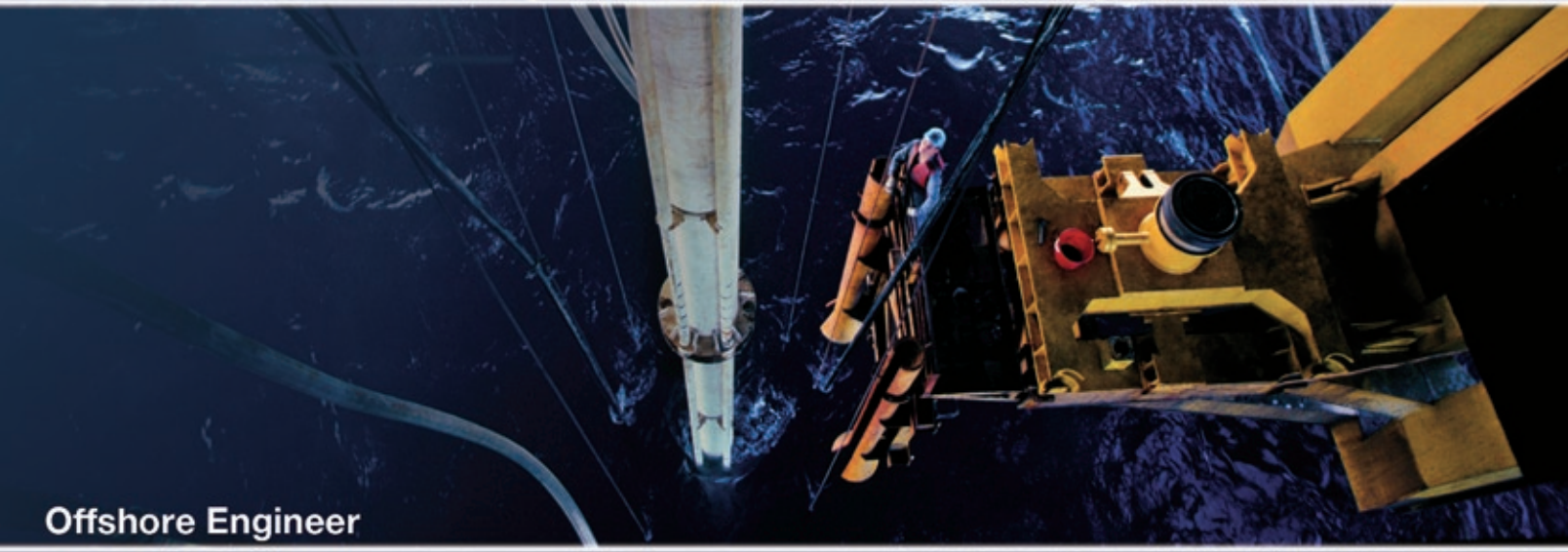
2011 Facilities Training Guide


Gas Processing Engineer


Production Facilities Engineer


Operator Training


Pipeline Engineer


Offshore Engineer

OGCI

John M. Campbell & Co.

Building competency in your Facilities Engineers

Upstream and midstream surface facilities are a critical component in the production and transportation of oil, gas and water. While facilities typically do not represent the largest capital cost segment of a field development project, it is imperative that they be properly designed and operated to maximize throughput and availability.

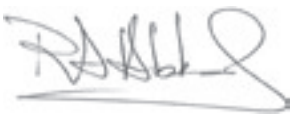
A competent Facility/Process engineer requires knowledge of a broad range of systems, e.g. separation, piping, rotating equipment, instrumentation and control, safety, electrical, etc. This required breadth of knowledge is unique relative to other engineers and technical professionals in the industry. John M. Campbell & Co. provides a wide selection of training programs to ensure your Facility/Process engineers quickly reach and maintain competency in this complex area.

As you read through our catalog you will see several examples of career training progressions for Facility/Process engineers. These have been organized to reflect different areas of interest, e.g. production facilities, midstream, offshore, etc. These suggested progressions provide a snapshot of the range of training programs available from JMC and how they can be used to quickly build competency in a workforce.

In 2010 we added two new courses to our catalog, Process Safety Engineering (PS-4) and Onshore Gas Gathering Systems: Design and Operation (PF-45). Again we are excited to be introducing two new courses for 2011.

- ICE-21 Instrumentation, Controls and Electrical Systems for Facilities Engineers –Applicable to field production facilities, pipelines, gas plants, and offshore systems, this course provides an overview of electrical power generation and distribution, process safety systems, instrumentation, control strategies and configurations.
- PF-44 Relief and Flare Systems – Applicable to any oil and gas facility, this course provides in-depth training of the system needs and causes for relief and flare, selecting and sizing the critical components, and the use of codes and standards coupled with industry best practices.

Competent Facilities/Process engineers are essential to the efficient, safe and profitable development of energy projects. Since 1967John M. Campbell & Co. has been the leader in the development and delivery of effective training solutions for facilities personnel for oil and gas organizations worldwide. We are proud to be one of the most recognized and respected training companies in this important and dynamic industry.



Robert A. Hubbard
President
John M. Campbell & Co.

Our Mission

To build proficient energy professionals that serve the energy needs of the global community.

WHAT SETS PETROSKILLS APART? THE ALLIANCE.

PetroSkills does not just provide a service to the oil and gas industry. PetroSkills IS the oil and gas industry.

Member Companies

From original members, Shell and BP, to the most recent, Talisman, MOL, Pertamina and Maersk Oil; the PetroSkills advantage lies with its members. What do the PetroSkills members provide to the Alliance and training industry?

- Curriculum advisors and Subject Matter Experts who direct and update PetroSkills competency maps for each technical discipline
- Competency assurance through adoption of structured personnel development based on industry approved competency maps
- Quality control and assurance that PetroSkills course material and instructors meet the highest industry standard

Service Providers

OGCI, TTG Systems, John M Campbell & Co, University of Trinidad & Tobago, and Southern Alberta Institute of Technology power the Alliance initiative by providing:

- Training that spans the industry, all from the same provider, using the same model
- Integrated and Accelerated development programs
- Competency-based solutions
- Virtual learning
- In-house training
- Operations and maintenance competencies
- Web based competency analysis tools

So what is PetroSkills? The differentiator... industry-driven competencies.

IT'S ALL IN THE MAPS. It's easy to talk about "developing the competency of employees," but what does that really mean? How do you establish that baseline for competency development? PetroSkills addresses this question with detailed competency maps. These maps define non-unique, but necessary job skills at skill levels ranging from awareness to mastery. These competency maps represent the shared viewpoint of PetroSkills Alliance contributors. It is not PetroSkills telling the industry what's important – it's the industry guiding PetroSkills.

A foundation of competency-based learning and development.

PetroSkills course content is based on the competency maps developed with and by the member companies. Every discipline has clearly defined skills contained in each competency map that ensures professionals they will receive the skills they need at their individual level and put them on the right track for advancement. The member curriculum advisors and the PetroSkills Board must approve each course and its material content, establishing that it is practical, up-to-date and relevant training. There are 190 courses offered to the public in over 40 locations worldwide, and are also available at your location, anywhere in the world, on an in-house basis.

PetroSkills®

John M. Campbell & Co. Delivers Competency

An experienced, seasoned facilities engineer requires competence in a number of areas. John M. Campbell & Co. has been providing this competence to upsteam and midstream professionals for over 40 years.

We understand the shortage of experienced engineering staff causes strain on the world's petroleum companies which is why our courses are designed to accelerate the transition from new hire to fully functioning team member. We do this by providing training courses that are highly technical, interactive, and facilitated by industry experts with hands-on field experience.

John M. Campbell & Company is the exclusive provider of PetroSkills facilities training and one of the most distinguished providers of facilities training in the oil and gas industry. We provide the most comprehensive collection of Facilities training, including the industry standard, the Campbell Gas Course (G-4 Gas Conditioning and Processing), and are continually developing new courses.

Courses are offered in the fields of Gas Processing, Production Facilities, Offshore, Pipeline, Instrumentation and Controls, Electrical, Mechanical, Operations Management, Supply Chain, Refining, Reliability Engineering and Operator Training.

John M. Campbell & Co.

TABLE OF CONTENTS

How to Quickly Build Competency in Surface Facility Engineers

Structured, integrated training programs taken in a logical progression are the key to quickly developing a "broad-based" facilities engineer with competencies in many areas.

The Society of Petroleum Engineers describes the knowledge components necessary as "covering a wide range including all aspects of surface facilities design (process/utility systems and equipment, measurement and control, electrical systems, flow assurance, materials, corrosion, solids handling), project management, safety, environmental, operations and abandonment. Included are: onshore, offshore (subsea, platform-based, and floating-based systems), and pipelines for oil and gas developments as well as LNG, CNG, GTL plants, terminals and transportation concepts".

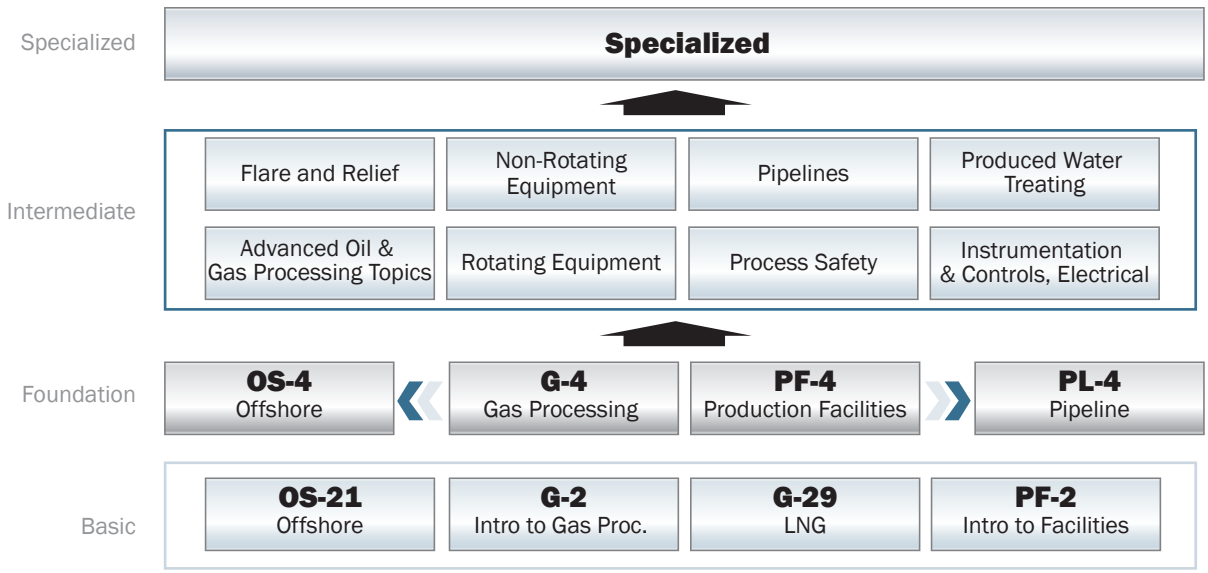
A surface facilities engineer may not need to know how to design or specify an electrical substation or a motor control center, but will need to understand: voltage levels, electrical classifications, how to specify electric motors, where variable speed motors are best used and their effect on the electrical system or how power factor affects the cost of purchased power.

Additionally, a surface facilities engineer may not need to know how to change-out a reciprocating compressor valve or analyze a vibration problem in a high speed centrifugal, but will need to understand: how valve unloaders and clearance pockets are used to control compressor capacity in a gas gathering system, the effect of MW and suction temperature on the performance of a centrifugal compressor in an offshore production facility.

To deliver the necessary competencies in a timely and effective manner John M. Campbell & Company training courses follow a logical course progression where learning in each course builds on previous courses. Training methods employ multiple delivery techniques to maximize retention of the technical content. The diagram below illustrates the broad approach JMC visualizes to develop "broad-based" facilities engineers. Using this approach for your specific career growth is discussed in the Course Progression matrices that follow.

Understanding the Course Progression Matrices - Pages 5 – 9

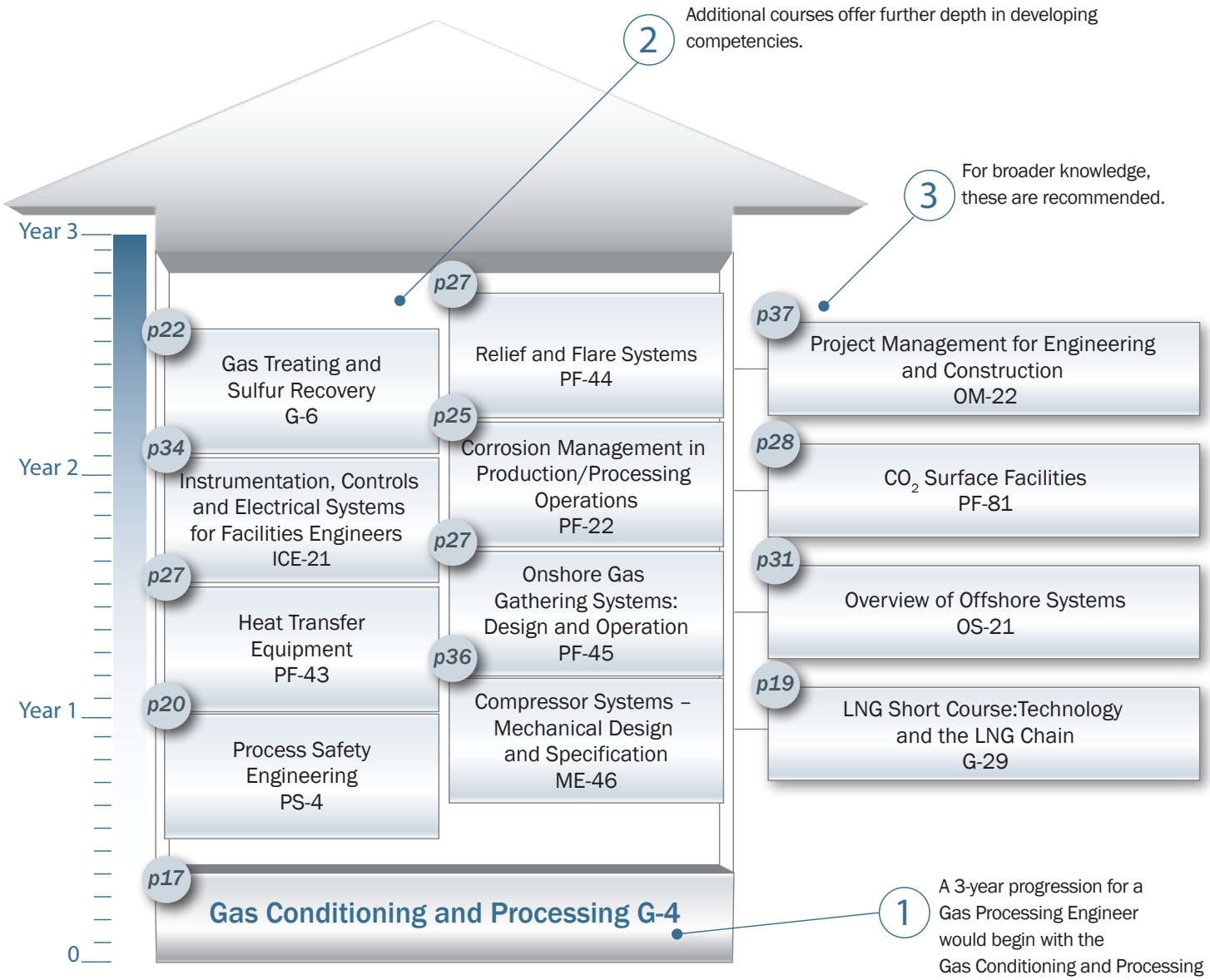
For an engineer starting in a facilities technical role, a logical progression would typically begin with a foundation level course such as the Gas Conditioning and Processing (G-4) course or Oil Production and Processing (PF-4). Subsequent Intermediate courses can then be chosen to increase competency. Beyond these, additional courses may be chosen for more in-depth specialization.



GAS PROCESSING ENGINEER

Gas Processing Engineer Course Progression

Example of recommended courses to develop a Gas Processing Engineer over a 3-year span.

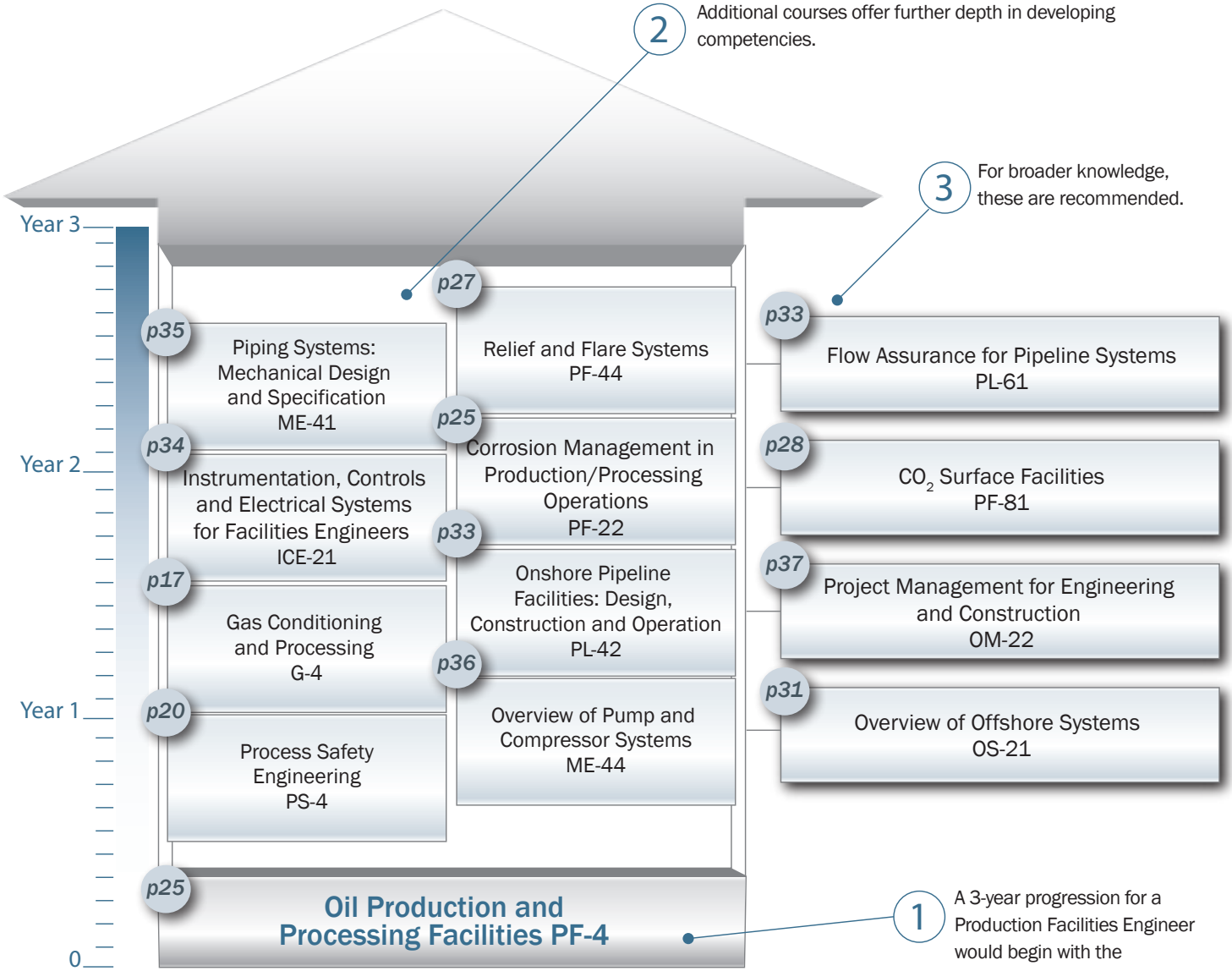


Example of a Gas Processing Engineer Progression

PRODUCTION FACILITIES ENGINEER

Production Facilities Engineer Course Progression

Example of recommended courses to develop a Production Facilities Engineer over a 3-year span.

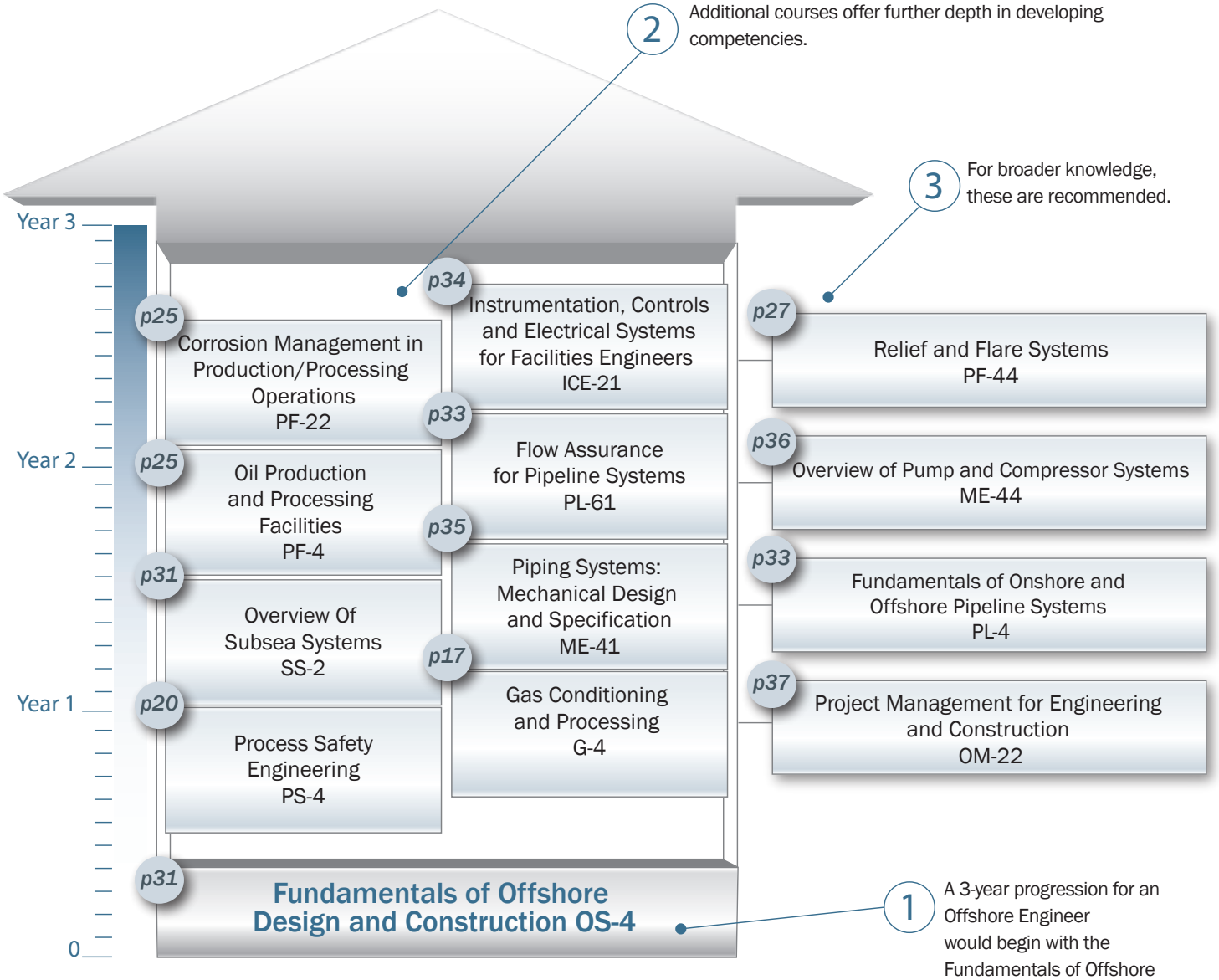


Example of a Production Facilities Engineer Progression

OFFSHORE ENGINEER

Offshore Engineer Course Progression

Example of recommended courses to develop an Offshore Engineer over a 3-year span.

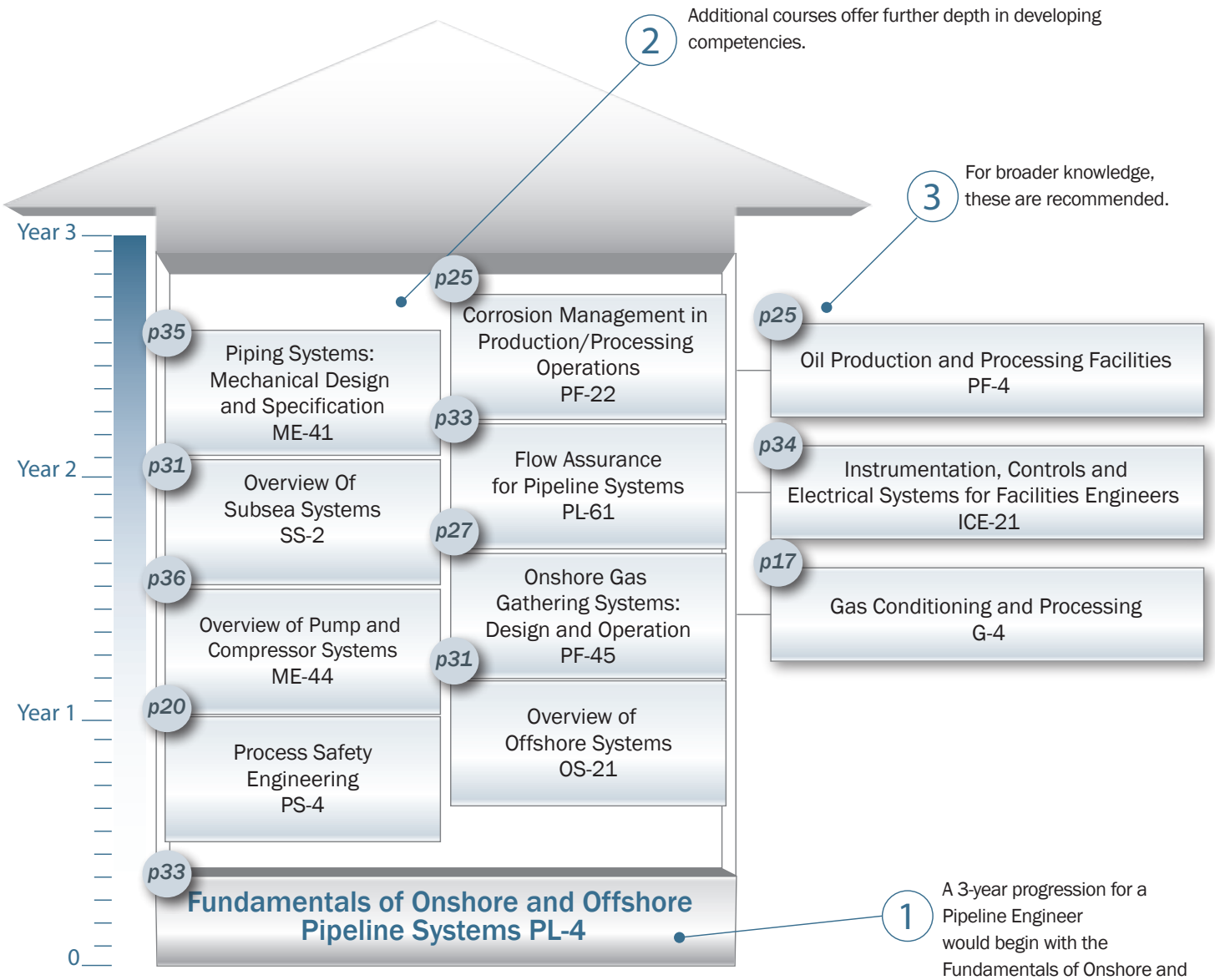


Example of an Offshore Engineer Progression

PIPELINE ENGINEER

Pipeline Engineer Course Progression

Example of recommended courses to develop a Pipeline Engineer over a 3-year span.

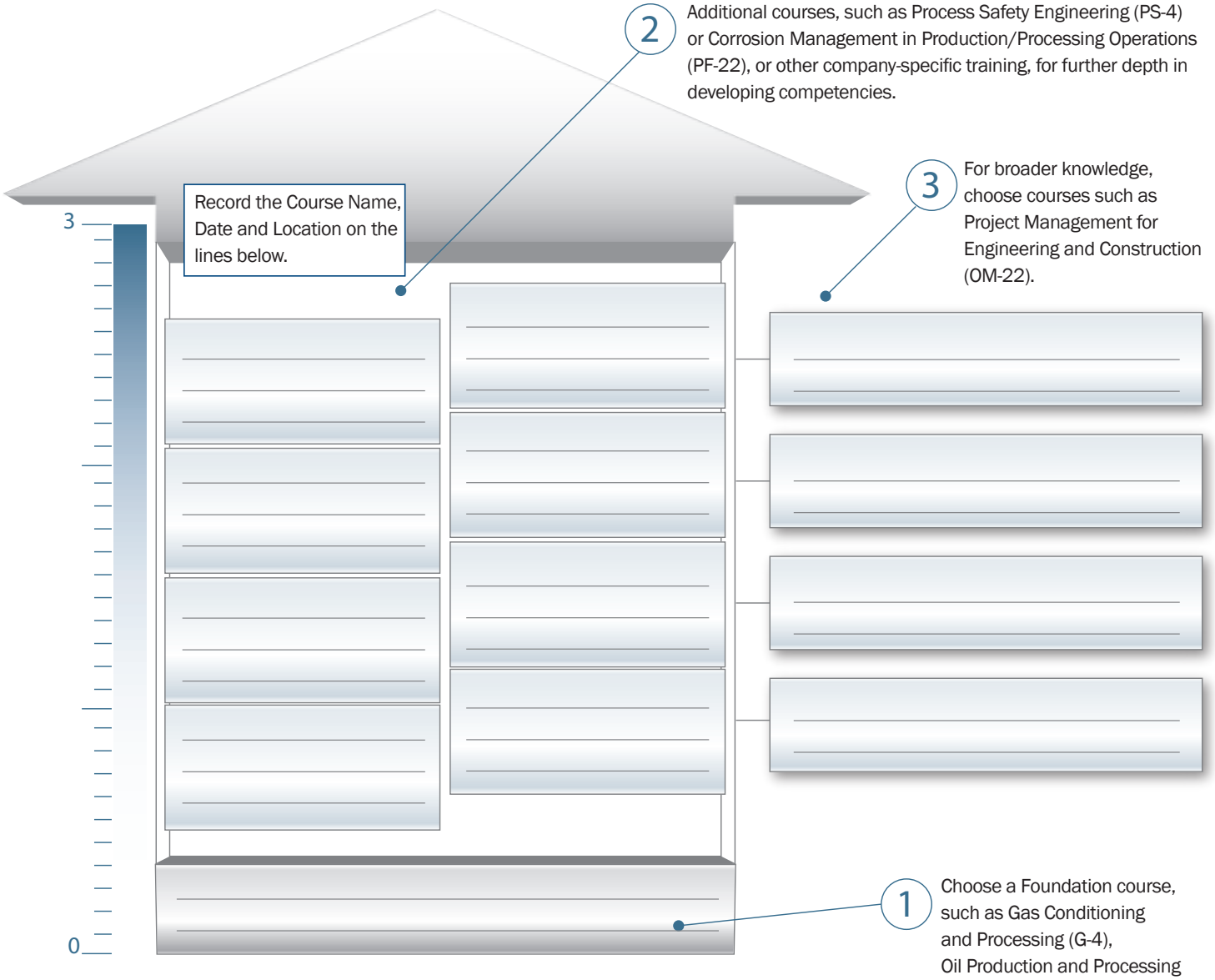


Example of an Pipeline Engineer Progression

PERSONAL FAST-TRACK

My Personal FastTrack to Competency (3-year plan)

You know what your career goals are but have you figured out the best way to get there? Comprehensive self-assessment can highlight areas in which you may need training. Use this chart to develop your own personal FastTrack to competency progression.



