



INDUSTRIAL TRAINING COURSES FOR OPERATION PERSONNEL

Pipeline Operators, Gas Plant Operators and
Refinery / Petrochem Plant Operators

Honeywell



INTRODUCTION

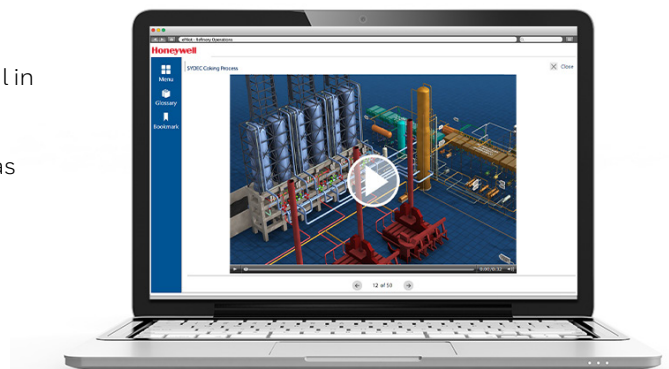
Safe and productive operations rely on skilled and knowledgeable workers. With the right knowledge, operators can anticipate issues and take actions that reduce risk and avoid costly errors.

Honeywell online learning for operator and maintenance gives learners anytime/anywhere access to secure, online learning programs proven to effectively transfer knowledge.

Knowledge gaps in your workforce equal risk. Honeywell identifies the gaps and transfers the required knowledge on demand. Proven instructional design methodology and advanced web technology provide effective knowledge transfer for learners, and our broad range of topics include technical skills, mandated training and process-specific unit operations making our platform the most comprehensive e-learning programs for the oil and gas industry.

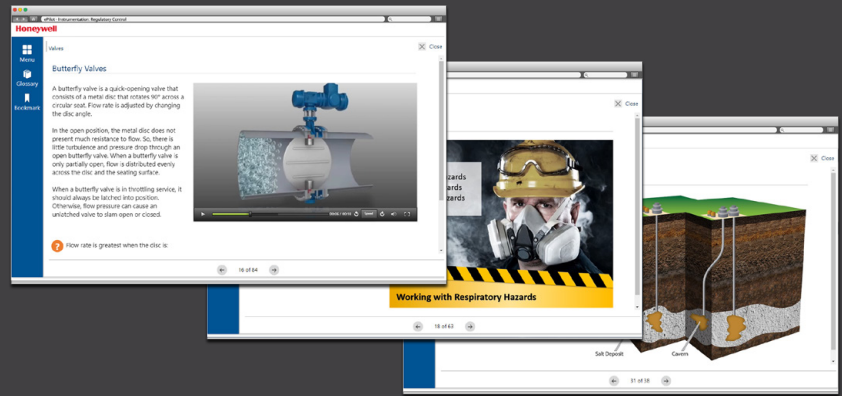
- Self-paced, web-based technology provides immediate feedback and automatic remediation.
- Structured learning is designed for adults according to certified instructional design methodologies.
- Animations and graphics keep learners engaged and present material in easy-to-understand formats.
- Content can be customized with site-specific information and links, as well as language translation.

- Fundamentals
- Gas Processing
- Core Competency
- Instrumentation
- Industry Overview
- Midstream Operations
- Refinery Operations
- Turnaround
- Stationary Equipment
- Safe Work Practices
- Rotating & Reciprocating
- Refinery Process Units
- Refinery Operations
- Production Operations
- Process Manufacturing
- Product & Process Quality Control



Honeywell online learning platform offers:

- Detailed Graphics and 3-D Animations
- Intuitive Navigation, Embedded Glossary and Bookmarking
- Translation Capabilities
- Site-Specific Customization
- AICC/SCORM Compliant - Integrates with existing LMS/ERP systems
- Instructor and Participant Guides



UNIT OPERATIONS

Industry experts and instructional designers worked jointly to develop online learning series for select process operations. The knowledge requirements specific to the process are identified and profiled. Proven instructional design methodologies are applied, and learning programs are created using advanced web technology. The critical information for operations, systems, equipment, instruments, fundamentals and process safety for these process units are then available in a dynamic learning environment.

Topics include:

- Crude Unit
- Fluidic Catalytic Cracking
- Gas Blending
- Gas Processing Operations
- Refinery Operations Overview
- Solvent Deasphalting
- Sulfur Recovery
- Turnaround Planning

CORE COMPETENCY

The challenges brought about by industry consolidation and skilled workforce attrition are changing the nature of work, the knowledge, and the skills workers need to perform. The online learning platform addresses these challenges with deep industry experience, effective knowledge transfer, and job-specific content. Core Competency has always focused on the skills and knowledge required for technicians and operators in the oil and gas industry. Based on the original training program series developed exclusively for the American Petroleum Institute, the learning platform expands this industry-validated content with web technology. Sound instructional design means effective knowledge transfer and reaching competency faster. The Core Competency library contains over 170 learning programs with over 500 hours of online training. Learners have anytime access to the secure, online environment.

Topics include:

- Fundamentals
- Equipment
- Instrumentation
- Process Operations
- Process Safety
- Production Operations
- Maintenance
- Safe Work Practices





PIPELINE OPERATORS



COURSES

252



HOURS

599

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ELECTRICITY AND ELECTRICAL EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
DRAWINGS AND DIAGRAMS			
A1186	Electrical System Basics and Diagrams	In Electrical System Basics, you will learn about electrical generation and transmission, system voltages, and building schematic diagrams; Single line drawings, electrical symbols, and logic symbols and gates; and low and medium voltage motor drives and drive circuits.	3
ELECTRICAL FUNDAMENTALS			
PS-EIA-EDO-101	Electrical Documentation	In Electrical Documentation, you will learn about types of electrical documentation, electrical loop numbers and symbols; power distribution and cable layout diagrams; control/schematic diagrams; protection and hazardous area diagrams; updating, storing, and controlling diagrams.	1.5
A1620	Electrical Fundamentals	The first section of Electrical Fundamentals describes units of electrical measurement, states Ohm's law and shows some of its uses, and describes and shows differences between series and parallel circuits. This section also shows some of the effects of resistance in series and parallel circuits, the use of resistance as voltage dividers, and ways to produce and make use of voltage drop. Next, the program describes how a magnetic field is produced and how magnetic fields are used in motors, measuring devices, and as resistors in electrical circuits and devices. You will also learn about the effects produced by alternating current, which describes alternating current, voltage and current phases, self-inductance, inductive reactance, the use of capacitors in AC circuits, and the use of induction coils as transformers. The program concludes with basic electronics, which briefly describes diodes and transistors and shows how they are used to rectify current and amplify electrical signals. This section also introduces simple transistor circuits and describes the use of capacitors in such circuits.	4
PS-MSO-ESP-101	Electrical System Protection	In Electrical System Protection, you will learn about electrical cables, conductors, and grounding; circuit protection, including causes of overcurrent, fuses, circuit breakers and protection relays, switchgear and contactors; and emergency power supplies, including batteries and generators, uninterruptible power supply configuration, and emergency generators.	3
A1185	Understanding Electricity	In Understanding Electricity, you will learn how to safely work with electricity. You will learn about basic electrical terms, the effect of electric current on the human body, and why electricity is a potential hazard. Additionally, you will learn about grounding electrical equipment, the proper precautions you must take when working with electrical equipment, and how to act in an emergency. The Electric Power Distribution System section describes how electric power is distributed from a generating plant to a lease. Finally, you will learn about measuring electric usage, including units of measurement and how to read a meter.	4
MOTORS			
A1081	AC Motors for Operators	Designed for Operations Personnel, AC Motors describes how a motor changes the energy of electric current into mechanical power. This program describes how electric current produces magnetism and magnetism induces electric current. You will learn how motors are designed so that the attracting and repelling of magnetic fields sets up rotation of the shaft. Also covered is the starting and running characteristics of AC motors, and the speeds and horsepower of AC motors. The section on motor control describes starting and stopping mechanisms for AC motors, protective devices that may be found on motor controllers, and safety devices. You will learn proper procedures for starting, running, and stopping the motor. Finally, the program describes lubrication and maintenance procedures, and types of motor enclosures.	5
PS-MSO-MCC-101	Motor Control Centers (MCCs)	In Motor Control Centers (MCCs), you will learn about motor control and motor control centers (MCC) including MCC common components of vertical sections, enclosure types, NEMA phase arrangement, MCC rating, overcurrent protection devices (fuses and circuit breakers), wiring classes and combination motor control units; motor starters including full-voltage and soft starters; variable frequency drives and programmable logic controllers.	1
OIL FIELD ELECTRICAL EQUIPMENT			
A1540c	Oil Field Electricity: Conservation and Classification	Oilfield Electricity is a series of four learning programs that introduce electrified lease equipment, some of the problems associated with its operation, and some of the ways used to reduce electrical consumption on a lease. Conservation and Classification discusses ways of conserving electrical energy and reducing the electric bill on a lease. The program also classifies lease areas according to fire and explosion hazards, outlines the National Electrical Code's classifications of hazardous lease areas, and why electrified equipment must meet rigid specifications for use in these classified areas.	2

COURSE #	COURSE TITLE	DESCRIPTION	HRS
A1540b	Oil Field Electricity: Electrified Equipment	Oilfield Electricity is a series of four learning programs that introduce electrified lease equipment, some of the problems associated with its operation, and some of the ways used to reduce electrical consumption on a lease. Electrified Equipment looks at the various electrified operations equipment found on leases, what equipment problems you should look for and report, and what equipment must be routinely inspected and maintained. The program also covers how electrified switches and corrosion protection help control potential sources of lease pollution.	3
A1540a	Oil Field Electricity: Fundamentals	Oilfield Electricity is a series of four learning programs that introduce electrified lease equipment, some of the problems associated with its operation, and some of the ways used to reduce electrical consumption on a lease. In Fundamentals, you will learn how to safely work with electricity. You will learn about basic electrical terms, the effect of electrical current on the human body, and why electricity is a potential hazard to lease personnel. Additionally, you will learn about grounding electrical equipment, the proper precautions you must take when working with electrical equipment, and how to act in an emergency. A section called Electric Power Distribution System describes how electrical power is distributed from a generating plant to a lease. Also, the kind of distribution equipment found on a lease is reviewed. Finally, you will learn about measuring electrical usage, including units of measurement and how to read a meter.	4
A1541	Oil Field Electricity: Offshore Oil Field Electricity	Oilfield Electricity is a series of four learning programs that introduce electrified lease equipment, some of the problems associated with its operation, and some of the ways used to reduce electrical consumption on a lease. Offshore Oilfield Electricity covers the basics of area classifications, power system components and controls on an offshore platform, and safe operation of electrical equipment. The program is designed to familiarize offshore operators and other personnel with the electrical systems on a platform and prepare them to recognize and report any problems with the electrical equipment.	3
SWITCHGEAR			
PS-MSO- ELC-101	Electrical Load Centers and Panelboards	In Electrical Load Centers and Panelboards, you will learn about Load Centers used in residential and light commercial applications including construction; main breaker, main lug only, and branch circuit breakers; power supply systems of 3-wire, 3-phase and 4-wire types; and load center grounding requirements.	1

GAS PROCESSING OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
DEHYDRATION			
PS-MSO-GST-101	Glycol Sampling and Testing	In Glycol Sampling and Testing, you will learn about visual checks, glycol sampling properties, and normal ranges and testing frequency.	1
PS-MSO-DPT-101	Dewpoint Testing/Requirements	In Dewpoint Testing/Requirements, you will learn about hydrocarbon and water dew points, dew point control, how dew point is measured, and dewpoint testing accuracy.	1
A1585	Glycol Dehydration	In Glycol Dehydration, you will learn about water vapor, the process of glycol dehydration, measuring water content, monitoring equipment, and testing and operations.	5
PS-MSO-GDO-101	Glycol Dehydration Equipment and Operation	In Glycol Dehydration Equipment and Operation, you will learn about the glycol dehydration process, contactor and regeneration main equipment, and the process variables that affect glycol dehydration operation.	1
PS-MSO-GIS-201	Glycol Injection System Operation	In Glycol Injection System Operation, you will learn about the function of monoethylene glycol (MEG), glycol loss, scaling and fouling, hydrocarbon carryover; glycol regeneration operation, including stripping gas, reflux ratio control, salt contamination, increasing separation efficiency, plant turndown, and foam control.	0.5
A2508	Molecular Sieve Dehydration	In Molecular Sieve Dehydration, you will learn about solid bed adsorption and molecular sieve dehydration including the purpose, function, and types of solid bed adsorbents, the advantages and process of mol sieve dehydration, and how to troubleshoot solid bed adsorption.	2
A2505	Solid Bed Adsorption and TEG Dehydration	In Solid Bed Adsorption and TEG Dehydration, you will learn about gas dehydration strategies, including solid bed adsorption, mol sieve dehydration, and TEG gas dehydration.	4
PS-MSO-SLD-101	Solid Desiccants	Solid desiccants adsorb water from process gas streams. In Solid Desiccants, you will learn about solid desiccant adsorption, types of solid desiccants and how they are selected, and modes of operation.	1
FRACTIONATION			
PS-MSO-CFL-101	Coalescing Filters	In Coalescing Filters, you will learn about the process of coalescence, types of coalescers, sales gas coalescers, mechanical and electrostatic coalescers.	1
PS-MSO-MIN-101	Methanol Injection	In Methanol Injection, you will learn about gas hydrates, the properties of methanol, typical methanol injection systems and the effect of methanol on other systems.	0.75
PS-MSO-SGC-201	Sales Gas Compressor Operation	In Sales Gas Compressor Operation, you will learn about types of sales gas compressors, including double-acting reciprocating and centrifugal compressors; types of drivers; pre-start, startup, shutdown, and emergency shutdown procedures; and compressor maintenance.	1
PS-MSO-SGC-202	Sales Gas Compressor Types, Use and Limitations	In Sales Gas Compressor Types, Use and Limitations, you will learn about advantages and limitations of centrifugal, reciprocating, and rotary screw compressors, along with dynamic and positive displacement compressor capacity control.	1
PS-MSO-SGF-201	Sales Gas Filter Replacement	In Sales Gas Filter Replacement, you will learn about the function of a coalescing sales gas filter, typical installation, filter replacement and return to service.	1
INLET SEPARATION			
PS-MSO-MNF-101	Manifold Systems Overview	In Manifold Systems Overview, you will learn about types of manifolds; metering stations and meter proving; and types of meters, including turbine, positive displacement, Coriolis, ultrasonic gas, and thermal mass flow meters.	1
PS-MSO-PWT-101	Produced Water Treatment	In Produced Water Treatment, you will learn about produced water composition; conventional water treatments, including oil-water separators, dissolved and induced gas flotation units, hydrocyclones and centrifuges, aeration, oxidation, adsorption and soluble organics removal; as well as advanced water treatment methods, such as ion exchange, mechanical evaporation (distillation), and membrane processes (ED and EDR).	2
PHASE BEHAVIOR			
A2501	Hydrocarbon Phase Behavior and Vapor-Liquid Equilibrium	In Hydrocarbon Phase Behavior and Vapor-Liquid Equilibrium, you will learn about the phase behavior, vapor-liquid equilibrium, the water content of gas, and hydrates.	4
PROCESS OVERVIEW			
A2500	Introduction to Gas Processing for Operations	In Introduction to Gas Processing, you will learn about gas processing hydrocarbons and about the equipment and process for gas conditioning and processing.	3

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PROCESS SAFETY			
A2507	Gas Processing Hazards	In Gas Processing Hazards, you will learn about hazards within a typical gas processing facility.	4
THERMODYNAMICS			
A2502	Gas Processing Thermodynamics	In Gas Processing Thermodynamics, you will learn about thermodynamics, heat transfer, the gas laws, and compression ratio.	5

GENERAL KNOWLEDGE AND SKILLS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
BEST PRACTICES			
A1100	Cost Reduction for Operators	In Cost Reduction for Operators, you will learn important strategies for reducing the waste of time, materials, and labor by running equipment at top efficiency and supporting a preventive maintenance program. Emphasis is placed on using instruments to accurately determine at which point in a process enough becomes too much. You will also learn ways to avoid fuel and steam waste, heat loss, waste of utilities, and ways to avoid excess equipment loss and repair through a preventive maintenance program.	2
A1137	Performing Skills Assessment	A performance assessment is a tool that is used to measure, maintain, and improve the behaviors associated with completing a task. Within a process facility, it is imperative that tasks be completed in a safe manner. Safety procedures specify how employees must complete each task within a process facility. In this program, you will learn how to assess job performance to ensure that each employee performs their assigned tasks in a safe manner.	1
A1200	Process Operator Responsibilities	In Process Operator Responsibilities, you will learn about general duties, training, and task observance competency; safety (process, environmental, personal, fire, and chemical); and process and maintenance operations, including shift turnover responsibilities and unit checks. You will also learn about communication and documentation, including radio communication practices, log sheet entries, checklists, and permits.	1
PS-MNT-RAC-101	Reports and Communication	In Reports and Communication, you will learn about giving oral reports, including preparation, delivery, visual aids, and handouts; how to structure technical reports; and how to update and mark up diagrams and schematics.	1
DRAWINGS AND DIAGRAMS			
PS-MNT-ENG-101	Engineering Drawings and Symbols	In Engineering Drawings and Symbols, you will learn about the different types of engineering drawings, different drawing formats used in creating engineering drawings, the different areas of the drawing, the types of symbols used.	0.5
GENERAL OPERATIONS KNOWLEDGE			
PS-EIA-EFA-101	EI&A Field Awareness	In EI&A Field Awareness, you will learn about electrical power systems, emergency power systems, AC and DC UPS; cathodic protection, heat tracing, lighting and grounding systems; types of instrumentation systems; types of analyzer systems, and hazard awareness.	4
PS-MSO-HAC-101	Fundamentals of Hazardous Area Classifications	In Fundamentals of Hazardous Area Classifications, you will learn about the fundamentals of Hazardous Areas and equipment protection classifications including explosive limits, flashpoint, auto-ignition temperature, ignition energy, and vapor density of material properties; the three different zones of hazardous areas and source of release classification.	0.5
PS-MSO-MEA-101	Introduction to Measurement: Measurement Basics and Standards	Understanding measurement is essential to performing work. In this first program, Measurement Basics and Standards, you will learn about the universal SI system, the rules for writing SI units, and how to make conversions between similar units and SI/Imperial conversions.	1
HAND TOOLS AND EQUIPMENT			
A1201	Working with Hand Tools	This program covers the basic hand tools that are normally found in an operator's tool box. You will learn to identify each tool and how to use it properly.	2
A1208	Working with Power Tools	Maintenance activities usually involve the use of some tools. Each of these tools is designed to perform a specific job. You must be able to select and operate the correct power tool for a particular job. In this program, you will learn the purpose, function and proper orientation of power tools. You will learn specific requirements of each type of power tool and how to use them safely.	2
QUALITY ASSURANCE AND CONTROL			
A1090	Process Control Tests	Process Control Tests is designed to provide operators with knowledge about how process control tests are used to aid in the production of high-quality products. You will learn about common tests – what they are, when they are used, and what the tests results mean. You will learn why products are tested, the different kinds of tests, how to obtain a good sample, and to interpret test results. You will also learn some of the more common physical tests, how they are run, what the results mean and how you can use these results as an operating tool. Also covered are some of the more common impurities found in petroleum products, how these impurities affect product quality, and how products are tested for the presence of these impurities. Finally, you will learn about the structure of hydrocarbons, how product composition affects product quality, and some of the tests used to determine product composition.	5
A1191	Statistical Process Control	In Statistical Process Control, you will learn about the operator's role in gathering and analyzing process information and taking corrective action when process problems occur.	3