Career Goal: _____

_____

2011 COURSE SCHEDULE

Code	Course Name	Start Date	End Date	Location	Tuition	Page
G-5	Gas Conditioning and Processing - Special	1/17/11	1/21/11	Calgary	$3,770	21
G-4	Gas Conditioning and Processing	1/31/11	2/11/11	London	$8,730	17
PF-4	Oil Production & Processing Facilities	1/31/11	2/11/11	Houston	$6,290	25
G-4	Gas Conditioning and Processing	2/7/11	2/18/11	Houston	$6,780	17
E-3	Electrical Engineering Fundamentals for Facilities Engineers	2/14/11	2/18/11	Houston	$3,140	34
PS-4	Process Safety Engineering	2/14/11	2/18/11	London	$4,330	20
G-4	Gas Conditioning and Processing	2/20/11	3/3/11	Doha	$8,250	17
IC-3	Instrumentation and Controls Fundamentals for Facilities Engineers	2/21/11	2/25/11	Houston	$3,140	35
SC-61	Inside Procurement in Oil and Gas	2/22/11	2/24/11	Houston	$2,020	39
ME-41	Piping Systems - Mechanical Design and Specification	2/28/11	3/4/11	Houston	$3,140	35
PF-42	Separation Equipment - Selection & Sizing	2/28/11	3/4/11	Houston	$3,140	28
PS-4	Process Safety Engineering	3/6/11	3/10/11	Dubai	$4,470	20
G-4	Gas Conditioning and Processing	3/7/11	3/18/11	Stavanger	$8,730	17
OM-22	Project Management for Engineering and Construction	3/7/11	3/11/11	Houston	$2,880	37
PF-45	Onshore Gas Gathering Systems: Design & Operations	3/7/11	3/11/11	Houston	$3,140	27
G-6	Gas Treating and Sulfur Recovery	3/14/11	3/18/11	Houston	$3,350	22
PF-21	Applied Water Technology in Oil and Gas Production	3/21/11	3/25/11	London	$4,330	25
PS-4	Process Safety Engineering	3/21/11	3/25/11	Houston	$3,140	20
SC-41	Contracts and Tenders Fundamentals	3/22/11	3/24/11	Houston	$2,020	39
PF-4	Oil Production & Processing Facilities	3/28/11	4/8/11	London	$7,520	25
G-2	Overview of Gas Processing - Technical	3/29/11	3/31/11	London	$3,400	19
PF-4	Oil Production & Processing Facilities	4/3/11	4/14/11	Dubai	$7,460	25
ME-41	Piping Systems - Mechanical Design and Specification	4/4/11	4/8/11	London	$4,330	35
OS-21	Overview of Offshore Systems	4/4/11	4/8/11	London	$4,330	31
OS-4	Fundamentals of Offshore Systems Design and Construction	4/4/11	4/15/11	Houston	$6,220	31
G-7	Process Simulation in Gas Conditioning and Processing	4/11/11	4/15/11	Houston	$3,770	22
ME-44	Overview of Pumps and Compressors in Oil and Gas Facilities	4/11/11	4/15/11	London	$4,330	36
PF-42	Separation Equipment - Selection & Sizing	4/11/11	4/15/11	London	$4,330	28
G-4	Gas Conditioning and Processing	5/2/11	5/13/11	Calgary	$6,780	17
ICE-21	Overview of Electrical, Controls and Instrumentation Systems in Oil and Gas	5/9/11	5/13/11	London	$4,330	34
PL-4	Fundamentals of Onshore and Offshore Pipeline Systems	5/9/11	5/20/11	Kuala Lumpur	$7,070	33
G-29	LNG Short Course: Technology and the LNG Chain	5/23/11	5/27/11	London	$3,400	19
ME-62	Turbomachinery Monitoring and Problem Analysis	5/23/11	5/27/11	London	$4,330	36
G-4	Gas Conditioning and Processing	5/23/11	6/3/11	Kuala Lumpur	$8,210	17
OM-24	Seven Keys to World Class Asset Management	6/6/11	6/7/11	Houston	$1,280	38
PF-45	Onshore Gas Gathering Systems: Design & Operations	6/6/11	6/10/11	Denver	$3,140	27
OM-25	Optimizing Preventive and Predictive Maintenance	6/8/11	6/10/11	Houston	$1,920	38
PF-4	Oil Production & Processing Facilities	6/13/11	6/24/11	Kuala Lumpur	$7,420	25
G-4	Gas Conditioning and Processing	6/20/11	7/1/11	Aberdeen	$8,730	17
G-4	Gas Conditioning and Processing	7/11/11	7/22/11	Denver	$6,920	17
SS-2	Overview of Subsea Systems	7/18/11	7/22/11	Singapore	$4,490	31
G-29	LNG Short Course: Technology and the LNG Chain	7/25/11	7/29/11	Perth	$3,670	19
ME-41	Piping Systems - Mechanical Design and Specification	7/25/11	7/29/11	Denver	$3,455	35
OS-21	Overview of Offshore Systems	7/25/11	7/29/11	Houston	$3,455	31
G-4	Gas Conditioning and Processing	8/1/11	8/12/11	Perth	$8,440	17

Code	Course Name	Start Date	End Date	Location	Tuition	Page
PL-42	Onshore Pipeline Facilities - Design, Construction and Operations	8/15/11	8/19/11	Denver	$3,455	33
PS-4	Process Safety Engineering	8/15/11	8/19/11	Perth	$3,670	20
G-2	Overview of Gas Processing - Technical	8/16/11	8/18/11	Houston	$2,490	19
ME-44	Overview of Pumps and Compressors in Oil and Gas Facilities	8/22/11	8/26/11	Houston	$3,455	36
SC-61	Inside Procurement in Oil and Gas	8/30/11	9/1/11	Houston	$2,220	39
ICE-21	Overview of Electrical, Controls and Instrumentation Systems in Oil and Gas	9/5/11	9/9/11	Kuala Lumpur	$4,490	34
PF-44	Relief and Flare Systems	9/5/11	9/9/11	Kuala Lumpur	$4,490	27
G-4	Gas Conditioning and Processing	9/12/11	9/23/11	Houston	$6,920	17
OS-4	Fundamentals of Offshore Systems Design and Construction	9/12/11	9/23/11	London	$7,220	31
PF-4	Oil Production & Processing Facilities	9/12/11	9/23/11	Stavanger	$7,520	25
G-4	Gas Conditioning and Processing	9/19/11	9/30/11	Aberdeen	$8,730	17
PF-21	Applied Water Technology in Oil and Gas Production	9/19/11	9/23/11	Houston	$3,455	25
G-40	Process/Facility Fundamentals	9/26/11	9/30/11	Houston	$3,960	21
PF-22	Corrosion Management in Production/Processing Operations	9/26/11	9/30/11	Houston	$1,840	25
SS-2	Overview of Subsea Systems	9/26/11	9/30/11	Houston	$3,455	31
ME-62	Turbomachinery Monitoring and Problem Analysis	10/3/11	10/7/11	Houston	$3,455	36
SC-41	Contracts and Tenders Fundamentals	10/4/11	10/6/11	Houston	$2,220	39
G-5	Gas Conditioning and Processing - Special	10/10/11	10/14/11	Houston	$3,960	21
ME-41	Piping Systems - Mechanical Design and Specification	10/17/11	10/21/11	Orlando	$3,455	35
PF-42	Separation Equipment - Selection & Sizing	10/17/11	10/21/11	Orlando	$3,455	28
PF-44	Relief and Flare Systems	10/17/11	10/21/11	Houston	$3,455	27
E-3	Electrical Engineering Fundamentals for Facilities Engineers	10/24/11	10/28/11	Orlando	$3,455	34
G-29	LNG Short Course: Technology and the LNG Chain	10/24/11	10/28/11	Kuala Lumpur	$3,320	19
ME-46	Compressor Systems - Mechanical Design and Specification	10/24/11	10/28/11	Orlando	$3,455	36
OS-4	Fundamentals of Offshore Systems Design and Construction	10/24/11	11/4/11	Singapore	$6,790	31
PF-4	Oil Production & Processing Facilities	10/24/11	11/4/11	Orlando	$6,920	25
G-6	Gas Treating and Sulfur Recovery	10/31/11	11/4/11	London	$4,970	22
IC-3	Instrumentation and Controls Fundamentals for Facilities Engineers	10/31/11	11/4/11	Orlando	$3,455	35
G-4	Gas Conditioning and Processing	11/7/11	11/18/11	Orlando	$6,920	17
G-4	Gas Conditioning and Processing	11/7/11	11/18/11	Stavanger	$8,730	17
G-2	Overview of Gas Processing - Technical	11/14/11	11/16/11	Kuala Lumpur	$3,320	19
OM-24	Seven Keys to World Class Asset Management	11/14/11	11/15/11	Orlando	$1,280	38
PF-45	Onshore Gas Gathering Systems: Design & Operations	11/14/11	11/18/11	Orlando	$3,455	27
OM-25	Optimizing Preventive and Predictive Maintenance	11/16/11	11/18/11	Orlando	$1,920	38
G-4	Gas Conditioning and Processing	12/3/11	12/14/11	Cairo	$8,250	17
ME-44	Overview of Pumps and Compressors in Oil and Gas Facilities	12/5/11	12/9/11	Kuala Lumpur	$4,490	36
OS-21	Overview of Offshore Systems	12/5/11	12/9/11	Orlando	$3,455	31
REL-4	Optimizing Asset Availability Using Reliability Engineering	12/5/11	12/9/11	Orlando	$3,170	40

CUSTOMIZED COURSES

Any Course, Any Time, Any Place

John M. Campbell & Co. is committed to making training as convenient as possible, that's why we offer our courses in cities known to be hubs of oil and gas activity, minimizing your travel and other related costs and adding value to our courses.

Don't see the course you need on our schedule?

All of our courses can also be scheduled on an In-House or Sponsored Public basis at the location of your choice. So whether you are looking for training for just yourself or your entire team, John M. Campbell & Co. offers an option to fit your needs.

	Sponsored Public	In-House
Minimum Registrations	Sponsored by 2 or more clients, each committing 5-8 registrations	12
Who Attends	Open Registration	Selected by Client
Location	Worldwide based on Consultation with Clients	Worldwide hosted by Client
Teambuilding with Coworkers	Yes	
Networking with Industry Peers	Yes	–
Course Materials	Standard	Customizable

In-House Courses

In-House courses allow participants to receive comprehensive training and individualized attention from top instructors and are an excellent solution to training needs when travel budgets are reduced. Using our resources, we can develop customized and relevant training programs on virtually any petroleum related subject while incorporating a company's own data into the curriculum. All course attendees are limited to your internal employees and can be held anywhere you need training.

Have too few participants for an In-House course? Consider a Sponsored Public course.

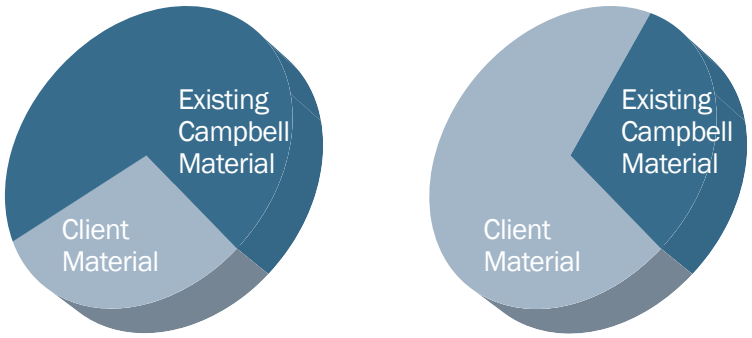
Sponsored Public courses are courses held using our standard course material for 2 or more clients, each commiting 5-8 registrations. The course location is arranged with the sponsoring client with John M. Campbell & Co. then opening registration to the public.

Campbell Customized Courses

At John M. Campbell & Co., public and In-House training sessions represent only a portion of the training we provide. Increasingly, clients come to us with training requests that require customization from a specific viewpoint. These can be delivered face-to-face or online, and with mentoring or remote coaching.

We continue to work closely with clients to meet v**ery specific geographic or asset based learning requirements**. These customized courses typically use part of an existing Campbell course that is then enhanced with additional content. This content can be developed by Campbell exclusively, or collaboratively with input and direction from the client. These courses, once developed, often become a regularly scheduled course in the client's training program.

For example, a Campbell Customized Course might include 70% Campbell material and 30% Client material. Campbell Customized Courses can be taught using John M. Campbell & Co. instructors alongside company Subject Matter Experts (SME) to produce an exceptional learning experience that reinforces company culture and priorities along with the technical content.



If your company has an interest in learning more about Campbell Customized Courses, please call 1-405-321-1383 or email jmcsupport@jmcampbell.com.

Course Previews Available Online

John M. Campbell & Co. courses have been taught all over the world for over 40 years. JMC is consistently upgrading courses and adding new ones based on industry demand. To keep you familiar with our course content, we are now making course previews available on our website.

Previews include a brief overview of the course content followed by a presentation of a section of the course materials. A preview of our popular PF-4 Oil Production and Processing Facilities course is now available and more courses are being added.

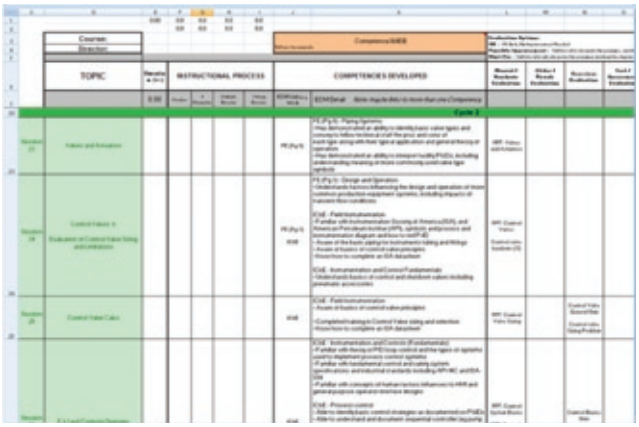
If you would like to know more about our courses prior to enrolling visit:

www.jmcampbell.com/previews

WORKFORCE DEVELOPMENT

"We need 50 more competent engineers for the new project by next year. Send everyone to some classes."

If this sounds familiar, let JMC help you move from great classes to a Workforce Development plan that includes all of the elements (mentoring, coaching, classes, on-the-job training, work experience) needed to decrease the time to competency for your workforce.



A typical Workforce Development program layout.

We can help you by providing:

- **Classes** delivered in the order and at the time your workforce is ready to maximize retention
- **Mentoring** to provide that deeper understanding of the knowledge element of competencies
- **Work experience** plans to provide the skills and practice to develop skilled competencies
- **Coaching** to help in utilization of company resources
- A Program to bring it all together to minimize the time to competency of your workforce

Our Workforce Development Plans are custom designed, organized to meet the unique challenges of your locations needs.

Typical Programs that we have delivered and continue to successfully deliver:

- 27 Week, Mentoring, Coaching, Class Room Instruction, Work Place Projects, Competency Measurement
- 13 Week, intensive, at a facility, ½ day class room, ½ day plant support projects, major project assisted by distance coaching both before and after the 13 week in-plant sessions
- 2 year, 8 course, development program with on-the-job training assignments between classroom sessions

We can provide technical advisors, learning development advisors and subject matter experts to help you develop a program suited to your needs. Our programs are focused to provide the training, mentoring and work experiences that decrease your team's time to competency.

Campbell's Workforce Development Model

- 0-3 years – New hires come from many backgrounds. A program of basic topics, chosen by you, is delivered in a consistent pattern, often coupled with a mentoring program using your internal SME's or JMC's deeply experienced instructor/mentors.
- 3-6 years – During this time, major career development takes place as your technical personnel find their niche and develop their specialties. Many JMC learning strategies are used during this time: public courses, In-House customized courses, mentoring and distance learning. Individual tracking of the career path of each of your employees is available.
- 6+ years – This is the period when career contributions are made as established engineers, operators and other technical personnel. But training doesn't stop; your workforce may need supervisory and mentoring skill development as they take on more responsible roles and lead others.

JMC has been developing the industry's technical professionals for 42 years! We can work with you, too. Email us at jmcsupport@jmcampbell.com or call us at 405-321-1383 with your workforce development challenges and we will work with you to create a solution.

FastTrack Courses:

Gas Processing Engineer FastTrack (see page 5)

Gas Conditioning and Processing (G-4)
Process Safety Engineering (PS-4)
Compressor Systems Mechanical Design and Specification (ME-46)
Heat Transfer Equipment (PF-43)
Onshore Gas Gathering Systems; Design and Operation (PF-45)
Instrumentation, Controls and Electrical Systems for Facilities Engineers (ICE-21)
Corrosion Management in Production/ Processing Operations (PF-22)
Gas Treating And Sulfur Recovery (G-6)
Relief and Flare Systems (PF-44)
Project Management for Engineering and Construction (OM-22)
CO_2 Surface Facilities (PF-81)
Overview of Offshore Systems (OS-21)
LNG Short Course: Technology and the LNG Chain (G-29)

Production Facilities Engineer FastTrack (see page 6)

Oil Production and Processing Facilities (PF-4)
Process Safety Engineering (PS-4)
Overview of Pump and Compressor Systems (ME-44)
Gas Conditioning and Processing (G-4)
Onshore Pipeline Facilities Design Construction and Operation (PL-42)
Instrumentation, Controls and Electrical Systems for Facilities Engineers (ICE-21)
Corrosion Management in Production/ Processing Operations (PF-22)
Piping Systems Mechanical Design and Specification (ME-41)
Relief and Flare Systems (PF-44)
Flow Assurance for Pipeline Systems (PL-61)
CO_2 Surface Facilities (PF-81)
Project Management for Engineering and Construction (OM-22)
Overview of Offshore Systems (OS-21)

Offshore Engineer FastTrack (see page 7)

Fundamentals of Offshore Design and Construction (OS-4)
Process Safety Engineering (PS-4)
Gas Conditioning and Processing (G-4)
Overview of Subsea Systems (SS-2)
Piping Systems Mechanical Design and Specification (ME-41)
Oil Production and Processing Facilities (PF-4)
Corrosion Management in Production/ Processing Operations (PF-22)
Instrumentation, Controls and Electrical Systems for Facilities Engineers (ICE-21)
Relief and Flare Systems (PF-44)
Overview of Pump and Compressor Systems (ME-44)
Fundamentals of Onshore and Offshore Pipeline Systems (PL-4)
Project Management for Engineering and Construction (OM-22)

Pipeline Engineer FastTrack (see page 8)

Fundamentals of Onshore and Offshore Pipeline Systems (PL-4)
Process Safety Engineering (PS-4)
Overview of Offshore Systems (OS-21)
Overview of Pump and Compressor Systems (ME-44)
Onshore Gas Gathering Systems; Design and Operation (PF-45)
Overview of Subsea Systems (SS-2)
Flow Assurance for Pipeline Systems (PL-61)
Piping Systems Mechanical Design and Specification (ME-41)
Corrosion Management in Production/ Processing Operations (PF-22)
Oil Production and Processing Facilities (PF-4)
Gas Conditioning and Processing (G-4)
Instrumentation, Controls and Electrical Systems for Facilities Engineers (ICE-21)

Put Your Career on the FastTrack

John M. Campbell & Co. Facilities FastTrack Courses are designed to quickly build competency in onshore and offshore Facilities Engineers.

For today's Facilities Engineer a wide range of competencies are necessary to succeed in a competitive job market. Skills are needed in all aspects of facilities including transportation, offshore structures, process/utility systems and equipment, measurement and control, electrical systems, flow assurance, materials, corrosion, and solids handling.

To quickly develop these competencies and build "broad-based" Facilities Engineers, an integrated and flexible training program is necessary. John M. Campbell & Co. has developed the Facilities FastTrack programs to help you quickly develop competency as a Production Facilities Engineer, Gas Processing Engineer, Offshore Engineer or Pipeline Engineer.

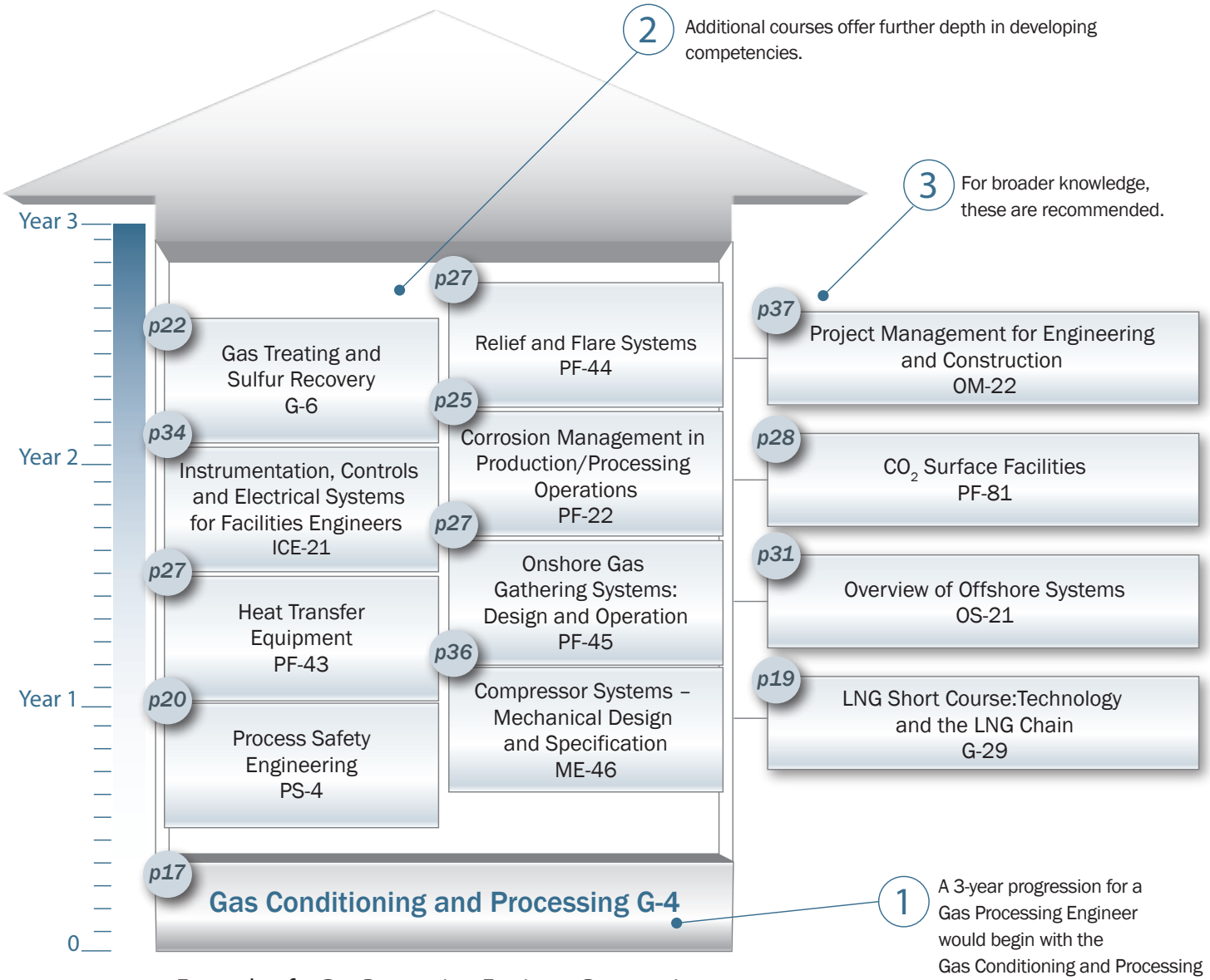
For more details see the Progression Matrices on pages 5-8.

GAS PROCESSING ENGINEER

The Gas Processing discipline covers equipment and processes primarily focused on the handling of natural gas and its associated liquids. The wellhead is the starting point, ending with delivery of the processed gas, meeting the required specifications, into a sales gas or reinjection pipeline. Recovered natural gas liquids (NGL), again meeting the required specifications, are delivered to an export point – either a pipeline or storage facility. The NGL may be fractionated into individual specification products or sold as a mix for fractionation elsewhere. Waste byproducts are disposed of in accordance with the applicable regulatory requirements. Main topics covered include: fundamentals, natural gas characterization, phase behavior, vapor – liquid equilibrium, basic thermodynamics, and water – hydrocarbon behavior **and all the key equipment to process natural gas.** Campbell Training delivers competency based training in these and other areas, at progressive levels to provide the skills necessary to successfully support the operation of oil and gas production processes.

Gas Processing Engineer Course Progression

Example of recommended courses to develop a Gas Processing Engineer over a 3-year span.



Example of a Gas Processing Engineer Progression

Gas Conditioning and Processing (G-4)

PETROSKILLS

COURSE LEVEL Intermediate

DURATION 10 Days

DESIGNED FOR

Production and processing personnel involved with natural gas and associated liquids to acquaint or reacquaint themselves with gas conditioning and processing unit operations. This course is for facilities engineers, process engineers, operations personnel, field supervisors and others that select, design, install, evaluate or operate gas processing plants and related facilities.

YOU WILL LEARN

- About the selection and evaluation processes used to dehydrate natural gas, meet hydrocarbon dew point specifications and extract NGLs
- How to apply physical/thermodynamic property correlations and principles to the design and evaluation of gas processing facilities
- Equipment sizing methods for major process equipment
- To recognize and develop solutions to operating problems and control issues in gas processing facilities

ABOUT THE COURSE

The "Campbell Gas Course™" has been the standard of the industry for forty years. Over 30,000 engineers have attended our G-4 program, considered by many to be the most practical and comprehensive course in the oil and gas 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.

COURSE CONTENT

- Gas processing systems
- Physical properties of hydrocarbons
- Qualitative phase behavior
- Vapor-liquid equilibrium
- Water-hydrocarbon phase behavior
- Basic thermodynamic concepts
- General system energy changes and rate processes
- Process control fundamentals
- Fluid hydraulics
- Separation equipment
- Heat transfer
- Pumps
- Compressors
- Refrigeration
- Fractionation/distillation
- Glycol dehydration
- Adsorption systems

See sample course outline and daily schedule on page 18.

2011 Schedule and Tuition

LONDON
31-JAN-11-FEB . . . . . US $8,730

HOUSTON
7-18-FEB . . . . . US $6,780

DOHA
20-FEB-3-MAR . . . . . US $8,250

STAVANGER
7-18-MAR . . . . . US $8,730

CALGARY
2-13-MAY . . . . . US $6,780

KUALA LUMPUR
23-MAY-3-JUN . . . . . US $8,210

ABERDEEN
20-JUN-1-JUL . . . . . US $8,730

DENVER
11-22-JUL . . . . . US $6,920

PERTH
1-12-AUG . . . . . US $8,440

HOUSTON
12-23-SEP . . . . . US $6,920

ABERDEEN
19-30-SEP . . . . . US $8,730

ORLANDO
7-18-NOV . . . . . US $6,920

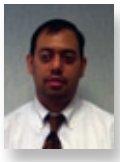
STAVANGER
7-18-NOV . . . . . US $8,730

CAIRO
3-14-DEC . . . . . US $8,250

Testimonials

"I loved the key learning points sessions! I loved the close follow-up and familiarity with the text book. I really liked the exercises and the frequent breaks to keep fresh and alert. And of course the instructor's positive and highly encouraging attitude."

Mirna S.
G-4 Participant



"The books given were excellent. The discussions were very informative. The best thing about the course was I could relate to the instructors. They helped a lot and imparted their vast experiences to us. It helped solve some problematic issues."

M. Riaz
G-4 Participant

"This course was by far the best course I have attended in my career so far. John Morgan's delivery of the course was excellent & I would rate him as one of the best lecturers I've ever had (which is taking into account school, university and other occupational training courses)."

Chris L.
G-4 Participant

SAMPLE COURSE OUTLINE

Considered by many to be the most practical and comprehensive course in the oil and gas industry, the"Campbell Gas Course™", has been attended by over 30,000 engineers. The standard of the industry for well over thirty (30) years, Gas Conditioning and Processing (G-4) deals with the practical planning, design, specification and operation of gas processing and production systems.

For schedule and tuition information, see page 17

Gas Conditioning and Processing (G-4)

Course Outline

DAY 1	**CONCEPTS** Introduction to gas processing; gas and liquid contracts and specifications; gas process systems and options; physical properties of hydrocarbon fluids; and phase behavior. • Course Introduction • Gas Processing Systems • Physical Properties of Hydrocarbons • Qualitative Phase Behavior	DAY 6	**CONCEPTS** Heat Exchangers - Overview, design and specification, shell and tube, plate, plate fin, heaters, cooling towers, and aerial coolers; pump principles; power and head; NPSH evaluation of pump performance and system curves; positive displacement and centrifugal pumps; and pump control. • Heat Transfer • Pumps
DAY 2	**CONCEPTS** Principles of vapor-liquid equilibrium; K-values; dewpoints; bubblepoints; flash calculations; water content of natural gas; and hydrates. • Vapor-Liquid Equilibrium • Water-Hydrocarbon Behavior • Phase Envelopes and Flash Calculations	DAY 7	**CONCEPTS** Overview and principles of compression including reciprocating and centrifugal compressors, power consumption, performance curves, axial compressors, compressor drivers and compressor control; principles of refrigeration including pressure vs. enthalpy charts, basic simple refrigeration cycle, economizer systems, power consumption, condenser load and mixed refrigerants; LTS/LTX processes; and turboexpanders. • Compressors • Refrigeration
DAY 3	**CONCEPTS** Hydrate inhibition with glycols and alcohols, low dosage; energy balances; energy and power; enthalpy/entropy; tables of data; and general correlations for enthalpy and entropy. • Water-Hydrocarbon Behavior (Cont'd) • Basic Thermodynamic Concepts • System Energy Changes	DAY 8	**CONCEPTS** Fractionator operation, design and specification; mass transfer fundamentals; minimum reflux theoretical plates; overall efficiency; energy balances; and oil stabilizers. • Refrigeration (Cont'd) • Fractionation • Refrigeration/Fractionation Exercise
DAY 4	**CONCEPTS** Control modes (proportional, reset, derivative); valve characteristics; DCS and PLCs; flow measurement; examples of control applications, including liquid and gas flow, looped systems, complex systems and 2 phase horizontal and vertical flow. • Process Control Fundamentals • Fluid Flow • Consolidated Problem. NGL extraction for HC dewpoint control and hydrate inhibition.	DAY 9	**CONCEPTS** Principles of glycol dehydration; glycol unit operation and design; absorber design and specification; equilibrium concepts; regeneration; coabsorption of aromatics; troubleshooting; foaming; and corrosion. • Fractionation (Cont'd) • Glycol Dehydration
DAY 5	**CONCEPTS** Pressure vessel design; principles of separation; vessel sizing - vertical and horizontal, two/three phase; mist extraction; internals and specification; principles of rate processes; series and parallel resistance; and fundamentals of heat transfer. • Separation Equipment • Rate Processes	DAY 10	**CONCEPTS** Operation and design of adsorption dehydration systems; properties of desiccants; sizing tower; regeneration requirements; and hydrocarbon recovery units. • Glycol Dehydration (Cont'd) • Adsorption Systems • Course Overview

G-4 is an intensive course and classroom hours are generally longer than a typical training course. Extended sessions are sometimes used for additional problems, exercises and syndicate work.

Note: Course schedule is approximate and may be adjusted for location and participant interest.

Overview of Gas Processing - Non-Technical (G-1)

PETROSKILLS

COURSE LEVEL Basic

DURATION 2 Days

DESIGNED FOR

General administration, supervisory, non-technical management personnel, as well as anyone that could benefit from a broad overview of important aspects of the gas processing industry.

YOU WILL LEARN

- Oil and gas facilities terminology
- Fundamentals of commercial and contract issues
- Key areas in oil and gas production surface facilities
- How gas is transported and sold
- Non-technical fundamentals of technology and processes
- Why various treatment processes and technologies are selected for differing gas compositions and processing applications
- Markets and uses for natural gas liquids

ABOUT THE COURSE

This course is designed for a broad non-technical audience. While the course is intended to be interactive and participatory, most technical calculations are eliminated and use of technical terminology is minimized.

COURSE CONTENT

- Basic concepts & fundamentals of natural gas
- Industry overview
- Natural gas composition and specifications
- Production facilities
- Gas properties and behavior
- Gas flow fundamentals
- Natural gas treating
- Overview of sulfur recovery and disposal
- Gas dehydration
- Conditioning and processing of natural gas
- Liquid product fractionation and treating
- Gas compression
- Transportation systems

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.

Overview of Gas Processing - Technical (G-2)

PETROSKILLS

COURSE LEVEL Basic

DURATION 3 Days

DESIGNED FOR

Geologists, reservoir engineers, line managers, operational staff, shift foremen, those new to the industry such as entry-level engineers, as well as anyone interested in a general, technically oriented overview of the gas processing industry.

YOU WILL LEARN

- Oil and gas facilities terminology
- How gas processing fits into the value chain for hydrocarbon products
- About key commercial and contract issues
- How gas is transported and sold
- The difference between various gas conditioning and processing technologies
- Why various treatment processes and technology are selected for differing gas compositions and processing applications
- Principles of gas measurement and common measurement devices
- Markets and uses for NGL, LPG, ethane, propane and butane
- Key pieces of equipment used in natural gas production and processing facilities

ABOUT THE COURSE

This course is designed for a broad technical audience. It is participative and interactive, and utilizes fundamental technical exercises and terminology to communicate key learning points.

COURSE CONTENT

- Industry overview
- Gas processing fundamentals
- Terminology
- Chemistry of oil and gas
- Markets, gas contracts and specifications
- Technical fundamentals, e.g. physical properties and phase behavior
- Oil and gas production facilities
- Hydrates, hydrate inhibition
- Gas dehydration
- Gas sweetening and sulfur recovery
- Acid gas reinjection
- Natural gas liquids and dew point control
- Nitrogen rejection and helium recovery
- Fractionation and stabilization
- Heat exchange and compression
- Gas transportation options
- Emerging technology

2011 Schedule and Tuition

LONDON
29-31 MAR. . . . . US $3,400

HOUSTON
16-18 AUG . . . . . US $2,490

KUALA LUMPUR
14-16 NOV . . . . . US $3,320

LNG Short Course: Technology and the LNG Chain (G-29)

PETROSKILLS

COURSE LEVEL Basic

DURATION 5 Days

DESIGNED FOR

Technical, engineering and operations staff, as well as commercial and management staff who require a technical overview of the LNG industry.

YOU WILL LEARN

- LNG industry review, technology
- LNG facilities world-wide
- A survey of commercial and contractual issues
- About project costs, feasibility and development
- Some fundamentals of gas technology
- To apply knowledge of LNG gas pretreatment, drying and refrigeration
- To describe liquefaction technologies and appreciate the differences
- The types of compressor drivers, gas turbines and electric motors
- About LNG storage, shipping and terminals

ABOUT THE COURSE

Technical LNG basics are covered in this intensive short course. It provides an overview of the technology in the LNG chain. The course covers facility operation topics, technical and design issues. Key commercial issues are also discussed. Selected exercises and syndicates are used throughout the course. In-House versions are available with either increased technical and operational emphasis or increased project and development emphasis.

COURSE CONTENT

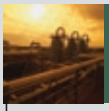
- Introduction to LNG
- Commercial issues
- Technical fundamentals
- Gas processing basics
- Major equipment
- Refrigeration and LNG liquefaction
- Shipping
- LNG storage
- Regasification terminals and energy recovery
- Future trends in LNG

2011 Schedule and Tuition

LONDON
23-27 MAY . . . . . US $3,400

PERTH
25-29 JUL . . . . . US $3,670

KUALA LUMPUR
24-28 OCT . . . . . US $3,320



Process Safety Engineering (PS-4)

CAMPBELL

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

Facilities, process and design engineers, supervisory/ management personnel, as well as new safety/loss prevention engineers and HSE professionals 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 oil & gas industry
- Basics of risk analysis
- Thinking in terms of Inherently Safer Design
- Most commonly used process hazards 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

ABOUT THE COURSE

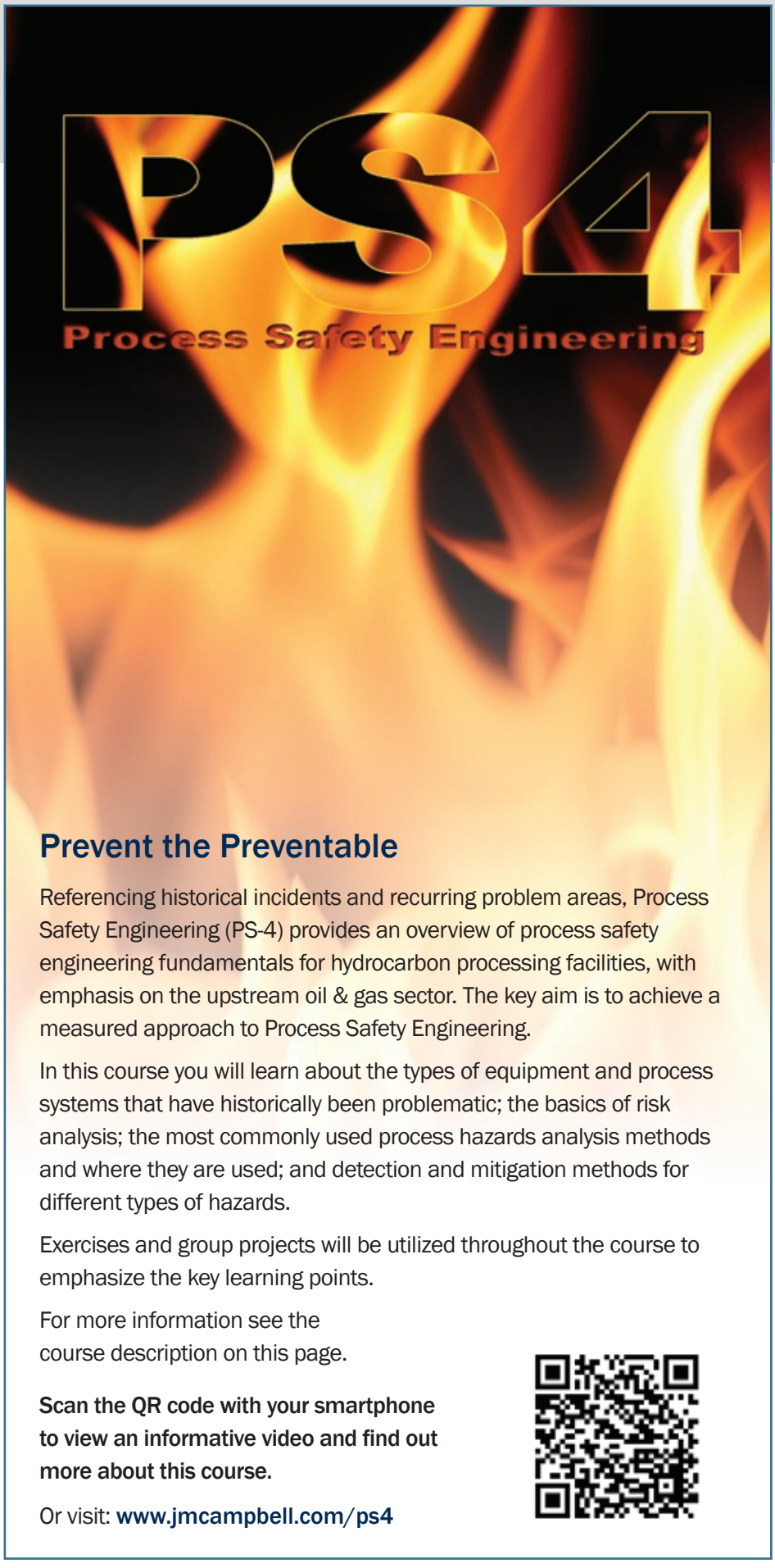
This course provides an overview of process safety engineering fundamentals for hydrocarbon processing facilities, with emphasis on the upstream oil & gas sector. The focus of this course is on the engineering/ design aspects of Process Safety Management. Frequent reference will be made to historical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

COURSE CONTENT

- Historical Incident & 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 & Equipment Spacing
- Pressure Relief and Disposal Systems
- Corrosion & Materials Selection
- Process Monitoring and Control
- Safety Instrumented Systems
- Fire Protection Principles
- Explosion Protection

2011 Schedule and Tuition

LONDON	14-18 FEB	US $4,330
DUBAI	6-10 MAR	US $4,470
HOUSTON	21-25 MAR	US $3,140
PERTH	15-19 AUG	US $3,670



Prevent the Preventable

Referencing historical incidents and recurring problem areas, Process Safety Engineering (PS-4) provides an overview of process safety engineering fundamentals for hydrocarbon processing facilities, with emphasis on the upstream oil & gas sector. The key aim is to achieve a measured approach to Process Safety Engineering.

In this course you will learn about the types of equipment and process systems that have historically been problematic; the basics of risk analysis; the most commonly used process hazards analysis methods and where they are used; and detection and mitigation methods for different types of hazards.

Exercises and group projects will be utilized throughout the course to emphasize the key learning points.

For more information see the course description on this page.

Scan the QR code with your smartphone to view an informative video and find out more about this course.

Or visit: **www.jmcampbell.com/ps4**

Gas Conditioning and Processing - LNG Emphasis (G-4 LNG)

PETROSKILLS

COURSE LEVEL Intermediate

DURATION 10 Days

DESIGNED FOR

Personnel involved with natural gas processing and LNG production, as well as anyone interested in a solid understanding of the principles of an LNG plant.

YOU WILL LEARN

- The basics of LNG gas conditioning and processing
- To select and evaluate processes used to dehydrate natural gas, remove heavy components and other contaminants, and to extract NGLs for LNG plants
- Physical/thermodynamic property correlations and principles, including heating values, etc. as applied to gas processing facilities and LNG plants
- Fundamentals of propane and propane pre-cooled, mixed refrigerant systems used in LNG plants
- Key points in other LNG liquefaction technologies
- How to perform and review equipment sizing for major process equipment
- Solutions to operating problems and control issues in LNG and gas processing facilities

ABOUT THE COURSE

This is the LNG-industry version of our popular G-4 course with expanded coverage on refrigeration. The course includes in-depth information on basic LNG gas conditioning and processing. Instructors will explain the acid gas removal processes (various amines, hot carbonate, Sulfinol®, etc.) employed in LNG processes. Relevant details of both the mixed refrigerant and cascade processes in LNG liquefaction are described. Versions of this course have been taught in many of the world's base-load and peak-shaving LNG plants.

COURSE CONTENT

- Basic gas technology principles
- Water-hydrocarbon system behavior
- Hydrates
- Thermodynamics of LNG processes
- Separation equipment
- Gas treatment, CO_2 and H_2S removal
- Dehydration of natural gas
- Heat transfer and exchangers
- Pumps and compressors
- Refrigeration systems
- LNG liquefaction technologies
- Fractionation and adsorption
- Course summary and overview

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.

Process/Facility Fundamentals (G-40)

PETROSKILLS

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

Oil and gas process and facility personnel in need of understanding gas processing fluid fundamentals and their applications to solve practical problems.

YOU WILL LEARN

- Technical fundamentals, property correlations, phase behavior and applied thermodynamics
- How to apply physical and thermodynamic property calculations with emphasis on limitations and applications to facility/equipment design
- How to apply phase behavior principles and phase diagrams to design and operating problems
- How to apply thermodynamic laws and principles to equipment design and operation

ABOUT THE COURSE

This course is designed for those who desire a brief but intensive overview of gas process engineering fluid principles. Course emphasis is on the application of engineering principles to solve operating and design issues common in gas processing facilities. Process simulation will be used throughout the course. The course is based on portions of Volume 1 of Campbell's Gas Conditioning and Processing.

COURSE CONTENT

- Hydrocarbon phase behavior
- Vapor liquid equilibrium
- Physical properties of hydrocarbons
- Applied thermodynamics

2011 Schedule and Tuition

HOUSTON
26-30 SEP . . . . . US $3,960

Gas Conditioning and Processing - Special (G-5)

PETROSKILLS

COURSE LEVEL Intermediate

DURATION 5 Days

DESIGNED FOR

Engineers needing an intensive training in natural gas processing and associated liquids recovery processes with emphasis on the use and benefits of a simulation package.

YOU WILL LEARN

- To determine the water content and hydrate formation conditions for gas streams using both a commercial process simulator and hand calculation methods
- Techniques to inhibit hydrate formation including injection of equilibrium inhibitors such as methanol and MEG
- Simulation of TEG dehydration processes and evaluation of the simulator results by using quick hand calculations
- Design of processes used to control the hydrocarbon dew point of sales gas streams by removing NGL's using mechanical refrigeration processes
- Various techniques to optimize mechanical refrigeration systems
- How to use the process simulator to evaluate the impact that pressure and temperature changes have on the sizing of process equipment
- How to use short-cut distillation calculations to provide input to rigorous distillation simulations in order to obtain consistent convergence
- Which thermodynamic property correlations are the best applications for various gas processing systems
- Limitations associated with commercial simulation packages and how the simulation results can be quickly checked for relative accuracy

ABOUT THE COURSE

The course has been designed to cover topics from the 10 day G-4 course in an accelerated 5-day format using a commercial simulator to perform calculations. A basic working knowledge of the commercial process simulation package being used will provide the best opportunity to achieve the learning objectives of this course. Volumes 1 and 2 of the John M. Campbell text books, Gas Conditioning and Processing, are used as the basis for the material presented in this course. A comprehensive course exercise based on a typical gas processing facility which can be applied to either onshore or offshore facilities is used for this course. The problem is developed in stages, as the material is covered, using a commercial simulator package (typically Promax® or UNISIM®). At the completion of the course the participant will have developed a process simulation model that includes a dew point control process, a mechanical refrigeration process with economizers, hydrate inhibition using MEG, gas dehydration using TEG, and liquid product stabilization with recycle.

COURSE CONTENT

- Gas processing systems
- Physical properties of hydrocarbons
- Qualitative phase behavior
- Vapor-liquid equilibrium
- Water-hydrocarbon equilibrium
- Basic thermodynamic concepts
- Separation equipment
- Heat transfer
- Pumps
- Compressors
- Refrigeration
- Fractionation/distillation
- Glycol dehydration
- Adsorption systems

2011 Schedule and Tuition

CALGARY
17-21-JAN . . . . . US $3,770

HOUSTON
10-14-OCT . . . . . US $3,960

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View informative video on YouTube:

www.jmcampbell.com/youtube

Interact with industry peers and instructors on the Campbell Forums:

www.campbellforums.com

Perform gas processing conversion calculations on the go with **GCAP**mobile. Download it at:

www. jmcampbell.com/mobile

Gas Treating and Sulfur Recovery (G-6)

PETROSKILLS

COURSE LEVEL Intermediate

DURATION 5 Days

DESIGNED FOR

Production and processing personnel involved with natural gas treating and sulfur recovery requiring an understanding of the principles of these process operations. This course is for facilities engineers, process engineers, operations personnel, field supervisors and others who select, design, install, evaluate or operate gas sweetening and sulfur recovery facilities.

YOU WILL LEARN

- Evaluation and selection of processes to remove acid gases (H_2S, CO_2, COS, CS_2, mercaptans, etc) from gas and NGLs
- The advantages and disadvantages of available gas treating technology and processes
- How to estimate solvent circulation rates, energy requirements and equipment sizes
- Recognize and evaluate solutions to common problems
- Sulfur recovery technologies, including an overview of the Claus Sulfur process
- How to select the proper sulfur recovery process given differing process conditions

ABOUT THE COURSE

This course emphasizes process selection, practical operating issues, technical fundamentals, and integration of the sweetening facilities into the overall scheme of gas processing. Sulfur recovery and tail gas processes are also covered including standard Claus configurations, SuperClaus®, EuroClaus®, SCOT® etc. Special design and operation topics such as trace sulfur compound handling and the importance of H_2S:CO_2 ratio is covered. Related topics such as liquid product treating, corrosion, materials selection and NACE requirements will also be reviewed.

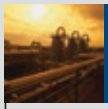
COURSE CONTENT

- Gas specifications and process selection criteria
- Generic and specialty amine treating
- Proprietary amine solvents such as Sulfinol® and Flexsorb®
- Carbonate processes
- Physical absorption processes, e.g. Selexol
- Metallurgical issues – corrosion
- Other technologies and new developments
- Selective treating
- Solid bed and non-regenerable treating; scavengers
- Liquid product treating
- Sulfur recovery processes
- Tail gas clean-up: SCOT-type, CBA and others
- Course workshop and summary

2011 Schedule and Tuition

HOUSTON
14-18-MAR . . . . . US $3,350

LONDON
31-OCT-4-NOV . . . . . US $4,970



Process Simulation in Gas Conditioning and Processing (G-7)

PETROSKILLS

COURSE LEVEL Specialized

DURATION 5 Days

DESIGNED FOR

Engineers involved in simulation modeling of natural gas and liquids processing facilities who have completed our Gas Conditioning and Processing course (G-4) or comparable training.

YOU WILL LEARN

- Recognize and appreciate the capabilities and limits of process simulators in the design and evaluation of production/processing facilities
- How to develop models to solve several real problems using commercial simulation packages
- Work independently to apply process simulations to profitably design new facilities or evaluate existing facilities

ABOUT THE COURSE

This extension of the Gas Conditioning and Processing (G-4) and Process/Facility Fundamentals (G-40) courses provides practical knowledge about using computers to solve operating problems more effectively and efficiently. Detailed discussions cover strengths, limitations and pitfalls of the calculation procedures used for the specification, design and operation of production processing facilities. Since most calculations are now made on a computer. This should be considered a required course in the normal training program for technical personnel. This course is presented using commercial simulator packages. The primary objective is to teach the participant how to work more effectively as an engineer by using a commercial simulator package as a tool. Familiarity with the simulation package used in the course is a prerequisite. The course is normally taught using UNISIM® or Promax®, but arrangements can be made with the instructor to use other packages as well.

COURSE CONTENT

- Overview of computer simulation as a tool in the management of engineering as it relates to the design, selection and operation of oil and gas production
- Equations of state and their application
- Calculation of thermodynamic properties
- Gas compression
- Preparation of a compressor train flow sheet
- Preparation of production train flow sheet with recycles and equipment sizing
- NGL recovery processing
- Preparation of offshore dew point control flow sheet
- Characterization of the C6+ fraction
- Preparation of offshore dew point control flow sheet with emphasis on the potential risk of improper feed characterization
- Fractionation/distillation
- Modeling a fractionation train for multiple product specifications
- Fluid hydraulics
- Modeling a piping system with both pumps and compressors

2011 Schedule and Tuition

HOUSTON
11-15-APR . . . . . US $3,770

Coming in 2011 to London and Kuala Lumpur

ICE-21

Instrumentation, Controls and Electrical Systems for Facilities Engineers

Designed for managers, engineers, technicians and system operators, this 5-day course provides an overview of electrical power generation and distribution, process and safety systems instrumentation, and control strategies and configurations. The focus is on application and integration into the process and control of upstream and midstream oil and gas facilities. The material of the course is applicable to field production facilities, pipelines, gas plants, and offshore systems.

Participants will learn about:

- Key electrical power considerations and fundamentals applied in oil and gas facilities.
- Voltage levels and power type (3-phase, single-phase, and direct current) selection and application.
- Purchased power considerations including generation efficiency, redundant sources, transmission grid parameters, and cost considerations.
- Electric power distribution, systems loads, internal grid layout, major distribution equipment and cabling.
- Power users definition and integration into the power distribution system.
- Electrical system safety.
- Process systems operations and the key characteristics, and measurement needs, as well as techniques to measure and control.
- Control modes and their applications, communications requirements, and the operator and computer controller interface.
- Interrelationships between process, equipment, instruments and controls.
- Field (facility) control and monitoring systems such as pressure and level indicators and controllers.
- Field (facility) safety monitoring and response systems including SIS, HIPPS and emergency shutdown valves.
- System-wide considerations including communications, local control, remote control, and data management and use.

See the course description and schedule for this course on page 34.

Scan the QR code with your smartphone to view an informative video and find out more about this course.

Or visit www.jmcampbell.com/ice21

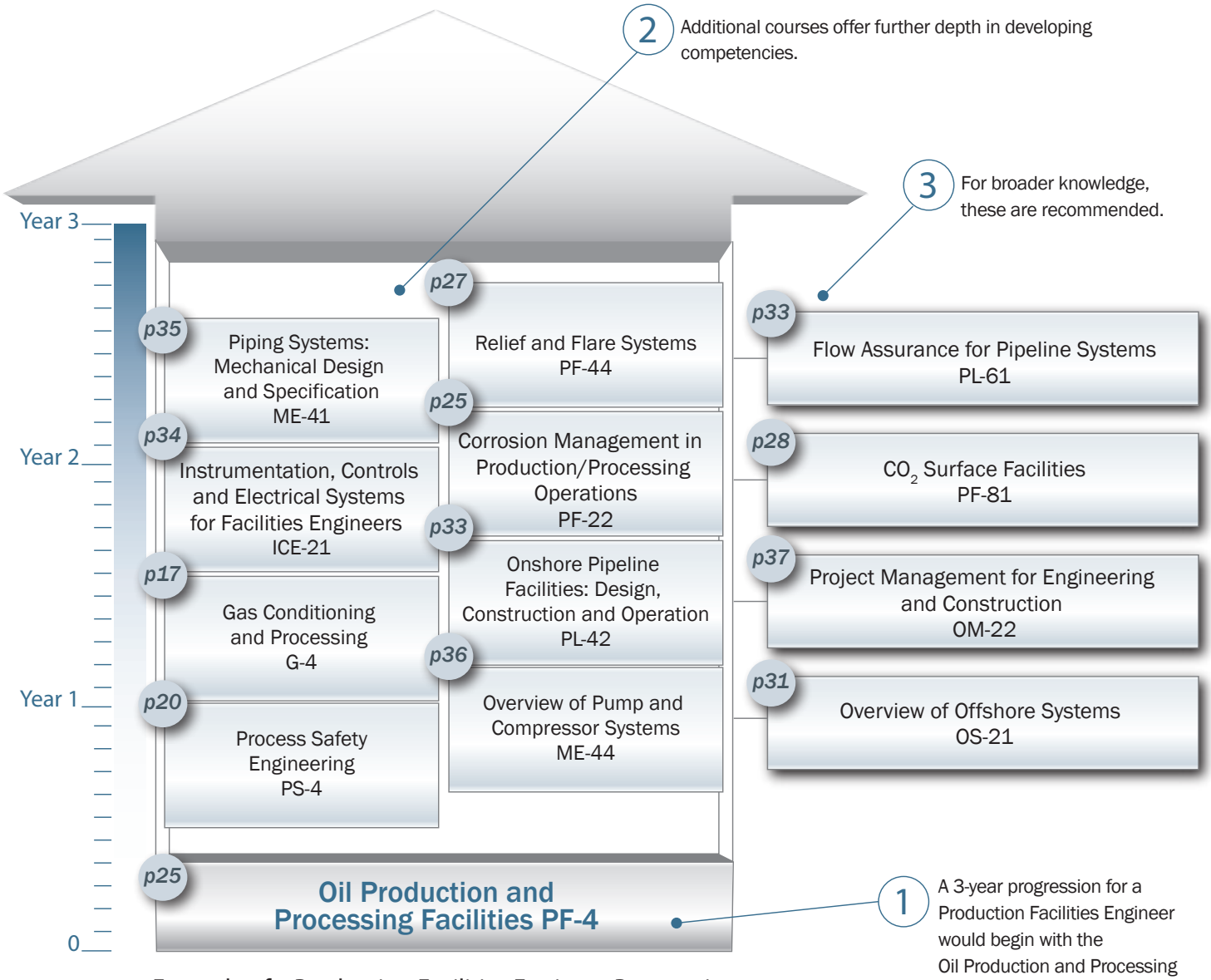
PRODUCTION FACILITIES ENGINEER

Production Facilities separate the well stream into three phases – oil, gas and water – and process these phases into marketable products or dispose of them in an environmentally acceptable manner. Gas handling/processing facilities are a major part of Production Facilities, and are covered in detail as Gas Processing in this catalog. Production Facilities, as used here, will mainly include:

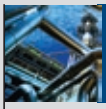
- Single–well, satellite & central tank batteries, including
  - Oil treating - Stabilization - Separation equipment
  - Desalting - Storage
- Produced water treating facilities
- Offshore topsides facilities
- Water injection facilities
- Corrosion management

Production Facilities Engineer Course Progression

Example of recommended courses to develop a Production Facilities Engineer over a 3-year span.



Example of a Production Facilities Engineer Progression



Oil Production and Processing Facilities (PF-4)

PETROSKILLS

COURSE LEVEL Intermediate

DURATION 10 Days

DESIGNED FOR

Process/facilities engineers, senior operating personnel, and production chemists. Wide-ranging skills for design, operation and troubleshooting of oil and water production equipment.

YOU WILL LEARN

- Well inflow performance and its impact on 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
- How 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
- How to evaluate processing configurations for different applications
- How to recognize and develop solutions to operating problems in oil/water processing facilities

ABOUT THE COURSE

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 will be discussed. Produced water treating and water injection systems are also covered. Solution gas handling processes and equipment will be discussed as well, though 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 be complementary to the G-4 Gas Conditioning and Processing course which is focused on the gas handling side of the upstream oil and gas facilities area.

COURSE CONTENT

• Overview of upstream oil and gas production operations • Fluid properties and phase behavior • Overview of artificial lift • Processing configurations (example PFD's) • Phase separation of gas, oil, and water • Emulsions • Sand, wax, and asphaltenes • Oil treating • Field desalting • Crude stabilization and sweetening • Crude oil storage and vapor recovery • Measurement of crude oil • Transportation of crude oil • Produced water treating • Water injection systems • Overview of solution gas processing • Compressors • Sweetening • Dehydration • NGL recovery • Relief and flare systems

2011 Schedule and Tuition

HOUSTON
31-JAN-11-FEB. . . . . US $6,920

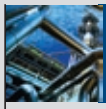
LONDON
28-MAR-8-APR. . . . . US $7,520

DUBAI
3-APR-14-APR . . . . . US $7,460

KUALA LUMPUR
13-24-JUN . . . . . US $7,420

STAVANGER
12-23-SEP . . . . . US $7,520

ORLANDO
24-OCT-4-NOV . . . . . US $6,920



Applied Water Technology in Oil and Gas Production (PF-21)

PETROSKILLS

COURSE LEVEL Basic

DURATION 5 Days

DESIGNED FOR

Managers, engineers, chemists, and operators needing to understand water related problems in oil and gas production and their solutions.

YOU WILL LEARN

- The basics of oilfield water chemistry
- How to monitor and control corrosion, scale, and bacterial growth in produced water and water injection/disposal systems
- How to implement system surveillance programs to detect potential problems before system damage occurs
- Produced (oily) water treatment options and related treatment equipment
- How to use the knowledge gained to identify typical system problems and be able to propose solutions

ABOUT THE COURSE

This course provides an overview of the main water handling systems typically encountered in upstream (E&P) production operations, both onshore and offshore. The chemistry of the main water related problems of mineral scales, corrosion, bacteria, and oily water will be reviewed both from the theoretical and practical aspects. Produced water treatment equipment and typical water quality specifications will be reviewed as well as water injection and disposal systems. An exercise will be given to identify typical system problems and you will be able to apply the knowledge you gained to propose solutions. Emphasis will be placed on understanding and resolving operational problems in process equipment.

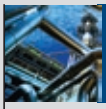
COURSE CONTENT

- Water chemistry fundamentals
- Water sampling and analysis
- Water formed scales
- Corrosion control
- Water treatment microbiology
- Produced water discharge/disposal and treatment principles
- Produced water treating equipment – theory of operation, advantages and disadvantages, and the importance of oil droplet size
- Water injection and disposal systems – theory of operation, corrosion, scale, and biological control
- Case study

2011 Schedule and Tuition

LONDON
21-25-MAR . . . . . US $4,330

HOUSTON
19-23-SEP . . . . . US $3,455



Corrosion Management in Production/Processing Operations (PF-22)

PETROSKILLS

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

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

YOU WILL LEARN

- The basics of corrosion chemistry
- The main corrosion mechanisms occurring in oil and gas production/processing systems
- The different types of damage caused by corrosion
- Materials selection for corrosion prevention
- Some methods for conducting cathodic protection (CP) surveys
- Items to consider in corrosion inhibitor selection
- Key advantages and disadvantages of the various corrosion monitoring methods
- Where the main locations of corrosion concern occur within oil production systems, gas processing facilities (including amine units), and water injection systems

ABOUT THE COURSE

This course will cover 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 all be considered. Participants will estimate the corrosivity of a given environment through analysis of the chemical and physical characteristics of the system. You will review approaches to selecting materials and coatings for corrosion resistance for different conditions and applications, including the use of NACE MR0175.
You will be introduced to CP surveys, selecting the CP system type, estimating current requirements and the design principles of simple cathodic protection systems. There will be opportunity to select and utilize corrosion inhibitors for different systems and you will learn how to select and apply corrosion monitoring techniques to create an integrated monitoring program.
The course content is based on a field facilities engineering point of view as opposed to a more narrowly specialized corrosion engineering or chemistry viewpoint. This course provides an appropriate balance of necessary theory and practical applications to solve/mitigate corrosion related problems.

COURSE CONTENT

- Fundamentals of corrosion theory
- Major causes of corrosion (O_2, CO_2, H_2S, microbiologically influenced corrosion)
- Forms of corrosion damage
- Materials selection
- Protective coatings & linings
- Cathodic protection
- Corrosion inhibitors
- Corrosion monitoring and inspection
- Corrosion in gas processing facilities
- Corrosion in water injection systems
- Corrosion management strategy and life-cycle costs

2011 Schedule and Tuition

HOUSTON
26-30-SEP . . . . . US $1,840

SAMPLE COURSE OUTLINE

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 will be discussed. This course is intended to be complementary to the G-4 Gas Conditioning and Processing course which is focused on the gas handling side of the upstream oil and gas facilities area.

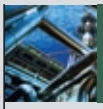
For schedule and tuition information, see page 25

Oil Production and Processing Facilities (PF-4)

Course Outline

	TOPICS
DAY 1	• Course introduction • Reservoir Traps, Rocks & Drive Mechanisms; Porosity & Permiability, Drive Machanisms • Phase Envelopes & Reservoir Fluid Classification; Phase behavior of different reservoirs • Well Inflow Performance; Inflow performance curve & Effect on facilities • Artificial Lift: When it is required, Types and selection of artificial lift • Oil, Gas & Water – Composition & Properties – Calculation of properties needed for equipment sizing
DAY 2 & 3	• Emulsions; Definition, causes and characterization • Gas – Liquid Separation – Types of equipment used – Feed pipe and inlet devices – Gas gravity separation section – Mist extractors
DAY 4	• Gas – Liquid Separation (cont'd) – Liquid handling section • Oil – Water Separation – Types of equipment used, including comopact coelescers – Residence time & droplet settling theory
DAY 5	• Oil Treating – Oil treating methods – Heat input requirements – Demulsifiers – Types of equipment, selection, performance and sizing methods • Desalting – Why desalt? → crude oil salt specifications – Overview of desalting, processes, sizing and selection • Crude Oil Stabilization & Sweetening – Crude oil vapor pressure & H_2S specifications – Stabilization and Sweetening processes
DAY 6	• Oil Storage & Vapor Recovery – Types of storage tanks & their applications – How vapor recovery systems work & where they are used • Sand, Wax & Asphaltenes – Problems caused & typical solutions for surface facilities
DAY 7	• Crude Oil Flow Measurement – Types, accuracy and selection of liquid and gas meters • Fired Equipment – Direct & Indirect fired heaters – Fire tube and process tube sizing criteria • Pipeline Transportation of Crude Oil – Bernoulli's equation, friction loss and piping codes – Line sizing and heat loss calculations
DAY 8	• Pumps – Types of pumps & their applications – Calculation of head requirements, NPSHA/NPSHR and specific speeds • Produced Water Treating – Produced water composition → characterization of hydrocarbon content – Importance of oil droplet size – Typical discharge/disposal specifications – Treating equipment options and performance – Combination of different equipment types
DAY 9	• Water Injection Systems – Typical flow diagrams and equipment – Source water quality and injection water quality • Relief & Flare Systems – Causes of overpressure – Types of relief valves & sizing; Flare system components – Radiation calculations – Flare gas recovery
DAY 10	• Solution Gas Handling – Sales gas specifications, sweetening, dehydration, NGL recovery, etc • Compressors – Types of compressors & applications • Course Wrap-up

Note: Course schedule is approximate and may be adjusted for location and participant interest.



Onshore Gas Gathering Systems: Design & Operation (PF-45)

CAMPBELL

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

Production & facilities department engineers/senior operating personnel responsible for the design, operation and optimization of onshore gas gathering systems and their associated field facilities.

YOU WILL LEARN

- The impact of gathering system pressure on gas well deliverability
- The impact of produced fluids composition on gathering system design & operation
- Evaluate field facility & gathering system configurations for different applications
- Recognize and develop solutions to operating problems with existing gas gathering systems

ABOUT THE COURSE

This course deals with the design, operation and optimization of onshore gas gathering systems and their associated field facilities, from the wellhead to the central gas processing facility. From a design perspective, the main variables that impact the flexibility and operational characteristics of an onshore gas gathering system will be discussed. Typical operating problems will also be covered including hydrates, multiphase flow issues, corrosion, declining well deliverability, etc. Exercises will be utilized throughout the course to emphasize the key learning points.