GENERAL MAINTENANCE SKILLS AND KNOWLEDGE

COURSE #	COURSE TITLE	DESCRIPTION	HRS
CLEANING ACTIVITIES			
A1207	Cleaning Activities	This program identifies the tools and procedures for cleaning pipes, burners, and other equipment. Major topics include cleaning gauge/sight glasses, strainer and burner cleaning, and changing filter elements.	1
CORROSION CONTROL			
PS-MNT-CPS-101	Cathodic Protection Systems	In Cathodic Protection Systems, you will learn about using cathodic protection to control metal surface corrosion, including: galvanic protection and anodes, impressed current and rectifier systems; cathodic protection surveys, inspection, testing, and record-keeping; and cathodic system safety, maintenance, and troubleshooting.	3
A1122	Corrosion Control	This program will teach you the basics of the corrosion process, the methods used to monitor the rate of corrosion and the control techniques used to protect equipment. By successfully controlling corrosion, the destructive effects can be minimized, and facility operations can be more profitable.	4
PS-MNT-COR-101	Corrosion in Metal	In Introduction to Corrosion, you will learn about the corrosion process, including metal corrosion, corrosion damage, and corrosion cells; and corrosion control, including cathodic protection, protective coatings, corrosion monitoring and measurement, and corrosion monitoring techniques.	3
A1580	Oil Field Corrosion	Millions of dollars are lost each year to corrosion in the oilfield. Millions more are spent attempting to control it. This program will teach you the basics of the corrosion process, the methods used to monitor the rate of corrosion and the control techniques used to protect equipment. By successfully controlling corrosion, the destructive effects can be minimized, and the operation of the lease can be more profitable.	4
COUPLINGS AND GEARS			
PS-MNT-GEA-101	Gears	In Gears, you will learn about gear purpose, classifications, and applications; routine maintenance; gear installation and removal; gearbox maintenance, overhaul, and assembly; and gear troubleshooting.	4
DRAWINGS AND DIAGRAMS			
PS-MNT-MND-101	Manuals and Drawings	In Manuals and Drawings, you will learn about maintenance drawings, orthographic, process flow, piping and instrumentation, and schematic drawings; reading drawings and blueprints; standards organizations; and operations and maintenance manuals.	2
FILTERS			
PS-MNT-DCF-101	Dust and Coalescer Filters	In Dust and Coalescer Filters, you will learn about the application and workings of coalescing filters, the purpose of dust filters, and how to safely remove and install filter elements.	1
PS-MNT-FTS-101	Filters and Strainers	In Filters and Strainers, you will learn about filtration, filter media, and operation; mechanical, absorbent, and adsorbent filters; Y-basket and temporary (geometric) strainers; filter and strainer cleaning and maintenance.	2
GENERAL MAINTENANCE CONCEPTS			
PS-MNT-BLD-101	Blinding and De-blinding	In Blinding and Deblinding, you will learn about slip blinds, spectacle blinds, and blind flanges, blind and flange sizes, and blind installation and removal.	1
PS-MNT-CMG-101	Condition Monitoring - General	In Condition Monitoring - General, you will learn about life, preventive, reactive, and predictive maintenance; potential fault analysis (PFA); vibration analysis, including imbalance, misalignment, and looseness analysis; and maintenance and maintainability data.	3
PS-MNT-FDT-101	Fault Diagnosis, Troubleshooting and Machine Inspections	In Fault Diagnosis, Troubleshooting and Machine Inspections, you will learn about common techniques of diagnosing and troubleshooting machine failures including Fault Tree Analysis (FTA) and Failure Mode and Effects Analysis (FEMA), machine performance monitoring, troubleshooting techniques using operation records, vibration analysis, and lubricating oil analysis and the non-destructive testing (NDT) methods of visual inspection, liquid penetrant, magnetic particle, ultrasonic, radiography and eddy current.	1.5
PS-MNT-CPM-101	Fundamentals of Condition and Predictive Monitoring	In Fundamentals of Condition and Predictive Monitoring, you will learn about the many different ways of monitoring the mechanical condition of equipment including vibration analysis, oil and wear debris analysis, ultrasonics, and infrared thermography.	1
PS-MNT-MFD-101	Maintenance Fundamentals	In Maintenance Fundamentals, you will learn about the principles and types of maintenance, including proactive, preventative, corrective, breakdown, and turnaround maintenance; and maintenance workflow planning and strategies.	1

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PS-MNT-PCB-101	Planned, Corrective, and Breakdown Maintenance	In Planned, Corrective, and Breakdown Maintenance, you will learn planned, corrective, and breakdown maintenance, including planning, implementing, and executing maintenance schedules.	1.5
PS-MNT-PMP-101	Preventative Maintenance Plans	In Preventative Maintenance Plans, you will learn about the basic steps involved with the development of a preventive maintenance plan as well as the benefits of such a plan including: benefits, purpose, the Development process and principles of the program.	0.5
LEAK DETECTION			
A1198	Leak Detection and Repair	In this program, you will learn about controlling hazardous emissions through leak detection and repair.	1
LUBRICATION			
A1210	Lubrication Concepts	To ensure proper operation, all machines must be lubricated. Metal parts must be separated from one another when in operation, or rapid wear and deterioration will result. This separation can be provided with oil lubricant. In this program, you will learn about the different lubricants and their qualities so that you can choose the proper lubricant for the equipment you operate.	1
PIPES, HOSES AND FITTINGS			
A1205	Flange Piping	This program explains the use of flange piping and the procedures for connecting flanges. Major topics include types of fittings and flanges, flange gaskets, and blinding lines.	2
A1202	Pipe Fitting Basics	This program covers the various pipes and fittings that make up a piping system and explains how to read piping diagrams. You will learn how pipe connections are made and how to select the proper equipment.	1
PS-MNT-PTF-101	Pneumatic Tubing and Fittings	In Pneumatic Tubing and Fittings, you will learn about pneumatic tubing applications, tubing types, how to select the proper tubing, types of pneumatic fittings, and tubing installation guidelines.	1
A1204	Small Threaded Pipe	This program covers applications for small threaded pipe and how to cut and thread piping joints. You will learn how to replace temperature and pressure indicators and how to operate pipe threading equipment.	2
A1203	Tubing	This program explains the various uses for tubing and how to make up a small tubing run. Major subjects include types of tubing and fittings, tubing applications, tube bending, and how to assemble and tighten tubing.	2
STRUCTURAL SAFETY			
PS-MNT-STC-101	Structural Safety	In Structural Safety, you will learn about OSHA requirements for ladders and stairways, handrail requirements; corrosion prevention and treatment; rebar corrosion and concrete damage, and structural repairs and inspection techniques.	3

HYDROCARBON STORAGE AND LOADING

COURSE #	COURSE TITLE	DESCRIPTION	HRS
RAILROAD TRANSPORTATION			
PS-MSO-RCI-201	Rail Car Inspection	In Rail Car Inspection, you will learn about routine visual inspection at ground level, routine inspection at dome, including vapor and liquid connections, PRV, Thermowell, gauge rod, and inspection after loading/offloading.	1
PS-MSO-RLO-101	Rail Car Loading and Offloading	In Rail Car Loading and Offloading, you will learn about rail car access, connections, liquid and vapor valves; emergency shutoff and excess flow valves; C3/C4 loading and NGLs offloading rail cars; measuring rail car content, using magnetic gauges and slip tube rods.	1
PS-MSO-RCS-201	Rail Car Sampling and Composition Testing	In Rail Car Sampling and Composition Testing, you will learn about rail car sampling equipment and analysis; testing composition of offloading NGLs and gas chromatography analysis.	0.75
SAFE TANK CLEANING			
A1133	Safe Tank Cleaning: Cleaning the Tank	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas freeing and cleaning stationary storage tanks. Cleaning the Tank covers the physical removal of sludge and other residue from the tank interior. You will learn about the proper tank cleaning supplies, personal protective equipment, and tests required prior to tank entry. You will also learn general safety precautions to be taken throughout the tank cleaning job.	1
A1132	Safe Tank Cleaning: Gas-Freeing	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas freeing and cleaning stationary storage tanks. In Gas Freeing, you will learn specific information on gas freeing three different tank designs, with the assumption that each tank contains a low-sulfur crude oil. The program emphasizes the importance of accurately performing tests for flammable vapors, toxic substances, and oxygen deficiency.	2
A1134	Safe Tank Cleaning: Hazardous Materials	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas freeing and cleaning stationary storage tanks. In Hazardous Materials, you will learn how a specific tank design, combined with the specific material that the tank contains, determines what gas freeing and tank cleaning procedures will be necessary. You will also be introduced to a chart that cross-references tank designs with specific materials a tank may contain. You will learn how to use the chart and its accompanying data sheets to obtain information on a variety of tank cleaning situations.	2
A1131	Safe Tank Cleaning: Preparing for Cleaning	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas-freeing and cleaning stationary storage tanks. Preparing for Cleaning explains why tank cleaning is necessary and outlines the steps that must be carried out before any tank cleaning work begins. You will also learn about the hazards that must be minimized or eliminated at the tank cleaning site, and the ways to handle those hazards. The program also covers basic test equipment and discusses the use and importance of permits as they apply to tank cleaning.	2
STORAGE TANKS			
PS-MSO-APS-101	Atmospheric and Pressure Storage Tanks	In Atmospheric and Pressure Storage Tanks, you will learn about storage tank construction, pressurized and atmospheric storage tanks, and tank classification; effects of water and storage tank water detection and removal; and storage tank roof inspection, including safety precautions, visual and non-destructive inspection, and external tank roof inspection.	3
PS-MNT-STT-102	Maintaining Storage Tanks	In Maintaining Storage Tanks, you will learn about corrosion, internal coatings, tank inspection and repair, emissions, removing a tank from service, tank cleaning, silo maintenance and inspection, and safety.	1.5
PS-MNT-STT-104	Purging Storage Tanks	In Purging Storage Tanks, you will learn about the purpose of purging, isolating the tank; the purging process, including water fill, air ventilation, inert gas fill, handling tanks containing sulfur or hydrogen sulfide, and atmospheric testing the tank interior.	0.75
PS-MNT-STT-101	Storage Tanks	In Storage Tanks, you will learn about tank designs, including cone roof, floating roof, dome roof, and pressure vessels; fire protection and hazards, flammable vapor testing, auxiliary equipment, and environmental hazards.	1.5
PS-MSO-TSO-101	Tank Isolation	In Tank Isolation, you will learn about performing tank isolation including its purpose, planning, locking out tank electrical equipment, blinding and blanking using blanks, spectacle blinds, paddle blinds, and double block and bleed systems, blinding safety procedures and transient vapors.	1
PS-MNT-STT-103	Tank Roof Inspection	In Tank Roof Inspection, you will learn about the purpose, procedures, regulatory requirements and methods involved with tank roof inspections including visual inspection, non-destructive techniques, and safety precautions.	1

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PS-MSO-TV5-101	Tank Venting Systems	In Tank Venting Systems, you will learn about the purpose of tank venting, sizing the venting system, pressure/vacuum relief vents, flame arrestors, discharge piping, and compressor and venturi vapor recovery systems.	1
PS-MSO-UST-101	Underground Storage Tank Inspection and Monitoring	In Underground Storage Tank Inspection and Monitoring, you will the purpose of underground storage tank inspections, the various types of release detection using automatic and manual tank gauging, interstitial monitoring, ground water monitoring, vapor monitoring, tank tightness and inventory control requirements for daily, monthly and annual inspections.	1
A1565	Vapor Recovery Systems	For years, the vapors escaping from oil storage tanks through hatches, vents and flare systems were given little attention. Specialists have since learned that if the vapors existed in sufficient quantities, the recovery of the vapors was economically feasible. The recovered vapors represented a valuable source of energy that previously had been "lost." This program explains the operation and routine maintenance of Vapor Recovery Systems. It describes the principles behind vapor recovery, the component parts of vapor recovery units, a method of determining quantities of vapors recovered, and how to keep the equipment operating efficiently.	3
PS-MSO-WRT-101	Water Removal from a Storage Tank Bottom	In this Water Removal from a Storage Tank Bottom, you will learn about the detection and removal of water from a petroleum storage tank including the effects of water in petroleum storage tanks, storage tank floor design, and manual and automatic draining systems.	1
TRUCK TRANSPORTATION			
PS-MSO-ITI-101	ISO Truck Tank Construction and Inspection	In ISO Truck Tank Construction and Inspection, you will learn about the characteristics of cryogenic ethylene and the construction and inspection of an ISO truck tank including regulatory truck tank markings, rated holding time, marked rated holding time, one way travel time, the location of valves, gauges and fittings, and leak detection.	1
PS-MSO-NTO-101	Natural Gas Liquids (NGL) Truck Offloading	In Natural Gas Liquids (NGL) Truck Offloading, you will learn about NGLs, the truck loading system; flow element and vapor eliminator, the automated offloading system, Scully ground prover and high level shutoff; fire protection, meter proving; truck offloading requirements, and truck offloading.	0.5
PS-MSO-PPT-101	Pentane (C5)+ Truck Loading	In Pentane (C5)+ Truck Loading, you will learn about pentane, C5 truck loading system; condensate pump and flow control valves and pressure control, the loading control system, ground prover and high level shutoff; custody transfer of condensate, and meter proving.	0.75
PS-MSO-PBT-101	Propane and Butane Truck Loading	In Propane and Butane Truck Loading, you will learn about propane and butane, C3/C4 truck loading system; pressure control valve, flow element and vapor eliminator, pressure transmitter functions, the loading control system, and high level shutoff; automatic odorizing system, meter proving, fire protection, and truck loading requirements and sequence.	0.75
PS-MSO-TSM-101	Testing Composition of Offloading Truck NGLs	In Testing Composition of Offloading Truck NGLs, you will learn about the three most common methods for sampling the composition of product at truck loading racks - Coriolis Meters for Density, Online Gas Chromatograph, and Grab Sampling.	0.75
UNDERGROUND STORAGE			
PS-MSO-SCS-101	Salt Caverns and Underground Storage	In Salt Caverns and Underground Storage, you will learn about salt cavern formation, operation, capacity, overfilling and flow rate restrictions, brine systems, and underground tube storage.	1

INSTRUMENTATION AND CONTROL

COURSE #	COURSE TITLE	DESCRIPTION	HRS
ANALYZERS AND INFERENCEALS			
A2065	Instrumentation: Analyzers and Inferenceals	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. Process analysis is continuously performed to determine the quality of raw materials, intermediates, and finished products. In Analyzers and Inferenceals, you will learn about working with analyzers and analytical instruments, key tools in instrumentation process control.	2
PS-MSO-GCH-102	Introduction to Gas Chromatography	In Introduction to Gas Chromatography, you will be introduced to the process and analysis results for Gas Chromatography.	0.5
PS-MSO-HST-201	Operating Hydrogen Sulfide (H ₂ S) Tube Samplers	In Operating Hydrogen Sulfide (H ₂ S) Samplers, you will learn about detector tube operation, detector tubes, piston and bellows-type detectors, and common operating instructions.	1
PS-MSO-TUM-101	Turbidity Measurement	In Turbidity Measurement, you will learn why turbidity measurement is important; common turbidity measuring devices including Single Beam Style, Ratio Style, and Modulated Four-Beam Style; and turbidity units and standards.	1
CONTROL SYSTEMS			
PS-MSO-ACA-101	Automated Control Applications	In Automated Control Applications, you will learn about on/off control systems; process dynamics, electronic proportional, integral, and derivative (PID) control; analog electronic controllers including operational amplifiers (op-amps) and automatic process control.	3
PS-EIA-CTL-101	Control Loops	In Control Loops, you will learn about control loops and controller action, including control types, controllers, variables, control modes; types of control schemes, including cascade, ratio, split range, feedforward, multivariable and adaptive control; and control loop tuning techniques.	3
A2066	Instrumentation: Regulatory Control	In this program, you will learn about regulatory control, including valves, signal transmission, and basic and advanced control systems.	4
A2060	Instrumentation: Fundamentals of Control	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Fundamentals of Control, you will learn about the basics of instrumentation, including the control loop, process variable indicators, process instrument equipment, and piping and instrumentation diagrams.	3
PS-MSO-CCO-101	Introduction to Computerized Control Systems	In Introduction to Computerized Control Systems, you will learn about computerized control systems used in the process facilities including human machine interfaces (HMI); the basic concepts of a distributed control systems (DCS) and its associated equipment; the functions of programmable logic controllers (PLC); and supervisory control and data acquisition (SCADA) systems.	1
PS-EIA-SCA-101	Introduction to Supervisory Control and Data Acquisition (SCADA)	In Introduction to SCADA Systems, you will learn about Supervisory Control and Data Acquisition (SCADA) and Distributed Control Systems (DCS). SCADA function and basic elements are described, including HMIs, PLCs, and RTUs, along with SCADA communications.	.75
PS-MSO-PCS-101	Process Control Strategies	In Process Control Strategies, you will learn about process variables and instrumentation control systems including open loop systems, feedback control systems, feedforward control systems, and Proportional-integral-derivative controller (PID).	1
PS-EIA-SIC-101	Safety in Instrumentation and Control Systems	In Safety in Instrumentation and Control Systems, you will learn about emergency shutdown systems, standards, safety system technologies, SIS architecture; system integrity levels (SIL), equipment failure modes and analysis, SIS factors, and procedures for overriding ESD and SIL systems.	3
PS-EIA-SCS-101	Simple Control System (PLC)	In Simple Control Systems, you will learn about PLC fundamentals, including architecture, basic PLC control and programming, external functions and hardware; PLC maintenance, and general troubleshooting.	2
PS-EIA-SCA-102	SCADA Operation	In SCADA Operation, you will learn about the SCADA system, function, and components, general operation and changing a setpoint. You will also learn about control room cold and warm start-ups, including cold start-up pre-checks and typical start-up screens. Control room facility shutdown is covered, with switch and display guidelines, and an extraction plant shutdown example. Finally, you will learn about control room emergency shutdown recovery.	1