COURSE CONTENT

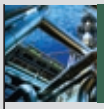
- Gas well inflow performance & deliverability
- Overview of gas well deliquification methods for low-rate, low pressure gas wells
- Effect of gathering system/abandonment pressure on reserves recovery
- Impact of produced fluids composition
- Sweet/sour
- CO_2 content
- Rich/lean
- Produced water
- Hydrates and hydrate prevention
- Dehydration
- Heating
- Chemical inhibition
- Multiphase flow basics
- Corrosion/materials selection
- Gathering system layout
- Wellsite/field facilities options
- Provisions for future compression

2011 Schedule and Tuition

HOUSTON
7-11-MAR. . . . . US $3,140

DENVER
6-10-JUN . . . . . US $3,140

ORLANDO
14-18-NOV. . . . . US $3,455



Relief and Flare Systems (PF-44)

CAMPBELL

COURSE LEVEL Foundation

DURATION 5 days

DESIGNED FOR

Engineers & senior operating personnel responsible for designing, operating and maintaining relief and flare systems in oil and gas facilities.

YOU WILL LEARN

- Purposes of relief and flare systems and their importance in safe operations
- Causes of overpressure and the ways to control/mitigate
- Defining the relief cases considering operations, upset/abnormal conditions and emergency situations (such as fire).
- Commonly used pressure relieving devices and how to select and size these devices
- Determining set/relieving pressures to meet operational, safety and Code requirements
- Operational considerations of maintenance, testing, certification, and disposal of fluids
- Designing and operating relief and flare header systems considering fluid characteristics, service conditions, volumes, gas dispersion and radiation.
- Defining requirements, selecting and sizing the components of a relief/flare system such as knockout drums, flare stack and tips, pilot and ignition systems.

ABOUT THE COURSE

This is an intensive 5-day course providing a comprehensive overview of relief and flare systems for oil and gas processing facilities. The course begins with the need for pressure control/overpressure protection, continues with the key engineering and design aspects including Code considerations, and concludes with selecting and defining the components of a relief and flare system. The material of the course is applicable to onshore field production facilities, pipelines, gas plants, terminals, and offshore production facilities.

COURSE CONTENT

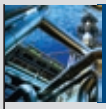
- Purposes and overview of typical relief and flare systems and key components
- Safety implications and the causes of overpressure
- Codes and standards as well as good practices typical in oil and gas facilities
- Overpressure protection philosophy including source isolation and relief
- Determination of relief requirements and defining set point pressures
- Types and applications of common relief devices
- Blow-down/depressurizing – purpose & design/operational considerations
- Design and specification considerations for relief valves and header systems including fluid characteristics, services conditions, material selection, and header sizing.
- Environmental considerations including flare versus vent decisions, emissions, noise and radiation levels.
- Radiation calculations and the impact of flare tip design
- Selection and sizing of key components such as knockout and seal drums, vent/flare stack, vent/flare tips, and flare ignition systems
- Defining need and quantity of purge gas
- Use of environmental friendly strategies such as flare gas recovery, smokeless flaring, and purge gas conservation.
- Operational and troubleshooting tips

– NEW IN 2011 –

2011 Schedule and Tuition

KUALA LUMPUR
5-9-SEP . . . . . US $4,490

HOUSTON
17-21-OCT . . . . . US $3,455



Heat Transfer Equipment (PF-43)

PETROSKILLS

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

Engineers and senior operating personnel involved in the design, specification, or operation of heat transfer equipment.

YOU WILL LEARN

- Select the correct heat transfer equipment for a particular application with reference to typical facility process flow diagrams (PFD's)
- Apply heat transfer principles to design and specify heat transfer equipment
- Evaluate the performance of heat transfer equipment and recommend solutions to problems
- About the typical instrumentation and control schemes used by the various types of heat transfer equipment

ABOUT THE COURSE

This course reviews the selection, basic design, and operation of heat transfer equipment commonly used in the oil and gas industry with focus on E&P production facilities. Heat transfer equipment discussed will include shell and tube exchangers, compact heat exchangers, brazed aluminum exchangers, air coolers, and fired equipment (fire-tube and direct–fired).

COURSE CONTENT

- Typical process heating & cooling applications
- Fluid properties
- Heat transfer principles
- Shell and tube exchangers
- Compact heat exchangers
- plate–frame
- printed circuit
- welded plate
- Brazed aluminum exchangers
- Air coolers
- Fired equipment (furnace type & fire-tube)
- Operating problems
- Typical instrumentation control schemes

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.

THE UNIVERSITY OF TRINIDAD AND TOBAGO

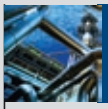
PetroSkills Alliance member, The University of Trinidad and Tobago, established a successful relationship with John M. Campbell & Co. in 2006 for the exclusive delivery of Campbell courses in Tunapuna, Trinidad.

Current offerings include:

- Gas Processing
- Operations Management
- Operator Training
- Production Facilities
- Offshore
- Reliability
- Electrical, Instrumentation and Controls
- Refining
- Mechanical

For the most up-to-date pricing and schedule information, visit:

www.u.tt/peu



Separation Equipment - Selection & Sizing (PF-42)

PETROSKILLS

COURSE LEVEL Intermediate

DURATION 5 Days

DESIGNED FOR

Process/Facilities engineers needing skills for design and troubleshooting of separators.

YOU WILL LEARN

- Different types of separation equipment utilized in the oil and gas industry and where they are used
- Separation performance capabilities of the different types of equipment
- How to size the different types of separation equipment
- How to troubleshoot and debottleneck separation equipment
- How to calculate the wall thickness and estimate the weight of separators
- Instrumentation and controls used on separation equipment

ABOUT THE COURSE

This course covers the different types of separation equipment typically encountered in oil & gas production facilities. Fractionation equipment and produced water treating equipment are not covered in this course. You will learn where the different types of separation equipment are used based on operating conditions and separation performance requirements. Frequent references will be made to real production facility process flow diagrams (PFD's). Typical operational problems and their solutions will be discussed. Exercises requiring calculations are utilized throughout the course.

COURSE CONTENT

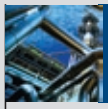
- Fluid properties & phase behavior
- Phase separation processes
- Gas–liquid separation equipment
  - Slug catchers
  - Conventional separators (horizontal & vertical)
  - Scrubbers
  - Compact separators
  - Filter separators/coalescing filters
- Separator internals
  - Inlet devices
  - Mist extractors
  - Baffles, weirs, etc
- Emulsions
- Oil–water separation equipment
  - Conventional 3–phase separators & freewater knockouts
  - Wash tanks
- Oil treating & desalting equipment
  - Mainly electrostatic coalescers
- Liquid-liquid coalescing filters
- Mechanical design aspects
  - Pressure vessel codes
  - Wall thickness & vessel weight estimation
  - Material selection
  - Relief requirements
- Operational problems

2011 Schedule and Tuition

HOUSTON
28-FEB-4-MAR . . . . . US $3,140

LONDON
11-15-APR . . . . . US $4,330

ORLANDO
17-21-OCT . . . . . US $3,455



CO_2 Surface Facilities (PF-81)

PETROSKILLS

COURSE LEVEL Specialized

DURATION 3 Days

DESIGNED FOR

Engineers and senior operating personnel involved with carbon dioxide/natural gas/CO_2 EOR systems.

YOU WILL LEARN

- Evaluate the effect of CO_2 on physical/thermodynamic properties
- Dehydrate high CO_2–content gases
- Practices to deal with Dense Phase pipelines, metering, flaring etc
- How to pump and compress CO_2
- Using purification processes: membranes, Ryan-Holmes, amines, hot carbonate, etc

ABOUT THE COURSE

This course emphasizes the affect of carbon dioxide on the selection and operation of equipment (separators, compressors, and dehydrators), as well as sweetening process equipment. This program, first introduced in 1985, assists those working with carbon dioxide or high carbon dioxide content natural gas. This course is particularly applicable to those persons who operate and/or design enhanced oil recovery (EOR) facilities using CO_2 as a miscible agent. Physical and thermodynamic property data for carbon dioxide/natural gas mixtures are discussed. Calculations are performed to illustrate principles and techniques. An extra day will be added to this course if a plant tour is available. The plant tour is optional.

COURSE CONTENT

- Overview of CO_2 injection and process facilities
- Heavy emphasis on CO_2 for enhanced oil recovery
- Physical and thermodynamic properties of CO_2 and high CO_2 mixtures
- Materials selection and design consideration in CO_2 systems
- Process vessel specification
- Pumps and compressors
- Fluid flow
- Dehydration of CO_2 and CO_2-rich gases
- General overview of processes to treat/recover CO_2

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.

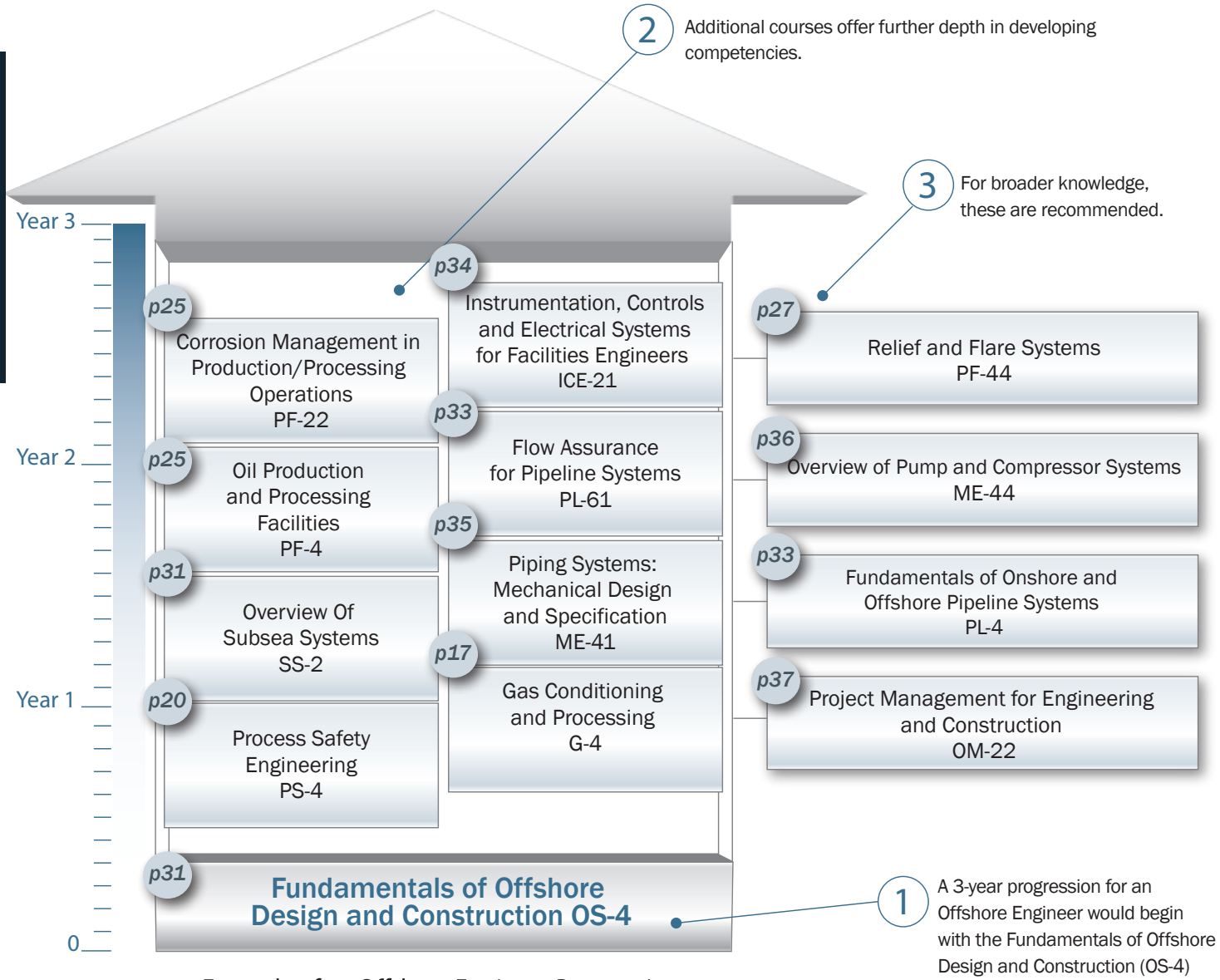
OFFSHORE ENGINEER

Campbell Training's Offshore Discipline Team provides technical training and consulting for the complete life-cycle of offshore oil and gas systems; from exploration and development to decommissioning. The discipline curriculum includes courses that provide the students the knowledge to understand and participate in evaluating the major offshore development alternatives: fixed structures, floating systems and subsea systems. Other key elements stressed in all offshore courses include life-cycle costs, constructability, operability and interface management.

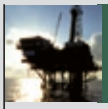
Offshore instructors have extensive real world experience managing offshore development projects, well construction and servicing, asset management and producing operations. Their broad knowledge blends the unique technical and operational issues of offshore into an integrated approach to enhance understanding of the full scope of offshore facilities.

Offshore Engineer Course Progression

Example of recommended courses to develop an Offshore Engineer over a 3-year span.



Example of an Offshore Engineer Progression



Fundamentals of Offshore Systems: Design and Construction (OS-4)

CAMPBELL

COURSE LEVEL Foundation

DURATION 10 days

DESIGNED FOR

Individuals with a basic awareness of or experience in offshore 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

- Identify the key facilities parameters that must be evaluated for field development
- Describe the types and capabilities of offshore well construction, pipeline, riser and production (surface and subsea) facilities needed for all water depths, from shallow to ultra deepwater
- Recognize the best applications and characteristics of each type of offshore fixed and floating structure
- Account for the affects 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 topside facilities (drilling, well servicing, processing and utilities) affect the structural design and how the topside design process is done
- Recognize and manage key design and operational interfaces between the major components of offshore facilities systems
- Understand and apply the key design, construction and installation issues associated with fixed and floating platforms to your work

ABOUT THE COURSE

This 10-day course will provide a fundamental understanding of the technology and work processes used for the design and construction of all types of offshore systems 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 "red thread" project exercise is included to develop field architecture recommendations, basic design and high level project execution plans for an offshore development. The course instructors are experienced offshore managers.

COURSE CONTENT

• Offshore systems overview and field architecture selection • Well construction and servicing equipment and operations • 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 • Project management lessons learned • Life-cycle and decommissioning considerations

2011 Schedule and Tuition

HOUSTON
4-15-APR . . . . . US $6,220

LONDON
12-23-SEP . . . . . US $7,220

SINGAPORE
24-OCT-4-NOV . . . . . US $6,790

Overview of Offshore Systems (OS-21)

PETROSKILLS

COURSE LEVEL Basic

DURATION 5 Days

DESIGNED FOR

Technical staff, business professionals, technicians, analysts and other non technical staff that 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

- Identify the key steps in the development of offshore fields from discovery through decommissioning
- Understand the elements on field architecture to define an optimum field development
- Recognize key technical and non-technical stakeholder issues
- Recognize the types and terminology of 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 the options and equipment used for transportation of produced fluids and treatment chemicals
- Develop an appreciation for the marine equipment used in the construction of offshore facilities.
- Understand basic issues in life-cycle and decommissioning decisions
- Appreciate the continuing advances being made in the technology of offshore

ABOUT THE COURSE

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 "red thread" exercises are used throughout the course. The course instructors are experienced offshore managers.

COURSE CONTENT

- Field development concepts
  - Ocean environment and its impact on offshore systems
  - Fixed and floating structures - options and applications
- Subsea Systems
- Drilling wells, their construction and servicing operations
- Topsides Facilities - Processing - Utilities
- Oil and gas transportation system design and installation
- Production operations
- Offshore Construction - Equipment
  - Fabrication, Transportation, Integration, Installation
- Project Management
- Life-cycle considerations including decommissioning

2011 Schedule and Tuition

LONDON
4-8-APR . . . . . US $4,330

HOUSTON
25-29-JUL . . . . . US $3,455

ORLANDO
5-9-DEC . . . . . US $3,455

Overview of Subsea Systems (SS-2)

PETROSKILLS

COURSE LEVEL Basic

DURATION 5 Days

DESIGNED FOR

Technical staff that 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

- 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

ABOUT THE COURSE

An overview of subsea components and how they are integrated into field architecture is provided during this 5-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 working underwater 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 "red thread" exercise to develop field architecture recommendations, basic component selection, and high level project execution plans for a subsea development. Course instructors are experienced offshore managers.

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

2011 Schedule and Tuition

SINGAPORE
18-22-JUL . . . . . US $4,490

HOUSTON
26-30-SEP . . . . . US $3,455

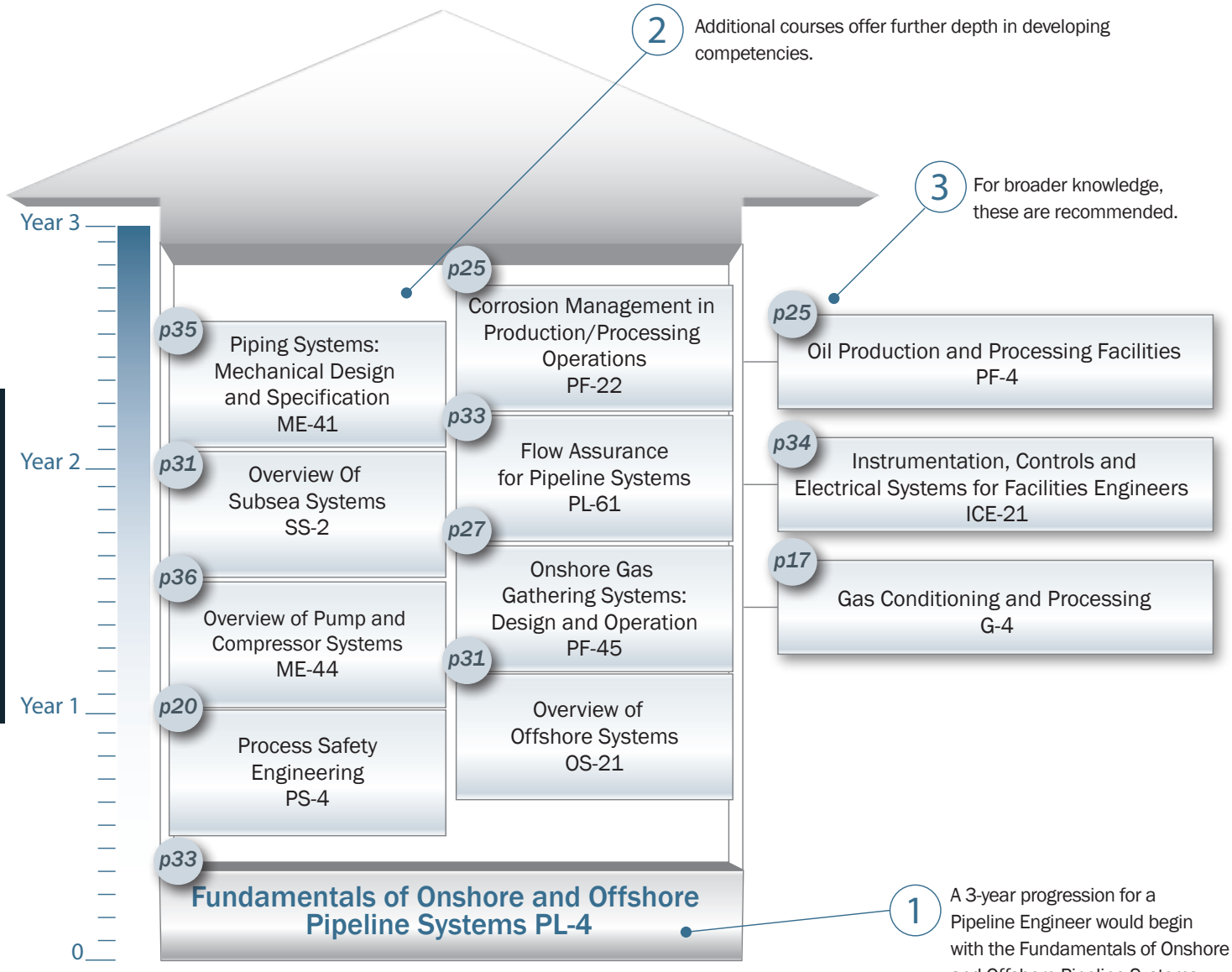
PIPELINE ENGINEER

The Campbell Training's Pipeline Discipline provides technical training and consulting for oil and gas transportation, focusing on pipeline systems as well as onshore infrastructure systems that support oil and gas operations. The discipline covers pipeline transportation systems, oil and gas terminals facilities, and the onshore infrastructure from regional considerations through design and construction of site specific systems. As with all PetroSkills/ Campbell training programs, these discipline areas integrate with the other technical, operations and HSE disciplines.

The Campbell Instructors and consultants that support the Pipeline discipline have extensive real world – global experience from conceptual development through operations. Their broad knowledge blends the unique technical and operational issues of pipeline systems that transport all types of fluids – from heavy oils to refined products to high pressure injection gas and water - into integrated systems. This global experience spans the pipeline industry from initial site selection through detailed design and construction of unique facilities.

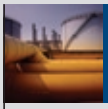
Pipeline Engineer Course Progression

Example of recommended courses to develop a Pipeline Engineer over a 3-year span.



Example of an Pipeline Engineer Progression

PIPELINE



Fundamentals of Onshore and Offshore Pipeline Systems (PL-4)

PETROSKILLS

COURSE LEVEL Foundation

DURATION 10 Days

DESIGNED FOR

Technical professionals new to the pipeline business or needing a broad understanding of the pipeline business including: pipeline project managers, pipeline engineers, facilities engineers, pipeline design and construction engineers, engineering and construction contractors.

YOU WILL LEARN

- How to apply mechanical and physical principles to all phases of pipeline design, construction, and operation
- Identify similarities and differences of onshore and offshore pipeline systems
- Incorporate construction methods, commissioning, pressure testing, and start-up into the design of a pipeline system
- Applying safety and environmental regulations for a sound design
- Common sense methods and technical requirements to define pipeline routes and facilities locations
- The importance of fluid properties and process to pipeline systems design and construction

ABOUT THE COURSE

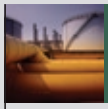
This intensive, ten-day foundation level course covers the design, construction, and operation of pipeline systems. The focus is on pipeline routing, hydraulics, mechanical design, and construction for both onshore and offshore pipelines. The result of this course is cost-effective, safe and environmentally sound design, construction, inspection, operation, and maintenance of pipelines. Design problems and group projects are an integral part of this course.

COURSE CONTENT

- Pipeline systems definition and applications
- Codes and standards related to pipelines
- Pipeline hydraulics: single-phase gas and liquids, multiphase fluids and heavy/waxy crudes
- Major design considerations for strength, stability, and installation
- Pipeline survey and mapping
- Pipeline route engineering
- Pipeline materials and components
- Corrosion and cathodic protection of pipelines
- Special design aspects, covering such issues as risers, slug catchers, pigging facilities, etc
- Basic design considerations for pipeline facilities
- Pipeline construction for cross country and offshore systems focusing on welding
- Pressure testing, pre-commissioning, and commissioning
- Pipeline integrity aspects including in-line inspection
- Leak detection and emergency planning considerations
- Repairs and modification considerations
- Safety, environmental, and regulatory requirements

2011 Schedule and Tuition

KUALA LUMPUR
9-20-MAY . . . . . US $7,070



Onshore Pipeline Facilities - Design, Construction and Operations (PL-42)

CAMPBELL

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

Technical professionals new to the onshore pipeline business or needing a broad understanding of the design and construction of onshore pipeline business including: pipeline project managers, pipeline engineers, facilities engineers, pipeline design and construction engineers, engineering and construction contractors.

YOU WILL LEARN

- How to apply mechanical and physical principles to pipeline design, material selection, construction, and operation
- Identify special design and construction challenges of onshore pipeline systems
- Identify the principal interfaces and potential interrelationships of pipeline facilities such as: pump stations and terminals on design and operations of onshore pipeline systems
- Safety and environmental practices and their affect on design, construction, and operation

ABOUT THE COURSE

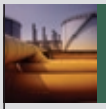
This intensive, five-day foundation level course covers the design, construction, and operation of onshore pipeline systems. This course will incorporate construction methods, commissioning, pressure testing, and start-up into the design of a pipeline system. The course focuses on pipeline routing, mechanical design, construction methods, hydraulics, installation, and operation of onshore pipeline systems. Participants will acquire and/or consolidate the essential knowledge and skills to design, construct, and operate pipelines. Design problems are an integral part of this course.

COURSE CONTENT

- Pipeline systems definition and applications
- Safety, environmental, and regulatory considerations; codes and standards related to pipelines
- Pipeline conceptual and mechanical design for strength, stability, and installation
- Impacts of pipeline hydraulics on pipeline design, construction, and operations
- Pipeline survey, mapping, and route selection
- Pipeline materials and components
- Corrosion and cathodic protection of pipelines
- Pipeline construction for onshore systems
- Introduction to flow assurance considerations and pipeline integrity aspects including in-line inspection, leak detection, and emergency planning considerations
- Pipeline operations, maintenance and repairs considerations

2011 Schedule and Tuition

DENVER
15-19-AUG . . . . . US $3,455



Flow Assurance for Pipeline Systems (PL-61)

CAMPBELL

COURSE LEVEL Intermediate

DURATION 5 Days

DESIGNED FOR

Technical professionals engaged in pipeline flow assurance offshore and onshore including: project managers, pipeline engineers, facilities engineers, design engineers, and engineering contractors.

YOU WILL LEARN

- Identifying and applying fluid characteristics and behavior in the design and operations of pipeline systems
- Assess the physical behavior of the key flow assurance and integrity challenges: corrosion, hydrate formation, transient behavior and wax deposition
- Evaluate mechanical integrity of the pipeline
- How to evaluate the effectiveness of pigging operations and leak detection systems
- Define the roles and uses of Supervisory Control And Data Acquisition Systems (SCADA) in flow assurance

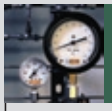
ABOUT THE COURSE

This course will provide an understanding of flow phenomena that can help the participant avoid problems such as hydrate formation, pressure (surge) waves, or high viscosity liquid flow failure. This intensive, five-day intermediate level course addresses several critical problems in achieving pipeline flow assurance. The focus of this course is on potential challenges to pipeline operations including: surge, corrosion, hydrate formation, wax deposition, multiphase fluids, and slugging. The causes for these problems, design solutions, and operational responses will be an integral part of the course.

COURSE CONTENT

- Introduction to oil and gas fluid transport properties
- Fluid property data and phase determination
- Fluid flow analysis – single and multiphase
- Slug formation and prediction
- Surge analysis
- Corrosion – internal and external
- Hydrate formation and prevention
- Wax formation and deposition, including prevention and remediation
- Asphaltene prediction, scale precipitation and sand production
- Pigging operations
- Leak detection methods and SCADA
- Startup/shutdown issues

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.



Instrumentation, Controls and Electrical Systems for Facilities Engineers (ICE-21)

CAMPBELL

COURSE LEVEL Basic

DURATION 5 days

DESIGNED FOR

Managers, engineers, technicians and system operators requiring a broad understanding of instrumentation, control, and electrical systems in oil and gas facilities.

YOU WILL LEARN

Electrical Power

- Defining fundamentals parameters for electrical power usage and generation such as voltage levels, self-generate versus purchased power, and basic electrical power management .
- Developing electrical power demand (load) lists, one-line diagrams, and the selecting and integrating power distribution systems.
- Identifying electrical power users (for the load list) then evaluating the equipment demand on the power system (such as intermittent or continuous service, and motor starting loads).
- Using safe practices such as hazardous area definition and circuit protection.

Instrumentation and Control

- Defining what to measure, why measure a parameter and how to measure.
- Determining and using the many control strategies, equipment and computer systems common to an oil and gas facility.
- Identifying equipment and instrument characteristics and using appropriate instrumentation and controls.
- Defining and integrating components into systems that monitor and locally control the process (and related equipment), safety systems, and the communications and remote control systems use.

ABOUT THE COURSE

This 5-day course provides an overview of electrical power generation and distribution, process and safety systems instrumentation, and control strategies and configurations. The focus is on application and integration into the process and control of upstream and midstream oil and gas facilities. The material of the course is applicable to field production facilities, pipelines, gas plants, and offshore systems.

COURSE CONTENT

- Key electrical power considerations and fundamentals applied in oil and gas facilities.
- Voltage levels and power type (3-phase, single-phase, and direct current) selection and application.
- Purchased power considerations including generation efficiency, redundant sources, transmission grid parameters, and cost considerations.
- Electric power distribution, systems loads, internal grid layout, major distribution equipment and cabling.
- Power users definition and integration into the power distribution system.
- Electrical system safety.
- Process systems operations and the key characteristics, and measurement needs, as well as techniques to measure and control.
- Control modes and their applications, communications requirements, and the operator and computer controller interface.
- Interrelationships between process, equipment, instruments and controls.
- Field (facility) control and monitoring systems such as pressure and level indicators and controllers.
- Field (facility) safety monitoring and response systems including SIS, HIPPS and emergency shutdown valves.
- System-wide considerations including communications, local control, remote control, and data management and use.

– NEW IN 2011 –

2011 Schedule and Tuition

LONDON
9-13 MAY . . . . . US $4,330

KUALA LUMPUR
5-9 SEP. . . . . US $4,490

Electrical Engineering Fundamentals for Facilities Engineers (E-3)

PETROSKILLS

COURSE LEVEL Basic

DURATION 5 Days

DESIGNED FOR

Facilities and Project Engineers as well as new Electrical, Instrumentation or Controls Engineers who need to improve their basic understanding of electrical systems within oil and gas facilities.

YOU WILL LEARN

- The key components of facilities electric power distribution which include circuit arrangements, wiring, cabling, terminations, conduit, low voltage boards, low and medium voltage switchgear, and single-phase and three phase schemes
- Operation, components, electromotive forces, turns and voltage ratios, losses, efficiency, rating, and connections of transformers
- The difference between direct current motors, alternating current motors, enclosures and how to select motors
- Protection including fuses, direct tripping, relaying, and coordination
- About emergency power to include power requirements, generator sets, direct current systems, batteries, and an overview of uninterruptible power supplies (UPS)
- Power generation which includes an overview of emergency, prime, base, peak and co-generation, quality, sizing, operation, control, and power factor correction
- Grounding and bonding with an overview of systems, equipment, ignition sources, separately derived systems, performance, and substation grounding
- Hazardous areas with general information on classifications, NEC, IEC, equipment protection, certification, and definitions

ABOUT THE COURSE

This course applies fundamental electrical engineering principles to oil and gas facilities design and operation. The course is designed for Facilities Engineers with or without a background in electrical engineering and can accelerate the development of new Facilities Electrical Engineers. Through the use of individual and group problem solving, attendees will learn about transformers, motors, generators, one-line diagram interpretation, protection and coordination of electrical equipment, emergency power, direct current systems, uninterruptible power supplies, site and standby generation, variable speed drives, programmable electronic systems, electrical safety, grounding and bonding, lighting, and hazardous areas. Participants will gain a better understanding of electrical components and systems and will develop a greater appreciation for electrical engineering.

COURSE CONTENT

- Fundamentals of electricity
- Direct current
- Basic AC theory
- Transformers
- Motors
- Power distribution
- System protection and coordination
- Emergency power generators, direct current systems and uninterruptible power systems
- Power generation
- Variable speed drives
- Programmable electronic systems
- Electrical safety
- Grounding and bonding
- Lighting
- Hazardous areas

2011 Schedule and Tuition

HOUSTON
14-18 FEB . . . . . US $3,140

ORLANDO
24-28 OCT . . . . . US $3,455

Electrical Engineering Practices for Facilities Engineers (E-4)

PETROSKILLS

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

Facilities and Project Engineers with two or more years of experience; Electrical, Instrumentation or Controls Engineers with two or more years of experience, or those who have completed the E-3 course and need to further develop their understanding of electrical systems within oil and gas facilities.