COURSE #	COURSE TITLE	DESCRIPTION	HRS
CUSTODY TRANSFER			
A1535	Lease Automatic Custody Transfer (LACT)	Lease Automatic Custody Transfer is an introduction to the components and the functions of LACT units. The fundamentals of oil volume measurement are explained and then related to the operation of the individual LACT components. Meter reading and sample removal and analysis are covered in detail. The relationship of the producer and the gatherer is discussed. Throughout the program, measurement accuracy is emphasized.	3
DRAWINGS AND DIAGRAMS			
A2067	Instrumentation: Process and Instrumentation Drawings	A company may have several production processes. Having uniform standards for instrumentation systems used for measurement and control simplifies and helps explain the process. In this program, you will learn standard symbols used in instrumentation systems how to apply them.	2
FLOW MEASUREMENT			
A2064	Instrumentation: Measuring Flow	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Measuring Flow, you will learn about flow rate and measurements, including differential pressure and positive displacement flow meters.	3
LEASE INSTRUMENTATION			
A1570c	Lease Instrumentation: Control Equipment	Instrumentation plays a vital role in the operation of a production lease. It helps control the production, separation, treatment and distribution of oil-well fluids with a minimum of hands-on labor. Lease equipment, like oil and gas separators and heater treaters are often equipped with instruments that automatically monitor and control temperatures, pressures, levels, and flows.	4
A1570b	Lease Instrumentation: Final Control Devices	Instrumentation plays a vital role in the operation of a production lease. It helps control the production, separation, treatment and distribution of oil-well fluids with a minimum of hands-on labor. Lease equipment, like oil and gas separators and heater-treaters are often equipped with instruments that automatically monitor and control temperatures, pressures, levels, and flows. Lease Instrumentation is a series of three learning programs that cover how instruments function to keep the equipment on the lease working safely and efficiently. In Final Control Devices, you will learn about valves and plugs, and valve operators.	2
A1570a	Lease Instrumentation: Sensing and Measuring Equipment	Instrumentation plays a vital role in the operation of a production lease. It helps control the production, separation, treatment and distribution of oil-well fluids with a minimum of hands-on labor. Lease equipment, like oil and gas separators and heater treaters are often equipped with instruments that automatically monitor and control temperatures, pressures, levels, and flows. Lease Instrumentation is a series of three learning programs that cover how instruments function to keep the equipment on the lease working safely and efficiently. In Sensing and Measuring Equipment, you will learn about pressure instruments, temperature and level instruments, and flow instruments.	3
LEVEL MEASUREMENT			
A2063	Instrumentation: Measuring Liquid Level	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. Effective control of liquid level is important to good process unit operation and safety. It is important that you understand how the different types of level measures function and how they can produce incorrect levels. In Measuring Liquid Level, you will learn about the different ways to measure liquid level.	3
MEASUREMENT FUNDAMENTALS			
PS-MSO-MEA-104	Introduction to Measurement: Density, Moisture, pH, and Conductivity	In Introduction to Measurement: Density, Moisture, pH, and Conductivity, you will learn about density measurement, including buoyant force, differential pressure, frequency, and nuclear absorption; moisture measurement, including microwave, infrared, and capacitance measurement; pH measurement; and conductivity measurement, including measurement units and cell constant, and conductivity probes.	1.5
PS-MSO-MEA-103	Introduction to Measurement: Level and Flow	Level and flow measurements are used throughout industry to determine the quantity of various solids and liquids and flow rates. The information is used for safety, economic and operational reasons, such as monitoring and controlling the inventory into and out of a process. Level measurement applies to liquid levels in vessels or tanks or dry substances such as wood chips, chemicals or products used in the food or pharmaceutical industry.	3
PS-MSO-MEA-102	Introduction to Measurement: Temperature and Pressure	In Introduction to Measurement: Pressure and Temperature, you will learn about heat transfer, temperature scales and sensors; different types of pressure, pressure measurement primary standards (manometers and deadweight testers); and mechanical and electrical pressure sensors and gauges.	3

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PRESSURE MEASUREMENT			
A2062	Instrumentation: Measuring Pressure	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Measuring Pressure, you will learn about the basics of measuring pressure, including the tools used for sensing pressure and pressure gauges.	3
TANK GAUGING			
A1196	Tank Gauging	Every oil and gas company must accurately and correctly report inventory. To do this, companies rely on tank gauging to measure all hydrocarbon inventory. Because the volume of inventory is high, the value can be in the billions of dollars. Any errors made in tank gauging mean that investors may not have the proper financial information with which to make decisions. In this program, you will learn about properly and safely gauging tank inventory.	4
TEMPERATURE MEASUREMENT			
A2061	Instrumentation: Measuring Temperature	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Measuring Temperature, you will learn about instruments designed to sense temperature, including electrical temperature sensors.	2

MATH AND SCIENCE FUNDAMENTALS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
BASICS OF MATHEMATICS			
A1130	Process Plant Mathematics	In Process Plant Mathematics, you will learn about the principles and operations involving mathematics within a process facility, including addition, subtraction, multiplication, and division of fractions and decimals. You will also learn about using percentages, ratios, proportions, and triangles to solve problems involving process plant activities, such as mixing liquids, determining actual amounts in storage, and angle fitting.	5
A1181	Hydrocarbon Chemistry 101	In Hydrocarbon Chemistry 101, you will learn about basic hydrocarbon composition and properties; carbon and hydrocarbon bonding; hydrocarbon structures and types of formulas. You will also learn about alkanes/paraffins, saturation, alkenes/olefins, alkynes/acetylenes, structural (constitutional) isomers and stereoisomers; and saturated and unsaturated ring hydrocarbons. Finally, you will learn about hydrocarbon nomenclature: naming conventions, how isomers and ring hydrocarbons are named, IUPAC naming rules, and nomenclature for other organic compounds.	3
BASICS OF HYDROCARBON CHEMISTRY			
A1180	Process Plant Chemistry	In this program, you will learn about the basic chemistry behind the refining process. You will learn basic chemical terminology, molecular formulas, structural formulas, some common chemical symbols, and the various hydrocarbon groups used within the petrochemical industry. This program is designed to provide a background in the chemical nature of the operator's job, work environment, and products of refining.	2
HEAT EXCHANGERS			
A1022a	Nature of Heat: Heat Exchange Equipment	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of learning programs including Heat and Temperature, Heat Transfer, and Fuels and Combustion. Efficient use of heat energy includes not only efficient combustion, but also the efficient transfer of heat energy from one place to another. In this program in the series, different types of heat exchangers, including fixed shell-and-tube, U-tube and floating head are examined.	1
PHYSICS OF FLUID AND FLOW			
A1610a	Fundamentals of Fluids for Production Operations: Fluid Behavior	In this program, you will learn about the types of fluids and their chemical and physical nature, the nature of phase, how phase change is used, and how it can be controlled. The program goes on to cover the instruments and units for measuring fluids. This includes units for measuring pressure, temperature, density, and viscosity. You will also learn about the nature of absolute measurements and how to convert measurements from one unit to another.	4
A1610b	Fundamentals of Fluids for Production Operations: Gases and Static Pressure	In this program, you will learn how to predict pressure, temperature, and volume changes that occur in gas compression and storage. You will also learn to recognize hazards in gas handling and the precautions used to avoid these hazards. This program also covers the nature, calculation, and uses of static pressure, including how to calculate pressure from liquid level and liquid level from bottom gauge pressure, the instruments that operate on the principle of static pressure, the nature and hazards of vacuum; and the uses of static pressure in handling and transporting fluids.	3
A1044	Mechanics of Fluids: Fluids in Motion	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In this final program, Fluids in Motion, you will learn the factors affecting flow rate and how these can be controlled, the basic principles and instruments of flow measurement, and the control of rate through valves and through pumping.	4
A1041a	Mechanics of Fluids: Introduction to Process Fluids	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. In Introduction to Process Fluids, you will learn about types of fluids and their chemical and physical nature, including gas compressibility and liquid incompressibility. You will learn about the nature of phase, how phase change is used, and how it can be controlled. You will also learn about the fluid distillation process, types of fluid systems and emulsions.	4
A1043	Mechanics of Fluids: Static Pressure and Head	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In Static Pressure and Head, the fourth program in the Mechanics of Fluids Series, you will learn about the nature, calculation, and uses of static pressure. Topics include how to calculate pressure from liquid level, and how to calculate liquid level from bottom gauge pressure, the instruments that operate on the principle of static pressure, the nature and hazards of vacuum, and the uses of static pressure in handling and transporting fluids.	5

COURSE #	COURSE TITLE	DESCRIPTION	HRS
A1041b	Mechanics of Fluids: Units of Fluid Measurement	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In Units of Fluid Measurement, you will learn about pressure measurements, temperature measurements, density and gravity measurements, and viscosity measurements. You'll also learn about the nature of absolute measurement and how to convert measurements from one unit to another.	4
A1042	Mechanics of Fluids: Behavior of Gases	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In Behavior of Gases, the third program in the Mechanics of Fluids Series, you will learn how to predict the pressure, temperature, and volume changes that occur in the compression and storing of gases. You will also learn to recognize hazards in gas handling and the precautions used to avoid these hazards.	4
PHYSICS OF GASES & COMPRESSORS			
A1051	Introduction To Compression	In Introduction to Compression, you will learn about the construction and operation of gas compressors. You will learn about the basic laws of gas behavior and the units of gas measurement. You will learn the nature of compression, including the compression ratio, the heat effects of compression, and the factors affecting compressor horsepower requirements.	4
PHYSICS OF HEAT & TEMPERATURE			
A1023	Nature of Heat: Fuels and Combustion	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of three learning programs covering Heat and Temperature, Heat Transfer, and Fuels and Combustion. Fuels and Combustion, the third program in the series, covers the nature of combustion. Major topics include basic chemical reactions, combustion requirements, combustion of solid, gas and liquid fuels, combustion reactions, combustion control, and analysis of combustion products.	4
A1021	Nature of Heat: Heat and Temperature	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of three learning programs including Heat and Temperature, Heat Transfer, and Fuels and Combustion. This program, Heat and Temperature, introduces heat as a form of energy, describes its effects on the phases of matter, introduces the differences between amount of heat and intensity of heat, and describes heat of transformation. Evaporation, pressure considerations, superheat, specific heat, the thermal properties of refinery products, and temperature measurements and expansion are also described.	4
A1022	Nature of Heat: Heat Transfer	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of three learning programs including Heat and Temperature, Heat Transfer, and Fuels and Combustion. Efficient use of heat energy includes not only efficient combustion, but also the efficient transfer of heat energy from one place to another. In this second program in the series, Heat Transfer, three methods of heat transfer are presented - conduction, convection and radiation. Other topics include heat transfer in furnaces, heat transfer rate, and heat exchangers, including fixed shell-and-tube, U-tube and floating head.	2

PETROLEUM INDUSTRY OVERVIEW

COURSE #	COURSE TITLE	DESCRIPTION	HRS
GAS PROCESSING			
INDUSTRY OVERVIEW			
PS-EPT-INO-101	Modern Oil and Gas Industry	In Modern Oil and Gas Industry, you will learn about the historical, geographical, and modern context of the petroleum industry; its organization, the petroleum value chain, and economic drivers.	2
PIPELINE SYSTEMS			
PS-EPT-INO-113	Pipelines and Storage Systems	In Pipelines and Storage Systems, you will learn about the different hydrocarbon transportation systems, advantages of pipelines, pipeline projects, pipeline construction and types of pipelines; pipeline system design and components; pipeline problems and protection; and pigging. In addition, you will learn about hydrocarbon storage systems for liquids and gases, including appropriate types of tank designs and use of depleted reservoirs and salt caverns.	2
SURFACE PROCESSING			
PS-EPT-INO-111	Surface Processing of Produced Fluids	In Surface Processing of Produced Fluids, you will learn about the integrated production system, fluid separation, emulsion breaking, crude products, gas separation and natural gas processing, NGL usage, and natural gas conversion to LNG and GTL.	1

PIPELINE OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
GENERAL PIPELINE OPERATIONS			
PS-MSO-HYD-101	Hydrates	In Hydrates, you will learn about hydrate formation and detection; hydrate prevention equipment and methods, and handling hydrates.	1
PS-MSO-COM-101	Pipeline Commissioning	In Pipeline Commissioning, you will learn about dry and wet commissioning, pre-checks, the commissioning process, and completion.	1
PS-MSO-ISO-101	Pipeline Isolation	In Pipeline Isolation, you will learn about isolation pre-checks, isolating a pipeline, and potential hazards.	1
PS-MSO-PRG-101	Pipeline Purging with Nitrogen	In Pipeline Purging with Nitrogen, you will learn about Nitrogen purging pre-checks, initiating the purge, completing the purge, and purging hazards.	1
PS-MSO-RSS-101	Remote Pipeline Startup and Shutdown	In Remote Pipeline Startup and Shutdown, you will learn about remote pipeline pre-checks and startup steps, post-startup field checks, remote pipeline shutdown pre-checks, shutdown tasks, and potential hazards.	1
PIGGING			
PS-MSO-PIG-101	Introduction to Pigging	In Introduction to Pigging, you will learn about pigging components, types of pigs, the pigging operation, safety, and troubleshooting a missing or stuck pig.	1
PS-MSO-PIG-102	Pig Launching and Receiving	In Pig Launching and Receiving, you will learn about pig launching and receiving pre-checks, preparing the trap barrel to launch or receive a pig, loading, launching, and receiving procedures; pig removal, returning the trap to normal, and potential hazards.	2
PS-MSO-PIG-104	Pipeline In-Line Inspection Tools	In Pipeline In-Line Inspection (ILI) Tools, you will learn about the function and of different types of in-line inspection tools, including magnetic flux leakage (MFL) tools; geometry/caliper tools, such as inertia mapping units (IMU) and multi-channel caliper units; crack detection tools, and potential hazards.	0.75
PS-MSO-PIG-103	Roto-Launch Automatic Multiple Pig Launcher	In Roto-Launch Automatic Multiple Pig Launcher, you will learned about the multiple pig launching system including system overview, benefits of a multiple launching system, rotary and "pig caddie" type launchers, isolation valve and pipeline adapter.	0.5
PIPELINE FUNDAMENTALS			
PS-MSO-FPH-101	Flowing Pipeline Hydraulics	In Flowing Pipeline Hydraulics, you will learn about calculating flowing pipeline hydraulics, including flow rate and friction factor, relative roughness and Reynold's number, pressure drop, converting pressure profiles to hydraulic profiles and finding interface head and hydraulic gradient; how vapor pressure affects pipeline pressure, backpressure requirements in static and flowing pipelines, maximum operating pressure, and pipeline surge or "hammer".	2
PS-MSO-IPH-101	Introduction to Pipeline Hydrocarbons	In Introduction to Pipeline Hydrocarbons, you will learn about natural gas and natural gas products; hydrocarbon compounds and isomers; natural gas impurities; crude oil molecular composition and classification; and oil sands and bitumen processing.	2
PS-MSO-BAT-101	Pipeline Batching	In Pipeline Batching, you will learn about batching operations, interface management, measurement devices, and field operations batching requirements.	1
PS-MSO-PFC-101	Pipeline Flow Characteristics and Static Pipeline Hydraulics	In Pipeline Flow and Static Pipeline Hydraulics, you will learn about pipeline flow, including multiphase flow, and types of liquid slugs and slug catchers; and static pipeline hydraulics, including specific and API gravity, pressure and elevation, calculating hydraulic gradient and static pressure, and the control point.	2
PS-MSO-PHM-101	Pipeline Hydrocarbon Measurement and Testing	In Pipeline Hydrocarbon Measurement and Testing, you will learn about flow measurement, including flow rate, types of flow, pressure and factors that affect flow and flow meters; density measurement, including specific, API, and Baume gravity, and density measuring instruments; conductivity and turbidity measurement and turbidity meters; pH and pH meters; and dew point testing, including water and hydrocarbon dew point, cricondenthem temperature, and hydrocarbon dew point control and measurement.	5
PIPELINE SYSTEMS			
PS-MSO-IPS-101	Introduction to Pipeline Systems	In Introduction to Pipeline Systems, you will learn about pipeline design and components; monitoring pipelines with corrosion protection and pigging; and gas and liquid pipeline system storage and transportation.	2
PS-MSO-MOS-101	Mercaptan Odorizing Systems	In Mercaptan Odorizing Systems, you will learn about mercaptan properties, types of odorizing systems, mercaptan detection and hazards, and odorizing (stenching) a propane rail car.	1
PS-MSO-NDE-101	Non-Destructive Examination (NDE)	In Non-Destructive Examination (NDE), you will learn about the function and different types of NDE, including Ultrasonic Testing (UT), Radiographic Testing (RT), Magnetic Particle Inspection (MPI), and EDDY current testing.	0.5
PS-MSO-PBS-101	Pipeline Bridge Systems	In Pipeline Bridge Systems, you will learn the purpose for a pipeline bridge system crossing and inspection methods used to maintain a safe operating structure.	0.5

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PS-MSO-CRS-101	Pipeline Crossings	In Pipeline Crossings, you will learn about types of pipeline crossings, roles and responsibilities, starting the process and possible hazards, right-of-way (ROW) activities, and hydrovac guidelines.	1
PS-MSO-IES-101	Pipeline Input/Feed and Export Systems	In Pipeline Input/Feed and Export Systems, you will learn about input/feed systems, LACT units, export systems, ESDs, and possible input/export system hazards.	1
PIPELINE SYSTEMS AND COMPONENTS			
PS-MSO-CIS-201	Chemical Injection Systems	In Chemical Injection Systems, you will learn about the function of chemical injection systems, injection method selection, components, and characteristics; and glycol use and typical injection points.	0.75

PROCESS SAFETY

COURSE #	COURSE TITLE	DESCRIPTION	HRS
EMERGENCY PLANNING & RESPONSE			
A1112	Fire Fighting: Extinguishing Agents	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. In this program, Extinguishing Agents, you will learn about the use of water, foam, carbon dioxide, dry chemicals, halons, and dry powders for controlling or extinguishing fires and for protecting men and equipment. You will also learn about proper hose handling and how to use small and large handlines, monitors, and fixed spray systems.	4
A1111	Fire Fighting: Fuels and Combustion	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. In this program, Fuels and Combustion, you will learn that fire is combustion requiring fuel, oxygen, and a source of ignition. You will also learn about the flammability of typical liquid and vapor fuels, the sources of oxygen, the sources of ignition, and the causes and effects of various kinds of explosions and detonations. Finally, you will learn the three ways of extinguishing fires—quenching, smothering, and starving—and the techniques of dispersing flammable vapors to keep them from igniting or re-igniting during a fire.	3
A1113	Fire Fighting: Portable Fire Extinguishers and Foams	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. In this program, you will learn about portable fire extinguishers, which are the first line of defense in many fire situations. This program covers how to select and operate them properly. You will also learn about the construction of CO2 and dry chemical extinguishers and how they are used for putting out small fires. Finally, you will learn about the use of foam for extinguishing large area flat fires, and how both chemical foams and air foams are prepared and applied.	4
A1114b	Fire Fighting: Strategies	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. Your ability to prevent a fire or react to a fire emergency may depend on how well you planned ahead for that particular situation. Planning ahead means that you have identified fire problem areas, developed the appropriate action plans, and prepared to fight a fire with the proper firefighting equipment, techniques and tactics. In this program, you will learn pre-fire planning and basic strategy. You will also learn strategies for fighting tank and dike fires. Finally, you will apply what you have learned in exercises that cover all different types of fires.	3
A1114a	Fire Fighting: Tactics	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. The way you attack a fire depends on several different factors, including how the fuel is burning and the location of the fire. It is important that you know and can implement the correct attack for any type of fire. In this program, you will learn the tactics of hose handling, of operating valves under fire exposure, of using dry chemical and foam, and of protecting pressure vessels.	3
SAFE WORK PRACTICES			
A1197	Job Hazard Analysis and Stop Work Authority	Working within the process industry can result in exceptionally high safety risks, and employers put programs in place to reduce the likelihood of accidents and injuries. Job Safety Analysis (JSA) and Stop Work Authority (SWA) require all employees to watch for safety risks and potential hazards. In this program, you will learn about JSAs and SWA and how you can help implement both.	1
A1170	Safe Handling of Light Ends	In this program, you will learn the physical properties of gaseous hydrocarbons that create hazards, and the special handling and safety procedures that are required.	3
A1190	Safe Laboratory Operations	Laboratory analysis of incoming raw materials and outgoing products has always been a vital concern in the refining, petrochemical and chemical industries. Due to the nature of the materials being tested and the equipment required to perform the necessary tests, safety in the laboratory is a must. Safe Laboratory Operations approaches laboratory safety from the viewpoint that most laboratory procedures involve common safety considerations - personnel attitude, handling hazardous materials, flammability of samples, sources of ignition, handling compressed gases, hazards associated with glassware, personal protective equipment and mechanical safeguards. The program concludes by providing safety information on a variety of specific tests and test equipment: LPG sampling, flash point test, Reid vapor pressure test, test for viscosity, distillation apparatus and vacuum distillation test equipment.	4

PRODUCTION OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
GAS FLOW MEASUREMENT			
A1465	Gas Measurement: Electronic Flow Measurement	In this program, you will learn about the components that make up an electronic flow measurement system. You will learn how the major components operate and how to maintain them, and you will learn to read and interpret generic EFM computer printout sheets. The program also provides a comparison of the advantages and disadvantages of EFM to traditional chart-recording meters.	2
A1462a	Gas Measurement: Equipment and Calculations	In Equipment and Calculations, you will learn about differential pressure within a flowing fluid. The introductory section also defines and discusses rate, velocity and critical flow of a fluid. You will learn about the basic operation of, and the method of measuring with a U-tube manometer, hand-held pitot tubes, permanently installed pitot tubes, calibrated choke nipples, calibrated choke nipples for open-flow potential testing, orifice well testers, and critical flow provers. Also included is a thorough explanation of the operation principles of turbine meters and rotary displacement meters. Finally, you will learn about proving with test meters, with low-pressure flow provers, and with critical flow provers.	6
A1461	Gas Measurement: Fundamentals	In Fundamentals of Gas Measurement, you will learn about the physical theory behind gas measurement hardware and practices. This program teaches the relationships between gas pressure, temperature and volume. You will also learn about Boyle's Law, Charles' Law, and the General Gas Law. You will learn about the difference between real and ideal gases, which will also provide the basis for an understanding of super-compressibility, known as the Z factor. The program also explains absolute, gauge and atmospheric pressures, the difference between a temperature scale and its absolute equivalent. Finally, you will learn about the concepts of specific gravity and density. The problem of calculating standard volume from measured volume provides a practical focus for the theory and concepts.	3
A1462c	Gas Measurement: Orifice Flow Calculations	Orifice Flow Calculations is an in-depth program covering the measurement of gases flowing through orifice meters. You will learn about the orifice flow rate equation and the eleven factors in the orifice meter flow constant. Tables are provided for the factors so you can work through the field measurement problems.	4
A1462b	Gas Measurement: Orifice Meters	Orifice Meters introduces the learner to the behavior of gases flowing through an orifice meter and to the measurement of that flow. Additionally, this program covers the American Gas Association's (AGA's) installation recommendations for orifice meters, including both mercury manometer-type and bellows-type meters. Special attention is given to the operation, inspection, and maintenance of pressure and temperature recorders as well as recorder-chart handling and reading. An auxiliary equipment section teaches proper handling of the dead weight tester, the specific gravity balance, the impulse-torque gravitometer and the rotometer. The program concludes with gas measurement economics, including the cost of vented gas loss.	4
A1466	Gas Measurement: Witnessing	In this program, you will learn about the major responsibilities of the witness during an orifice meter test. This program covers the equipment and supplies needed to witness an orifice meter test; identifies what components should be checked during a witnessing session; describes the proper methods for calibrating temperature, static, and differential pressure elements; and describes the required checks for the orifice plate and fitting.	2
PROCESS SAFETY MANAGEMENT			
A1638	SEMS Standard and Requirements	In SEMS Standards and Requirements, you will learn about the Bureau of Ocean Energy Management (BOEM) and Bureau of Safety Environmental Enforcement (BSEE) regulations established in 30 CFR, 250, Subpart S.	1
PSST (T2)			
A1630	Oil and Gas Production Overview	In this first program in the series, operators will learn about the basic geology and fluid science of oil and gas production, including liquid separation. Operators will also learn about well equipment and oil and gas processing systems. This program is designed for operators who require a basic understanding of offshore oil and gas production, processing and equipment.	3
A1634	Process Component Safety Analysis and System Testing	In this sixth program in the series, operators will learn about the basic operation of safety devices that regulate process variables, including pressure, temperature, level, and flow. This program is designed for Production Foremen, Senior (Lead) Operators, "A" Operators, Instrument and Electrical Technicians, and/or other positions.	4

COURSE #	COURSE TITLE	DESCRIPTION	HRS
A1631	Production Safety Equipment and Support Systems	In this second program, operators will learn about process components, variables, and safety devices involved in offshore oil and gas production. Operators will also learn about safety requirements specified in API's Recommended Practice 14C, including identifying undesirable events, reading and interpreting Safety Flow Charts, and identifying components of the Emergency Shutdown System. This program is designed for all offshore oil and gas production positions and personnel involved in the operation, maintenance or testing of production safety systems and devices.	5
A1633	Production Safety Systems Regulations and Device Identification	In this fourth program in the series, operators will learn about the regulations governing safety systems and the different types of safety devices found on offshore process components. This program is designed for "B" Operators, Instrument and Electrical Technicians, "A" Operators, Senior (Lead) Operators, Production Foremen and/or other positions	2
A1639	Reducing Marine Trash and Debris	Reducing Marine Trash and Debris is designed to help you meet the training requirements of 30 CFR 250.300 (a) and (b)(6). It covers information related to marine trash and debris in offshore environments, including how to report pollution, and how to prevent it.	1
A1635	Safety Device Operation	In this sixth program in the series, operators will learn about the basic operation of safety devices that regulate process variables, including pressure, temperature, level, and flow. This program is designed for Production Foremen, Senior (Lead) Operators, "A" Operators, Instrument and Electrical Technicians, and/or other positions.	4
A1636	Testing and Setting Safety Devices	In this seventh program in the series, operators will learn how to test the operating performance of a safety device in each major class of surface and subsurface safety devices. Operators will also learn how to properly adjust, calibrate or reset these devices. This program is designed for Production Foremen, Senior (Lead) Operators, Instrument and Electrical Technicians, and/or other positions.	4
A1632	Well Control and Production Safety Regulations	In this third program in the series, operators will learn about regulatory requirements governing well control and production safety duties specified in 30 CFR 250, including pollution prevention requirements, well completion requirements, and oil and gas drilling requirements. This program is designed for Mechanics and Electricians, "B" Operators, Instrument and Electrical Technicians, "A" Operators, Senior (Lead) Operators, Production Foremen and/or other positions.	3
WATER TREATMENT			
A1575c	Water Treatment and Disposal: Facilities and Testing	Since water is common in oil and gas reservoirs, most wells will produce it at some point in their worklife. When this occurs, it is necessary to dispose of the water in some way. Oilfield water, however, usually contains salt and other impurities that are harmful to fresh water reserves. And, these same impurities may cause corrosion or plugging in oilfield equipment. To counteract these destructive tendencies, oilfield water is given special treatment before its disposal. Water Treatment and Disposal is a series of three learning programs that will introduce you to some of the treatment methods and disposal techniques that are used on the lease. In Facilities and Testing, you will learn about water storage and disposal, and water testing.	2
A1575a	Water Treatment and Disposal: Fundamentals	Since water is common in oil and gas reservoirs, most wells will produce it at some point in their worklife. When this occurs, it is necessary to dispose of the water in some way. Oilfield water, however, usually contains salt and other impurities that are harmful to fresh water reserves. And, these same impurities may cause corrosion or plugging in oilfield equipment. To counteract these destructive tendencies, oilfield water is given special treatment before its disposal. Water Treatment and Disposal is a series of three learning programs that will introduce you to some of the treatment methods and disposal techniques that are used on the lease. In Fundamentals, you will learn about the fluids found in reservoirs, scale deposits, and corrosion and microorganisms.	3
A1575b	Water Treatment and Disposal: Processes and Equipment	Since water is common in oil and gas reservoirs, most wells will produce it at some point in their worklife. When this occurs, it is necessary to dispose of the water in some way. Oilfield water, however, usually contains salt and other impurities that are harmful to fresh water reserves. And, these same impurities may cause corrosion or plugging in oilfield equipment. To counteract these destructive tendencies, oilfield water is given special treatment before its disposal. Water Treatment and Disposal is a series of three learning programs that will introduce you to some of the treatment methods and disposal techniques that are used on the lease. In Processes and Equipment, you will learn about gas exchange and degasification equipment, coagulation and sedimentation, and filters.	3

COURSE #	COURSE TITLE	DESCRIPTION	HRS
WELL SYSTEM PERFORMANCE			
A1555a	Heater Treaters: Fundamentals	Heater Treaters: Fundamentals introduces you to the treatment given to crude oil as it is produced. The program covers how emulsions are formed and how stable emulsions are broken by chemical treatment. The program also introduces you to the basics of heater treater construction and operation.	3
A1555b	Heater Treaters: Types and Operation	Heater Treaters: Types and Operation discusses the construction and operation of horizontal heater treaters, thermal-electric horizontal heater treaters, vertical heater treaters. The program also covers trouble-shooting and heater treater operating economy.	3

REFINERY OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
TURNAROUND			
PS-REF-TUR-101	Turnaround Operations	During process operations, equipment becomes less flexible and increasingly unable to reach maximum production capacity because operating conditions deteriorate. To keep conditions optimal for production, process facilities schedule turnaround (T/A) operations to restore unit operating capabilities. In this series, you will learn about T/A operations, how they are implemented, and the overall impact a turnaround operation has on facility costs.	5

ROTATING & RECIPROCATING EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
AIR COMPRESSORS			
A1050	Air Compressors	In Air Compressors, you will learn about the different types and applications used in the oil and gas industry including their principles of operation based upon Boyle's and Charles gas laws, reciprocating and rotary positive displacement compressors, and centrifugal, ejector and axial flow dynamic compressors.	1
CENTRIFUGAL COMPRESSORS			
A1053a	Centrifugal Compressors: Introduction	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is about the construction and operation of compressors. In this program you will learn the construction, principal parts, and operation of reciprocating compressors.	3
A1053b	Centrifugal Compressors: Construction and Operation	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is about the construction and operation of compressors. In this program you will learn about the construction and operation of centrifugal compressors.	4
CENTRIFUGAL PUMPS			
A1071b	Centrifugal Pumps: Equipment and Operation	Centrifugal pumps are machines which use centrifugal force to move liquids. In this program, you will learn about the construction of pump parts, including packing boxes, seals, bearings, balancing drums, and couplings. You will learn the relation of alignment and misalignment to vibration, how pumps are lubricated, and how they are cooled in operation. Finally, you will learn the details of pump operation including start-up, normal operation, and shut-down. You will learn what the common problems of centrifugal pump operation are and how to spot and correct them, and how to maintain the pumps for dependable, safe operation.	4
A1071a	Centrifugal Pumps: Introduction	Centrifugal pumps are machines that use centrifugal force to move liquids. In this program, you will learn the principles, parts, and general operation of these pumps, what pump efficiency is, and how head and pressure are calculated.	3
COMPRESSOR PERFORMANCE			
PS-MSO-GCP-201	Gas Compressor Performance	In Gas Compressor Performance, you will learn about performance differences between centrifugal, reciprocating, and screw compressors, including capacity, conditions that affect compressor performance, and pressure/volume (P/V) diagrams.	1
COUPLINGS AND GEARS			
A1085b	Couplings, Gear Trains, and V-Belts: Gear Trains and V-Belt Drives	This program covers two different ways prime movers or drivers are connected to driven equipment, the special advantages and problems of each of the different ways, and the adjustment and preventive maintenance of different types of coupling equipment. Also covered are the physical principles of power transmission, and the relationship of speed and torque as different forms of power. You will learn about simple and compound gear trains, and how gear trains may be used as speed changers or torque increasers. You will learn about spur, helical, double-helical, bevel, and worm gears, and the uses of each. You will learn about gear lubrication and about handling the shock loads that your equipment applies to gears. Finally, you will learn about the construction and uses of the different types of single and multiple V-belt drives, the use of V-belt drives as speed changes, the adjustment and replacement of V-belts, and the control of slippage.	4
A1085a	Couplings, Gear Trains, and V-Belts: Machine Connections and Couplings	This program covers one way drivers are connected to driven equipment. You will learn about the special advantages and problems associated with couplings, and their adjustment and preventive maintenance requirements. In this program, you will learn about the causes and control of misalignment, end float, surges in torque, and the different basic types of rigid and flexible couplings.	3
DYNAMIC PUMPS			
A1070	Introduction to Dynamic Pumps	In Introduction to Dynamic Pumps, you will about fluid flow, dynamic pump classifications and properties of the two dynamic pump types - axial and centrifugal.	1
FANS AND BLOWERS			
PS-MNT-FBL-101	Fans and Blowers	In Fans and Blowers, you will learn about centrifugal, cross-flow, and axial flow fans, mechanical draft, positive displacement, and dynamic blowers; fan and blower system characteristics, and fan efficiency.	3
GAS TURBINES			
A1083b	Combustion Gas Turbines: Equipment and Operation	In Combustion Gas Turbines: Systems and Operation, you will learn about the functions of casing seals, bearings and lubrication in a combustion gas turbine. The program also covers the control and operation of combustion gas turbines, including start-up, operating, and shutdown procedures, and the control of vibration, critical speed, and turbine imbalance. Finally, you will learn about temperature control, the use of turning gears, and turbine control using the automated control panel. Through this understanding of turbine principles, construction, and control, you will be better able to secure efficient and safe turbine operation.	4

COURSE #	COURSE TITLE	DESCRIPTION	HRS
A1083a	Combustion Gas Turbines: Introduction	In Combustion Gas Turbines you will learn the operating principles of the compressor, the combustion chamber, and turbine section. You will also learn about the construction of the compressor, combustion chamber, and turbine section; the blading arrangement; and the use of the turbine as a driver and hot-gas generator. Also covered is turbine auxiliary equipment such as starting devices, governors, and overspeed mechanisms, and their functions.	4
INTERNAL COMBUSTION ENGINES			
A1084a	Internal Combustion Engines: Introduction	Internal combustion engines are engines which burn fuel in a cylinder to produce power. Presented in this program are the principles of the internal combustion engine, and its general operation and parts. You will learn how the combustion cycle differs in 2-cycle and 4-cycle engines. You will also learn some of the more common cylinder arrangements. Also covered are the details of the construction of an internal combustion engine, including the camshaft, carburetor, natural gas admission system, safety devices, and the electrical system. You will learn how each of these parts functions as a part of the total engine. Finally, you will learn the principles of a diesel engine, how it operates and how it differs from the traditional IC engine.	4
A1084b	Internal Combustion Engines: Operating Techniques	Internal combustion engines are engines which burn fuel in a cylinder to produce power. In this program, you will learn the details of the auxiliary systems of IC engines and how they operate, including the cooling system, lubrication system, air cleaners, superchargers and exhaust systems. You will also learn the operation and maintenance of the engine, how to read an instrument panel and interpret gauge readings, typical engine start-up and shut-down procedures, and preventive maintenance procedures for daily, weekly and monthly checks.	3
MIXERS AND BLENDERS			
PS-MNT-MXB-201	Mixers and Blenders	In Mixers and Blenders, you will learn about the difference between liquid and solid blending; solids mixing, including convective, shear, and diffusive mixing; fluids mixing, including bulk transport, molecular diffusion, and turbulent and laminar mixing; semi-solid mixing; advantages and disadvantages of batch and continuous mixing; types of mixing equipment, including blenders, agitators, and heavy duty mixers.	1
POSITIVE DISPLACEMENT COMPRESSORS			
A1052b	Positive Displacement Compressors: Construction and Operation	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is about the construction and operation of compressors. In this program you will learn the construction, principal parts, and operation of reciprocating compressors.	4
A1052a	Positive Displacement Compressors: Introduction	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is an introduction to positive displacement compressors. In this program you will learn the operating principles of reciprocating compressors, the different types of rotary compressors, and techniques for controlling compressor output.	3
POSITIVE DISPLACEMENT PUMPS			
A1072b	Positive Displacement Pumps: Equipment and Operation	Positive displacement pumps are reciprocating and rotary pumps that move liquid by the positive displacement of liquid volume. In this program, you will learn about packing, lubrication, and cooling systems, the construction and operation of pump valves, pulsation dampeners and suction stabilizers, variable displacement devices and bypasses and relief valves. Finally, you will learn startup and shutdown procedures, how to recognize and solve common pumping problems; and proper operating maintenance.	4
A1072a	Positive Displacement Pumps: Introduction	Positive displacement pumps are reciprocating and rotary pumps that move liquid by the positive displacement of liquid volume. In this program, you will learn the operating principles and performance characteristics of positive displacement pumps, what determines their capacity, pressure, horsepower and efficiency, and how NPSH is calculated. You will also learn the basic types of reciprocating and rotary pumps, including piston pumps, plunger pumps, diaphragm pumps, direct-acting steam and air pumps, and rotary lobe, vane, gear and screw pumps, and how these pumps differ from each other in design and performance.	4
SCREW COMPRESSORS			
PS-MSO-SCC-101	Screw Compressor Components and Auxiliary Equipment	In Screw Compressor Components and Auxiliary Equipment, you will learn about screw compressor components, including rotors, bearings, balance piston, shaft seals, and stepless capacity control; along with auxiliary systems such as suction scrubbers, oil system, oil cooling, economizer, and utilities.	2

COURSE #	COURSE TITLE	DESCRIPTION	HRS
STEAM ENGINES AND PUMPS			
A1086a	Steam Engines and Pumps: Introduction	In Introduction to Steam Engines and Pumps, you will learn about steam engine and pump basics, steam engine and pump valves, constructing steam engines and pumps, and steam engine control.	4
STEAM ENGINES AND PUMPS			
A1086a	Steam Engines and Pumps: Introduction	In Introduction to Steam Engines and Pumps, you will learn about steam engine and pump basics, steam engine and pump valves, constructing steam engines and pumps, and steam engine control.	4
A1086b	Steam Engines and Pumps: Operation and Maintenance	In Steam Engines and Pumps: Operation and Maintenance, you will learn about steam engine control systems, steam engine lubrication, operation and maintenance, and steam pumps.	4
STEAM TURBINES			
A1082b	Steam Turbines: Equipment and Operation	Steam turbines may differ from one another in size, appearance, and construction, but all steam turbines are similar in operation and work on similar principles. In this program, you will learn about the construction of the turbine, including rotor and casing, diaphragms, seals, and packing boxes, and labyrinth and carbon ring packing. You will also learn about the construction of the bearings and bearing combinations used in turbines, of single- and multi-valve governors, and of the oil circulation system. And finally, you will learn turbine operation and operating problems; the effects of pressure, heat, and steam condensation; uneven heating and cooling; leakage of steam; vibration; lubrication and lubrication problems; speed adjustment, instrumentation, and the visual inspections that must be conducted before startup. With this understanding of turbine principles, construction and control, you will be able to ensure the efficiency and safety of turbine operations.	4
A1082a	Steam Turbines: Introduction	Steam turbines may differ from one another in size, appearance, and construction, but all steam turbines are similar in operation and work on similar principles. In this program, you will learn how impulse and reaction turbines convert thermal energy to mechanical energy, how condensing and non-condensing turbines work, how turbine speed is controlled, and how the over-speed trip protects the turbine against failure of other speed controls.	3