YOU WILL LEARN

- Key principles in project management for electrical projects including basics, front end loading, scope definition, brown-field vs. green-field, engineering deliverables, roles and responsibilities, project planning, risk analysis and management, cost estimating, and procurement, construction, contractor and supplier management
- Standards and recommended practices through an introduction to ANSI, API, CSA, CFR, IEC, IEEE, IES, ISA, NEMA, NFPA, AND UL
- Electrical distribution systems including background, planning, voltage selection, and system protection
- How to select, maintain and control DC and AC motors
- The characteristics, properties, insulation, shielding, jacketing, short circuit capabilities, and references of wires and cables
- Transformers which include operation, models, types, components, turns and voltage ratios, connections, losses, efficiency, ratings, application, selection, and safety
- Medium and low voltage switchgear and motor control centers including specifications, maintenance, and distribution
- Topics in faults and circuit protection including sensing devices, fuses, direct tripping devices, protective relaying, relaying schemes, major equipment protection, and system relay coordination
- Distribution, construction, fuses, circuit breakers, disconnects, grounding, types, and ratings of switchboards and panels
- The systems and requirements of uninterruptible power supply (UPS) and emergency power in addition to an overview of generator set, ATSs, and batteries
- Fault protection, system grounding philosophy, ungrounded systems, grounded systems, bonding, ignition sources, bonding techniques, separately derived systems, performance, and substation grounding
- About North American and International classifications of hazardous areas in addition to NEC and IEC comparisons, extension of zones, equipment certification, and equipment protection methods

ABOUT THE COURSE

This course applies Electrical Engineering principles to oil and gas facilities design and operation and requires some prior experience. Electrical Engineering principles are reinforced through the use of individual and team problem solving exercises, one-line diagram coordination, interpretation, and class discussions of interfaces between facilities engineers, contractors and maintenance personnel. Participants gain additional understanding of electrical equipment requirements for facilities and what is important to the Electrical discipline.

COURSE CONTENT

- Electrical project management
- Standards and recommended practices
- Distribution systems
- Motors
- Wire and cable
- Transformers
- Switchgear
- Motor control centers
- Switchboards and panels
- Electrical faults (short circuits) and circuit protection
- UPS and emergency power
- Electrical system ground and bonding
- Hazardous area classification

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.

Instrumentation and Controls Fundamentals for Facilities Engineers (IC-3)

PETROSKILLS

COURSE LEVEL Basic

DURATION 5 Days

DESIGNED FOR

Facilities and Project Engineers as well as newly graduated Electrical, Controls and Instrument Engineers who need to improve their basic understanding of instrumentation and control systems within oil and gas facilities.

YOU WILL LEARN

- Field measurement devices including level, pressure, temperature and flow
- Final elements and actuators including control loops, control valves, shutdown valves, actuators, transducers
- Pressure relief and pressure regulation
- How to document instrumentation including tag numbers, P&IDs, loop and logic diagrams
- Process control basics with emphasis on control loops, types, strategies, and loop tuning
- How programmable logic controllers operate as well as their advantages, application, functionality, architecture, and programming
- Supervisory Control and Data Acquisition (SCADA) Systems to include telemetry, RTUs, internet and web based
- Distributed Control Systems (DCS) including Fieldbus and Profibus
- Risk mitigation, technologies, and architecture of Safety Instrumented Systems (SIS)
- The best practices for hazardous areas and equipment selection which will include area classification, NEC, IEC, equipment protection, selection, certification, location, and ingress

ABOUT THE COURSE

This course applies fundamental instrumentation and control engineering principles to oil and gas facilities design and operation and is designed for Facilities Engineers with or without a background in instrumentation or control engineering. The course is also designed to accelerate the development of new facilities Instrumentation and Control Engineers. Through the use of individual and group problem solving, attendees will learn about field measurement devices, final elements and actuators, pressure relief and regulation, documentation, programmable logic controllers, power supplies, SCADA, DCS, SIS, hazardous areas, and installation methods. Participants will gain a better understanding of instrumentation and control components and systems and will gain a greater appreciation for instrumentation and control engineering.

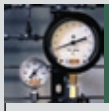
COURSE CONTENT

- Fundamentals
- Field measurement devices
- Final elements and actuators
- Pressure relief and pressure regulation
- Instrumentation documentation
- Control system basics
- Programmable logic controllers
- Supervisory control and data acquisition (SCADA) systems
- Distributed control systems (DCS)
- Safety instrumented system (SIS)
- Hazardous areas and equipment selection

2011 Schedule and Tuition

HOUSTON
21-25 FEB . . . . . US $3,140

ORLANDO
31 OCT - 4 NOV . . . . . US $3,455



Instrumentation and Controls Engineering Practices for Facilities Engineers (IC-4)

CAMPBELL

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

Oil and gas Facilities and Project, Electrical or Instrumentation and Controls Engineers with two or more years of field experience who want to further improve their practical understanding of Instrumentation/Controls systems within oil and gas facilities. Attendees should have good working knowledge of instrumentation and control fundamentals.

YOU WILL LEARN

- How to work through a project with a brief introduction to a three-phase (oil, gas, water) inlet separator, its design, operation, components, and controls
- Basic principles of project management for instrumentation and control projects to include front-end loading, scope definition, brown-field vs. green-field projects, engineering deliverables, roles and responsibilities, project planning, risk analysis and management, cost estimating, procurement management, construction management, contractors and suppliers management
- Front end engineering design (FEED) to include pre-feed, flow diagrams, P&IDs, material take off, indices, plot plan, control system philosophy, I&C block diagrams, safety instrumented system (SIS) logic, specifications, cost estimates, and design approval
- Final design activities that includes authorization for expenditure (AFE), indices, specifications, SIS design, distributed control system (DCSs), plot plans, power systems, installation details, wiring and connection diagrams, schematics, logic diagrams, cable and conduit schedules, electronic systems i/o indices, loop diagrams, bill of materials (BOM), and panel arrangements
- The various requirements of construction and commissioning to include procurement requirements, construction requirements, QA and QC requirements, factory acceptance test (FAT), commissioning and startup requirements
- Basic design criteria for selection of control valves (CVs), sizing of control valves, selection of flow measurement devices, sizing of orifice plates, selection of relief valves, selection of temperature devices, selection of level devices, selection of pressure measurement, selection of alarm and shutdown switches, instrument tag numbering, loop diagrams preparation, P&IDs, and SIS logic matrices

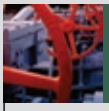
ABOUT THE COURSE

An exercise is developed throughout the session to illustrate the process of instrumentation selection and specification for a pressure vessel. The required documentation is identified and developed for incorporation in a BPCS (basic process control system). The exercise does not require formal instrument engineering training but prior field experience is very helpful. Through the use of individual and team problem solving you will learn about instrumentation on a vessel, developing required documentation, reviewing end devices, control valves, process control basics and discussing the various interfaces between facilities engineers, contractors and maintenance personnel. Participants will gain a better understanding of the instrumentation process and what is important to this discipline.

COURSE CONTENT

- Introduction
- Basic project management
- Front end engineering design (FEED)
- Final design activities
- Construction and commissioning
- Weekly project design actives

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.



Piping Systems - Mechanical Design and Specification (ME-41)

CAMPBELL

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

Mechanical, facilities, plant or pipeline engineers and piping system designers who are involved in the design of in-plant piping systems for oil and gas facilities.

YOU WILL LEARN

- Apply piping system codes and standards
- About line sizing and layout of piping systems in various types of facilities
- How to specify proper components for process and utility applications
- Compare alternative materials of construction
- The process of steelmaking, pipe manufacturing and material specifications
- Joining methods and inspection techniques
- Key considerations for flare and vent systems, including PSV sizing

ABOUT THE COURSE

This five-day foundation level course for engineers and piping system designers reviews the key areas associated with the design of piping systems for oil and gas facilities. The course is focused on four areas: codes and standards, pipe materials and manufacture, piping components, and piping layout and design. Applicable piping codes for oil and gas facilities (ISO, B31.3, B31.4, B31.8, etc.), pipe sizing calculations, pipe installation, and materials selection are an integral part of the course. The emphasis is on proper material selection and specification of piping systems.

COURSE CONTENT

- Piping codes and standards (ANSI/ASME, API, ISO)
- Pipe materials and manufacturing
- Basic pipe stress analysis methods
- Valves and actuators
- Welding and non-destructive testing
- Line sizing basics (single-phase and multiphase flow)
- Pipe and valve material selection
- Piping layout and design
- Manifolds, headers, and flare/vent systems
- Non-metallic piping systems
- Operations and maintenance considerations of facilities and pipelines

2011 Schedule and Tuition

HOUSTON
28-FEB-4-MAR . . . . . US $3,140

LONDON
4-8-APR . . . . . US $4,330

DENVER
25-29-JUL . . . . . US $3,455

ORLANDO
17-21-OCT . . . . . US $3,455

Overview of Pump and Compressor Systems (ME-44)

PETROSKILLS

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

Engineers, senior technicians and system operators 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, changes in fluid composition, and changes in operating conditions that can affect equipment selection and operating strategies.
- Assessing the key pump hydraulics and compressor thermodynamics and their affect on selection and operations.
- Identifying significant operating conditioning monitoring parameters and troubleshooting techniques.

ABOUT THE COURSE

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, integration of these units in the process 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.

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, lube and seal systems, and fuel/power systems.
- Major design, installation, operating, troubleshooting, and maintenance considerations.

2011 Schedule and Tuition

LONDON
11-15-APR . . . . . US $4,330

HOUSTON
22-26-AUG . . . . . US $3,455

KUALA LUMPUR
5-9-DEC . . . . . US $4,490

Compressor Systems - Mechanical Design and Specification (ME-46)

CAMPBELL

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

Mechanical, facilities, plant, or pipeline engineers and technicians needing an in-depth understanding of the different types of compressors.

YOU WILL LEARN

- How to apply thermodynamics to compressor performance and operating characteristics
- How to size, specify, and select compressors
- Compressor auxiliary systems
- Series and parallel application of compressors
- How to integrate compressor systems into process facilities used in the oil and gas industry
- How to use state-of-the-art monitor and control devices in the operation, maintenance, and troubleshooting of compression systems
- How to apply maintenance practices to improve compressor reliability
- Shop and field performance testing
- Compressor economics including OPEX vs. CAPEX considerations

ABOUT THE COURSE

This five-day foundation level course is for facility design engineers, operations engineers and technicians seeking an in-depth understanding of centrifugal, reciprocating, and screw compressors. This course provides basic knowledge of compressor types and associated auxiliary systems, mechanical design of equipment, operating and performance characteristics, control and monitoring systems, maintenance practices, and codes and standards.

COURSE CONTENT

- Types and application of compressors
- Selection criteria of dynamic and positive displacement compressors
- Compressor thermodynamics and operating characteristics
- Performance curves and off-design evaluations
- Key compressor components and other auxiliary systems
- Equipment specifications
- Compressor controls and monitoring devices
- Driver and gear involvement
- Installation, operation, maintenance practices, and troubleshooting
- Economic considerations

2011 Schedule and Tuition

ORLANDO
24-28-OCT . . . . . US $3,455

Turbomachinery Monitoring and Problem Analysis (ME-62)

PETROSKILLS

COURSE LEVEL Intermediate

DURATION 5 Days

DESIGNED FOR

Experienced mechanical or facilities engineers and senior technicians needing an understanding of monitoring and troubleshooting turbomachinery.

YOU WILL LEARN

- How to evaluate turbine performance during startup and operation
- How to identify turbomachinery system components
- How to define and use appropriate monitoring techniques and tools
- How to utilize effective operation and shutdown procedures
- How to analyze common turbomachinery problems, such as vibration, temp/pressure operation and surge
- How to solve instrumentation and control problems
- Understand the inter-relationships of drivers, couplings, gearboxes, and driven equipment
- Installation techniques, equipment failures and different maintenance practices
- Economic considerations

ABOUT THE COURSE

This five-day course is an intensive, intermediate level program for experienced mechanical equipment engineers to develop and expand their capabilities in monitoring and problem analysis of turbomachinery. This course focuses on defining the systems and subsystems that form the turbomachinery, the potential problems with these systems and subsystems, monitoring techniques for early detection of problems, and methods to analyze the monitored variables to detect potential problems or reconstruct reasons for failures. Case studies are used throughout the course.

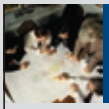
COURSE CONTENT

- Gas turbine machinery - general description
- Operating principles of gas turbines
- Key performance variables and means to monitor
- Major components of axial flow compressors: rotors, blades, shafts, combustion chambers, nozzles, etc
- Auxiliary systems: lube oil, seal oil, fuel, start-up, etc
- Evaluation of turbine performance parameters during start-up and normal operation
- Troubleshooting control systems for gas turbines: start-up, speed and temperature controls, vibration
- Principles of operation and general components of compressors: rotors, seals, diaphragms, etc
- Operating characteristics curves
- Surging phenomenon
- Choking phenomenon
- Compressor instrumentation: various control loops; anti-surge control loops
- Compressor safety interlock and trip systems
- Gas turbine and compressor systems start-up procedures
- Normal operation - monitoring of parameters
- Shutdown procedures
- Logging of monitoring checks
- Vibration monitoring
- Troubleshooting

2011 Schedule and Tuition

LONDON
23-27-MAY . . . . . US $4,330

HOUSTON
3-7-OCT . . . . . US $3,455



Applied Maintenance Management (OM-21)

PETROSKILLS

COURSE LEVEL Basic

DURATION 5 Days

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 & scheduling
- Optimization of Preventive and Predictive maintenance
- How to focus your resources on critical equipment
- How to work with contractors more effectively
- Develop organizational competence

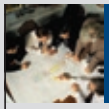
ABOUT THE COURSE

This course provides essential knowledge required for achieving excellence in maintenance management. Work control, planning, and scheduling will be covered. 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 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.

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

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.



Project Management for Engineering and Construction (OM-22)

PETROSKILLS

COURSE LEVEL Basic

DURATION 5 days

DESIGNED FOR

Maintenance, operations, engineering, and purchasing personnel including team leaders and managers who plan, manage, or participate on project teams.

YOU WILL LEARN

- Define project phases and execute them skillfully
- Develop control tools and progress report cards
- Use extensive checklists to make sure all project deliverables are addressed
- Apply project management skills to your current projects
- Utilize project management software as an effective tool
- Develop sustainable, repeatable knowledge management for projects

ABOUT THE COURSE

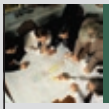
This course will provide a comprehensive presentation and discussion of modern project management principles and practices as they relate to design; procurement; construction activities, maintenance; and upgrade turnarounds at facilities in the oil and gas industry. The specific training received in schedule and cost management, risk management, and the proper use of scarce resources (people and materials) will help the project manager make the best decisions possible. Upon completion of this course, the participant will know what the eight project management process groups are. Participants will understand how project management process groups relate to one another, what tools are available for the project manager to use, what information will be generated, and what that information means. The course is taught using a combination of instruction, facilitated discussion, and hands-on exercises using "real-world" project examples related to facilities design, procurement, construction, and turnarounds. The exercises will include both individual and group activities that will provide each participant with a visual application of the principles and practices discussed throughout the course.

COURSE CONTENT

- Introduction to project management framework
- Four stages of project management
- Eight project management process groups
- Initiation: scope/change, schedule/cost, quality, resource/team, communication/information, risk, subcontract/outsourcing, and integration
- Control: scope/change, schedule/cost, quality, resource/team, communication/information, risk, procurement/contracting, and integration/coordination
- Close-out: scope, subcontract/outsourcing, lessons learned, and integration

2011 Schedule and Tuition

HOUSTON
7-11-MAR. . . . . US $2,880



Essential Leadership Skills (OM-23)

CAMPBELL

COURSE LEVEL Basic

DURATION 5 days

DESIGNED FOR

Supervisors, team leaders, managers, and others increasing the effectiveness of their leadership and communication skills.

YOU WILL LEARN

- To enhance your leadership, decision-making and communication styles
- Coaching and leading an empowered team
- Recognize and solve conflicts
- How to negotiate difficult situations

ABOUT THE COURSE

This seminar will include lecture, discussion, readings, role-playing, video examples and creation of participant action plans. This course will help you unleash natural motivation in your team. You will lower your stress level by working more efficiently and effectively by tapping into the emotional intelligence of your team. Under the guidance of the seminar leaders, you will use competency maps in Leadership and Management to assess yourself in seven major skill areas before and after the seminar.

COURSE CONTENT

- The nature of groups
- Leadership vs. Management
- Self-centering
- Listening
- Motivation
- Group dynamics
- Conflict management
- Team building
- Critical thinking and taking action

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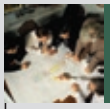


Seven Keys to World Class Asset Management (OM-24)

CAMPBELL

COURSE LEVEL Intermediate

DURATION 2 Days

DESIGNED FOR

Maintenance supervisors or above (including team leaders and managers.) who are involved in an operational excellence or similar initiative. This short course will focus on the seven key strategies that apply to all proactive maintenance missions.

YOU WILL LEARN

- How to get control of the assets rather than letting them control you
- Essential tools for clarifying your information exchanges
- How to focus on lead time to facilitate work management
- How availability of spare parts creates reactive work
- The importance of building alliances in your teams

ABOUT THE COURSE

This short course will provide knowledge of how to progress towards world-class performance and support excellence initiatives. (May be taken in conjunction with OM-25 the same week)

COURSE CONTENT

- Seven keys for world class asset management

2011 Schedule and Tuition

HOUSTON
6-7-JUN .....US $1,280

ORLANDO
14-15-NOV..... US $1,280

Optimizing Preventive and Predictive Maintenance (OM-25)

CAMPBELL

COURSE LEVEL Intermediate

DURATION 3 Days

DESIGNED FOR

Maintenance planners and supervisors including team leaders and managers who want to improve their scheduled maintenance activities. This 3-day course will show you how to optimize activities while equipment is running.

YOU WILL LEARN

- How to evaluate the current effectiveness of PM and PdM
- How to migrate scheduled maintenance activities \ from shutdown to operating
- Use of the P-F curve to prevent equipment failures
- Base loading your schedule with PM activities
- Prioritizing work using a RIME (Ranking Index of Maintenance Expenditures) tool

ABOUT THE COURSE

This 3-day course will help you evaluate and improve your PM and PdM activities necessary for gaining higher availability and reliability of equipment. (May be taken in conjunction with OM-24 the same week)

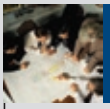
COURSE CONTENT

- Evaluating your PM system
- Linking PM to the work schedule
- Using PM and PdM to prevent equipment failures
- Simple prioritizing of work using a RIME tool
- Integrating Condition-Based activities with other maintenance strategies
- Basic equipment failure patterns and when to use PM

2011 Schedule and Tuition

HOUSTON
8-10-JUN .....US $1,920

ORLANDO
16-18-NOV..... US $1,920



Maintenance Planning and Work Control (OM-41)

PETROSKILLS

COURSE LEVEL Foundation

DURATION 5 Days

DESIGNED FOR

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

YOU WILL LEARN

- Develop world class planning and work control
- 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

ABOUT THE COURSE

This course is designed to build competency in Work Control as a primary skill set in the Competency Map for Facilities Maintenance Management. 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, resource control, and reliable operation. A pre and post self assessment will be used to measure competency improvement. Each participant will develop an action plan to help their organizations become more efficient and safe.

COURSE CONTENT

- Work identification
- Planning
- Prioritization
- Scheduling
- Execution
- History records
- Optimizing preventive maintenance
- Predictive maintenance planning
- Critical equipment focus
- Emergency response

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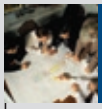

Effective Maintenance Shutdowns (OM-43)

PETROSKILLS

COURSE LEVEL Foundation

DURATION 5 days

DESIGNED FOR

Maintenance, engineering, and operations personnel planning and managing effective maintenance shutdowns and includes key skills in maintenance planning and scheduling.

YOU WILL LEARN

- How to develop and control maintenance shutdown scope of work
- Control work before and during the maintenance shutdown
- Use available computerized scheduling tools
- Use Manpower planning and control methods
- How to measure progress of the maintenance shutdown
- Manage worker productivity
- How to measure maintenance shutdown performance
- How to improve performance on future maintenance shutdowns

ABOUT THE COURSE

This course is designed to teach the skills of maintenance shutdown management as described in the Facilities Maintenance Management Competency Map. You will develop shutdown planning strategies and will develop the organizational structure necessary for managing successful shutdowns. Case studies and real world examples will be used to reinforce the techniques learned in the course. Students will be asked to bring examples from their maintenance shutdown experiences to be used as case studies during the course.

COURSE CONTENT

- Maintenance shutdown terms and basics
- Shutdown planning strategy: establishing goals and objectives, working cooperatively across departments, developing maintenance shutdown procedures
- Management planning: components of the maintenance shutdown plan, planning for effective communications
- Developing a management strategy, organization, and roles and responsibilities
- Work scope development and strategy
- Planning and scheduling controls: participation and teamwork, the overall plan, specifying tasks, shutdown and start-up plans, work scheduling, optimizing the plan, handling emergent work, work control documents
- Computerized scheduling tools
- Manpower planning and control: using In-House resources, balancing teams and skills, managing scarce and critical resources

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Contracts and Tenders Fundamentals (SC-41)

PETROSKILLS

COURSE LEVEL Foundation

DURATION 3 days

DESIGNED FOR

Individuals involved in any aspect of sourcing, tendering, selecting, forming and executing contracts with suppliers of goods and services to the oil and gas industry. This includes supply chain roles such as contracting and procurement specialists, sourcing specialists, category managers, and logistics managers. The course is also intended for technical roles assigned to project work such as facilities engineers, drilling engineers, project engineers and coordinators, commissioning engineers, contracts engineers, planning engineers, asset managers, and legal trainees.

YOU WILL LEARN

- How to better manage project and legal risks in the contracting process.
- Key similarities and differences of the legal systems in global contracting.
- The key steps to avoid or successfully manage disputes and contract performance issues.
- How to initiate the tendering process and what is required in a tender package.
- How progress payments, currency terms and transportation terms can manage cost risks.
- How to identify the appropriate contracting strategy associated with fixed price and cost reimbursement contracts to minimize financial risks and contract costs
- The variety of pricing models used in supplier proposals and what strategies may be used to achieve fair market pricing outcomes.
- The difference between cost and price analysis and how to use each technique to evaluate a proposal
- How to more effectively use appropriate terms and conditions and some of the most common mistakes made today.

ABOUT THE COURSE

Contracts and Tenders Fundamentals will provide attendees with a more strategic approach to contracting, along with numerous tools to use throughout the contracting process. When you leave this course, you will improve job performance through: 1) better alignment of contract process steps with supply needs; 2) better contracts; 3) fewer disputes and claims; and 4) better contract outcomes. Contracting involves many roles that must work together to achieve desired outcomes. Everyone involved in some element of contracting must understand the entire process, keys to success and what is required of their role. Materials and exercises are built around oil and gas industry issues to be more relevant to the needs of attendees.

COURSE CONTENT

- Overview of the contracting process
- Key issues in forming a contract in the oil and gas industry
- Establishing risk management priorities throughout the contracting process
- The legal environment and best use of legal counsel in contracting
- Avoiding and managing contract disputes in a challenging industry
- The tendering process and key documents in the tender package
- Buyer and seller pricing objectives to consider when tendering
- Tools used in tendering to address financial key risks
- Types of contracts and examples of industry applications
- Making better use of economic price adjustment clauses in place of lump sum agreements
- Bid evaluation and award considerations including price/cost analysis
- Key contract terms and conditions for oil and gas Industry
- Using a formal contract change control process

2011 Schedule and Tuition

HOUSTON

22-24-MAR. . . . . US $2,020
4-6-OCT . . . . . US $2,220

Effective Materials Management (SC-42)

PETROSKILLS

COURSE LEVEL Foundation

DURATION 3 days

DESIGNED FOR

Professional and management personnel who have responsibility for, materials, spare parts and supplies needed to support any refinery, gas plant, onshore/offshore production or other industry operations. Buyers, procurement specialists, stock analysts, and logistics, warehouse, distribution or operations supervisors will benefit from this course by learning the techniques and principles for providing better service to their operations, reducing stock outs and surplus materials and maximizing the return on investment for inventory.

YOU WILL LEARN

- How to provide better customer service for long lead or critical materials and spare parts essential to the success of any well field operation, offshore platform, refinery, gas plant or chemical processing facility
- How to establish the best methods of inventory analysis and create performance measures for min/max and order point systems
- The most useful inventory classifications, stocking levels and safety stock calculations
- How the decision to stock can be made more effectively to avoid surplus materials
- How to use supplier stocking programs, consigned inventory and integrated supply agreements.
- How inventory systems use forecasting techniques and what can be done to improve them
- How to improve warehousing efficiency, layout and space utilization for better inventory management
- How to establish improvement goals for fewer stock outs, higher inventory turnover and reduced obsolescence
- How to improve inventory record accuracy and physical control of materials to lower inventory levels and increase space utilization
- Best practices used to manage surplus or inactive assets and increase investment recovery dollars.

ABOUT THE COURSE

This 3-day course covers practical considerations essential to achieve major improvements in planning, buying, storing and disposing of the vast array of materials and spare parts needed in the oil and gas industry. Evolving best practices by major oil and gas companies are explored as three inter-related modules for inventory management, warehousing and investment recovery.

COURSE CONTENT

- Setting comprehensive inventory goals & objectives
- Understanding carrying costs and economic order quantity theory
- Improving Material identification and coding
- Segmenting inventory for analysis
- Using formal procedures for making the decision to stock
- Determining safety stock levels and order points
- Improving Min/max systems and settings
- Understanding and using material forecasts
- Establishing a warehouse scorecard
- Creating best practices in the physical control of materials
- Measuring record accuracy and improving cycle counting systems
- Increasing the use of warehouse technologies
- Improving warehouse safety and security
- Setting up an investment recovery program
- Preventing and reducing surplus materials
- Understanding Investment recovery techniques
- Using the disposition value chain for investment recovery

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.

Inside Procurement in Oil and Gas (SC-61)

PETROSKILLS

COURSE LEVEL Intermediate

DURATION 3 days

DESIGNED FOR

Supply chain professionals with 2-7 years experience either inside or outside the oil and gas industry. The course is for anyone who needs a better understanding of procurement value creation in the oil & gas industry and includes buyers, procurement specialists, logistics specialists, business analysts, team leaders, project managers, commodity managers, materials managers, and new sourcing specialists or category managers. This course has been designed in collaboration with major oil companies to increase procurement competencies that are most relevant to the industry today.

YOU WILL LEARN

- How the industry is structured including host country and strategic relationships
- Business drivers and interface issues to be supported by procurement in an environment of increasing joint operations and shifting relationship models around the globe.
- The role of industry economics in dictating procurement good practices in cost management.
- Industry global compliance needs and how procurement can add value in meeting them.
- How the industry is modeled in the E&P (upstream), midstream and downstream value chains.
- The E&P Asset Management Cycle and Total Cost of Ownership (TCO) concepts as it relates to the oil and gas industry.
- Characteristics of supply markets to oil and gas and the emphasis on market intelligence practices and managing supply risks.
- What constitutes effective procurement/supply chain metrics for performance improvement
- Procurement challenges unique to the industry including global sourcing, local content requirements, and the growth of eCommerce.

ABOUT THE COURSE

This course will expand the industry understanding of supply chain professionals and increase their value-added in a global, fast changing environment. Participants will learn what each industry segment requires from procurement and be given insights to maximize value delivery and increase their contribution to any business unit of the organization. Course registration includes an online, interactive forum with the instructor and pre-read materials designed to familiarize course attendees with relevant issues prior to the learning that will occur in the classroom. Attendees will leave better prepared to create and support procurement strategies that meet stakeholder needs whether for projects or operations support.

COURSE CONTENT

- Industry overview for procurement including host country and strategic relationships
- Key business drivers and interface issues between projects (CAPEX) and operations (OPEX).
- Procurement's role in Oil and gas value chain management – upstream, midstream and downstream
- The E&P asset management cycle and total cost of ownership (TCO)
- Economics of oil and gas that drive procurement value creation
- Industry regulatory and contractor safety compliance issues that impact procurement
- Industry market intelligence practices in procurement
- Industry spend analysis characteristics and needed strategies
- Creating industry category management (sector) strategies
- Key procurement and supplier performance metrics
- Trends in global sourcing and local content requirements
- Oil and gas law and global contracting risks
- The influence of eCommerce and eProcurement initiatives in oil and gas

2011 Schedule and Tuition

HOUSTON

22-24-FEB . . . . . US $2,020
30-AUG-1-SEP . . . . . US $2,220

Refining Technology Overview (RF-31)

CAMPBELL

COURSE LEVEL Basic

DURATION 4 days

DESIGNED FOR

Personnel in the petroleum refining business and related activities.

YOU WILL LEARN

- Sources of refinery feedstocks, crude or synthetic
- Composition of the feeds, their characterization, desirable properties, and selection
- How a refinery matches crude composition (assay) to product market demand by selection of process units
- Fundamentals of individual refinery processes, engineering, materials, and construction challenges
- Operational challenges
- How to improve profitability by debottlenecking, yield improvement, and blending
- How to evaluate alternative processing schemes and what makes a regional 'Pacesetter' refinery

ABOUT THE COURSE

This basic course shows how any crude oil is converted to products based upon the demand for premium quality gasoline, diesel, lubes, and chemical feedstock. It is useful for those new to the refining business such as new hires of any discipline, transferees from other sectors of the petroleum, upstream, mid-stream, and chemical sectors. This course is excellent for experienced operators who want to understand the 'why' as much as the 'how' of refining. Basics of refining and its technology are stressed. Details of chemistry, process conditions, and materials are described where necessary to support the basics. The backbone of the course is to develop a refinery processing scheme through a series of simple, linked student-worked problems. This will show how a processing scheme to meet product qualities and volumes is developed.

COURSE CONTENT

- Refining climate, background and driving forces
- Crude oil distillation processes: atmospheric and vacuum
- Straight-run naphtha processing, treating, isomerisation and reforming for gasoline production
- Distillate desulfurization for diesel and heating oil production
- Light-ends recovery and treating of liquefied petroleum gas (LPG) for gasoline blending and sales
- Vacuum gas oil conversion, catalytic feed hydrotreater (CFHT), fluidized catalytic cracking (FCC) and hydrocracking
- Light olefin streams recovery, treating and alkylation for gasoline
- Residue processing, residue fluidized catalytic cracking (RFCC), ARVDS, VRDS, residue hydrocracking, delayed and continuous coking
- Lube oil production
- Aromatics recovery and re-arrangement to make benzene, toluene, ethyl-benzene and xylene (BTEX)
- Product blending to make gasoline, diesel, heating oil, and fuel oil
- Refining economics

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.

Refinery Gas Treating, Sour Water, Sulfur and Tail Gas (RF-61)

PETROSKILLS

COURSE LEVEL Intermediate

DURATION 5 Days

DESIGNED FOR

Personnel in the gas treating, sulfur recovery and environmental conservation areas of the petroleum refining business including managers, process engineers, and operators.

YOU WILL LEARN

- Safety concerns with handling H_2S and H_2S rich streams
- Composition of typical refinery sour gas and acid gas feeds and their characterization
- The different types of amines: advantages and disadvantages
- How to select an amine from the various types available and calculate amine circulation rates required
- How to select a sour water processing scheme
- How to select sulfur recovery unit configuration
- About the economics of tail gas treatment plant selection to meet legislation
- Individual processes, engineering, materials, and construction challenges
- How to handle the operation of units, interaction and challenges encountered
- How to maximize reliability
- How to increase sulfur removal and recovery by debottlenecking, changing solvents, and sulfur plant oxygen injection

ABOUT THE COURSE

This is an intermediate, five-day course with an established, successful format that has been delivered worldwide to refinery and natural gas process engineers and managers. Practical acid gas removal, sour water stripping, and sulfur recovery processes are stressed. Details of chemistry, process conditions and materials are described as required to assure a real understanding of the processes and their materials, construction, and operational issues. To ensure that participants return to their workplace with enhanced ability and understanding, a large portion of the course includes participant discussions and problem solving.

COURSE CONTENT

- Source and compositions of refinery sour gas and sour water streams
- Types of sulfur compounds and ammonia and their affects on treating, stripping, and sulfur recovery
- Gas treating with amines – Acid Gas Removal Unit (ARU)
- Sour water stripping (SWS)
- Elemental sulfur recovery – Sulfur Recovery Unit (SRU)
- Tail gas treating – Tail Gas Unit/Tail Gas Clean-Up (TGU /TGCU)
- Incineration

For schedule and pricing information or to arrange an In-House session of this course, visit our website at www.jmcampbell.com or contact us at jmcsupport@jmcampbell.com.

Optimizing Asset Availability Using Reliability Engineering (REL-4)

CAMPBELL

COURSE LEVEL Intermediate

DURATION 5 Days

DESIGNED FOR

Maintenance, engineering and operations personnel involved in improving reliability, availability, condition monitoring, and maintainability of process equipment and systems. Participants should have foundation skills in statistical analysis and reliability techniques for equipment.