STATIONARY EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
FIRED HEATERS			
A1165	Fired Heaters: Equipment and Design	The major source of energy consumption in a refinery, chemical, or petrochemical plant is fuel for fired heaters. Fired heaters are used in many process operations such as distillation, reforming, olefins manufacturing and hydrocracking. Almost every unit in a plant or refinery is equipped with some type of fired heater. With the rising cost of fuel, efficient operation of these furnaces can save hundreds of thousands of dollars for a company each year. In this program, you will learn about basic furnace operating principles of fired heaters and details of equipment construction and function.	3
A1166	Fired Heaters: Operating Techniques	The major source of energy consumption in a refinery, chemical, or petrochemical plant is fuel for fired heaters. Fired heaters are used in many process operations such as distillation, reforming, olefins manufacturing and hydrocracking. Almost every unit in a plant or refinery is equipped with some type of fired heater. With the rising cost of fuel, efficient operation of these furnaces can save hundreds of thousands of dollars for a company each year. In this program, you will learn about safe and efficient operating procedures for fired heaters, including variables that are monitored on the process and combustion sides of the furnace, and the major steps and safety measures in furnace startup, shutdown, and emergency shutdown.	4
FURNACE			
A1032	Furnace Operations: Working With Furnaces	Few aspects of operation are more sensitive or more potentially hazardous than furnace startup and shutdown. This program leads you through these two important procedures to a complete understanding of the rigorous order of successive steps required and the way to accomplish each step prudently. Finally, you will be presented with several situations that can be brought under control by an astute application of the general principles of furnace operation. Each situation is adapted from an actual incident from the history of petroleum refining. You will examine real symptoms, consider their significance and choose a course of action that results in proper and economical firing of the furnace.	4
A1031	Introduction to Furnace Operations	This program describes the furnace and its components. You will learn about how the components function in the total process of making heat and transferring it to the petroleum materials being processed into useful products. Also discussed are the three elements of combustion - fuel, air, and a source of ignition - and the way these elements are combined under controlled conditions in the furnace. Providing air for combustion in sufficient quantity for maximum release of heat is the normal day-to-day task of the operator. This program discusses the operation and use of air control equipment and the indicators and analyzers that make strict regulation of the air supply possible. Proper control of air minimizes the consumption of fuel and extends the life of furnace equipment. Operators who develop the ability to regulate air supply within narrow limits contribute to the economy of heat production and extended life of the equipment.	4
HEAT EXCHANGERS			
A1160a	Heat Exchangers: Introduction	In this program, you will learn about heat transfer as it is applied in modern refining techniques, conduction and convection as methods of heat transfer and heat transfer in tubes. You will also learn the various parts of heat exchangers and their functions, as well as the various types of shell and tube heat exchangers.	4
A1160b	Heat Exchangers: Operations and Maintenance	In this program, you will learn about startup and shutdown procedures in heat exchanger operation and maintenance, the various problems of exchanger maintenance, and the flow and mechanisms of various heat exchange systems.	3
PS-MNT-THE-101	Shell and Tube Heat Exchangers	In Shell and Tube Heat Exchangers, you will learn about shell and tube components, exchanger operation and flow paths; cleaning procedures and requirements; contaminants, testing and repairs.	3
PS-MNT-HEX-101	Heat Exchangers for Technicians	In Heat Exchangers for Technicians, you will learn about types and functions of heat exchangers, contaminants, cleaning requirements, testing and repairs.	3

COURSE #	COURSE TITLE	DESCRIPTION	HRS
OIL AND GAS SEPARATORS			
A1470	Oil and Gas Separators	In Oil and Gas Separators, you will learn the effects of pressure, temperature, and density on fluid separation and the function of separator components, such as baffles and mist extractors. You will learn how the backpressure regulator and the liquid level controller operate to maintain optimum separation conditions. You will also learn to recognize such basic separators as vertical, horizontal, spherical, double-tube, baffling, and metering separators. And, you will be introduced to the related processes of liquid stabilization, stage separation, low temperature separation, gas dehydration, and crude oil dehydration.	3
VALVES			
A1206	Valve Maintenance	This program reviews the various types of valves in piping systems and the maintenance required to keep them in good operating condition. You will learn how to lubricate valves, adjust valve packing, and inspect steam traps.	2
A1140a	Valves: Introduction to Valves	Valves are used to control the flow of liquids and gases. In this program, you will learn about the construction and operation of the most widely used valves, such as gate, globe, plug, and check valves.	4
A1140b	Valves: Operating Valves	Valves are used to control the flow of liquids and gases. In this program, you will learn to operate and maintain valves. You will also learn what valves should be used with various types of service and how to troubleshoot difficulties that may develop due to fouling, leakage, or wear.	3
PS-MNT-VDC-101	Valve Design and Characteristics	In Valve Design and Characteristics, you will learn about fluid flow in pipes, selecting a valve, valve body materials, mounting styles, sizing, cavitation, flashing, noise, and flow characteristics.	1.5
PS-MNT-VLA-101	Valve Accessories	In Valve Accessories, you will learn about valve accessories, including hand wheels, manual levers and loading stations, transducers, air sets, volume boosters, fail-safe systems, limit switches, and positioners; and calibrating and troubleshooting valve accessories.	2
PS-MNT-VLV-101	Valves Inspection, Testing and Repair	In Valves Inspection, Testing and Repair, you will learn about types of valves, valve components, specifications and standards; visual inspection, repairs and maintenance, removing and installing valves, and pressure testing.	3
SEPARATORS			
PS-MSO-CTS-101	Two Phase and Three Phase Separators	In Two and Three Phase Separators, you will learn about separator function, operating pressure; vertical, horizontal, and spherical separators; primary separation, secondary separation, mist extraction, and liquid accumulation sections, and separator external components and controls.	2
COLUMNS AND PROCESS VESSELS			
PS-MNT-CPV-101	Columns and Process Vessels	In Columns & Process Vessels, you will learn about components and functions of process vessels; regulations and standards for performing inspections, internal and external inspections; and packed and tray tower internal and external repairs and maintenance.	3

UTILITY, SAFETY AND FACILITY SYSTEMS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
COOLING TOWERS			
PS-MNT-CTW-101	Cooling Towers for Technicians	In Cooling Towers for Technicians, you will learn about natural draft, louver covered natural draft, mechanical draft, and induced draft types of cooling towers, components, classification and modes of operation; maintaining water and filtration systems, fan and drive systems, heat transfer surfaces, fill pack, drift eliminator, and air inlet louver maintenance, and cooling tower troubleshooting.	5
A1150a	Cooling Towers: Introduction	A great deal of process water is used daily within industry to cool process products and equipment. To conserve this potentially scarce resource and to minimize the costs of industrial cooling, much of the water is recycled and used again. This recycling operation is accomplished by utilizing a recirculating water cooling system. The system is composed of two major parts - a heat exchanger that transfers heat from a hot liquid to the cooling water and a cooling tower, which cools the water so that it can be reused. In this program, you will learn about various types of cooling towers and their construction, how they cool to save water and the factors that affect cooling tower performance.	5
A1150b	Cooling Towers: Water Conditioning	Billions of gallons/liters of water are used daily by industry to cool process products and equipment. To conserve this potentially scarce resource and to minimize the costs of industrial cooling, much of the water is recycled and used again. This recycling operation is accomplished by utilizing a recirculating water cooling system. The system is composed of two major parts - a heat exchanger that transfers heat from a hot liquid to the cooling water and a cooling tower, which cools the water so that it can be reused. Because cooling water is recirculated throughout the cooling system, it must be treated to remove or neutralize impurities that would otherwise damage the heat transfer equipment. In this program, you will learn about water conditioning and its effect on the efficiency and upkeep of cooling tower units.	5
FIRE AND GAS SYSTEMS			
PS-EIA-FDE-101	Fire Detection	In Fire Detection, you will learn about fire detection systems, including heat, smoke, and flame detectors; hydrocarbon emissions, UV/IR sensors and how to calibrate and troubleshoot these systems.	2
PS-MNT-FPS-101	Fire Protection Systems	In Fire Protection Systems, you will learn how about fire protection system components, fire pump types, operation, and maintenance; gas detector system types and sensors; Fire/gas detection system types, control, and operation; fire/gas protection systems, extinguishers, and maintenance, and fire/gas panels and maintenance.	6
PS-EIA-GDE-101	Gas Detection	In Gas Detection, you will learn about gas terminology, combustible gas detection, sensor types and features; detector and sensor calibration and troubleshooting.	1.5
FLARE SYSTEMS			
PS-MSO-FSF-101	Flare System Fundamentals	In Flare System Fundamentals, you will learn about applications for gas flaring, such as high pressure protection, natural gas processing, solution gas, and well testing; flare systems; flame monitoring; fuel, pilot, makeup, and purge gases; and flare system equipment.	2
PS-MSO-FSH-101	Flare System Hazards and Ignition	In Flare System Hazards and Ignition, you will learn about gas flaring and flare system safety, including thermal radiation, explosion hazards, liquid carryover, noise, temperature limits and incomplete combustion; flame ignition and detection systems, pilot flame ignition systems, and flare ignition systems.	1
PS-MSO-FSP-201	Flare System Purging Startup and Shutdown	In Flare System Purging Startup and Shutdown, you will learn about general purging considerations; purging methods, including displacement, dilution, and pressure cycle purging; and flare system startup and shutdown inspection, preparation, and procedures.	1
PS-MSO-PKD-201	Pumping Out Flare Knockout Drums	In Pumping Out Flare Knockout Drums, you will learn about flare knockout drum function, hazards, knockout drum liquid disposal considerations, ambient air monitoring, and general procedures.	0.5
LIQUID NITROGEN SYSTEMS			
PS-MNT-LNN-101	Liquid Nitrogen Storage Systems	In Liquid Nitrogen Storage Systems, you will learn about the properties and characteristics of nitrogen, the major health hazards and precautions for handling, common industry applications for nitrogen, and the major system equipment in a liquid nitrogen storage system.	0.75
PLANT COMMUNICATION SYSTEMS			
A1192	Plant Radio Communication	In Plant Radio Communication, you will learn how to operate plant radio equipment to communicate effectively and according to FCC rules.	1

POWERED INDUSTRIAL EQUIPMENT			
PS-MNT-FOM-101	Forklifts	In Forklifts, you will learn about basic principles of forklift operation, applications, pallets and stillages, palletless handling, hydraulically powered fork options, telescopic handlers, inspection and certification.	1
PRESSURE SAFETY DEVICES			
PS-MNT-PRS-101	Pressure Relief Safety Devices	In Pressure Relief Safety Devices, you will learn about the purpose of pressure relief safety devices, common types including conventional relief valve, balanced relief valve, pilot operated relief valve and rupture disk; the difference between a full lift, high lift, or low lift pressure relieving safety device, internal material options for the different service conditions and major factors involved in the selection of a pressure relieving safety device.	0.5
VENT AND RUNDOWN SYSTEM			
PS-MNT-VSR-101	Vent System and Rundown System	In Vent and Rundown System, you will learn about vent stacks and rundown vessels, including vertical and horizontal flash tank operation; internal and external inspections; maintaining stacks and rundown vessels, and packed tower repairs.	2.5
WATER TREATMENT			
PS-MNT-DWT-101	Fundamentals of Demineralized Water Treatment Systems	In this course, you will learn about the fundamentals of demineralized water treatment systems including the need for boiler water treatment, reverse osmosis process and ion exchange cycle operation, regeneration, mixed bed polishing, and selective ion exchange.	0.75
PS-MNT-ROS-101	Fundamentals of Reverse Osmosis Systems	In Fundamentals of Reverse Osmosis systems, you will learn about the reverse osmosis process, the differences between natural and reverse osmosis, pre-treatment options and system maintenance.	1
PS-MNT-PWT-101	Potable Water Treatment System	In Potable Water Treatment Systems, you will learn about the need for potable water treatment, types of water contamination, potable water treatment process, water disinfection, and reverse osmosis.	1
A1102	Wastewater Treatment: Biological Treatment Process	Following preliminary treatment, the different wastewater streams are mixed together to a more or less uniform consistency for further treatment by a process called biological oxidation, also known as the activated sludge process. This process uses microorganisms to digest and break down the organic chemicals in the wastewater, producing treated effluent and sludge. This program examines the equipment used in the activated sludge process and its operation. You will also learn about sludge treatment and disposal methods and examine the various methods of effluent polishing, which further remove suspended solids and hard-to-treat organics before the treated wastewater is discharged as effluent into the environment.	3
A1101	Wastewater Treatment: Preliminary Treatment	Wastewater treatment is an increasingly important aspect of refinery and chemical plant operations. An efficient wastewater plant is not only important from the standpoint of environmental conservation, but also represents an opportunity to recover and recycle some resources that might otherwise be lost, thereby contributing to the economic success of the overall process operation. In this program, you will learn about important sources of contamination within a typical refinery, and contaminants that various process operations may generate. You will also learn about the various preliminary, or physical, treatment processes that the different wastewater streams must undergo before they are suitable for further processing. The program also covers methods used to remove and recover emulsified oil from wastewater and the different chemical unit operations that are used to improve the operation of the physical treatment processes.	4
A1103	Wastewater Treatment: Process Control	The effectiveness of the biological oxidation process is affected by a number of control factors. These factors can be divided into two basic categories, environmental and process-related. The environmental control factors include the organic loading, pH, availability of nutrients, temperature, and presence of toxic substances, and determine the environment in which the biox process takes place. The process-related control factors are adjusted by the operator to achieve the best effluent quality, and include the influent rate, the return activated sludge rate, and the waste activated sludge rate. This program examines the effect each variable has on the process, and the relationship between them. You will also learn strategies that you can use to monitor and optimize the process operation. The program includes some simple calculations that you can perform to determine the operating target levels.	3

COURSE #	COURSE TITLE	DESCRIPTION	HRS
A1104	Wastewater Treatment: Testing and Troubleshooting	Testing is an important responsibility of the wastewater treatment operator. The biological oxidation (activated sludge) process is very sensitive to changes in its operation, so it is critical that you know what tests to run, how to run them, and how to use the test results to keep the process operating effectively. This program covers important tests that a treatment plant operator commonly uses on a daily basis to monitor the operation of the unit. You will learn the units of measurement and the methods of calculating the results of the tests for total solids, volatile solids, and suspended solids. The BOD5 test procedure is covered for general information and methodology. The program also covers the 30-minute sludge-settling test and calculation of the sludge volume index. Because the 30-minute settleability test is a quick, easy test that can be performed without laboratory analysis, the program includes some of the troubleshooting steps you might take, based on some typical results of the 30-minute settleability test.	2
WEIGHING EQUIPMENT			
PS-MNT-WBS-101	Weigh Bridges, Docks Levelers & Scales	In Weighbridges, Dock Levelers and Scales, you will learn about the purpose of weighbridges, dock levelers, and scales, and how to maintain and troubleshoot them.	1
PS-MNT-WDV-101	Weighing Devices	In Weighing Devices, you will learn about weighing terminology, types of load cells, sensors, and feeders; truck and rail scales; calibrating weighing devices; and troubleshooting strain gages, load cell electrical problems, and instrumentation and communications problems.	2



GAS PLANT **OPERATORS**



COURSES

243



HOURS

334

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ELECTRICITY AND ELECTRICAL EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
DRAWINGS AND DIAGRAMS			
A1186	Electrical System Basics and Diagrams	In Electrical System Basics, you will learn about electrical generation and transmission, system voltages, and building schematic diagrams; Single line drawings, electrical symbols, and logic symbols and gates; and low and medium voltage motor drives and drive circuits.	3
ELECTRICAL FUNDAMENTALS			
PS-EIA-EDO-101	Electrical Documentation	In Electrical Documentation, you will learn about types of electrical documentation, electrical loop numbers and symbols; power distribution and cable layout diagrams; control/schematic diagrams; protection and hazardous area diagrams; updating, storing, and controlling diagrams.	1.5
A1620	Electrical Fundamentals	The first section of Electrical Fundamentals describes units of electrical measurement, states Ohm's law and shows some of its uses, and describes and shows differences between series and parallel circuits. This section also shows some of the effects of resistance in series and parallel circuits, the use of resistance as voltage dividers, and ways to produce and make use of voltage drop. Next, the program describes how a magnetic field is produced and how magnetic fields are used in motors, measuring devices, and as resistors in electrical circuits and devices. You will also learn about the effects produced by alternating current, which describes alternating current, voltage and current phases, self-inductance, inductive reactance, the use of capacitors in AC circuits, and the use of induction coils as transformers. The program concludes with basic electronics, which briefly describes diodes and transistors and shows how they are used to rectify current and amplify electrical signals. This section also introduces simple transistor circuits and describes the use of capacitors in such circuits.	4
PS-MSO-ESP-101	Electrical System Protection	In Electrical System Protection, you will learn about electrical cables, conductors, and grounding; circuit protection, including causes of overcurrent, fuses, circuit breakers and protection relays, switchgear and contactors; and emergency power supplies, including batteries and generators, uninterruptible power supply configuration, and emergency generators.	3
A1185	Understanding Electricity	In Understanding Electricity, you will learn how to safely work with electricity. You will learn about basic electrical terms, the effect of electric current on the human body, and why electricity is a potential hazard. Additionally, you will learn about grounding electrical equipment, the proper precautions you must take when working with electrical equipment, and how to act in an emergency. The Electric Power Distribution System section describes how electric power is distributed from a generating plant to a lease. Finally, you will learn about measuring electric usage, including units of measurement and how to read a meter.	4
MOTORS			
A1081	AC Motors for Operators	Designed for Operations Personnel, AC Motors describes how a motor changes the energy of electric current into mechanical power. This program describes how electric current produces magnetism and magnetism induces electric current. You will learn how motors are designed so that the attracting and repelling of magnetic fields sets up rotation of the shaft. Also covered is the starting and running characteristics of AC motors, and the speeds and horsepower of AC motors. The section on motor control describes starting and stopping mechanisms for AC motors, protective devices that may be found on motor controllers, and safety devices. You will learn proper procedures for starting, running, and stopping the motor. Finally, the program describes lubrication and maintenance procedures, and types of motor enclosures.	5
PS-MSO-MCC-101	Motor Control Centers (MCCs)	In Motor Control Centers (MCCs), you will learn about motor control and motor control centers (MCC) including MCC common components of vertical sections, enclosure types, NEMA phase arrangement, MCC rating, overcurrent protection devices (fuses and circuit breakers), wiring classes and combination motor control units; motor starters including full-voltage and soft starters; variable frequency drives and programmable logic controllers.	1
SWITCHGEAR			
PS-MSO-ELC-101	Electrical Load Centers and Panelboards	In Electrical Load Centers and Panelboards, you will learn about Load Centers used in residential and light commercial applications including construction; main breaker, main lug only, and branch circuit breakers; power supply systems of 3-wire, 3-phase and 4-wire types; and load center grounding requirements.	1