YOU WILL LEARN

- RE Fundamentals
  - Important Definitions
  - Three Types of Availability
  - How Equipment Spends Its Time
- Statistical Analysis for Reliability Engineering
  - Why Gaussian Statistical Analysis May Not Apply
  - Weibull Analysis
- Reliability-Centered Maintenance (RCM) Methodology
  - Seven Questions of RCM
  - Six Failure Patterns and the Maintenance Strategies for Battling Them
  - Failure Modes, Effects, and Criticality Analysis
  - How to Apply RCM in Operating Facilities
  - How to Apply RCM in New Facilities
  - How to Implement a Reliability-Centered Maintenance Program
  - RCM with Simulation and Modeling
- Root Cause Analysis (RCA) Methodology
  - Elements of RCA
  - How to Implement a Successful RCA Program
- Availability Simulation and Modeling
  - Building Reliability Block Diagrams (RBDs)
  - Assessing System Design
  - Assessing Maintenance Strategies
  - Assessing Spares Holding Strategies
- Failure Reporting, Analysis, and Corrective Action Systems (FRACAS)
  - Relationship to RCM, RCA, Statistical Analysis, and Availability Simulation and Modeling
  - Fundamental System Requirements
  - How to Implement FRACAS

ABOUT THE COURSE

This course is designed to teach the skills of Availability Engineering as detailed in the Facilities Maintenance Management and Reliability Engineering Competency Maps. We will use statistical analysis examples and Monte Carlo Simulation software to measure plant availability and optimize it against business need. Case studies and exercises will be used to demonstrate availability optimization techniques and their benefits.

COURSE CONTENT

- Statistical analysis techniques
- MTBF
- MTTR
- Weibull Analysis
- Monte Carlo simulation
- Availability analysis and simulation
- Equipment performance gap analysis
- Work procedure analysis for maintainability
- Creating improvement actions in the organization

2011 Schedule and Tuition

ORLANDO
5-9-DEC . . . . . US $3,170

REFINING/RELIABILITY

MASTER OF TECHNOLOGY PETROLEUM TECHNOLOGY

- > Complete the University assessments online, from anywhere in the world
- > Part-time studies available, complete the MTech in 2-4 years
- > Enjoy a flexible study program aligned with job skills and competencies
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What is the PetroSkills MTech?

An online, part-time and flexible Masters Degree in Petroleum Technology awarded by Curtin University of Technology, Western Australia. Online assessment of selected PetroSkills courses will provide approximately half the total credits required for the MTech. The remaining program credits are obtained through workplace-based projects monitored and assessed by Curtin University.

Program Duration: 2-4 Yrs Part-Time – All Assessment Online

For course entry requirements, application information and course structure information, visit the MTech website at: www.mtechpt.curtin.edu.au

Curtin University of Technology

Curtin is an institution with a worldwide reputation for providing programs of study that focus on the delivery of knowledge and the acquisition of practical skills designed to achieve industry and workplace standards. One of Curtin's core areas of academic strength and research expertise is in the oil and gas industry, with internationally recognised programs available in Petroleum Engineering, Chemical Engineering and Exploration Geophysics.

Petroleum Engineering
www.petroleum.curtin.edu.au

Chemical Engineering:
www.chem.eng.curtin.edu.au

Exploration Geophysics:
www.geophysics.curtin.edu.au

mtechpt.curtin.edu.au

For further information, please refer to the University Website: www.curtin.edu.au

PetroSkills®

Curtin University of Technology

OPERATOR TRAINING

Operator Training

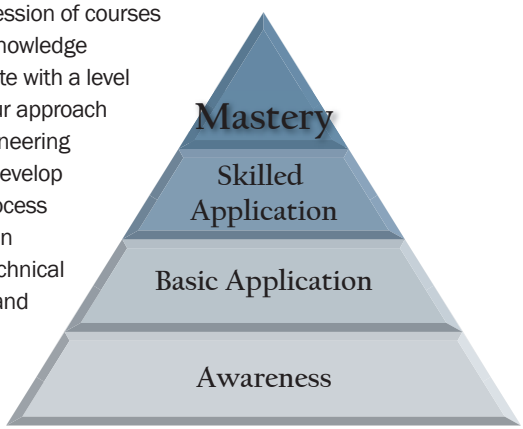
When it comes to training programs for plant and facility operators, one size doesn't fit all. That's why our Operator Training is designed from the beginning with your company in mind. Starting with a client consultation and a more formal needs analysis, we customize the course material and relate it directly to your facility, incorporating PFD's, material balance tables and other information you may supply.

JMC Operator Training is presented on an In-House basis, featuring traditional courses delivered in the classroom, instructor-mentored online and blended courses. Course length is content-dependent but is flexible and adaptable to shift schedules. Courses are typically 2 to 10 days in length.

JMC Operator Training provides a productive experience for both the novice and the more seasoned operator or supervisor. Advanced level courses are available that include problem sets with applicable calculations, indispensable tools for the process troubleshooter's master toolkit. Non-mathematical introductory courses are available for newer operators.

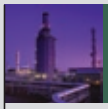
The JMC Master Operator Series™

JMC Master Operator Series™ courses are part of Operator Training and are a progression of courses specifically designed to deliver the knowledge competencies that are commensurate with a level of mastery in the operator's craft. Our approach is to introduce and apply sound engineering principles and concepts in order to develop a true, in-depth understanding of process operations. One obvious advantage in our approach is to promote better technical communication between operators and engineers while eliminating serious sources of miscommunication among operators themselves.



JMC Master Operator Series™ courses are supported and validated by a network of 60+ working professionals and world-class instructors, many of whom are recognized experts in their field. Backed by the integrity and reputation of the JMC brand, who for 40+ years has been the international leader in the development of oil & gas professionals, offering the highest level facility Operator Training courses available anywhere.

For more information about Operator Training or the JMC Master Operator Series™, email operatortraining@jmcampbell.com or call our corporate offices at (405) 321-1383.



P-3 Production/Processing Operations (OT)

CAMPBELL

COURSE LEVEL Advanced

DURATION 10 Days

DESIGNED FOR

Plant and facility operators, supervisors and technicians.

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 and compressors
- To understand process equipment, including heat exchangers, fired heaters, separators, piping and towers with trays or packing
- To understand process unit operations, including gas dehydration, NGL extraction processes and stabilization/fractionation

ABOUT THE COURSE

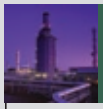
This course will provide a more detailed examination of the processes found in gas production facilities, including the important theoretical aspects that must be mastered before operators can truly understand their processes and become proficient at avoiding problems and troubleshooting the technical 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 P-3 course. It is an effective introduction to the G-4 engineering-level course. Course content is customizable to client needs.

COURSE CONTENT

- Hydrocarbons and hydrocarbon system language
- 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 & turboexpander)
- Crude oil, condensate, and NGL stabilization
- NGL fractionation
- Process troubleshooting

This course is also available in non-mathematical, Basic version of 5 days duration.

Email operatortraining@jmcampbell.com or contact us at 1-405-321-1383 for more information.



Gas Dehydration Operations (OT)

CAMPBELL

COURSE LEVEL Basic

DURATION 2 Days

DESIGNED FOR

Plant and facility operators, supervisors and technicians.

YOU WILL LEARN

- To determine the water content of produced natural gas
- The problems and dangers of hydrate formation
- Effective methods of hydrate inhibition
- Principles and operational elements of TEG gas dehydration
- Principles and operational elements of Mole Sieve gas dehydration

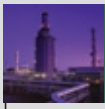
ABOUT THE COURSE

This course will provide the basic knowledge required for understanding operating issues in natural gas dehydration units. This course is customizable to client needs.

COURSE CONTENT

- Types of dehydration processes: absorption, adsorption and condensation
- Water vapor content of gaseous hydrocarbons
- Hydrates and hydrate inhibition
- Dewpoint depression
- Mass transfer operations: absorption and stripping, trays vs. packing
- TEG equipment: gas scrubbers, glycol contactors, flash tank, filters, lean/rich heat exchanger, regenerator, stripping gas
- Operating procedures and problems for TEG systems: startup and shutdown, normal operations, glycol losses, corrosion, troubleshooting
- Care of the TEG solution
- Mole sieve gas dehydration
- Adsorbers and desiccants
- Mass transfer zone
- Regeneration system
- Operation and adsorbent life
- Mole Sieve operating problems and troubleshooting

Email operatortraining@jmcampbell.com or contact us at 1-405-321-1383 for more information.



Cryogenic NGL Recovery and NGL Fractionation (OT)

CAMPBELL

COURSE LEVEL Basic

DURATION 4 Days

DESIGNED FOR

Plant and facility operators, supervisors and technicians.

YOU WILL LEARN

- To use hydrocarbon system language
- Basic principles of gas processing
- The physical properties of natural gas and NGL components
- Practical application of the principles of hydrocarbon phase behavior
- Principles, operation, and troubleshooting of mechanical refrigeration systems
- Operating principles and issues in gas expansion NGL recovery (Turboexpander and J-T Valve) processes
- Operating principles and techniques for NGL stabilization and fractionation

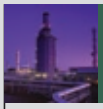
ABOUT THE COURSE

This course will provide the basic knowledge required for understanding operating issues in cryogenic NGL (Natural Gas Liquids) extraction and stabilization/ fractionation. Course content is non-mathematical and customizable to client needs.

COURSE CONTENT

- Hydrocarbon systems: reservoir fluids
- Hydrocarbon series: paraffins
- Physical properties of hydrocarbons
- Fluid properties: VLE, vapor pressure, boiling point, etc.
- Pressure-temperature phase diagrams (phase envelopes)
- Application of phase envelopes: hydrocarbon dewpoint control, equilibrium stage concepts, flash separators and fractionators
- Mechanical refrigeration: principles and equipment
- Tray-type towers; packed towers
- Components of turboexpander NGL recovery plants
- Turboexpander-compressor and utilities
- Principles of gas expansion NGL recovery and process variations
- Stabilizers, fractionators, and fractionation trains
- The basic fractionator and operator control techniques
- Troubleshooting

Email operatortraining@jmcampbell.com or contact us at 1-405-321-1383 for more information.



Process Safety Case Study for Operations and Maintenance (OT-21)

CAMPBELL

COURSE LEVEL Basic

DURATION 2 days

DESIGNED FOR

Operations, maintenance, supervisory and other personnel working in processing facilities.

YOU WILL LEARN

- Identify and mitigate common issues associated with catastrophic incidents in oil and gas processing facilities

ABOUT THE COURSE

The course will focus on how failures within an organization's management system can lead to catastrophic failures and how personnel work within the system to identify and reduce the risk of incidents. Using investigation reports from the United States Chemical Safety Board (CSB) as case studies, this course will provide operators, maintenance personnel and supervisors the ability to study what happened during selected incidents to apply the lessons learned to their own area of operations. The course will consist of lecture, exercises associated with CSB investigation reports and videos, and group discussions to identify similar issues within the participant's area of operations. Techniques for analyzing and mitigating hazards will be introduced and all participants will prepare an individual action plan that will focus on applying the lessons to the workplace.

COURSE CONTENT

- Incident overview
- Procedural deviations
- Supervisory oversight
- Operator fatigue
- Operator training
- Mechanical integrity deficiencies
- Management of change
- Organizational culture

Email operatortraining@jmcampbell.com or contact us at 1-405-321-1383 for more information.

John M. Campbell & Co. Operator Training courses are offered In-House; all courses are customized for the client's needs. The course descriptions shown are examples of typical Operator Training courses. Topics we cover include, but are not limited to:

Introductory and Overview Subjects

Hydrocarbons & Hydrocarbon System Language

Units of Measurement

Process Drawings

Overview of Oil & Gas Processing

Basic Principles

Important Physical Properties of Hydrocarbons

Chemistry Review

Phase Behavior Fundamentals

Water-Hydrocarbon Behavior

Hydrate Inhibition (EG and Methanol)

Practical Thermodynamics: Mass and Energy Balances

Principles of Fluid Flow

Corrosion and Corrosion Monitoring

Equipment Basics

Introduction To Process Control

Valves, Piping, Relief Valves and Flare Systems

Separators

Heat Transfer and Gas-Fired Heaters

Centrifugal Pumps (and Positive Displacement Pumps)

Centrifugal Compressors

Reciprocating Compressors

Gas Turbines Basics

Basic Processes

Mechanical Refrigeration (and Screw Compressors)

Solid Bed Adsorbers

Mass Transfer Operations: Fractionators, Stabilizers, Absorbers & Strippers

Applied Processes

Oil Treating, Stabilization and Dehydration

Condensate Stabilization, NGL Fractionation

TEG Gas Dehydration

Mole Sieve Dehydration

Refrigerated Lean Oil NGL Recovery

Turboexpander-Based Cryogenic Gas Processing

Mixed Refrigerant LNG Plant Processes

Gas Sweetening Processes (All types)

Product Treating Processes (All types)

Sulfur Recovery and Tail Gas Cleanup (All types)

CO_2 Miscible Flood and CO_2 Cycling Facilities

Membrane Removal of CO_2

To learn more about JMC Operator Training for your plant or facility, email operatortraining@jmcampbell.com or call our corporate office at (405) 321-1383. We look forward to building a course for your operations team.

JMC CONSULTING

John M. Campbell (JMC) Consulting provides first choice, high-end consulting for the global energy industry. Our major emphasis is on oil and gas production and processing facilities, for both onshore and offshore operations. We routinely perform services in the LNG, LPG, NGL and sulfur industries. Our consultants are highly experienced industry professionals and include consultants who are also world recognized instructors for Campbell courses.

Our Specialty Areas

Conceptual Design/Feasibility Studies

JMC Consulting provides front-end technical support and leadership from the earliest conceptual analyses through detailed assessments of completed designs and equipment selections. Our range of expertise includes evaluation of field development options, oil and gas processing facilities, and world-scale sulfur plants. As an integral part of your team or as an objective third-party reviewer, JMC Consulting brings broad experience to design, operations, construction, and safety.

Specialist Consulting

The world-wide availability and capability of JMC Consulting provides specialists to meet your needs, whether in strategic planning, engineering, safety, or due diligence support. We have provided specialist consulting as third-party support to peer assist reviews, expert witness, owners' engineer, third party process simulation review and optimization, facility startup support, hazards analysis and remediation, and sulfur process consulting.

Sulfur Process Expertise

JMC Consulting is an authoritative source for sulfur technology. We have experience in process development, sulfur technology training, troubleshooting, facility operations and start-up, economic evaluations, process studies, and business development. Specific project types include, Claus Sulfur Recovery Units, SULFTEN Tail Gas Treating Units, SCOT™ (MDEA) Tail Gas Treating Units, Stretford Units, Amine Treating Units, Gas Processing, Sour Water Strippers, Gas Plant/SRU Utilities and Off-sites.

Troubleshooting and Debottlenecking

We are frequently asked to address operating problems, bottlenecks, modifications or reliability in existing facilities. Our worldwide experience provides the insight to allow us to efficiently develop innovative and cost effective solutions.

Facility Optimization/Facilities Consulting Services

JMC Consulting can provide facilities with the uniquely technical resources that many asset owners lack to optimize asset operations to minimize operating costs. In addition, we can provide facility engineering services in a cost effective approach through a consulting services retainer program.

Operations Support/Start-Up Support/Performance Testing

From operator support through our facilities engineering capabilities to start-up support and facility performance planning and testing, JMC Consulting provides first-choice consulting to maintain, optimize, and/or validate your assets capabilities.

Process Safety/PSM/HAZOP Support and Participation

JMC Consulting prides itself in its safety culture. This attitude of "safety first" permeates all our work. Our consultants routinely conduct and participate in process hazard analyses and process safety reviews, e.g. HAZOPs, LOPA, and PSM audits. The safety expertise at JMC Consulting is a natural extension of our wide ranging engineering, operations, and maintenance experience.

Owners' Engineer

JMC Consulting can provide expert technical overview for clients at any stage of a project. Our experts can advise if project deliverables are to industry standards and provide technical guidance to our clients to ensure their projects meet their standards and expectations.

A brief overview of projects recently completed by JMC Consulting.

Peer Assist Reviews

JMC Consulting provided independent third party consultation during a Peer Assist Review of a deepwater topsides design. The objective was to review the process flow diagrams and the design and operating philosophies for the current development case. JMC Consulting participated with the client's Subject Matter Experts and project team to review the current design with the focus of mitigating any inherent risks in the process and to identify any possible opportunities to improve topside safety and operational reliability.

Process Selection Studies

JMC Consulting provided a high-level evaluation of Nitrogen Rejection Unit (NRU) designs currently being used in the industry (Single-Column, Dual-Column and any other design that may be pertinent to our evaluation) with a proprietary process. The HYSYS® simulations were studied over a range of inlet nitrogen concentrations from 10 to 70 mole percent.

For each process design, the heat and material balances, compression power, heat transfer surface area, methane and nitrogen recovery, operating costs and estimated capital costs for each option were developed. Each technology reviewed had advantages and disadvantages. The primary driver for process selection was the design inlet nitrogen concentration. The study provided the client with a clear justification for the optimum process selection for the project.

Process Safety Reviews/PHA Support

Consultants from JMC Consulting were retained to facilitate Hazard and Operability (HAZOP) studies for a pilot oil sands extraction plant outside Vernal, Utah, USA. In addition to the HAZOPs performed, JMC Consulting developed guidance manuals for managing the organization's process safety management system and general safety program. An emergency response plan was developed and JMC Consultants developed first draft operating procedures for commissioning, startup and normal operation of the plant.

JMC Consultants provided process safety support for an upgraded propane shipping facility in Texas which included additional storage bullets, state of the art metering and monitoring equipment and upgrading the pipeline pump to ship increased volumes of propane into Mexico. JMC Consulting performed PSM/RMP audits, process hazards analysis (PHA) studies, calculated worst case and alternative release scenarios and prepared the facility's Risk Management Plan submission.

Owners' Engineer

JMC Consulting provided an independent, third party assessment of recommendations provided by an engineering contractor for modifications to a sour gas treating facility/sulfur recovery process to meet state emission limits. The independent review generated many alternate recommendations that reduced the capital cost of the modifications. In addition, the focus of the study was on eliminating the source for the operating problems upstream rather than installing additional equipment and controls to deal with the problems downstream.

The above examples are just a sampling of the many projects executed by JMC Consulting. To learn more, contact JMC Consulting by phone at 1-800-230-9128 or by email at consulting@jmcampbell.com.

With the most sought after consultants in the world-wide energy industry, John M. Campbell Consulting provides first choice consulting services to select clients. Our clients strive to be the best in the energy industry and they use our consulting services to provide a competitive advantage that the new energy market demands.

For more information about services offered by Campbell Consulting contact us:

By phone at:

1-800-230-9128

By email at:

consulting@jmcampbell.com

Or visit our web site at:

www.jmcampbell.com/consulting.

TIP OF THE MONTH

The classroom is not the only way to learn from John M. Campbell & Co.'s expert instructors. Our instructors share their valuable, technical knowledge monthly to address current issues in the Oil and Gas industry through our Tip of the Month (TOTM).

The Campbell Tip of the Month is available FREE by subscribing at **www.jmcampbell.com**.

The Campbell Tip of the Month is available in both English and Spanish.

The Hybrid Hydrate Inhibition-Part 2: Synergy Effect of Methanol and KHI

July 2010

By: Dr. Mahmood Moshfeghian

Thermodynamic Hydrate Inhibitors (THIs) are used in concentration ranging from 10 to 60 weight percent in water and Low Dosage Hydrate Inhibitors (LDHIs) are used in concentration normally less than 5 weight percent. A proper combination of THI and LDHI will result in a lower injection rate of their mixture while controlling hydrate formation and the ability to dissociate any formed hydrate.

Laboratory studies and field experiences indicate hydrate-inhibition synergy is gained through the combination of two THIs or a combination of a THI and a LDHI . This is termed a hybrid hydrate inhibition (HHI).

In the June 2010 tip of the month (TOTM) we demonstrated the synergy effect of mixed THIs like NaCl and MEG solution and presented a shortcut method to estimate the synergy effect of brine and MEG solution. In this TOTM, we will discuss the results of a successful application of combined methanol and a KHI solution for a well producing natural gas, condensate and water in the Gulf of Mexico (GOM). This TOTM is based on a successful field study reported by Szymczak *et al.*

The Hybrid Hydrate Inhibition

June 2010

By: Dr. Mahmood Moshfeghian

Laboratory studies and field experiences indicate hydrate-inhibition synergy is gained through the combination of two or more thermodynamic hydrate inhibitors (THIs) or a combination of a THI and a low dosage hydrate inhibitor (LDHI). This is termed a hybrid hydrate inhibition (HHI).

In this TOTM we will demonstrate the synergy effect of mixed THIs like NaCl and MEG solution. We also present a simple shortcut method for estimating hydrate formation temperature depression in the presence of mixed THIs. In the next TOTM, we will discuss the results of a successful application of combined methanol and a KHI solution for well producing natural gas, condensate, and water in the Gulf of Mexico (GOM).

Three Simple Things to Improve Process Safety Management

April 2010

By: Clyde Young

When there are newspaper accounts of process incidents that have occurred, there is usually a statement along the lines of, "It just happened with no warning." There are warning signs for every incident. Latent failures exist in all processes and eventually lead to active failures when circumstances align. Personnel must be taught how to see and react to these warning signs

In this Tip of the Month, we look at how to deal with some of the challenges of managing process safety. This TOTM is an excerpt of a paper presented by JMC Instructor/Consultant, Clyde Young at the 2008 Mary K. O'Connor Process Safety Symposium. This TOTM continues where the February 2009, TOTM left off.

To learn more about these tips and past Tips of the Month, visit JMC Tip of the Month at www.jmcampbell.com/TOTM.

Tip of the Month Archives Available for Free Download at www.jmcampbell.com

March 2010	*The parameters affecting a phase envelope in the dense phase region*
February 2010	*Distribution of Sulfur-Containing Compounds in NGL Products*
January 2010	*Variation of properties in the dense phase region; Part 2 – Natural Gas*
December 2009	*Variation of properties in the dense phase region; Part 1 - Pure Compounds*
November 2009	*Three Simple Things to Improve Process Safety Management*
October 2009	*Considering the effect of crude oil viscosity on pumping requirements*
September 2009	*How to Tune the EOS in your Process Simulation Software?*
August 2009	*How sensitive are crude oil pumping requirements to viscosity?*
July 2009	*Variation of Natural Gas Heat Capacity with Temperature, Pressure, and Relative Density*
June 2009	*Corrosion Monitoring and Inspection – Is There a Difference?*
May 2009	*The Sensitivity of k-Values on Compressor Performance*
April 2009	*Quick Determination of the Methanol Injection Rate for Natural-Gas Hydrate Inhibition*
March 2009	*How Sensitive is Pressure Drop Due to Friction With Roughness Factor?*
February 2009	*Three Simple Things to Improve Process Safety Management*
January 2009	*Pressure Relief System Design Pit-falls*
December 2008	*Maintenance Fallacy: Focusing on Maintenance Planning and Scheduling and Reliability Will Increase Reliability Quickly*
November 2008	*Effect of gas molecular weight on centrifugal compressor performance*
October 2008	*How good are the detailed methods for sour gas density calculations? Part 2*
September 2008	*How good are the shortcut methods for sour gas density calculations? Part 1*
August 2008	*How good is Flanigan Correlation for Two Phase Gas-Liquid Pipeline Calculations?*
July 2008	*The Truth about Why Your Preventive Maintenance Program Isn't Working*
June 2008	*Two Phase Gas-Liquid Pipeline Simulation*
May 2008	*Flash Tank vs. HEX Economizer Refrigeration System*
April 2008	*Providing a safe work place is good business: Learn from experience*
March 2008	*Effect of Impurities on Propane Refrigeration System – Constant Approach Temperature*
February 2008	*Effect of Impurities on Propane Refrigeration System*
January 2008	*Refrigeration with Flash Economizer vs Simple Refrigeration System*
December 2007	*Acid Gas-Water Phase Behavior*
November 2007	*Water-Sour Natural Gas Phase Behavior: Part 2*
October 2007	*Water-Sweet Natural Gas Phase Behavior: Part 1*
September 2007	*Consequence of Liquid Carry Over – Part 2: Fixed Heat Exchanger Area*
August 2007	*Vigilance in Outside Contracting*
July 2007	*Consequence of Liquid Carry Over in a Simple Dew Point Control Plant*
June 2007	*Why do I care about phase diagrams?*
May 2007	*Vigilance With a Healthy Dose of Fear*
April 2007	*MEG Dehydration Ability in MEG Injection Plant*
March 2007	*MEG Injection vs. TEG Dehydration*
February 2007	*Friction Pressure Drop Calculation*
January 2007	*Guidelines for Liquid Density Prediction – Part 2: Process Simulator*
December 2006	*Guidelines for Liquid Density Prediction – Part 1: Correlations*
November 2006	*Liquid Density*
October 2006	*Guidelines for Selecting K-Value Method*
September 2006	*How to determine K-Values?*
August 2006	*Effect of Viscosity on Pump Performance*
July 2006	*Accuracy of Three Shortcut Prediction Methods for Hydrate Inhibition*
June 2006	*Accuracy of Commercial Process Simulators for Hydrate Inhibition*
May 2006	*Better Alternative for Natural Gas Sweetening*

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www.jmcampbell.com/bestof

BOOKS AND SOFTWARE

Gas Conditioning and Processing

Volume 1: Gas Conditioning and Processing
The Basic Principles (a Campbell book)

One of a four volume series, this book has been published for the natural gas processing industry for over 25 years. This edition has been edited to reflect continuing changes in technology and the manner in which it is practiced. This book addresses gas processing overview; introduction; material and energy balances; phase behavior; physical properties; water-hydrocarbon equilibrium; hydrates; applied thermodynamics; process control and flow of fluids.

Volume 2: Gas Conditioning and Processing
The Equipment Modules (a Campbell book)

This edition includes information applying today's technology and the current business requirements in selecting and operating gas processing and production facilities. This book aids in decisions relating to separation; heat transfer; pumps; compressors; refrigeration; fractionation and absorption; glycol and solid bed dehydration.

Volume 3: Gas Conditioning and Processing
Computer Applications for Production/Processing Facilities (a Campbell book)

This book emphasizes the more detailed calculations required for computer modeling and simulation. Equations of state, heavy component characterization, rotating equipment modeling, fractionation, fluid flow and separation are covered. These topics are addressed by the practical application of modeling techniques available in most simulators. The questions "How do I know if the model is correct?" and "What changes will I make based on my model?" are emphasized in each chapter.

Volume 4: Gas Conditioning and Processing
Gas Treating and Sulphur Recovery (a Campbell book)

This book concentrates on problems associated with treating and removing H_2S, CO_2 and trace sulfur compounds often associated with natural gas production. A detailed view of commercial amine type processes; carbonate processes; physical absorption methods; solid bed sweetening; sulphur production; and tail gas conditioning is presented.

Applied Water Technology (a Campbell book)

This book focuses on water handling and disposal problems for produced water associated with gas and oil production. The subjects covered include: water sampling and analysis; water-formed scales; corrosion control; microbiology; water processing equipment; water injection system; water treatment for EOR; boiler water and cooling water treatment.

Pricing for Campbell books.

$135 each	US and Canada
$160 each	Europe and South America
$170 each	All other countries

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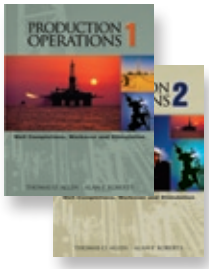
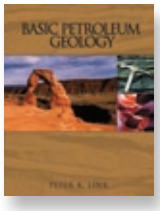


Production Operations

Thomas O. Allen and Alan P. Roberts

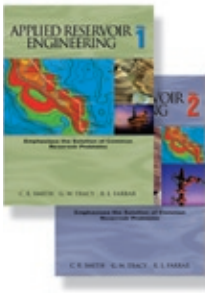
Set Price $180.00 Vol 1 & 2
Vol 1 Price $95.00 448 pages
Fourth Edition - Seventh Printing - September 2010
Vol 2 Price $95.00 416 pages
Fourth Edition - Fifth Printing - March 2006
Vol 1 ISBN 978-0-930972-19-6
Vol 2 ISBN 978-0-930972–20-2
Set ISBN 978-0-930972–18-9



Basic Petroleum Geology

Peter K. Link

Price $82.50 443 pages
Third Edition - Third Printing - January 2007
ISBN 978-0-930972-22-6



Applied Reservoir Engineering Vol. 1 & 2

Charles R. Smith. G.W.. Tracy and R. Lance Farrar

Set Price $180.00 Vol 1 & 2
Vol 1 Price $95.00 480 pages
Seventh Printing - September 2010
Vol 2 Price $95.00 408 pages
Seventh Printing - September 2010
Vol 1 ISBN 978-0-930972-15-8
Vol 2 ISBN 978-0-930972-16-5
Set ISBN 978-0-930972-03-5

Risk and Decision Analysis in Projects, 2nd Ed.

John Schuyler

Price $34.95 259 pages
Second Edition - First Printing 2001
ISBN 1-880410-28-1

Production Optimization Using Nodal™ Analysis

H. Dale Beggs

Price $95.00 411 pages
Second Edition - Second Printing - March 2006
ISBN 978-0-930972-14-1

Gas Production Operations

H. Dale Beggs
Price $92.50 311 pages
First Edition - Fifth Printing - April 2007
ISBN 978-0-930972-06-6

Economics of Worldwide Petroleum Production

Richard D. Seba

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Exploration and Production

PetroSkills Exploration and Production is a unique competency-based training program. The training courses listed on the opposite page are currently offered by PetroSkills E&P publicly and on an in-house basis for 2010. PetroSkills also offers a variety of programs with specific focus to certain areas or individuals in the Oil and Gas Industry.