GAS PROCESSING OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
DEHYDRATION			
PS-MSO-GST-101	Glycol Sampling and Testing	In Glycol Sampling and Testing, you will learn about visual checks, glycol sampling properties, and normal ranges and testing frequency.	1
PS-MSO-DPT-101	Dewpoint Testing/Requirements	In Dewpoint Testing/Requirements, you will learn about hydrocarbon and water dew points, dew point control, how dew point is measured, and dewpoint testing accuracy.	1
A1585	Glycol Dehydration	In Glycol Dehydration, you will learn about water vapor, the process of glycol dehydration, measuring water content, monitoring equipment, and testing and operations.	5
PS-MSO-GDO-101	Glycol Dehydration Equipment and Operation	In Glycol Dehydration Equipment and Operation, you will learn about the glycol dehydration process, contactor and regeneration main equipment, and the process variables that affect glycol dehydration operation.	1
PS-MSO-GIS-201	Glycol Injection System Operation	In Glycol Injection System Operation, you will learn about the function of monoethylene glycol (MEG), glycol loss, scaling and fouling, hydrocarbon carryover; glycol regeneration operation, including stripping gas, reflux ratio control, salt contamination, increasing separation efficiency, plant turndown, and foam control.	0.5
A2508	Molecular Sieve Dehydration	In Molecular Sieve Dehydration, you will learn about solid bed adsorption and molecular sieve dehydration including the purpose, function, and types of solid bed adsorbents, the advantages and process of mol sieve dehydration, and how to troubleshoot solid bed adsorption.	2
A2505	Solid Bed Adsorption and TEG Dehydration	In Solid Bed Adsorption and TEG Dehydration, you will learn about gas dehydration strategies, including solid bed adsorption, mol sieve dehydration, and TEG gas dehydration.	4
PS-MSO-SLD-101	Solid Desiccants	Solid desiccants adsorb water from process gas streams. In Solid Desiccants, you will learn about solid desiccant adsorption, types of solid desiccants and how they are selected, and modes of operation.	1
FRACTIONATION			
PS-MSO-CFL-101	Coalescing Filters	In Coalescing Filters, you will learn about the process of coalescence, types of coalescers, sales gas coalescers, mechanical and electrostatic coalescers.	1
PS-MSO-CSS-201	Condensate Stabilization System	In Condensate Stabilization System, you will learn about condensate formation, specifications, stabilization, process flow, and process temperature control.	1
PS-MSO-FDF-201	Fractional Distillation Process Fundamentals	In Fractional Distillation Process Fundamentals, you will learn about distillation and vapor pressure, the fractional distillation process, distillation columns and process flow, feed and reflux, process equipment and tray design; NGL fractionation, the NGL temperature/pressure relationship, and methane, propane, and butane separation.	2
A2504	Fractionation in Gas Processing	In Fractionation in Gas Processing, you will learn about the process of fractionation during gas processing, consequences of deviation, and how to regulate tower temperature and pressure.	4
PS-MSO-HMO-101	Heat Medium and Hot Oil Systems	In Heat Medium and Hot Oil Systems, you will learn about the function of heat medium systems and hot oil systems, including heat medium distribution, heater, surge tank, pumps, and filter; direct fired heat components, including fuel supply, burners, pilot, burner management system (BMS), and draft and dampers.	1
PS-MSO-HMS-101	Heat Medium System Operation	In Heat Medium System Operation, you will learn about Heat medium systems, routine operator checks, the heat medium heater, and plant startup and shutdown requirements.	0.5
PS-MSO-HPG-201	High Pressure Gas Sampling	In High Pressure Gas Sampling, you will learn about the purpose of gas sampling, accuracy requirements; types of high pressure sampling containers, including constant pressure and floating piston high pressure cylinders; sampling station parts and connections; and taking a high pressure sample.	1.5
PS-MSO-HPL-201	High Pressure Liquid Sampling	In High Pressure Liquid Sampling, you will learn about critical aspects of sampling, spot and composite samples, sample containers; sampling methods, including fluid displacement, floating piston, and purge methods; and high pressure liquid sample shipping.	2
PS-MSO-LSS-101	Liquid Storage Systems	In Liquid Storage Systems, you will learn about natural gas liquid storage systems including cavern storage, tank storage, high pressure bullet storage, and tube storage.	1
PS-MSO-MIN-101	Methanol Injection	In Methanol Injection, you will learn about gas hydrates, the properties of methanol, typical methanol injection systems and the effect of methanol on other systems.	0.75
PS-MSO-PRU-201	Propane Refrigeration Units and Low Temperature Separators (LTS)	In Propane Refrigeration Units and Low Temperature Separators (LTS), you will learn about refrigeration process equipment, including compressors, condensers, economizers and subchillers; chillers, and low temperature separators.	1
PS-MSO-REC-201	Recycle Compressor Operation	In Recycle Compressor Operation, you will learn about recycle compressor function; drivers and recycle compressor operation, including pre-start checks and starting sequence; compressor and motor controls; and recycle compressor maintenance.	1

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PS-MSO-REF-101	Reflux in Fractionation Operations	In Reflux in Fractionation Operations, you will learn about factors affecting distillation, column operations, including feed, vapor flow, and process upsets; tray design, and reflux flow and separation efficiency, including reflux ratio and operating considerations.	1
PS-MSO-SGC-201	Sales Gas Compressor Operation	In Sales Gas Compressor Operation, you will learn about types of sales gas compressors, including double-acting reciprocating and centrifugal compressors; types of drivers; pre-start, startup, shutdown, and emergency shutdown procedures; and compressor maintenance.	1
PS-MSO-SGC-202	Sales Gas Compressor Types, Use and Limitations	In Sales Gas Compressor Types, Use and Limitations, you will learn about advantages and limitations of centrifugal, reciprocating, and rotary screw compressors, along with dynamic and positive displacement compressor capacity control.	1
PS-MSO-SGF-201	Sales Gas Filter Replacement	In Sales Gas Filter Replacement, you will learn about the function of a coalescing sales gas filter, typical installation, filter replacement and return to service.	1
PS-MSO-TCC-201	Tower Fouling and Corrosion Cleaning	In Tower Fouling and Corrosion Cleaning, you will learn about natural gas fractionating tower chemical cleaning, symptoms of corrosion or fouling, chemical treatments, corrosion and fouling control, and chemical cleaning procedures.	1
INLET SEPARATION			
PS-MSO-MNF-101	Manifold Systems Overview	In Manifold Systems Overview, you will learn about types of manifolds; metering stations and meter proving; and types of meters, including turbine, positive displacement, Coriolis, ultrasonic gas, and thermal mass flow meters.	1
PS-MSO-PWT-101	Produced Water Treatment	In Produced Water Treatment, you will learn about produced water composition; conventional water treatments, including oil-water separators, dissolved and induced gas flotation units, hydrocyclones and centrifuges, aeration, oxidation, adsorption and soluble organics removal; as well as advanced water treatment methods, such as ion exchange, mechanical evaporation (distillation), and membrane processes (ED and EDR).	2
PHASE BEHAVIOR			
A2501	Hydrocarbon Phase Behavior and Vapor-Liquid Equilibrium	In Hydrocarbon Phase Behavior and Vapor-Liquid Equilibrium, you will learn about the phase behavior, vapor-liquid equilibrium, the water content of gas, and hydrates.	4
PROCESS OVERVIEW			
A2500	Introduction to Gas Processing for Operations	In Introduction to Gas Processing, you will learn about gas processing hydrocarbons and about the equipment and process for gas conditioning and processing.	3
PRODUCTION FACILITIES			
A1600	Production Facility Gas Processing	Product purity specifications require that natural gas be processed to remove undesirable components before it is delivered to the customer. In Production Facility Gas Processing, you will learn about the basic principles on which most refrigerated gas processing plants operate. You will also learn about the operation of the systems of equipment which are used to implement those principles. The program teaches the fluid properties which are especially important to gas plant operation, such as specific heat, specific gravity, latent heat of vaporization, and critical temperature, and relates these properties to the behavior of hydrocarbons in gas processing.	4
PROCESS SAFETY			
A2507	Gas Processing Hazards	In Gas Processing Hazards, you will learn about hazards within a typical gas processing facility.	4
SWEETENING			
A2506	Amine Sweetening Process	In the Amine Sweetening Process program, you will learn about amine sweetening, absorption in amine sweetening, primary absorption equipment, and controlling the sweetening process.	5
THERMODYNAMICS			
A2502	Gas Processing Thermodynamics	In Gas Processing Thermodynamics, you will learn about thermodynamics, heat transfer, the gas laws, and compression ratio.	5
TURBOEXPANSION			
A2503	Turboexpander Gas Processing Plant	In Turboexpander Gas Processing Plant, you will learn about the purpose and function of the turboexpansion unit, including its primary and auxiliary equipment.	3

GENERAL KNOWLEDGE AND SKILLS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
BEST PRACTICES			
A1100	Cost Reduction for Operators	In Cost Reduction for Operators, you will learn important strategies for reducing the waste of time, materials, and labor by running equipment at top efficiency and supporting a preventive maintenance program. Emphasis is placed on using instruments to accurately determine at which point in a process enough becomes too much. You will also learn ways to avoid fuel and steam waste, heat loss, waste of utilities, and ways to avoid excess equipment loss and repair through a preventive maintenance program.	2
A1137	Performing Skills Assessment	A performance assessment is a tool that is used to measure, maintain, and improve the behaviors associated with completing a task. Within a process facility, it is imperative that tasks be completed in a safe manner. Safety procedures specify how employees must complete each task within a process facility. In this program, you will learn how to assess job performance to ensure that each employee performs their assigned tasks in a safe manner.	1
A1200	Process Operator Responsibilities	In Process Operator Responsibilities, you will learn about general duties, training, and task observance competency; safety (process, environmental, personal, fire, and chemical); and process and maintenance operations, including shift turnover responsibilities and unit checks. You will also learn about communication and documentation, including radio communication practices, log sheet entries, checklists, and permits.	1
PS-MNT-RAC-101	Reports and Communication	In Reports and Communication, you will learn about giving oral reports, including preparation, delivery, visual aids, and handouts; how to structure technical reports; and how to update and mark up diagrams and schematics.	1
DRAWINGS AND DIAGRAMS			
PS-MNT-ENG-101	Engineering Drawings and Symbols	In Engineering Drawings and Symbols, you will learn about the different types of engineering drawings, different drawing formats used in creating engineering drawings, the different areas of the drawing, the types of symbols used.	0.5
GENERAL OPERATIONS KNOWLEDGE			
PS-EIA-EFA-101	EI&A Field Awareness	In EI&A Field Awareness, you will learn about electrical power systems, emergency power systems, AC and DC UPS; cathodic protection, heat tracing, lighting and grounding systems; types of instrumentation systems; types of analyzer systems, and hazard awareness.	4
PS-MSO-HAC-101	Fundamentals of Hazardous Area Classifications	In Fundamentals of Hazardous Area Classifications, you will learn about the fundamentals of Hazardous Areas and equipment protection classifications including explosive limits, flashpoint, auto-ignition temperature, ignition energy, and vapor density of material properties; the three different zones of hazardous areas and source of release classification.	0.5
PS-MSO-MEA-101	Introduction to Measurement: Measurement Basics and Standards	Understanding measurement is essential to performing work. In this first program, Measurement Basics and Standards, you will learn about the universal SI system, the rules for writing SI units, and how to make conversions between similar units and SI/Imperial conversions.	1
HAND TOOLS AND EQUIPMENT			
A1201	Working with Hand Tools	This program covers the basic hand tools that are normally found in an operator's tool box. You will learn to identify each tool and how to use it properly.	2
A1208	Working with Power Tools	Maintenance activities usually involve the use of some tools. Each of these tools is designed to perform a specific job. You must be able to select and operate the correct power tool for a particular job. In this program, you will learn the purpose, function and proper orientation of power tools. You will learn specific requirements of each type of power tool and how to use them safely.	2
QUALITY ASSURANCE AND CONTROL			
A1090	Process Control Tests	Process Control Tests is designed to provide operators with knowledge about how process control tests are used to aid in the production of high-quality products. You will learn about common tests — what they are, when they are used, and what the tests results mean. You will learn why products are tested, the different kinds of tests, how to obtain a good sample, and to interpret test results. You will also learn some of the more common physical tests, how they are run, what the results mean and how you can use these results as an operating tool. Also covered are some of the more common impurities found in petroleum products, how these impurities affect product quality, and how products are tested for the presence of these impurities. Finally, you will learn about the structure of hydrocarbons, how product composition affects product quality, and some of the tests used to determine product composition.	5
A1191	Statistical Process Control	In Statistical Process Control, you will learn about the operator's role in gathering and analyzing process information and taking corrective action when process problems occur.	3

GENERAL MAINTENANCE SKILLS AND KNOWLEDGE

COURSE #	COURSE TITLE	DESCRIPTION	HRS
CLEANING ACTIVITIES			
A1207	Cleaning Activities	This program identifies the tools and procedures for cleaning pipes, burners, and other equipment. Major topics include cleaning gauge/sight glasses, strainer and burner cleaning, and changing filter elements.	1
CORROSION CONTROL			
A1122	Corrosion Control	This program will teach you the basics of the corrosion process, the methods used to monitor the rate of corrosion and the control techniques used to protect equipment. By successfully controlling corrosion, the destructive effects can be minimized, and facility operations can be more profitable.	4
COUPLINGS AND GEARS			
PS-MNT-GEA-101	Gears	In Gears, you will learn about gear purpose, classifications, and applications; routine maintenance; gear installation and removal; gearbox maintenance, overhaul, and assembly; and gear troubleshooting.	4
DRAWINGS AND DIAGRAMS			
PS-MNT-MND-101	Manuals and Drawings	In Manuals and Drawings, you will learn about maintenance drawings, orthographic, process flow, piping and instrumentation, and schematic drawings; reading drawings and blueprints; standards organizations; and operations and maintenance manuals.	2
FILTERS			
PS-MNT-DCF-101	Dust and Coalescer Filters	In Dust and Coalescer Filters, you will learn about the application and workings of coalescing filters, the purpose of dust filters, and how to safely remove and install filter elements.	1
PS-MNT-FTS-101	Filters and Strainers	In Filters and Strainers, you will learn about filtration, filter media, and operation; mechanical, absorbent, and adsorbent filters; Y-basket and temporary (geometric) strainers; filter and strainer cleaning and maintenance.	2
GENERAL MAINTENANCE CONCEPTS			
PS-MNT-BLD-101	Blinding and De-blinding	In Blinding and Deblinding, you will learn about slip blinds, spectacle blinds, and blind flanges, blind and flange sizes, and blind installation and removal.	1
PS-MNT-CMG-101	Condition Monitoring - General	In Condition Monitoring - General, you will learn about life, preventive, reactive, and predictive maintenance; potential fault analysis (PFA); vibration analysis, including imbalance, misalignment, and looseness analysis; and maintenance and maintainability data.	3
PS-MNT-FDT-101	Fault Diagnosis, Troubleshooting and Machine Inspections	In Fault Diagnosis, Troubleshooting and Machine Inspections, you will learn about common techniques of diagnosing and troubleshooting machine failures including Fault Tree Analysis (FTA) and Failure Mode and Effects Analysis (FEMA), machine performance monitoring, troubleshooting techniques using operation records, vibration analysis, and lubricating oil analysis and the non-destructive testing (NDT) methods of visual inspection, liquid penetrant, magnetic particle, ultrasonic, radiography and eddy current.	1.5
PS-MNT-CPM-101	Fundamentals of Condition and Predictive Monitoring	In Fundamentals of Condition and Predictive Monitoring, you will learn about the many different ways of monitoring the mechanical condition of equipment including vibration analysis, oil and wear debris analysis, ultrasonics, and infrared thermography.	1
PS-MNT-MFD-101	Maintenance Fundamentals	In Maintenance Fundamentals, you will learn about the principles and types of maintenance, including proactive, preventative, corrective, breakdown, and turnaround maintenance; and maintenance workflow planning and strategies.	1
PS-MNT-PCB-101	Planned, Corrective, and Breakdown Maintenance	In Planned, Corrective, and Breakdown Maintenance, you will learn planned, corrective, and breakdown maintenance, including planning, implementing, and executing maintenance schedules.	1.5
PS-MNT-PMP-101	Preventative Maintenance Plans	In Preventative Maintenance Plans, you will learn about the basic steps involved with the development of a preventive maintenance plan as well as the benefits of such a plan including: benefits, purpose, the Development process and principles of the program.	0.5
LEAK DETECTION			
A1198	Leak Detection and Repair	In this program, you will learn about controlling hazardous emissions through leak detection and repair.	1
LUBRICATION			
A1210	Lubrication Concepts	To ensure proper operation, all machines must be lubricated. Metal parts must be separated from one another when in operation, or rapid wear and deterioration will result. This separation can be provided with oil lubricant. In this program, you will learn about the different lubricants and their qualities so that you can choose the proper lubricant for the equipment you operate.	1

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PIPES, HOSES AND FITTINGS			
A1205	Flange Piping	This program explains the use of flange piping and the procedures for connecting flanges. Major topics include types of fittings and flanges, flange gaskets, and blinding lines.	2
A1202	Pipe Fitting Basics	This program covers the various pipes and fittings that make up a piping system and explains how to read piping diagrams. You will learn how pipe connections are made and how to select the proper equipment.	1
PS-MNT-PTF-101	Pneumatic Tubing and Fittings	In Pneumatic Tubing and Fittings, you will learn about pneumatic tubing applications, tubing types, how to select the proper tubing, types of pneumatic fittings, and tubing installation guidelines.	1
A1204	Small Threaded Pipe	This program covers applications for small threaded pipe and how to cut and thread piping joints. You will learn how to replace temperature and pressure indicators and how to operate pipe threading equipment.	2
A1203	Tubing	This program explains the various uses for tubing and how to make up a small tubing run. Major subjects include types of tubing and fittings, tubing applications, tube bending, and how to assemble and tighten tubing.	2
STRUCTURAL SAFETY			
PS-MNT-STS-101	Structural Safety	In Structural Safety, you will learn about OSHA requirements for ladders and stairways, handrail requirements; corrosion prevention and treatment; rebar corrosion and concrete damage, and structural repairs and inspection techniques.	3

HYDROCARBON STORAGE AND LOADING

COURSE #	COURSE TITLE	DESCRIPTION	HRS
RAILROAD TRANSPORTATION			
PS-MSO-RCI-201	Rail Car Inspection	In Rail Car Inspection, you will learn about routine visual inspection at ground level, routine inspection at dome, including vapor and liquid connections, PRV, Thermowell, gauge rod, and inspection after loading/offloading.	1
PS-MSO-RLO-101	Rail Car Loading and Offloading	In Rail Car Loading and Offloading, you will learn about rail car access, connections, liquid and vapor valves; emergency shutoff and excess flow valves; C3/C4 loading and NGLs offloading rail cars; measuring rail car content, using magnetic gauges and slip tube rods.	1
PS-MSO-RCS-201	Rail Car Sampling and Composition Testing	In Rail Car Sampling and Composition Testing, you will learn about rail car sampling equipment and analysis; testing composition of offloading NGLs and gas chromatography analysis.	0.75
SAFE TANK CLEANING			
A1133	Safe Tank Cleaning: Cleaning the Tank	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas freeing and cleaning stationary storage tanks. Cleaning the Tank covers the physical removal of sludge and other residue from the tank interior. You will learn about the proper tank cleaning supplies, personal protective equipment, and tests required prior to tank entry. You will also learn general safety precautions to be taken throughout the tank cleaning job.	1
A1132	Safe Tank Cleaning: Gas-Freeing	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas freeing and cleaning stationary storage tanks. In Gas Freeing, you will learn specific information on gas freeing three different tank designs, with the assumption that each tank contains a low-sulfur crude oil. The program emphasizes the importance of accurately performing tests for flammable vapors, toxic substances, and oxygen deficiency.	2
A1134	Safe Tank Cleaning: Hazardous Materials	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas freeing and cleaning stationary storage tanks. In Hazardous Materials, you will learn how a specific tank design, combined with the specific material that the tank contains, determines what gas freeing and tank cleaning procedures will be necessary. You will also be introduced to a chart that cross-references tank designs with specific materials a tank may contain. You will learn how to use the chart and its accompanying data sheets to obtain information on a variety of tank cleaning situations.	2
A1131	Safe Tank Cleaning: Preparing for Cleaning	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas-freeing and cleaning stationary storage tanks. Preparing for Cleaning explains why tank cleaning is necessary and outlines the steps that must be carried out before any tank cleaning work begins. You will also learn about the hazards that must be minimized or eliminated at the tank cleaning site, and the ways to handle those hazards. The program also covers basic test equipment and discusses the use and importance of permits as they apply to tank cleaning.	2
STORAGE TANKS			
PS-MSO-APS-101	Atmospheric and Pressure Storage Tanks	In Atmospheric and Pressure Storage Tanks, you will learn about storage tank construction, pressurized and atmospheric storage tanks, and tank classification; effects of water and storage tank water detection and removal; and storage tank roof inspection, including safety precautions, visual and non-destructive inspection, and external tank roof inspection.	3
PS-MNT-STT-102	Maintaining Storage Tanks	In Maintaining Storage Tanks, you will learn about corrosion, internal coatings, tank inspection and repair, emissions, removing a tank from service, tank cleaning, silo maintenance and inspection, and safety.	1.5
PS-MNT-STT-104	Purging Storage Tanks	In Purging Storage Tanks, you will learn about the purpose of purging, isolating the tank; the purging process, including water fill, air ventilation, inert gas fill, handling tanks containing sulfur or hydrogen sulfide, and atmospheric testing the tank interior.	0.75
PS-MNT-STT-101	Storage Tanks	In Storage Tanks, you will learn about tank designs, including cone roof, floating roof, dome roof, and pressure vessels; fire protection and hazards, flammable vapor testing, auxiliary equipment, and environmental hazards.	1.5
PS-MSO-TSO-101	Tank Isolation	In Tank Isolation, you will learn about performing tank isolation including its purpose, planning, locking out tank electrical equipment, blinding and blanking using blanks, spectacle blinds, paddle blinds, and double block and bleed systems, blinding safety procedures and transient vapors.	1
PS-MNT-STT-103	Tank Roof Inspection	In Tank Roof Inspection, you will learn about the purpose, procedures, regulatory requirements and methods involved with tank roof inspections including visual inspection, non-destructive techniques, and safety precautions.	1