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- Operating Company / Service Company Dynamics: How E&P Gets Done – OSD
- Surface Production Operations – PO3

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- Seismic Acquisition Field Techniques – Theory and Practice – SFT
- Seismic Attributes for Reservoir Characterization – SARC
- Seismic Interpretation – SI1
- Seismic Velocities and Depth Conversion – SVDC

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- Geochemical Techniques for Solving Reservoir Management and Field Development Problems – GTS
- Mapping Subsurface Structures – MSS
- Naturally Fractured Reservoirs: Geologic and Engineering Analysis – FR
- Operations Geology – OG
- Petroleum Geochemistry: Tools for Effective Exploration and Development – MGT
- Production Geology for Other Disciplines – PGD
- Prospect and Play Assessment – PPA
- Sandstone Reservoirs – SR
- Sequence Stratigraphy: An Applied Workshop – SQS
- Structural Styles in Petroleum Exploration – ST

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- Carbonate Reservoirs – Petrophysical Characterization – CBP
- Cased Hole Formation Evaluation – CH
- Coring and Core Analysis – CCA
- Foundations of Petrophysics – FPP
- Integration of Rocks, Log and Test Data – ILC
- Operations Geology – OG
- Petrophysics of Unconventional Reservoirs – PUR
- Shaly Sand Petrophysics – APS
- Structural and Stratigraphic Interpretation of Dipmeters and Borehole-Imaging Logs – SSI
- Well Log Interpretation – WLI
- Wireline Formation Testing and Interpretation – WFT

Well Construction / Drilling

- Basic Drilling Technology – BDT
- Cementing Practices – Cementing II – CEP
- Directional, Horizontal, and Multilateral Drilling – DHD
- Drill String Design and Optimization – DSD
- Drilling Fluids Technology – DFT
- Drilling Practices – DP
- Fundamentals of Casing Design – FCD
- Managing Wellsite Operations – MWC
- Practical Drilling Skills – PDS
- Primary Cementing – Cementing I – PCE
- Solids Control Systems – SCS
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- Well Design and Engineering – WDE

Reservoir Engineering

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- Oil Recovery Enhancement Techniques – ORE
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- Production Logging – RMP
- Production Operations I – PO1
- Production Technology for Other Disciplines – PTO
- Progressing Cavity Pumps – PCP
- Sand Control – SNDC
- Surface Production Operations – PO3
- Well Stimulation: Practical and Applied – WS

Petroleum Business

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- Cost Management – CM
- Economics of Worldwide Petroleum Production – EWP
- Expanded Basic Petroleum Economics – BEC
- Fundamentals of International Oil and Gas Law – IOG
- International Petroleum Contracts – IPC
- Introduction to Petroleum Business – IPB
- Petroleum Finance and Accounting Principles – PFA
- Petroleum Project Management: Principles and Practices – PPM
- Petroleum Risks and Decision Analysis – PRD
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- Accredited Health & Safety Practitioner: Occupational Health & Safety NVQ level 4 (to CMIOSH) by Applied Learning – HS70
- Applied Environment – HS23
- Applied Health – HS24
- Applied HSE Management – HS28
- Applied Safety – HS20
- Basics of Environment – HS13
- Basics of Health – HS14
- Basics of HSE Management – HS18
- Basics of Safety – HS10
- Construction and Demolition Safety – HS48
- Contractor Safety Management – HS46
- NEBOSH International General Certificate – HS55
- Risk Based Auditing – HS47
- Risk Based Process Safety Management – HS45

Petroleum Data Management

- Introduction to Data Management – GEOM1

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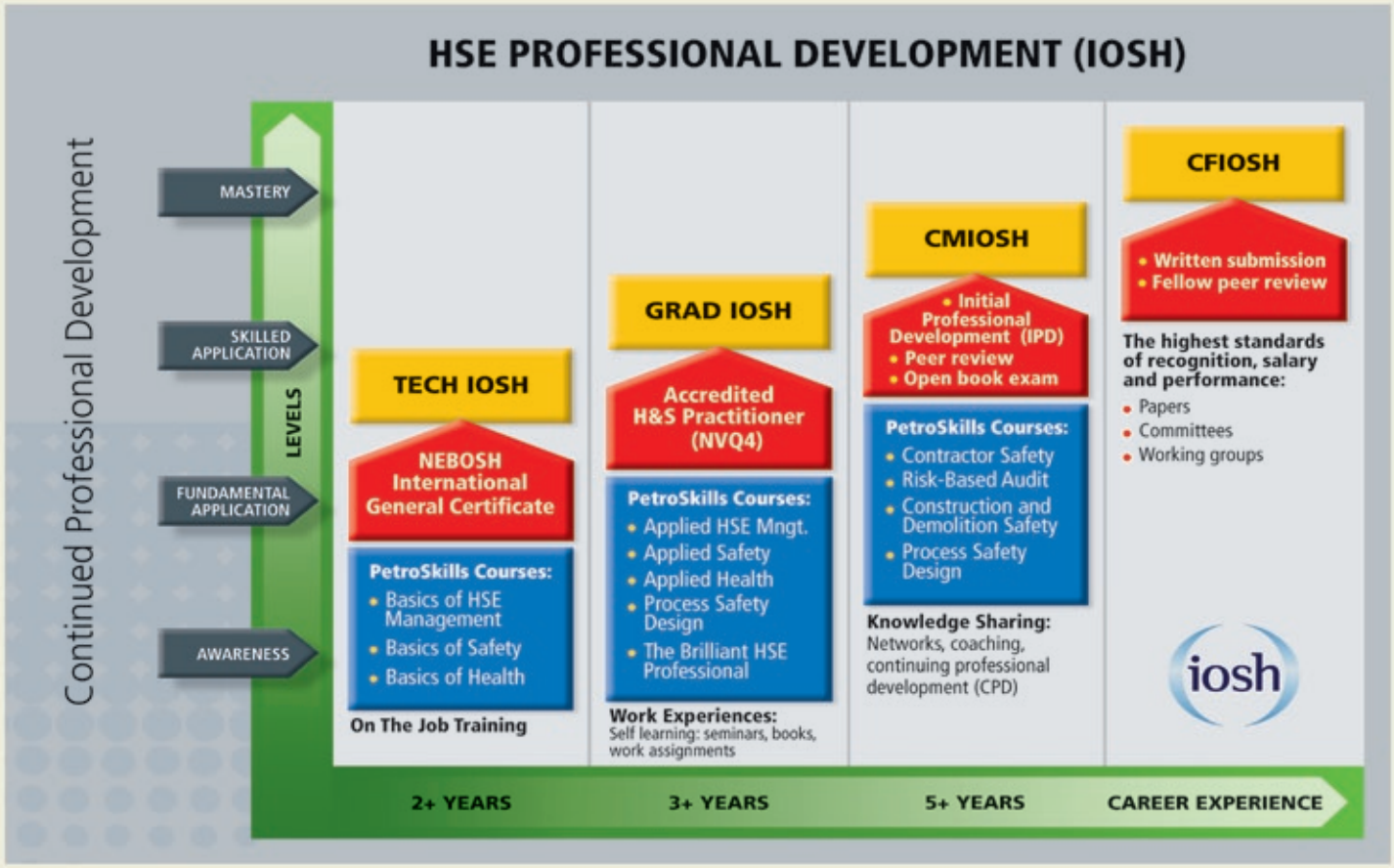

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HSE PROFESSIONAL DEVELOPMENT 'LADDERS'

Programs that support HSE professional development, here shown for Institution of Occupational Safety and Health (IOSH) – the world's largest professional membership body for health and safety practitioners. A similar ladder is available for environmental professional development through IEMA - the Institute of Environmental Management& Assessment.

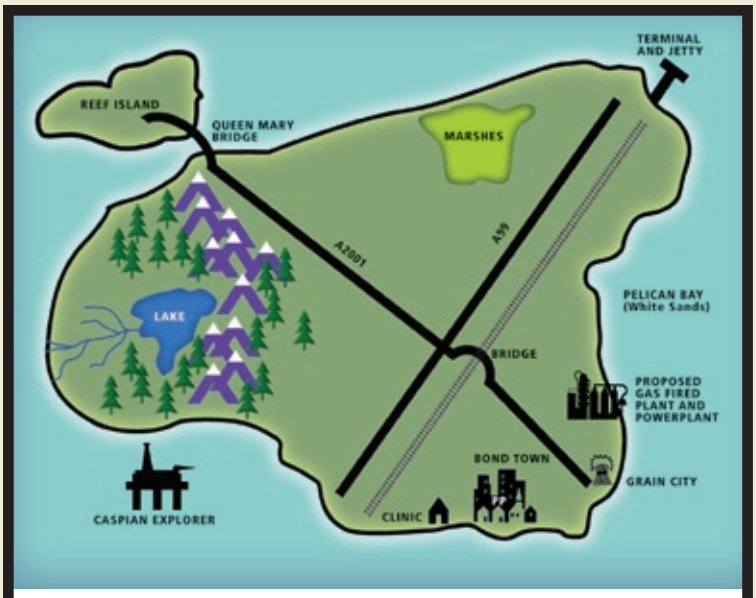
www.iosh.co.uk / www.iema.net

PROFESSIONAL DEVELOPMENT BY APPLIED LEARNING

ACCREDITED HEALTH & SAFETY PRACTITIONER: NVQ LEVEL 4 (to CMIOSH) - HS70

ACCREDITED ENVIRONMENTAL PRACTIONER: AIEMA ASSOCIATE CERTIFICATE (to AIEMA) - HS71

- For practicing HS&E professionals
- Mentored and perfectly blended to balance one-to-one learning with work-based evidence
- Supports professional development to CMIOSH and AIEMA (with reciprocity agreements with other national bodies)
- Duration is typically twelve months for health and safety program and nine months for environment program
- Flexible - you can start the program at any time



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HEALTH, SAFETY, ENVIRONMENT

PetroSkills designed the publicly offered Health, Safety, Environmental and HSE Management courses in this section to develop your skills and competency in this discipline. The Course Progression Matrix below shows how these courses relate to each other and provides an easy way to construct a training plan with coursework that specifically relates to present or future job requirements. Likewise, managers can use the matrices to develop training plans for their team.

The HSE courses are suitable for all professionals including Engineers, Supervisors, Project Managers, Operations and HSE professionals. HSE professionals will also benefit from courses that provide an understanding of other petroleum-related functions and disciplines. For cross-training, PetroSkills recommends courses in the lighter-shaded columns on either side of the HSE – Health, Safety, Environment section.

The following instructors have been selected and approved by the PetroSkills Curriculum Network to teach one or more of the following Health, Safety, Environment courses:

Andrew Arkinstall
Stephen Asbury
Richard Ball
Art Bedrosian
Stewart Clarke
Andrew Cope
Chris Dougherty
Kerry Edwards
Melita Elmore
Craig Lydiate
Andrew Steel
Tom Van Zandt
Clyde W. Young

Health, Safety, Environment
COURSE PROGRESSION MATRIX

Health, Safety, Environment				Exploration and Production	Surface Facilities
HSE MANAGEMENT	SAFETY	HEALTH	ENVIRONMENT		
SPECIALIZED					
HS70 - Accredited Health & Safety Practitioner			HS71 - Accredited Environmental Practitioner		
INTERMEDIATE					
HS47 - Risk Based Auditing					
FOUNDATION					
HS55 - NEBOSH International General Certificate					
HS46 - Contractor Safety Management	HS48 - Construction and Demolition Safety				
	HS45 - Risk Based Process Safety Management				
HS28 - Applied HSE Management	HS20 - Applied Safety	HS24 - Applied Health	HS23 - Applied Environment	BEC3 - Basic Petroleum Economics	
BASIC					
				BDC - Basic Drilling, Completion and Workover Operations	
				EPB - Exploration and Production Process Basics (2 weeks)	PF40 - Production / Facilities Basics (Technical Managers)
HS18 - Basics of HSE Management	HS10 - Basics of Safety	HS14 - Basics of Health	HS13 - Basics of Environment	BPT - Basic Petroleum Technology (5 days)	G1 - Overview of Gas Processing (non-technical)

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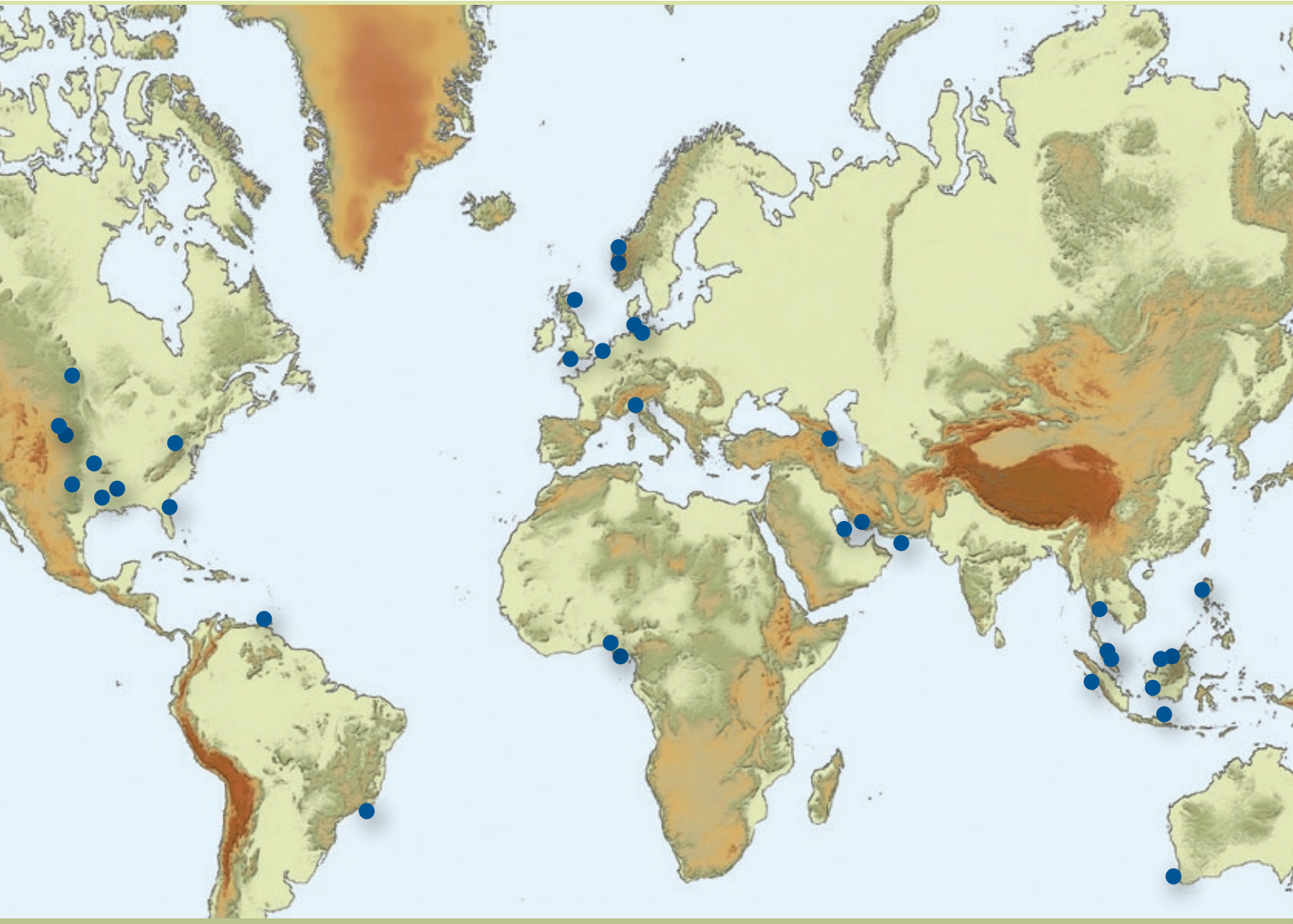

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INSTRUCTORS

KY ALSTON

MR. KY ALSTON comes from an extensive background in gas processing. He is currently a contract Instructor/Consultant for John M. Campbell & Co. Ky had 24+ years with Amoco Production Company. He worked in maintenance, operations, and engineering disciplines for Amoco Production Co. in several locations throughout Wyoming. He worked his way up through the operations ranks training newer operators, debugging new projects. He then shifted his focus to the engineering group where he became heavily involved in the process simulation effort for process optimization and troubleshooting at several area facilities. He has also been involved in all stages of project management of all sizes. His primary responsibilities for JMC are Operator Training, Consulting and Process Simulation.

TIM ARMSTRONG

MR. TIM ARMSTRONG has over 40 years experience in Refining and Gas Treating/ Sulfur Recovery. He is currently an Instructor/ Consultant for John M. Campbell & Co. Previously Mr. Armstrong has worked in plant operations and design engineering as well as licensing and technology development. Mr. Armstrong graduated in 1968 with a BSChE from Rose-Hulman Institute of Technology. He is currently a Registered Professional Engineer in Illinois, Texas, and Oklahoma and is a member of AIChE. Mr. Armstrong is an expert in the area of sulfur recovery, tail gas treating, and sour water stripping and presented papers at NPRA, North Texas Regional GPA, and AIChE meetings as well as published articles in Hydrocarbon Processing and Today's Refinery.

FRANK ASHFORD

DR. FRANK ASHFORD has 40 years experience in oil and gas producing facilities. Dr. Ashford joined with John M. Campbell & Co. in 1988; he provides instruction fluently in either Spanish or English. Previous to joining John M. Campbell & Co., Dr. Ashford was a Professor at Central University of Venezuela, Caracas, Venezuela, where he taught various courses in Natural Gas Engineering Technology. He has authored technical articles published in World Oil, JPT, SPE, Intevep Pub., PDVSA, Pacific Oil World, AAPG, SPELAC, and GPA. He holds a B.S., a M.S. and a PhD in Petroleum Engineering from the University of Oklahoma.

LOU BEKE

MR. LOU BEKE is an Instructor/Consultant with John M. Campbell & Co.. He is working as a consultant in process design in general and as a consultant and advisor in the technology areas of gas treating and sulfur recovery and caustic-based product treating in particular. Lou retired from Mobil Technology Company after a 31-year career that included research, capital projects, technical service and troubleshooting, startup assistance for new and revamped units, and turnaround planning/support. He was lead technologist for gas treating, sulfur recovery and tail gas clean-up, sour water stripping and light product treating for Mobil's worldwide downstream (refining) business when he retired. Lou has been a speaker at symposia, authored several papers and represented Mobil as a member of the Amine Best Practices Group. Lou earned a B.S. in Chemical Engineering at Drexel University.

JOHN BERRY

MR. JOHN BERRY has worked in the industry over 30 years as project engineer, engineering manager, and project manager. He has experience in the design and construction of natural gas and liquid pipelines, dehydration systems, compressor installations, and various surface facilities. Mr. Berry was named American Hero by *Newsweek* for work on behalf of peoples with disabilities and is the chair of RARC Board serving adults with disabilities. He is also a member of the Pipeliner's Club of Tulsa. Mr. Berry received a B.S. in Industrial Engineering from the University of Oklahoma and well as an MBA.

GARY BLACKBURN

MR. GARY BLACKBURN has over 35 years of experience in engineering and management of oil and gas developments. During his 27 years working for Shell Oil Company, he led well construction and field production teams in the Gulf of Mexico, Texas, Oklahoma, Kansas and Alaska. While working in ABB's

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LRGCC Laurance Reid Gas Conditioning Conference

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SPE MEOS 17th Middle East Oil & Gas Exhibition & Conference

March 13-16; Bahrain

GasTech 2011

March 21-24; Amsterdam Rai, Netherlands

SPE Production and Operations Symposium

March 28-29; Oklahoma City, Oklahoma

GPA 90th Annual Convention

April 3-6; San Antonio, Texas

GPA GCC Annual Technical Conference

April 28; Muscat, Oman

OTC Offshore Technology Conference

May 2-5; Houston, Texas

Brimstone Sulfur Symposium

September ; Vail, Colorado

SPE ATCE Annual Technical Conference and Exhibition

Sept 30- Nov 2; Denver, Colorado

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Floating Production System's Division, Gary led engineering teams designing deepwater systems, naval architecture, structural, topside facilities, drilling systems, and floating system hulls. After an assignment as the ABB's Project Manager for ExxonMobil's Kizomba A TLP, he was assigned as ABB's Vice President - Project Execution. In this role, he was responsible for oversight of ongoing projects and development of new processes for EPC project execution. Currently, Gary is providing consulting services for drilling systems as part of field architecture design with operators of deepwater fields in the Gulf of Mexico.

MARK BOTHAMLEY

MR. MARK BOTHAMLEY is Chief Engineer with John M. Campbell & Co. His experience covers the areas of design, operation, troubleshooting and optimization of offshore and onshore oil and gas production and treating facilities. Prior to joining JMC he was with BP/Amoco for 24 years, in several locations around the world. Mr. Bothamley is a past chairman of the SPE Facilities Subcommittee and a former member of the GPSA Data Book Editorial Review Board. Mr. Bothamley holds a B.S. in Chemical Engineering from Lakehead University in Thunder Bay, Ontario, Canada, and a Diploma in Natural Gas and Petroleum Technology from the British Columbia Institute of Technology in Vancouver, B.C. Canada.

JOHN C. BOURDON

MR. JOHN C. BOURDON has more than twenty-nine years experience in hydrocarbon processing and specializes in sulfur recovery processes for the petroleum refining industry. Mr. Bourdon has been involved in the development of several sulfur-related technologies and mechanical innovations, has authored several papers and made presentations worldwide. He has experience with several E&C firms including extensive start-up and troubleshooting activities. He consults for both North American and international clients. He is a registered professional engineer and is fluent in English and Spanish. Mr. Bourdon has a B.S. in Chemical Engineering from the Georgia Institute of Technology and advanced degrees in other fields.

JAMES N. BREAUX

MR. JIMMY N. BREAUX is a consultant engineer working for Shell International Exploration and Production as well as an Instructor/Consultant for John M. Campbell & Co.. He has more than 30 years experience in the oil and gas industry. He is currently working as Topsides Lead Engineer for a 120,000 BOPD FPSO in West Africa. He is responsible for Process, Mechanical, Instrumentation, and Rotating Equipment Engineering deliverables. Also Mr. Breaux is the Topsides Lead Engineer for design and installation of a 45 MMscfd Gas Lift Compressor and for a Waterflood Expansion project on a Gulf of Mexico TLP. This project is in the pre approval system selection phase. The expansion will involve addition of a 2nd gas turbine driven waterflood pump for 45,000 BWPD @ 5,000 psi discharge. His previous responsibilities include Topsides Manager for the Auger TLP in the Gulf of Mexico and leading the debottlenecking team for this facility. He was the API RP 2G Chairman 1991-1993 and headed a rewrite committee for offshore firefighting systems. He received a B. S. in Physics from Loyola University of New Orleans and a M. S. in Electrical Engineering from Tulane University. He is a Registered Professional Engineer in the State of Louisiana and a member of SPE.

DARRELL G. CARVER

MR. DARRELL G. CARVER is a registered engineer in Texas with international and domestic experience who has worked on facilities in domestic and international locations both on and offshore. He retired from ConocoPhillips Petroleum Company in 2002. He has more than 32 years of uniquely diverse electronics, instrumentation, and electrical upstream experience, holding senior operational and technical positions on oil and gas projects worldwide. As Principal Controls System Engineer for Phillips Petroleum he was recognized as a company expert for automation and electrical control systems. While with Phillips Petroleum, he served on numerous committees and task forces for the company representing both electrical and instrumentation disciplines. Mr. Carver has authored and co-authored several technical papers and has been the instructor for numerous In-House courses. In addition, he has participated on numerous process enhancement teams for upstream facilities as the electrical and instrument representative. Mr. Carver received his B.S. in Electrical Engineering from the University of Arkansas.

AJEY CHANDRA

MR. AJEY CHANDRA has 25 years experience in the energy industry, primarily in gas processing, transportation and market analysis. During his time in the industry he has served in a variety of roles in operations management and consulting activities. Mr. Chandra was a Senior Principal in the consulting firm of Purvin & Gertz, Inc. He has worked on a variety of assignments in the areas of market analysis, forecasting, gas processing and transportation costs. He has served in managerial roles for multiple gas processing facilities in multiple regions around the world and holds a B.S. in Chemical Engineering from Texas A&M University, and an M.B.A from the University of Houston.

MICK CRABTREE

MR. MICK CRABTREE holds an MSc (Research) in Industrial Flow Measurement and an HNC in Electrical Engineering. Before joining John M. Campbell & Co. as an Instructor/Consultant, he trained over 5,000 engineers, technicians and scientists. Formerly trained in aircraft instrumentation and guided missiles in the Royal Air Force, he completed his service career seconded to the Ministry of Defense. Immigrating to South Africa in 1966, he worked for many years for a local manufacturing and systems integration company, involved in industrial process control, SCADA and PLC-based systems. Later, as editor and managing editor of 'Pulse', a leading monthly engineering journal, Mr. Crabtree wrote and published hundreds of articles as well as seven technical resource books on industrial process control: 'Flow Measurement', 'Temperature Measurement', 'Analytical On-line Measurement'; 'Pressure and Level Measurement'; 'Valves'; 'Industrial Communications' and 'The Complete Profibus Handbook'. Mr. Crabtree has spent the last 12 years running industrial workshops throughout the world in the fields of: Process Control and Instrumentation; Data Communications; Fieldbus; Emergency Shut-down Systems; Project Management; On-Line Analysis; Valve Technology; and Technical Writing and Communications.

PIERRE CREVIER

MR. PIERRE CREVIER earned B.Sc and M.Sc degrees in Chemical Engineering from the University of Waterloo in 1980 and 1987 respectively. He worked in operations, design and business development functions across Canada prior to joining Saudi Aramco in 1992. As a member of the Upstream Process Engineering Division in Dhahran he provides process consultancy to the company's gas plants and refineries. Over the last 15 years he has led the company's efforts in addressing chronic Claus catalyst deactivation caused by aromatic contaminants.

RALPH DARTEZ

MR. RALPH DARTEZ has over 30 years of engineering and management experience. He has led engineering, construction, operating and field development and management teams in the Gulf of Mexico, Alaska Cook Inlet and UK North Sea for Marathon Oil Company. Ralph was Marathon Oil Company's Gulf of Mexico Region Manager during the mid 1990s at the time a number of deepwater fields were discovered and developed including Troika (2700' water depth), Oyster (1000' wd), Arnold (1700' wd), Petronius (1800' wd) and Camden Hills (7100'wd). He has experience with drilling and completions, design, construction and reservoir management of deepwater and particularly sub-sea developments.

ARTHUR DELARGY

MR. ARTHUR DELARGY has over 15 years experience in Process Design/Consultancy, Field Development Planning and Process Systems engineering. Technologies he has worked with include Nitrogen Rejection, CO/H_2 Coldbox technology, LNG, Gas Processing including dehydration/dewpointing, sweetening and NGL/LPG extraction, ammonia, heavy oil and various oil refining processes, as well as both on and offshore oil and gas experience. The scope of his project work has ranged from proposal preparation and field development planning to engineering design and HAZOP studies to troubleshooting on an operating plant. He holds a Masters degree in Chemical Engineering (Honors.)

KRIS DIGRE

MR. KRIS A. DIGRE is an Instructor/Consultant in the Offshore discipline for John M. Campbell & Co. He has over 36 years working in locations around the world. He has designed or been involved with the design of offshore structures located off the coast of West Africa, Alaska, Australia, Brazil, Borneo, California, China, Egypt, the Gulf of Mexico and the North Sea. He has been involved in the technical specification development and/or installation of all of deepwater Tension Leg Platforms (TLP) and a Floating Production System (FPS) in the Gulf of Mexico and an FPSO offshore Nigeria. Kris remains active in retirement providing advice to E&P project groups on various Nigeria FPSO projects. Mr. Digre is a graduate (BSCE) of Illinois Institute of Technology and a Licensed Professional Engineer in New Jersey, Louisiana, Texas and California.

BILL DOKIANOS

MR. BILL DOKIANOS has over 35 years experience in Electrical engineering. He is an Instructor/Consultant for John M. Campbell & Co. His experience includes Analyzing and solving poor platform up time at GB 128. Activities included process control changes due to stacked separator vessels, revising safe charts, operating settings and reconfiguration of pipeline export pumps. He managed a subsea tieback project in which the platform modifications included high pressure vessel redesign, dehydrator expansion, adding a second vapor recovery unit, restaging high pressure and intermediate gas compressors and modifying bulk oil process design. He has been responsible for DOT compliance activities and reporting. This included development and implantation of federal risk programs and smart pigging. Mr. Dokianos holds a Bachelor of Science in Electrical Engineering, Wayne State University, Detroit, MI. He is a Professional Engineer in the states of Louisiana and New Mexico, and holds a General and Commercial Contractor License in the State of New Mexico.

RAFIL ELYAS

MR. RAFIL ELYAS is an Instructor/Consultant of John M. Campbell & Co. He has approximately seventeen years experience in gas conditioning and processing. Mr. Elyas has authored several papers and made presentations worldwide. He has experience with several simulation software programs including HYSYS. He is a registered professional engineer with the Board of Engineers, Malaysia. Mr. Elyas is fluent in English and Bahasa: Malaysia and Indonesia. Mr. Elyas received a Bachelor's Degree in Chemical Engineering from Syracuse University, LC Smith School of Engineering in Syracuse, New York.

ROBERT FANNING

MR. ROBERT FANNING is a training consultant with John M. Campbell & Co. He held various Process Engineering and Management positions in his 26 years with Mobil. Mr. Fanning's background includes general oilfield facilities, water flood facilities, CO_2 flood facilities, NGL recovery, and LNG. Mr. Fanning was on the Board of the Permian Basin Chapter of the GPA for several years and is a past President of the chapter. He received his B.S. in Chemical Engineering from the University of Wyoming and is a Registered Professional Engineer in the state of Texas.

JOHN FARRAH

MR. JOHN FARRAH is an Instructor/Consultant for John M. Campbell & Co. He has more than 40 years of chemical production, power production, gas processing and process engineering experience. He works as a Gas Processing and Chemical Production Safety Consultant, who has proven strengths in the areas of planning, problem solving and team building, combined with attention to detail. He also has extensive knowledge in the field of safety. Mr. Farrah is a Fellow Member of the American Institute of Chemical Engineers, a Registered Professional Engineer in Texas, and served as Chairman for the Coastal Bend Section of AIChE. He has acted as Team Leader to update and publish the Gas Processor's Association Gas "Plant Safety Checklist" and served as Safety representative for Marathon on the GPA Safety Committee for 10 years.

Mr. Farrah published and presented a paper on "Conversion of Boilers to Oil Firing" to the Mexican Chemical Engineering Society (IMIQ) in Mexico City. He received his B.S. in Chemical Engineering from the University of Colorado.

ALAN FOSTER

MR. ALAN FOSTER is a training consultant with John M. Campbell & Co.; he is based in the UK. Mr. Foster spent 25 years with Petrolite Corporation and Baker Petrolite, involved in oilfield and refinery operational problems and their resolution by chemical treatment programs. Mr. Foster has developed and taught courses on oilfield water treatment and oilfield corrosion control, since 1978. Other courses included oil demulsification, paraffin and asphaltenes, oilfield microbiology (and MIC) and refinery technology. He was also qualified by the original training company in its field, to teach their project management course. He is a Chartered Chemist, Member of the Royal Society of Chemistry and a Fellow of the Chartered Institute of Personnel and Development. Mr. Foster received his B.S. in Applied Chemistry from Portsmouth Polytechnic (UK) and his MBA from Leeds University.

DAVID HAIRSTON

MR. DAVID HAIRSTON is an Instructor/Consultant with John M. Campbell & Co. for over 7 years. Mr. Hairston has over 38 years of experience oil and gas pipeline systems in project and construction management, engineering and design, construction and material logistics, and executive management for oil and gas facilities. Project experience includes pipeline transportation and production facilities, both onshore and offshore, offshore structures, training, and construction operations. Worldwide project and construction management experience at all levels includes grass-roots gathering, processing, and transmission pipeline systems with a capital cost of over USD$ 2.5 billion. Specialized technical expertise includes river and special obstacle crossings using open-cut, bridging and directional drilling methods; offshore construction and logistics planning and operations. Mr. Hairston has been published in ASCE Magazine, Proceedings of Marine Technology, Proceedings of several industry Pipeline Conferences, and the Oil and Gas Journal. He holds a B.S. in Aerospace Engineering from Texas A&M University and an M.S. in Civil Engineering for the University of Houston. He is a Registered Professional Engineer in several U.S. states.

BRUCE HARTMAN

MR. BRUCE HARTMAN has formal training in incident investigations, PSM auditing, audit team leader training, HAZOP facilitation, and engineering design for process safety and has been involved in more than 40 incident investigations either as consultant or as team leader including any litigation that has resulted. He has also facilitated or participated in 15 Process Safety Management audits of refineries and chemical plants and upstream facilities. Mr. Hartman has managed a team of experienced fire protection and process safety engineers split between Richmond, CA, Houston, TX, Perth, Australia and Aberdeen, Scotland. He has participated in design reviews of many major capital projects, primarily in refineries, chemical plants and upstream facilities including guidance in areas of plant/equipment layout, area classification, drainage, fireproofing and fire suppression. He initiated and managed the annual process to review major incidents and near misses throughout his career. Mr. Hartman is a past member of API Safety and Fire Protection subcommittee and chairman of the API Fire Protection Subcommittee.

BOB HLOZEK

MR. BOB HLOZEK, P.E., is an Instructor/Consultant for John M. Campbell & Co. He has over 40 years of technical experience in the Oil & Gas, Refining, Petrochemicals, and Specialty Chemicals Industries. His extensive background includes process engineering, design and equipment sizing, product development, plant startups, economic evaluations, technical management, business development, and operations, sales, and marketing support. He retired from Dow Chemical Company after 19 years. Prior to Dow, Bob worked for ICI America, Celanese, Northern Natural Gas (Enron), Production Operators (Schlumberger), and several E/C firms. Bob's expertise is in natural gas processing specializing in sour gas removal, sulfur recovery, and amine solvent technology. He has been involved with many amine plant startups including field troubleshooting of over 100 global plants. Bob has a BSCHE from Texas A&M with graduate studies toward MBA at Univ. of Delaware.

KEITH HODGES

MR. KEITH J. HODGES is a learning advisor, instructor development consultant and project manager for John M. Campbell & Co. He is British and has now relocated to Spain. He qualified as a Project Manager in the UK and from 2000 to 2005 managed a multi-million pound building project there. Work with JMC includes Project Managing programs in Saudi Arabia and Angola. He has developed and directed an Instructor Acceleration Course for new Campbell instructors and developed a Competency framework for instructors. In 2003 he had a paper relating to project management, published in the Public Service Review, Central Government and an article published within the Public FM in 2006. For a number of years he worked within National Police Training, where he designed, directed and evaluated courses at a National level, including management courses. He has been involved in Computer Supported Collaborative E-Learning since 1996 and continues to develop programs in this medium. He has also directed Coach/Mentor and Management courses in this format. Mr. Hodges has a Masters Degree in Education (M.Ed.), Training and Evaluation, gained from the University of Hull in 1995, and a Post Graduate Certificate in Education from the University of the West of England gained in 1998.