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PS-MSO-TV5-101	Tank Venting Systems	In Tank Venting Systems, you will learn about the purpose of tank venting, sizing the venting system, pressure/vacuum relief vents, flame arrestors, discharge piping, and compressor and venturi vapor recovery systems.	1
PS-MSO-UST-101	Underground Storage Tank Inspection and Monitoring	In Underground Storage Tank Inspection and Monitoring, you will the purpose of underground storage tank inspections, the various types of release detection using automatic and manual tank gauging, interstitial monitoring, ground water monitoring, vapor monitoring, tank tightness and inventory control requirements for daily, monthly and annual inspections.	1
A1565	Vapor Recovery Systems	For years, the vapors escaping from oil storage tanks through hatches, vents and flare systems were given little attention. Specialists have since learned that if the vapors existed in sufficient quantities, the recovery of the vapors was economically feasible. The recovered vapors represented a valuable source of energy that previously had been "lost." This program explains the operation and routine maintenance of Vapor Recovery Systems. It describes the principles behind vapor recovery, the component parts of vapor recovery units, a method of determining quantities of vapors recovered, and how to keep the equipment operating efficiently.	3
PS-MSO-WRT-101	Water Removal from a Storage Tank Bottom	In this Water Removal from a Storage Tank Bottom, you will learn about the detection and removal of water from a petroleum storage tank including the effects of water in petroleum storage tanks, storage tank floor design, and manual and automatic draining systems.	1
TRUCK TRANSPORTATION			
PS-MSO-ITI-101	ISO Truck Tank Construction and Inspection	In ISO Truck Tank Construction and Inspection, you will learn about the characteristics of cryogenic ethylene and the construction and inspection of an ISO truck tank including regulatory truck tank markings, rated holding time, marked rated holding time, one way travel time, the location of valves, gauges and fittings, and leak detection.	1
PS-MSO-NTO-101	Natural Gas Liquids (NGL) Truck Offloading	In Natural Gas Liquids (NGL) Truck Offloading, you will learn about NGLs, the truck loading system; flow element and vapor eliminator, the automated offloading system, Scully ground prover and high level shutoff; fire protection, meter proving; truck offloading requirements, and truck offloading.	0.5
PS-MSO-PPT-101	Pentane (C5)+ Truck Loading	In Pentane (C5)+ Truck Loading, you will learn about pentane, C5 truck loading system; condensate pump and flow control valves and pressure control, the loading control system, ground prover and high level shutoff; custody transfer of condensate, and meter proving.	0.75
PS-MSO-PBT-101	Propane and Butane Truck Loading	In Propane and Butane Truck Loading, you will learn about propane and butane, C3/C4 truck loading system; pressure control valve, flow element and vapor eliminator, pressure transmitter functions, the loading control system, and high level shutoff; automatic odorizing system, meter proving, fire protection, and truck loading requirements and sequence.	0.75
PS-MSO-TSM-101	Testing Composition of Offloading Truck NGLs	In Testing Composition of Offloading Truck NGLs, you will learn about the three most common methods for sampling the composition of product at truck loading racks - Coriolis Meters for Density, Online Gas Chromatograph, and Grab Sampling.	0.75
UNDERGROUND STORAGE			
PS-MSO-SCS-101	Salt Caverns and Underground Storage	In Salt Caverns and Underground Storage, you will learn about salt cavern formation, operation, capacity, overfilling and flow rate restrictions, brine systems, and underground tube storage.	1

INSTRUMENTATION AND CONTROL

COURSE #	COURSE TITLE	DESCRIPTION	HRS
ANALYZERS AND INFERENCEALS			
A2065	Instrumentation: Analyzers and Inferenceals	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. Process analysis is continuously performed to determine the quality of raw materials, intermediates, and finished products. In Analyzers and Inferenceals, you will learn about working with analyzers and analytical instruments, key tools in instrumentation process control.	2
PS-MSO-GCH-102	Introduction to Gas Chromatography	In Introduction to Gas Chromatography, you will be introduced to the process and analysis results for Gas Chromatography.	0.5
PS-MSO-HST-201	Operating Hydrogen Sulfide (H ₂ S) Tube Samplers	In Operating Hydrogen Sulfide (H ₂ S) Samplers, you will learn about detector tube operation, detector tubes, piston and bellows-type detectors, and common operating instructions.	1
PS-MSO-TUM-101	Turbidity Measurement	In Turbidity Measurement, you will learn why turbidity measurement is important; common turbidity measuring devices including Single Beam Style, Ratio Style, and Modulated Four-Beam Style; and turbidity units and standards.	1
CONTROL SYSTEMS			
PS-MSO-ACA-101	Automated Control Applications	In Automated Control Applications, you will learn about on/off control systems; process dynamics, electronic proportional, integral, and derivative (PID) control; analog electronic controllers including operational amplifiers (op-amps) and automatic process control.	3
PS-EIA-CTL-101	Control Loops	In Control Loops, you will learn about control loops and controller action, including control types, controllers, variables, control modes; types of control schemes, including cascade, ratio, split range, feedforward, multivariable and adaptive control; and control loop tuning techniques.	3
A2066	Instrumentation: Regulatory Control	In this program, you will learn about regulatory control, including valves, signal transmission, and basic and advanced control systems.	4
A2060	Instrumentation: Fundamentals of Control	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Fundamentals of Control, you will learn about the basics of instrumentation, including the control loop, process variable indicators, process instrument equipment, and piping and instrumentation diagrams.	3
PS-MSO-CCO-101	Introduction to Computerized Control Systems	In Introduction to Computerized Control Systems, you will learn about computerized control systems used in the process facilities including human machine interfaces (HMI); the basic concepts of a distributed control systems (DCS) and its associated equipment; the functions of programmable logic controllers (PLC); and supervisory control and data acquisition (SCADA) systems.	1
PS-EIA-SCA-101	Introduction to Supervisory Control and Data Acquisition (SCADA)	In Introduction to SCADA Systems, you will learn about Supervisory Control and Data Acquisition (SCADA) and Distributed Control Systems (DCS). SCADA function and basic elements are described, including HMIs, PLCs, and RTUs, along with SCADA communications.	.75
PSEIA-PNE-101	Pneumatic Control Systems	In Pneumatic Control Systems, you will learn about the fundamentals and basic components of a pneumatic control system including the flapper and nozzle mechanisms, booster relays, and pneumatic transmitters and controllers.	1
PS-MSO-PCS-101	Process Control Strategies	In Process Control Strategies, you will learn about process variables and instrumentation control systems including open loop systems, feedback control systems, feedforward control systems, and Proportional-integral-derivative controller (PID).	1
PS-EIA-SIC-101	Safety in Instrumentation and Control Systems	In Safety in Instrumentation and Control Systems, you will learn about emergency shutdown systems, standards, safety system technologies, SIS architecture; system integrity levels (SIL), equipment failure modes and analysis, SIS factors, and procedures for overriding ESD and SIL systems.	3
PS-EIA-SCS-101	Simple Control System (PLC)	In Simple Control Systems, you will learn about PLC fundamentals, including architecture, basic PLC control and programming, external functions and hardware; PLC maintenance, and general troubleshooting.	2
PS-EIA-SCA-102	SCADA Operation	In SCADA Operation, you will learn about the SCADA system, function, and components, general operation and changing a setpoint. You will also learn about control room cold and warm start-ups, including cold start-up pre-checks and typical start-up screens. Control room facility shutdown is covered, with switch and display guidelines, and an extraction plant shutdown example. Finally, you will learn about control room emergency shutdown recovery.	1

COURSE #	COURSE TITLE	DESCRIPTION	HRS
CUSTODY TRANSFER			
A1535	Lease Automatic Custody Transfer (LACT)	Lease Automatic Custody Transfer is an introduction to the components and the functions of LACT units. The fundamentals of oil volume measurement are explained and then related to the operation of the individual LACT components. Meter reading and sample removal and analysis are covered in detail. The relationship of the producer and the gatherer is discussed. Throughout the program, measurement accuracy is emphasized.	3
DRAWINGS AND DIAGRAMS			
A2067	Instrumentation: Process and Instrumentation Drawings	A company may have several production processes. Having uniform standards for instrumentation systems used for measurement and control simplifies and helps explain the process. In this program, you will learn standard symbols used in instrumentation systems how to apply them.	2
FLOW MEASUREMENT			
A2064	Instrumentation: Measuring Flow	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Measuring Flow, you will learn about flow rate and measurements, including differential pressure and positive displacement flow meters.	3
LEVEL MEASUREMENT			
A2063	Instrumentation: Measuring Liquid Level	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. Effective control of liquid level is important to good process unit operation and safety. It is important that you understand how the different types of level measures function and how they can produce incorrect levels. In Measuring Liquid Level, you will learn about the different ways to measure liquid level.	3
MEASUREMENT FUNDAMENTALS			
PS-MSO-MEA-104	Introduction to Measurement: Density, Moisture, pH, and Conductivity	In Introduction to Measurement: Density, Moisture, pH, and Conductivity, you will learn about density measurement, including buoyant force, differential pressure, frequency, and nuclear absorption; moisture measurement, including microwave, infrared, and capacitance measurement; pH measurement; and conductivity measurement, including measurement units and cell constant, and conductivity probes.	1.5
PS-MSO-MEA-103	Introduction to Measurement: Level and Flow	Level and flow measurements are used throughout industry to determine the quantity of various solids and liquids and flow rates. The information is used for safety, economic and operational reasons, such as monitoring and controlling the inventory into and out of a process. Level measurement applies to liquid levels in vessels or tanks or dry substances such as wood chips, chemicals or products used in the food or pharmaceutical industry.	3
PS-MSO-MEA-102	Introduction to Measurement: Temperature and Pressure	In Introduction to Measurement: Pressure and Temperature, you will learn about heat transfer, temperature scales and sensors; different types of pressure, pressure measurement primary standards (manometers and deadweight testers); and mechanical and electrical pressure sensors and gauges.	3
COURSE #	COURSE TITLE	DESCRIPTION	HRS
PRESSURE MEASUREMENT			
A2062	Instrumentation: Measuring Pressure	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Measuring Pressure, you will learn about the basics of measuring pressure, including the tools used for sensing pressure and pressure gauges.	3
TANK GAUGING			
A1196	Tank Gauging	Every oil and gas company must accurately and correctly report inventory. To do this, companies rely on tank gauging to measure all hydrocarbon inventory. Because the volume of inventory is high, the value can be in the billions of dollars. Any errors made in tank gauging mean that investors may not have the proper financial information with which to make decisions. In this program, you will learn about properly and safely gauging tank inventory.	4
TEMPERATURE MEASUREMENT			
A2061	Instrumentation: Measuring Temperature	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Measuring Temperature, you will learn about instruments designed to sense temperature, including electrical temperature sensors.	2

MATH AND SCIENCE FUNDAMENTALS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
BASICS OF MATHEMATICS			
A1130	Process Plant Mathematics	In Process Plant Mathematics, you will learn about the principles and operations involving mathematics within a process facility, including addition, subtraction, multiplication, and division of fractions and decimals. You will also learn about using percentages, ratios, proportions, and triangles to solve problems involving process plant activities, such as mixing liquids, determining actual amounts in storage, and angle fitting.	5
A1181	Hydrocarbon Chemistry 101	In Hydrocarbon Chemistry 101, you will learn about basic hydrocarbon composition and properties; carbon and hydrocarbon bonding; hydrocarbon structures and types of formulas. You will also learn about alkanes/paraffins, saturation, alkenes/olefins, alkynes/acetylenes, structural (constitutional) isomers and stereoisomers; and saturated and unsaturated ring hydrocarbons. Finally, you will learn about hydrocarbon nomenclature: naming conventions, how isomers and ring hydrocarbons are named, IUPAC naming rules, and nomenclature for other organic compounds.	3
BASICS OF HYDROCARBON CHEMISTRY			
A1180	Process Plant Chemistry	In this program, you will learn about the basic chemistry behind the refining process. You will learn basic chemical terminology, molecular formulas, structural formulas, some common chemical symbols, and the various hydrocarbon groups used within the petrochemical industry. This program is designed to provide a background in the chemical nature of the operator's job, work environment, and products of refining.	2
HEAT EXCHANGERS			
A1022a	Nature of Heat: Heat Exchange Equipment	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of learning programs including Heat and Temperature, Heat Transfer, and Fuels and Combustion. Efficient use of heat energy includes not only efficient combustion, but also the efficient transfer of heat energy from one place to another. In this program in the series, different types of heat exchangers, including fixed shell-and-tube, U-tube and floating head are examined.	1
PHYSICS OF FLUID AND FLOW			
A1610a	Fundamentals of Fluids for Production Operations: Fluid Behavior	In this program, you will learn about the types of fluids and their chemical and physical nature, the nature of phase, how phase change is used, and how it can be controlled. The program goes on to cover the instruments and units for measuring fluids. This includes units for measuring pressure, temperature, density, and viscosity. You will also learn about the nature of absolute measurements and how to convert measurements from one unit to another.	4
A1610b	Fundamentals of Fluids for Production Operations: Gases and Static Pressure	In this program, you will learn how to predict pressure, temperature, and volume changes that occur in gas compression and storage. You will also learn to recognize hazards in gas handling and the precautions used to avoid these hazards. This program also covers the nature, calculation, and uses of static pressure, including how to calculate pressure from liquid level and liquid level from bottom gauge pressure, the instruments that operate on the principle of static pressure, the nature and hazards of vacuum; and the uses of static pressure in handling and transporting fluids.	3
A1044	Mechanics of Fluids: Fluids in Motion	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In this final program, Fluids in Motion, you will learn the factors affecting flow rate and how these can be controlled, the basic principles and instruments of flow measurement, and the control of rate through valves and through pumping.	4
A1041a	Mechanics of Fluids: Introduction to Process Fluids	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. In Introduction to Process Fluids, you will learn about types of fluids and their chemical and physical nature, including gas compressibility and liquid incompressibility. You will learn about the nature of phase, how phase change is used, and how it can be controlled. You will also learn about the fluid distillation process, types of fluid systems and emulsions.	4
A1043	Mechanics of Fluids: Static Pressure and Head	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In Static Pressure and Head, the fourth program in the Mechanics of Fluids Series, you will learn about the nature, calculation, and uses of static pressure. Topics include how to calculate pressure from liquid level, and how to calculate liquid level from bottom gauge pressure, the instruments that operate on the principle of static pressure, the nature and hazards of vacuum, and the uses of static pressure in handling and transporting fluids.	5

COURSE #	COURSE TITLE	DESCRIPTION	HRS
A1041b	Mechanics of Fluids: Units of Fluid Measurement	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In Units of Fluid Measurement, you will learn about pressure measurements, temperature measurements, density and gravity measurements, and viscosity measurements. You'll also learn about the nature of absolute measurement and how to convert measurements from one unit to another.	4
A1042	Mechanics of Fluids: Behavior of Gases	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In Behavior of Gases, the third program in the Mechanics of Fluids Series, you will learn how to predict the pressure, temperature, and volume changes that occur in the compression and storing of gases. You will also learn to recognize hazards in gas handling and the precautions used to avoid these hazards.	4
PHYSICS OF GASES & COMPRESSORS			
A1051	Introduction To Compression	In Introduction to Compression, you will learn about the construction and operation of gas compressors. You will learn about the basic laws of gas behavior and the units of gas measurement. You will learn the nature of compression, including the compression ratio, the heat effects of compression, and the factors affecting compressor horsepower requirements.	4
PHYSICS OF HEAT & TEMPERATURE			
A1023	Nature of Heat: Fuels and Combustion	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of three learning programs covering Heat and Temperature, Heat Transfer, and Fuels and Combustion. Fuels and Combustion, the third program in the series, covers the nature of combustion. Major topics include basic chemical reactions, combustion requirements, combustion of solid, gas and liquid fuels, combustion reactions, combustion control, and analysis of combustion products.	4
A1021	Nature of Heat: Heat and Temperature	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of three learning programs including Heat and Temperature, Heat Transfer, and Fuels and Combustion. This program, Heat and Temperature, introduces heat as a form of energy, describes its effects on the phases of matter, introduces the differences between amount of heat and intensity of heat, and describes heat of transformation. Evaporation, pressure considerations, superheat, specific heat, the thermal properties of refinery products, and temperature measurements and expansion are also described.	4
A1022	Nature of Heat: Heat Transfer	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of three learning programs including Heat and Temperature, Heat Transfer, and Fuels and Combustion. Efficient use of heat energy includes not only efficient combustion, but also the efficient transfer of heat energy from one place to another. In this second program in the series, Heat Transfer, three methods of heat transfer are presented - conduction, convection and radiation. Other topics include heat transfer in furnaces, heat transfer rate, and heat exchangers, including fixed shell-and-tube, U-tube and floating head.	2

PETROCHEMICAL PROCESS EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
REGENERATIVE THERMAL OXIDIZER			
PS-MNT-RTO-101	Regenerative Thermal Oxidizer	In Regenerative Thermal Oxidizers, you will learn about waste gas treatment processes, oxidizer components, safety precautions, routine maintenance and troubleshooting.	2

PETROLEUM INDUSTRY OVERVIEW

COURSE #	COURSE TITLE	DESCRIPTION	HRS
GAS PROCESSING			
PS-EPT-INO-114	Gas Processing Overview	In Gas Processing Overview, you will learn about saleable products recoverable from raw, produced gas; gas composition and contaminants; sales gas specifications; gas sweetening and dehydration; hydrocarbon liquid products and extraction processes, Nitrogen removal and helium recovery; NGL fractionation/stabilization; NGL product treating; and sulfur recovery and disposal.	3
INDUSTRY OVERVIEW			
PS-EPT-INO-101	Modern Oil and Gas Industry	In Modern Oil and Gas Industry, you will learn about the historical, geographical, and modern context of the petroleum industry; its organization, the petroleum value chain, and economic drivers.	2
MIDSTREAM INDUSTRY SEGMENT			
PS-EPT-INO-112	Overview of the Midstream Industry Segment	In Overview of the Midstream Industry segment, you will learn about the Petroleum Value Chain, the midstream segment, conventional and unconventional reservoirs, the crude oil and natural gas value chains and value chain investment trends; natural gas terminology, global energy demand and trade, gas production and contracts; and gas processing, including end use products, contaminants and sales gas specifications, gas conditioning, dehydration, hydrocarbon dewpoint control, NGL extraction and stability, and NGL product treating.	3
PIPELINE SYSTEMS			
PS-EPT-INO-113	Pipelines and Storage Systems	In Pipelines and Storage Systems, you will learn about the different hydrocarbon transportation systems, advantages of pipelines, pipeline projects, pipeline construction and types of pipelines; pipeline system design and components; pipeline problems and protection; and pigging. In addition, you will learn about hydrocarbon storage systems for liquids and gases, including appropriate types of tank designs and use of depleted reservoirs and salt caverns.	2