JOE HONEYWELL

MR. JOE HONEYWELL is a graduate of University of Tulsa with a Bachelor of Science in Aerospace Engineering and a Master's of Science in Mechanical Engineering. Mr. Honeywell began his career with an engineering consulting company named Crest Engineering. He worked in the mechanical department for thirteen years, specializing in rotating equipment, pressure vessels and piping systems. Mr. Honeywell advanced to project engineer and later project manager, where he was involved in many offshore and onshore projects for oil and gas producers, both domestic and international. Mr. Honeywell joined another consulting company, Crown Tech, Inc. where he worked for 19 years and became a principle in the company. At CTI,

Mr. Honeywell provided engineering services to many oil and gas producers, pipeline companies, power producers and equipment manufacturers. His responsibilities included project management, design, manufacturer, construction management, start-up and operation of power plants, pipelines and production facilities. Mr. Honeywell's background includes extensive experience with mechanical systems and rotating machinery. Mr. Honeywell is a Registered Professional Engineer; and a member of ASME and holds a U.S.A. patent.

ROBERT HUBBARD

MR. ROBERT A. HUBBARD is President of John M. Campbell & Co. and serves as an Instructor/Consultant. He is based in Norman Oklahoma with over 30 years experience in oil and gas facilities. Mr. Hubbard specializes in gas dehydration and economic evaluation. Mr. Hubbard joined John M. Campbell & Co. in 1980, within the company organization he has held the positions of Vice President, Chief Operating Officer, President and Chief Financial Officer. He now provides consulting and training services worldwide. Previous to John M. Campbell & Co. he held various engineering and management positions at Texaco Inc. from 1972 to 1980. Mr. Hubbard is a member of SPE, AIChE, and GPSA and he has chaired the SPE Facility Engineering Committee. He holds a B.S. in Chemical Engineering from Kansas State University, and an MBA from Tulane University.

FRANK JARRETT

MR. FRANK JARRETT is an Instructor and senior engineer for John M. Campbell & Co. He has over 35 years of experience in the natural gas processing industry. Mr. Jarrett has a background that covers natural gas liquids recovery, natural gas liquefaction, nitrogen rejection and recovery of helium from natural gas, acid gas removal, product distillation, dehydration, relief system design and evaluation, CO_2 pipeline and compression, plant utilities and support systems. He is a registered professional Engineer in the state of Colorado and has served on the Board of Directors of the Rocky Mountain Chapter of the Gas Processors Association. Mr. Jarrett received a B.Sc. in Chemical and Petroleum Refining Engineering from the Colorado School of Mines.

JOHN KANENGEITER

MR. JOHN KANENGEITER specializes in executive coaching and working with teams in challenging work systems. His work with leaders in a consulting and executive coaching relationship is augmented by his expertise gained from 20 years in the field of experiential education and leadership development. His practice includes clients as individuals, teams, and large organizations. John is a principle trainer contracted by NASA to work with Space Shuttle Crews in the dynamics of teamwork and leadership on extended space expeditions and worked closely with the Columbia Shuttle Crew. He also works on leadership development with the U.S. Naval Academy, the Wharton School of Business and Wildland Forest Fire Crews. He holds a Masters Degree in Applied Behavioral Science with an emphasis in Executive Coaching and Consulting in Organizations from the Leadership Institute of Seattle, Bastyr University.

BILL KEETER

MR. BILL KEETER joined Allied Reliability in 2006 after serving as President of BK Reliability Engineers, Inc. where he provided training and facilitation services to help facilities improve asset performance using Weibull Analysis, Reliability Centered Maintenance, Availability Simulation, and Life-cycle Cost Analysis. Bill is has over 30 years of experience in Maintenance Engineering and Management. He has successfully implemented maintenance improvement programs in a variety of manufacturing and production facilities. Bill's experience includes maintenance leadership positions in the US Military, the nuclear industry, chemicals, paper converting, and plastic film manufacturing. He has provided training and reliability consulting services to petroleum, process, mining, and defense industries in the United States, Mid-East, and Europe. Bill has developed competency maps for Reliability, Availability, and Maintainability Engineering for the Petroleum Industry's PetroSkills® program. Bill has published articles in a variety of internationally recognized maintenance publications, and has presented papers on the practical application of Weibull Analysis at several internationally attended Maintenance and Reliability Conferences. Bill is a Certified Maintenance and Reliability Professional with the Society for Maintenance and Reliability Professionals Certifying Organization. He also holds degrees in Business Administration and Electrical Engineering.

DALE KRAUS

MR. DALE KRAUS is an Instructor/Consultant for John M. Campbell & Co. He has twenty-nine years of progressive responsibility from staff to management positions within the Upstream Oil and Gas Industry. Mr. Kraus has obtained sound basis in Facility/Processing Engineering and Field Operations in Oil and Gas Production. Mr. Kraus is a member of A.P.P.E.G.A. and the Canadian Gas Processors Association. He holds a Bachelor's degree in Chemical Engineering from the University of Saskatchewan.

LARRY L. LILLY

DR. LARRY L. LILLY has over 30 years experience with Engineering & Consulting companies including design, commissioning and startup. Dr. Lilly provides consulting and training services worldwide including process simulation applications, facilities operations and detailed project development. Dr. Lilly is a member of AIChE, GPSA and numerous local technical societies. He has published extensively on gas and liquid properties, world energy economics and process calculations. Dr. Lilly has presented invited papers for international conferences. In addition he has co-authored numerous operating manuals and equipment selection manuals used by major oil companies. Dr. Lilly has also co-authored three books on Gas Conditioning and Processing and Computer Applications for Production/Processing. He holds a B.S., an M.S. and a PhD in Chemical Engineering from Oklahoma State University.

PERRY LOVELACE

MR. PERRY LOVELACE is the Director of Business Development for John M. Campbell & Co., a PetroSkills member. Mr. Lovelace specializes in Maintenance Management and Competency-based Training Programs and has over 25 years experience in industrial

training and consulting. After graduate studies, he worked for a large consulting mechanical/electrical engineering firm applying rigorous systems analysis to industrial facility design and construction. He has dedicated his career to providing high quality learning experiences, keeping in tune with the changing economic and technological environment, especially as applied to long-term facilities and equipment management. He has assisted many organizations through on-site consultation and training. Clients include industrial and utility organizations of different types and sizes in the United States, Kingdom of Saudi Arabia, United Arab Emirates, Qatar, Canada, New Zealand, Australia, Thailand, Malaysia, Singapore, Trinidad/Tobago, UK and Mexico. A certified Maintenance and Reliability Professional (CMRP) by the Society for Maintenance and Reliability Professionals and a member of the Society of Petroleum Engineers, Mr. Lovelace also holds a B.S. in Science Education and an M.S. in Botany from the University of Oklahoma, with pre-doctoral studies in Plant Ecology at the University of California.

HARVEY MALINO

MR. HARVEY MALINO is an Instructor/Consultant for John M. Campbell & Co. He has more than 35 years of experience in the Chemical and Hydrocarbon Processing Industries. During his 28 years with Union Carbide Corporation/UOP, he held both technical and commercial positions. These included: Molecular Sieve Technical Manager- Design and Field Service; Licensing Manager for the Ethylene Oxide business; Area Sales and Marketing Manager for Southeast Asia; Business Manager for the Gas Processing Business Group; and, World Wide Sales Manager for the Gas Processing Business Group. Mr. Malino has lived and worked in New Hampshire, Maine, New York, Singapore and Chicago Mr. Malino is a registered Professional Engineer in the State of New Hampshire. He is a Senior Member of the Advisory Board of the Laurence Reid Gas Conditioning Conference in Norman, OK. Mr. Malino earned a B.S. in Chemical Engineering from the City College of New York; and, an M.B.A from Pace University in New York.

ANDREA MANGIAVACCHI

MR. ANDREA MANGIAVACCHI is an Instructor/Consultant with John M. Campbell & Co. in the Offshore Discipline. A free-lance independent consultant since 2001, Andrea is involved in international deep-water offshore projects on behalf of several major clients. As technical liaison member between API and ISO committees, he is also actively involved in the development of US and international standards for offshore structures. After an early involvement in teaching and research activities at the University of Rome, Italy and at Rice University in Houston, Andrea joined Brown & Root (today KBR), where over the next 25 years he was involved in a number of major international offshore oil and gas projects (Gulf of Mexico, North Sea, South America, West Africa, Asia-Pacific). He also held a number of corporate positions in the area of deep water technology, fixed and floating offshore structures. Andrea has extensive experience in structural analysis and design, hydrodynamics, naval architecture, Computer Aided Engineering and Design. Andrea holds a M.Sc. in Nuclear Engineering and a Ph.D. in Aerospace Engineering, both from the University of Rome.

JOHN MORGAN

MR. D. JOHN MORGAN is based in Denver, Colorado, and is Executive Vice President of John M. Campbell & Co. with over 30 years experience in the design, startup and troubleshooting of oil and gas facilities. He has published extensively on sour gas treating, sulfur recovery, CO_2 treating, materials of construction, LNG training, and cryogenic gas processing. He consults for both North American and international clients in the gas processing industry. He performs training in LNG facilities, oil and gas production facilities, and gas plants around the world. He is very active in industry activities including membership of the Editorial Review Board of the Gas Processors Supplier's Association, the Program Advisory Committee of the Laurence Reid Gas Conditioning Conference, and had served as Adjunct Professor of Petroleum Engineering at Colorado School of Mines. Mr. Morgan has many years of experience training non-native English speakers. He holds a B.Sc. (Honors) in Chemical Engineering from London University; and an M.E. in Chemical & Refinery Engineering from Colorado School of Mines, USA.

MAHMOOD MOSHFEGHIAN

DR. MAHMOOD MOSHFEGHIAN is an Instructor/Consultant with John M. Campbell & Co. (JMC). He is the author of most of Campbell Tips of the Month and develops technical software for JMC. He has 30 years teaching experience in universities (Oklahoma State University, University of Shiraz, University of Sydney and University of Qatar) as well as for oil and gas industries. Dr. Moshfeghian joined JMC in 1990 as a part time consultant and then as full time Instructor/Consultant in 2005. Previous to joining JMC, Dr. Moshfeghian was a Senior Research Scientist at Kuwait Institute for Scientific Research and Professor of Chemical Engineering at Shiraz University. Dr. Moshfeghian is a senior member of AIChE and has published numerous technical papers on thermodynamic properties, and Process Engineering. Dr. Moshfeghian has presented invited papers in international conferences. He holds a B.S., an M.S. and a Ph.D. in Chemical Engineering, all from Oklahoma State University.

RALPH NEUMANN

MR. RALPH NEUMANN is an Instructor/Consultant for John M. Campbell & Co.'s Gas Processing courses. Throughout his extensive career, Mr. Neumann has gained experience in Oil and Gas Production, Natural Gas Processing, Specialty Fractionation, and Pipelines and Gathering Systems. Responsibilities have included the development of conceptual and detailed designs, multi-discipline project supervision, economic feasibility studies, consulting, and a variety of field services including pre-commissioning, startup, training, and troubleshooting. He has also been responsible for project development, management of engineering (including safety and environmental), and management of field operations for a large midstream natural gas processing company. He has authored and presented technical papers to AIChE (dynamic simulation) and Gas Processors Association (nitrogen rejection facilities, gas plant operations management, and gas and NGL treating). Mr. Neumann received his baccalaureate and master's degrees in Chemical Engineering from Rice University in Houston, Texas.

STEPHEN PEHNEC

MR. STEPHEN T. PEHNEC is JMC's Senior Manager and Instructor of Operator Training. He joined the company in 1990. He is responsible for the design, development and delivery of operator training programs, worldwide. Mr. Pehnec has more than 38 years of experience in oil & gas exploration, production and processing operations, including technical, supervisory and management positions. He has delivered pre-startup training for a number of large projects, such as Qatar Petroleum's North Field Project (Um Said, 1991) and Sable Offshore Energy's Goldboro and Point Tupper plants (Nova Scotia, 1999). Mr. Pehnec holds a BA degree (Physics) from the California University of Pennsylvania (1971) and an MBA degree (Operations Management) from Waynesburg College (1989). He has earned instructor certificates from the Petroleum Industry Training Service (PITS, 1984) and Abacus Learning Systems (2002), and he has completed a number of JMC's engineering-level courses.

DENNIS PERRY

MR. DENNIS PERRY is a training consultant with John M. Campbell & Co. and teaches in the Electrical and Instrumentation discipline. Mr. Perry has been working in the automation, electrical and instrumentation design business for many years. His work experience includes working in the aerospace industry as an analog circuit designer, working in the electronic instrument manufacturing business as production engineering manager, and working for a major oil and gas company as a division automation supervisor and later as a staff engineer in the central, Upstream Technology group. He has also worked for an instrument manufacturer as service manager and for an engineering construction company as an instrument/electrical engineer. Mr. Perry Graduated from Louisiana Tech with a B.S. degree in Electrical Engineering.

PETER REEVES

MR. PETER REEVES is an Instructor/ Consultant for John M. Campbell & Co. He has over 18 years experience, 13 years of which is in Oil and Gas Processing and LNG. Particular areas of expertise include: gas processing; LPG/condensate recovery from gas; NGL fractionation and storage; process optimization; LNG; heavy oil processing; field development planning, including high level cost estimating and scheduling; steady state and dynamic process simulation; and plant operations. Mr. Reeves is a member of several professional societies. These memberships include MIChemE, CEng, and Gas Processors Association. Mr. Reeves has experience both as a Contractor/Consultant and in an Operating Company environment. His design experience ranges from field development/concept screening studies to front end engineering, dynamic simulation studies and detailed design. Operations experience includes plant troubleshooting, performance monitoring, process optimization, energy efficiency improvements and process development/ improvement. Mr. Reeves received his B.S. in Chemical Engineering from the University of Birmingham.

FRED RUSSELL

MR. FRED RUSSELL is a training consultant with John M. Campbell & Co. Mr. Russell has enjoyed a forty-five year career in chemical engineering in the hydrocarbon processing business Mr. Russell started his career as a gas reservoir engineer and concluded as Vice President and General Manager of a manufacturing company serving the oil and gas industry. He has extensive experience in domestic as well as international projects in designing and building such facilities as expander plants, oil absorption units, refrigeration systems, and compressor stations. He was given the Hanlon Award in 1999 by the GPSA and was named Outstanding Engineering Alumnus by the Rice Engineering Alumni Association in 2000. Mr. Russell received a B.S. in Chemical Engineering from Rice University.

JOHN SHEFFIELD

MR. JOHN A. SHEFFIELD is a Senior Manager with M.W. Kellogg Ltd. a major UK E&C Company for more than 16 years. John was the manager of the Process Engineering Department, Project Manager for development of LNG projects for export and import terminals and Commercial Vice President with responsibilities for key clients and projects. He helped develop projects for LNG facilities in the UK, China, Norway, Egypt, Germany and Australia and the development of LNG offshore technology for the Azure Project an EU funded project. With John M. Campbell & Co. John is an Instructor/ Consultant presenting short courses on the LNG business and technologies on both an In-House and public basis in venues around the world. He also practices as a consultant, assisting companies with development of both LNG export and reception terminals and is currently active with major LNG projects in Europe and Far East Asia. John graduated from UC London with a degree in Chemical Engineering. He has served on the Management Committee of the European GPA for more than 12 years and chairs the GPA Europe LNG working party.

PRAVIN SHETH

Mr. Pravin Sheth is a consultant with over 27 years of experience in refining industry in the areas of Technical Training, Technical Service, Refinery Operations and Asset Support. During his previous experience he was responsible for providing technical training, technical service and design support to worldwide ExxonMobil affiliates and technology licensors. He was Lead Asset Support Engineer responsible for providing technical support to company's worldwide Sulfur, Amine and Cat Cracker units. He has also served as a Sulfur, Amine and FCC complex operation supervisor. Mr. Sheth presented "Sulfur Recovery Unit Operation with Lean acid gas feed" at PT Arun conference in Bali, Indonesia in 1993. He was a Panel Member at the National Petroleum and Refining Association in 2004. And he presented "Cat Cracker Operations Troubleshooting" at the National Petroleum and Refining Association Cat Cracker Seminar in Houston, Texas during 2006. Mr. Sheth received his Bachelor's in Chemical Engineering in India and a Master's in Chemical Engineering from the University of Missouri.

RICKY SMITH

MR. RICKY SMITH has over 30 years experience in maintenance as a maintenance manager, maintenance supervisor, maintenance engineer, maintenance training specialist, maintenance consultant and is a well known published author. Ricky has worked with maintenance organizations in hundreds of facilities, industrial plants, etc, worldwide in developing reliability, maintenance and technical training strategies. Prior to joining Allied Reliability in 2008, Ricky worked as a professional maintenance employee for Exxon Company USA, Alumax (this plant was rated the best in the world for over 18 years), Kendall Company, and Hercules Chemical providing the foundation for his reliability and maintenance experience. Ricky is the co-author of "Rules of Thumb for Maintenance and Reliability Engineers", "Lean Maintenance" and "Industrial Repair, Best Maintenance Repair Practices". Ricky also writes for different magazines during the past 20 years on technical, reliability and maintenance subjects. Ricky holds certification as Certified Maintenance and Reliability Professional from the Society for Maintenance and Reliability Professionals as well as a Certified Plant Maintenance Manager from the Association of Facilities Engineering.

KINDRA SNOW-MCGREGOR

MS. KINDRA SNOW-MCGREGOR has been working in the oil and gas business industry for 11 years. Prior to joining Campbell Consulting, she was the Process Engineering Department Manager for Pearl Development Company where she managed and mentored eight engineers with a variety of work experience and backgrounds. Her favorite responsibility in this position was mentoring and training the team. She has been actively involved in industry groups such as the Gas Processors Association, and the Rocky Mountain Gas Processors Association (RMGPA). Currently she is on the GPA Technical Research Committee, Sub-Group 2, and is a RMGPA scholarship committee member. She enjoys presenting technical papers at conferences and encourages the rest of her staff to do so as well. Ms. Snow-McGregor also worked at Washington Group International where she completed projects for clients such as ExxonMobil, ConocoPhillips, and QatarGas. At Washington Group, she was also responsible for developing the oil and gas process engineering training program. She graduated from Colorado School of Mines with a Bachelors and Masters degree in Chemical Engineering and Petroleum Refining.

GORDON STERLING

MR. GORDON STERLING is based in The Woodlands, Texas. In a 35-year career with Shell E & P, USA, he was involved in many deepwater developments. He was the design supervisor for the Cognac Platform, in 1978, which set the "deepwater" record at 1024 feet of water; the project manager for the Bullwinkle Platform, which set a new water depth record of 1354 feet in 1988, and the Construction Planning Manager for the Auger Tension Leg Platform (TLP) in 2850 feet. He was the Manager of Major Projects for Shell's Deepwater Division in New Orleans during the mid and late 90's when the Mars, Ram Powell and Ursa TLP's were designed, built and installed, (Ursa in 3950 feet of water) and when the Mensa subsea development in 5400 feet of water was designed, built and brought on production. From 1991 through 1999 he was on the Board of Directors of the Offshore Technology Conference (OTC), the largest technical conference related to offshore oil and gas in the world, annually host to 45,000 or so visitors in Houston, Texas. He was Chairman of the conference in 1998 and 1999. In 2008 he was chosen for the prestigious Heritage Award by the OTC. With this background he brings a broad knowledge of the early development planning steps, and a detailed knowledge of the development and production system options. In association with two colleagues he has written a book titled "Deepwater-Petroleum Exploration and Production-A non-technical guide", which was recently published by PennWell.

DAVID TENHOOR

MR. DAVID A. TENHOOR, CPIM is an instructor in the field of Supply Chain Management for PetroSkills/John M. Campbell & Co. He has been consulting and teaching APICS (The Association for Operations Management) CPIM certification courses since 2005. He has taught in many different industries from chemical processing to discrete manufacturing. Companies include BASF, National Oil well Varco, Halliburton, ExxonMobil Chemical and Cameron. David brings a well-rounded package of industry experience to PetroSkills/JMC. He has held positions in Inventory Control, Manufacturing Management, Strategic Sourcing and Transportation/ Distribution Management. He also has experience in Finance and Product Development. David received his undergraduate degree in Geology from Hope College in Holland, Michigan and an MBA in Supply Chain Management from Michigan State University. He is a member of the Houston Chapter of APICS and served two terms on the Board of Directors as Treasurer.

ADRIAN TUCK

MR. ADRIAN TUCK is an Instructor/Consultant for John M. Campbell & Co. He has over 35 years of experience with LNG. Currently designing and delivering LNG specific technical training at three European LNG importation facilities having designed and delivered training for every aspect of the operation of and LNG facility at all of the UK peakshavers for the last ten years. Mr. Tuck has condemned one LNG facility cold box as unfit for duty and launched an LNG refurbishment project. Working with a team of 2, he scoped the project, led the team that analyzed the bids and selected the MWC. Mr. Tuck directed a team of engineers to undertake the conceptual design of an LNG road truck loading facility for UK peakshave LNG facilities. He scoped the work and selected the MWC, managed project delivery and commissioning. He has designed training and delivery for all UK LNG road truck drivers.

RICHARD VAN LAERE

DR. RICHARD J. VAN LAERE is an Instructor/ Consultant for John M. Campbell & Co's Mechanical and Pipeline courses. His career began in 1969 with positions of increasing responsibility. Mr. Van Laere is on the Board of Directors of the Gulf South Minority Supplier Diversity Council and the Louisiana Pipeliners Association. Other memberships include Texas Board of Engineers, Louisiana State Bar Association, and the Louisiana Mississippi Oil and Gas Association. He also sits on the Environmental Advisory Committee for the Department of Energy Strategic Petroleum Reserve as the pipeline expert. He was selected Executive of the Year in 2001 by Equiva Services for his contributions to supplier diversity. Mr. Van Laere graduated with a BSME in from the University of Tulsa and with a Juris Doctor degree in civil law in from Loyola Law School in

New Orleans. He is a registered professional engineer in Texas and an attorney licensed to practice law in the state of Louisiana.

VINTON (BUD) VESTA

MR. BUD VESTA is currently the International Operations Manager for Mid-Western manufacturer of both power equipment and irrigation products for consumer, commercial and agricultural customers. Previously, he served with Mobil Oil Corporation (now ExxonMobil) for over 20 years in a variety of operations management positions including over 3 years as General Manager and Director of Logistics for Mobil Oil Japan. He also served with the U.S. Army as a logistics officer for nearly five years. During his working career he has had foreign assignments for nearly 11 years. Mr. Vesta is also specialized in a number of operations research models and has conducted numerous logistics optimization studies and has conducted training in related areas. He is an accomplished project manager and has successfully lead large scale international teams engaged in ERP/MRP implementations. Mr. Vesta holds an M.A. in Political Science from Northern Illinois University and an MBA in Finance and Management from George Mason University. He conducts frequent volunteer training in various forums including an annual guest lecturer at Bethel University in St. Paul, MN.

JIM VINSON

MR. JIM VINSON is a project manager and instructor with over 30 years experience in the areas of industrial technical sales and services, project management, and technical management. He has lived and worked in worldwide locations, specifically, Holland, Saudi Arabia, Bahrain, Qatar, United Arab Emirates, and South America. Mr. Vinson has held several management positions in the energy and power industry which include heavy equipment commissioning, pre-commissioning, routine maintenance services, and specialty chemical cleaning. His responsibilities included liaison and consulting work between clients, owners, operators, and engineering-construction companies on numerous large heavy industrial projects: electric power plants, de-salination plants, refineries, petrochemical plants, fertilizer and methanol plants, as well as GOSP, GTL, and NGL plants. Mr. Vinson received baccalaureate degrees in Chemistry from Cameron University and the University of Oklahoma, followed by advanced degrees at OU and OSU.

STUART WATSON

MR. STUART WATSON has over 13 years of experience from Offshore Australia, the Middle East and the United States. Stuart relocated to the U.S. in January 2000 and worked with Pearl Development Co. of Colorado on an array of Gas production and processing facilities including; Expansions for the Unocal Alaska Swanson River Plant; Facility engineer at the El Paso Field Service's 650MMscfd "Chaco Plant" in 2002 – 2004 and various other projects in Colorado and Wyoming. Stuart has recently completed project oversight and commissioning of a 92MMscfd amine sweetening and cryogenic NGL train for the Government of Ras Al Khaimah (U.A.E.) and has started his own engineering consultancy in 2009 supporting both mechanical and process disciplines. Stuart graduated in 1996 from Curtin University, Perth, Australia with a bachelor's degree in Mechanical Engineering (honors).

LEONARD WEGMAN

MR. LEONARD WEGMAN is a training consultant with John M. Campbell & Co. Mr. Wegman has over 25 years experience in operations and maintenance of production and processing facilities in Wyoming with Amoco Production Company and Burlington Resources. This includes operating procedure development, and participating in plant PHA's. In his spare time Mr. Wegman enjoys hunting and camping. Mr. Wegman holds a Bachelors of Business Administration degree from Washburn University in Topeka, Kansas.

PETER WILLIAMS

MR. PETER WILLIAMS is an Instructor/ Consultant with over 35 years of industrial experience, most of which were in oil and gas processing. His experience includes plant process engineering, operations supervision, project development and business case definition, project technical support, plant engineering management, and internal consulting, primarily with Saudi Aramco. Canadian experience includes plant engineering in phosphorus production, heavy water, and bitumen upgrading, and project engineering. He also has experience with benchmarking, implementation of a safety management system, and the application of lean Six Sigma methods to engineering management. He has Masters' degrees in Chemical Engineering and in Economics, is a Professional Engineer in Alberta and is a certified Six Sigma Black Belt.

RONN WILLIAMSON

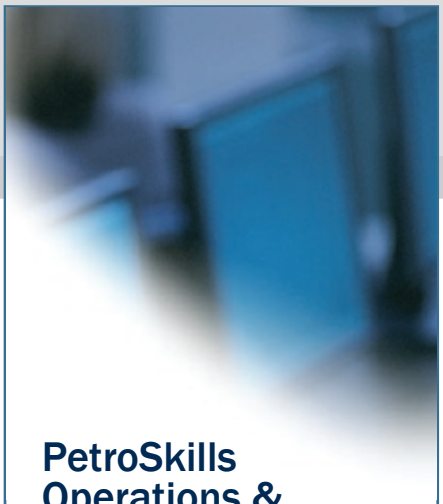
MR. RONN E. WILLIAMSON, C.P.M., CFPIM is an Instructor/Consultant for PetroSkills/John M. Campbell & Co. He has been consulting and instructing in the field of supply chain management for more than fifteen years. During this time, he has delivered significant value to more than fifty, cross-industry organizations. He has provided education programs internationally to hundreds of people in procurement, logistics and materials management. In 2005, he joined the PetroSkills/John M. Campbell team to develop a competency-based training model for Procurement/Supply Chain Management (PSCM) for the oil and gas industry. Ronn gained his supply management expertise during twenty-three years of operational and management roles for a major equipment OEM company. For five years, he had executive responsibility for purchasing and transportation at Thermo King Corporation, a subsidiary of Westinghouse Electric and a billion-dollar global business. Ronn received an undergraduate degree (BME) in engineering and a master of business administration degree (MBA) from the University of Minnesota. He has been a member and past chapter president, of the American Production and Inventory Control Society (APICS). He is a member of the Institute for Supply Management (ISM) and the International Association for Commercial Contract Management (IACCM). Ronn is certified at the Fellow Level by APICS and has a lifetime certification from ISM.

WES WRIGHT

MR. WES WRIGHT has 25 years experience in oil and gas producing facilities and is currently a Consultant and Instructor. Mr. Wright began teaching with John M. Campbell & Co. in 2004 where he has been delivering courses in CO2 Surface Facilities, Oil and Gas Processing and Operator Training world-wide. Prior to joining John M. Campbell & Co., Mr. Wright was the lead on-site engineer at the Weyburn CO2 Miscible flood where he was closely involved in the development, design, construction, start-up and operations. Through the 1980's, Mr. Wright performed contract research at the University of Calgary in Enhanced Oil Recovery, and was a consultant on a wide range of sweet and sour oil and gas projects throughout Western Canada. Mr. Wright graduated in 1983 with a BSc in Engineering from the University of Calgary. He is a Professional Engineer in Saskatchewan and Alberta, Canada and is a member of the SPE. He has been published in the ASME-OMAE, the CSCE and the IAHR.

CLYDE YOUNG

MR. CLYDE YOUNG is a training consultant with John M. Campbell & Co. Mr. Young has over twenty-five years of diverse experience in operations and maintenance of production and processing facilities. This includes significant experience in operations and development of management systems for gas processing and water/wastewater treatment facilities, which includes operating procedure development, training program development, compliance auditing, vulnerability assessment, emergency planning and mechanical integrity program development. Mr. Young holds a B.S. in Social Sciences from the University of Wyoming–Laramie, Wyoming.



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REGISTRATION AND PAYMENT

In a worldwide teaching operation, sufficient lead time is needed for course logistics. For this reason, PetroSkills/John M. Campbell & Co. would appreciate receiving registrations at least one month before the course. However, we accept paid registrations for a viable session through the day before the course begins. Registrations can be made online at www.petroskills.com or www.jmcampbell.com or by contacting customerservice@petroskills.com or registrar@jmcampbell.com for a Registration Form.

Registrations are confirmed upon receipt of payment. In the meantime, an Acknowledgment of Reservations will be issued via email. Once payment is received, an email will be issued confirming the registrant's seat in the course. Please note we do not arrange hotel accommodations for participants. When possible, we reserve a block of rooms at the suggested hotel(s). Participants should contact the suggested hotel directly for room rates and availability at least three weeks before the course begins. Remember to mention that you are attending a PetroSkills or John M. Campbell & Co. course to receive a discounted rate, if applicable. Please note if a course venue changes for whatever reason, the participant or their representative will be contacted via email.

TUITION FEES

Tuition fees are due and payable in US dollars upon receiving the corresponding invoice. Again, a registration will not be confirmed until payment has been received.

Tuition fees do not include living costs, but do include tuition, purchase price of course materials, daily refreshments, and a $100.00(USD) non-refundable registration fee, per five days of training or less. Tuition must be paid prior to the first day of the course. If payment has not been made prior to the course start date, the registrant or their representative should contact the appropriate Customer Service Department to make payment arrangements.

Note: Where applicable due to government regulations, Goods and Services Tax (GST) or Value Added Tax (VAT) will be added to the total tuition fees. Pricing subject to change. See website for current pricing and availability.

TRANSFERS, SUBSTITUTIONS, CANCELLATIONS AND REFUNDS

Transfers may be accepted if received 30 days or more before the course begins. There is not a transfer fee but tuition will be due based on the registered course. PetroSkills/John M. Campbell & Co. may allow a registrant to transfer to a subsequent course after the 30-day cut off period ***providing*** the tuition fees have been paid and the requested course is open for enrollment. If a transfer is made and the subsequent course is not attended, no money will be refunded. Only one transfer per initial registration is allowed.

Substitutions may be made at any time without penalty.

If it is necessary to cancel an enrollment, full paid tuition, less the non-refundable registration fee of $100.00(USD) per five days of training or less, will be refunded providing the cancellation is received in our office 30 days or more prior to the course start date. If tuition is not paid at the time of the cancellation, the $100.00(USD) registration fee per five days of training or less is due, providing the 30 day notice was received. For cancellations received less than 30 days prior to the course, the full tuition fee is due. Please contact the appropriate Customer Service Department if you wish to cancel or transfer your enrollment. *Enrollments are not automatically cancelled if tuition payment is not received by the start of the course.*

Transfers and cancellations will not be honored and tuition is forfeited and non-transferable for courses that have reached maximum participation regardless of the amount of notice given.

We reserve the right to cancel any course session at any time. This decision is usually made approximately two weeks before the course begins. If we cancel a course, enrollees will be given the opportunity to transfer to another course or receive a full refund, provided the enrollment was not transferred into the cancelled course late. Keep our cancellation policy in mind when making travel arrangements (airline tickets, hotel reservations, etc.), as we cannot be responsible for any fees charged for canceling or changing your travel arrangements. We reserve the right to substitute course instructors as necessary.

CERTIFICATES, PROFESSIONAL DEVELOPMENT HOURS (PDHs) AND CONTINUING EDUCATION UNITS (CEUs)

A Certificate of Completion is awarded to each participant who satisfactorily completes the course and will be awarded by the instructor(s) on the final day.

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