PROCESS OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
CRUDE DISTILLATION			
A1014	Practical Distillation: Abnormal Operations	In Practical Distillation: Abnormal Operations, you will learn to recognize the symptoms of abnormal fractionating tower operation and learn how to make corrections. This program identifies and analyzes serious abnormalities which affect tower operation, including: flooded trays, high levels, dry trays, trapped water, loss of cooling water, loss of heat, and plugged outlets. The program also discusses the effects of these abnormalities on products, and on temperature, pressure, and flow rates. Abnormal Operating Conditions also outlines the procedures for discovering what is happening in the tower, which corrections are most likely to re-establish normal operation, and how to judge the effects of adjustments. Finally, the program provides practice in solving abnormal operating problems. Using the knowledge from this and the previous programs in this series, you will be able to meet the challenge of abnormal operation and restore the tower to efficient and economical fractionation.	4
A1012a	Practical Distillation: Fractionating Equipment	Practical Distillation: Fractionating Equipment, provides a fundamental knowledge of fractionating equipment, including the tower, temperature and pressure, bubble cap tray and other tray types, packed towers, and auxiliary equipment. To appreciate the precautions taken during normal operations, shutdown, and turnaround, the program provides a working knowledge of foreign deposits and liquid traps, explosive mixtures, and unnecessarily rapid changes. A thorough knowledge of these factors and a deep appreciation of the trouble they can cause will permit you to wisely adapt your actions to situations you will experience, especially as they affect the various stages of shutdown and turnaround.	3
A1013	Practical Distillation: Normal Operations	In Practical Distillation: Normal Operations, you will learn how to control the normal operation of a fractionating tower. This includes collecting data, considering the problem, correcting the operation, and checking the results. This program also identifies and analyzes the three key variables in tower operation - pressure, flow rates, and temperature - and illustrates their effects on the material balance, the heat balance, and the quality of the product. The basic tests of product quality are described, as well as the kinds of checks and adjustments the operator performs in controlling normal tower operations. Finally, the program presents operating situations that you are likely to encounter on a distillation unit. You will practice solving normal operating problems. These practice exercises will help you recognize and respond quickly to actual distillation problems.	4
A1012c	Practical Distillation: Concepts and Quality	The physical law behind distillation is that heat can be used to separate a mixture of hydrocarbons by their respective boiling points or boiling point ranges. In a distillation column, there must be a balance of heat and material into and out of the tower. These heat and material balance concepts are the same for every column and can be used to predict how a tower will react to any operating change. The concepts of sensible and latent heat, partial pressure, and vapor pressure explain how and why hydrocarbons react as they do during the separation process. In Concepts and Quality, you will learn about the major concepts that are common to all distillation processes, identify operational principles that can be utilized to conserve energy and improve quality, identify how the interaction of process variables can affect product quality, and learn how to identify and correct operating problems.	3
DISTILLATION			
A1011a	Practical Distillation: Behavior of Hydrocarbons	Practical Distillation: Behavior of Hydrocarbons, begins by explaining how crude oil is processed. Next, it discusses the different properties of oil, giving special attention to the properties often referred to or measured in the refining process. The program also explains sensible heat, latent heat, vapor pressure, and partial pressure. These lessons form a review of the basic principles of the distillation process, and are presented as background for future programs in the series that explain the actual practical operation of distillation units. The final section of this program is about the process of distillation and how it works. This unit is designed to logically develop the knowledge of the distillation process from the elementary shell still through to the mechanisms of reflux, reboiling, and sidestream drawing of the sophisticated fractionator. An important lesson describes the temperature profile of the tower in distillation, showing the nature of the flow of liquid and vapors in the tower and the reasons for the flow. The final lesson is a review and summary of the entire distillation process.	2.5
A1011b	Practical Distillation: Principles and Practices	Practical Distillation: Principles and Practices, will provide you with general knowledge of how a distillation column is designed and how the distillation process works. You will learn how heat balance adjustments affect product composition. Finally, you will be introduced to several different types of columns and the basic instrumentation used to control a distillation tower. The distillation columns and related equipment shown in this program may not be the same as the columns and equipment used in your plant. However, the principles and practices presented in this program are applicable to any normal distillation process.	3

PROCESS SAFETY

COURSE #	COURSE TITLE	DESCRIPTION	HRS
EMERGENCY PLANNING & RESPONSE			
A1112	Fire Fighting: Extinguishing Agents	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. In this program, Extinguishing Agents, you will learn about the use of water, foam, carbon dioxide, dry chemicals, halons, and dry powders for controlling or extinguishing fires and for protecting men and equipment. You will also learn about proper hose handling and how to use small and large handlines, monitors, and fixed spray systems.	4
A1111	Fire Fighting: Fuels and Combustion	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. In this program, Fuels and Combustion, you will learn that fire is combustion requiring fuel, oxygen, and a source of ignition. You will also learn about the flammability of typical liquid and vapor fuels, the sources of oxygen, the sources of ignition, and the causes and effects of various kinds of explosions and detonations. Finally, you will learn the three ways of extinguishing fires—quenching, smothering, and starving—and the techniques of dispersing flammable vapors to keep them from igniting or re-igniting during a fire.	3
A1113	Fire Fighting: Portable Fire Extinguishers and Foams	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. In this program, you will learn about portable fire extinguishers, which are the first line of defense in many fire situations. This program covers how to select and operate them properly. You will also learn about the construction of CO2 and dry chemical extinguishers and how they are used for putting out small fires. Finally, you will learn about the use of foam for extinguishing large area flat fires, and how both chemical foams and air foams are prepared and applied.	4
A1114b	Fire Fighting: Strategies	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. Your ability to prevent a fire or react to a fire emergency may depend on how well you planned ahead for that particular situation. Planning ahead means that you have identified fire problem areas, developed the appropriate action plans, and prepared to fight a fire with the proper firefighting equipment, techniques and tactics. In this program, you will learn pre-fire planning and basic strategy. You will also learn strategies for fighting tank and dike fires. Finally, you will apply what you have learned in exercises that cover all different types of fires.	3
A1114a	Fire Fighting: Tactics	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. The way you attack a fire depends on several different factors, including how the fuel is burning and the location of the fire. It is important that you know and can implement the correct attack for any type of fire. In this program, you will learn the tactics of hose handling, of operating valves under fire exposure, of using dry chemical and foam, and of protecting pressure vessels.	3
SAFE WORK PRACTICES			
A1197	Job Hazard Analysis and Stop Work Authority	Working within the process industry can result in exceptionally high safety risks, and employers put programs in place to reduce the likelihood of accidents and injuries. Job Safety Analysis (JSA) and Stop Work Authority (SWA) require all employees to watch for safety risks and potential hazards. In this program, you will learn about JSAs and SWA and how you can help implement both.	1
A1170	Safe Handling of Light Ends	In this program, you will learn the physical properties of gaseous hydrocarbons that create hazards, and the special handling and safety procedures that are required.	3
A1190	Safe Laboratory Operations	Laboratory analysis of incoming raw materials and outgoing products has always been a vital concern in the refining, petrochemical and chemical industries. Due to the nature of the materials being tested and the equipment required to perform the necessary tests, safety in the laboratory is a must. Safe Laboratory Operations approaches laboratory safety from the viewpoint that most laboratory procedures involve common safety considerations - personnel attitude, handling hazardous materials, flammability of samples, sources of ignition, handling compressed gases, hazards associated with glassware, personal protective equipment and mechanical safeguards. The program concludes by providing safety information on a variety of specific tests and test equipment: LPG sampling, flash point test, Reid vapor pressure test, test for viscosity, distillation apparatus and vacuum distillation test equipment.	4

PRODUCTION OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PROCESS SAFETY MANAGEMENT			
PS-PSM-PSO-101	Process Safety in Operations: Introduction	Understanding Process Safety is important at all levels of the organization. This program introduces Process Safety in the industry, reviews global Process Safety incidents and consequences, and acquaints the learner with components of Process Safety Management (PSM) including concept design, detailed design and steps to manage Process Safety in operations.	0.75
PS-PSM-PSO-102	Process Safety in Operations: Hazards	In this program, you will review hazard identification within the Risk Assessment process and explore various hazards, material properties and reactions, and how these conditions and failures impact process safety. You will be introduced to the use of hazard scenario used when designing a plan and the tools used to identify hazards for Process Safety Management (PSM).	1
PS-PSM-PSO-103	Process Safety in Operations: Risk Management	Once we have identified hazards and scenarios, we move toward Risk Assessment and Risk Management steps to reduce risks and identify barriers of protection. In this program you will be introduced to the role of Risk Analysis in the Risk Assessment process and become acquainted with key Risk Analysis tools. With these tools, we will review and select risk reduction measures and how to use the Bow-Tie model and its use in Risk Management.	1.5
PS-PSM-PSO-104	Process Safety in Operations: Projects, Construction and Operations	From an Operations perspective, process safety is critical. This program will review the role of Process Safety during Project initiation and construction phase into Operations. Operations teams must operate, inspect and maintain the equipment, plant and risk reduction measures to ensure they are working effectively in order to manage the risk of a major incident.	1.5
PS-PSM-PSO-105	Process Safety in Operations: Management of Change	To ensure that change (equipment, procedural, or organizational) does not bring risk with it, we have processes for managing the change. Process Safety is a key piece throughout the required steps. This program will introduce change and the management of change in the plant in light of Process Safety Management.	0.75
PS-PSM-PSO-106	Process Safety in Operations: Emergency Response and Incident Investigation	The plant and facilities need to be prepared to deal with unforeseen events and have plant, equipment and procedures in place to mitigate the consequences of an incident. This is commonly referred to as an Emergency Response Program. This program reviews typical steps with in emergency response and preparedness and how these take Process Safety into consideration. We also examine the importance of incident investigation in process safety.	1
PS-PSM-PSO-107	Process Safety in Operations: Audits and Key Performance Indicators	It is important to monitor systems and establish performance measurements so that we can improve. In Operations, the plant, procedures and practices can degrade over time. This program will review steps we take in order to be alert to changes and correct deficiencies.	0.5

REFINERY OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
TURNAROUND			
PS-REF-TUR-101	Turnaround Operations	During process operations, equipment becomes less flexible and increasingly unable to reach maximum production capacity because operating conditions deteriorate. To keep conditions optimal for production, process facilities schedule turnaround (T/A) operations to restore unit operating capabilities. In this series, you will learn about T/A operations, how they are implemented, and the overall impact a turnaround operation has on facility costs.	5

ROTATING & RECIPROCATING EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
AIR COMPRESSORS			
A1050	Air Compressors	In Air Compressors, you will learn about the different types and applications used in the oil and gas industry including their principles of operation based upon Boyle's and Charles gas laws, reciprocating and rotary positive displacement compressors, and centrifugal, ejector and axial flow dynamic compressors.	1
CENTRIFUGAL COMPRESSORS			
A1053a	Centrifugal Compressors: Introduction	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is about the construction and operation of compressors. In this program you will learn the construction, principal parts, and operation of reciprocating compressors.	3
A1053b	Centrifugal Compressors: Construction and Operation	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is about the construction and operation of compressors. In this program you will learn about the construction and operation of centrifugal compressors.	4
CENTRIFUGAL PUMPS			
A1071b	Centrifugal Pumps: Equipment and Operation	Centrifugal pumps are machines which use centrifugal force to move liquids. In this program, you will learn about the construction of pump parts, including packing boxes, seals, bearings, balancing drums, and couplings. You will learn the relation of alignment and misalignment to vibration, how pumps are lubricated, and how they are cooled in operation. Finally, you will learn the details of pump operation including start-up, normal operation, and shut-down. You will learn what the common problems of centrifugal pump operation are and how to spot and correct them, and how to maintain the pumps for dependable, safe operation.	4
A1071a	Centrifugal Pumps: Introduction	Centrifugal pumps are machines that use centrifugal force to move liquids. In this program, you will learn the principles, parts, and general operation of these pumps, what pump efficiency is, and how head and pressure are calculated.	3
COMPRESSOR PERFORMANCE			
PS-MSO-GCP-201	Gas Compressor Performance	In Gas Compressor Performance, you will learn about performance differences between centrifugal, reciprocating, and screw compressors, including capacity, conditions that affect compressor performance, and pressure/volume (P/V) diagrams.	1
COUPLINGS AND GEARS			
A1085b	Couplings, Gear Trains, and V-Belts: Gear Trains and V-Belt Drives	This program covers two different ways prime movers or drivers are connected to driven equipment, the special advantages and problems of each of the different ways, and the adjustment and preventive maintenance of different types of coupling equipment. Also covered are the physical principles of power transmission, and the relationship of speed and torque as different forms of power. You will learn about simple and compound gear trains, and how gear trains may be used as speed changers or torque increasers. You will learn about spur, helical, double-helical, bevel, and worm gears, and the uses of each. You will learn about gear lubrication and about handling the shock loads that your equipment applies to gears. Finally, you will learn about the construction and uses of the different types of single and multiple V-belt drives, the use of V-belt drives as speed changes, the adjustment and replacement of V-belts, and the control of slippage.	4
A1085a	Couplings, Gear Trains, and V-Belts: Machine Connections and Couplings	This program covers one way drivers are connected to driven equipment. You will learn about the special advantages and problems associated with couplings, and their adjustment and preventive maintenance requirements. In this program, you will learn about the causes and control of misalignment, end float, surges in torque, and the different basic types of rigid and flexible couplings.	3
DYNAMIC PUMPS			
A1070	Introduction to Dynamic Pumps	In Introduction to Dynamic Pumps, you will about fluid flow, dynamic pump classifications and properties of the two dynamic pump types - axial and centrifugal.	1
FANS AND BLOWERS			
PS-MNT-FBL-101	Fans and Blowers	In Fans and Blowers, you will learn about centrifugal, cross-flow, and axial flow fans, mechanical draft, positive displacement, and dynamic blowers; fan and blower system characteristics, and fan efficiency.	3
GAS TURBINES			
A1083b	Combustion Gas Turbines: Equipment and Operation	In Combustion Gas Turbines: Systems and Operation, you will learn about the functions of casing seals, bearings and lubrication in a combustion gas turbine. The program also covers the control and operation of combustion gas turbines, including start-up, operating, and shutdown procedures, and the control of vibration, critical speed, and turbine imbalance. Finally, you will learn about temperature control, the use of turning gears, and turbine control using the automated control panel. Through this understanding of turbine principles, construction, and control, you will be better able to secure efficient and safe turbine operation.	4

COURSE #	COURSE TITLE	DESCRIPTION	HRS
A1083a	Combustion Gas Turbines: Introduction	In Combustion Gas Turbines you will learn the operating principles of the compressor, the combustion chamber, and turbine section. You will also learn about the construction of the compressor, combustion chamber, and turbine section; the blading arrangement; and the use of the turbine as a driver and hot-gas generator. Also covered is turbine auxiliary equipment such as starting devices, governors, and overspeed mechanisms, and their functions.	4
INTERNAL COMBUSTION ENGINES			
A1084a	Internal Combustion Engines: Introduction	Internal combustion engines are engines which burn fuel in a cylinder to produce power. Presented in this program are the principles of the internal combustion engine, and its general operation and parts. You will learn how the combustion cycle differs in 2-cycle and 4-cycle engines. You will also learn some of the more common cylinder arrangements. Also covered are the details of the construction of an internal combustion engine, including the camshaft, carburetor, natural gas admission system, safety devices, and the electrical system. You will learn how each of these parts functions as a part of the total engine. Finally, you will learn the principles of a diesel engine, how it operates and how it differs from the traditional IC engine.	4
A1084b	Internal Combustion Engines: Operating Techniques	Internal combustion engines are engines which burn fuel in a cylinder to produce power. In this program, you will learn the details of the auxiliary systems of IC engines and how they operate, including the cooling system, lubrication system, air cleaners, superchargers and exhaust systems. You will also learn the operation and maintenance of the engine, how to read an instrument panel and interpret gauge readings, typical engine start-up and shut-down procedures, and preventive maintenance procedures for daily, weekly and monthly checks.	3
MIXERS AND BLENDERS			
PS-MNT-MXB-201	Mixers and Blenders	In Mixers and Blenders, you will learn about the difference between liquid and solid blending; solids mixing, including convective, shear, and diffusive mixing; fluids mixing, including bulk transport, molecular diffusion, and turbulent and laminar mixing; semi-solid mixing; advantages and disadvantages of batch and continuous mixing; types of mixing equipment, including blenders, agitators, and heavy duty mixers.	1
POSITIVE DISPLACEMENT COMPRESSORS			
A1052b	Positive Displacement Compressors: Construction and Operation	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is about the construction and operation of compressors. In this program you will learn the construction, principal parts, and operation of reciprocating compressors.	4
A1052a	Positive Displacement Compressors: Introduction	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is an introduction to positive displacement compressors. In this program you will learn the operating principles of reciprocating compressors, the different types of rotary compressors, and techniques for controlling compressor output.	3
POSITIVE DISPLACEMENT PUMPS			
A1072b	Positive Displacement Pumps: Equipment and Operation	Positive displacement pumps are reciprocating and rotary pumps that move liquid by the positive displacement of liquid volume. In this program, you will learn about packing, lubrication, and cooling systems, the construction and operation of pump valves, pulsation dampeners and suction stabilizers, variable displacement devices and bypasses and relief valves. Finally, you will learn startup and shutdown procedures, how to recognize and solve common pumping problems; and proper operating maintenance.	4
A1072a	Positive Displacement Pumps: Introduction	Positive displacement pumps are reciprocating and rotary pumps that move liquid by the positive displacement of liquid volume. In this program, you will learn the operating principles and performance characteristics of positive displacement pumps, what determines their capacity, pressure, horsepower and efficiency, and how NPSH is calculated. You will also learn the basic types of reciprocating and rotary pumps, including piston pumps, plunger pumps, diaphragm pumps, direct-acting steam and air pumps, and rotary lobe, vane, gear and screw pumps, and how these pumps differ from each other in design and performance.	4
SCREW COMPRESSORS			
PS-MSO-SCC-101	Screw Compressor Components and Auxiliary Equipment	In Screw Compressor Components and Auxiliary Equipment, you will learn about screw compressor components, including rotors, bearings, balance piston, shaft seals, and stepless capacity control; along with auxiliary systems such as suction scrubbers, oil system, oil cooling, economizer, and utilities.	2

COURSE #	COURSE TITLE	DESCRIPTION	HRS
STEAM ENGINES AND PUMPS			
A1086a	Steam Engines and Pumps: Introduction	In Introduction to Steam Engines and Pumps, you will learn about steam engine and pump basics, steam engine and pump valves, constructing steam engines and pumps, and steam engine control.	4
STEAM ENGINES AND PUMPS			
A1086a	Steam Engines and Pumps: Introduction	In Introduction to Steam Engines and Pumps, you will learn about steam engine and pump basics, steam engine and pump valves, constructing steam engines and pumps, and steam engine control.	4
A1086b	Steam Engines and Pumps: Operation and Maintenance	In Steam Engines and Pumps: Operation and Maintenance, you will learn about steam engine control systems, steam engine lubrication, operation and maintenance, and steam pumps.	4
STEAM TURBINES			
A1082b	Steam Turbines: Equipment and Operation	Steam turbines may differ from one another in size, appearance, and construction, but all steam turbines are similar in operation and work on similar principles. In this program, you will learn about the construction of the turbine, including rotor and casing, diaphragms, seals, and packing boxes, and labyrinth and carbon ring packing. You will also learn about the construction of the bearings and bearing combinations used in turbines, of single- and multi-valve governors, and of the oil circulation system. And finally, you will learn turbine operation and operating problems; the effects of pressure, heat, and steam condensation; uneven heating and cooling; leakage of steam; vibration; lubrication and lubrication problems; speed adjustment, instrumentation, and the visual inspections that must be conducted before startup. With this understanding of turbine principles, construction and control, you will be able to ensure the efficiency and safety of turbine operations.	4
A1082a	Steam Turbines: Introduction	Steam turbines may differ from one another in size, appearance, and construction, but all steam turbines are similar in operation and work on similar principles. In this program, you will learn how impulse and reaction turbines convert thermal energy to mechanical energy, how condensing and non-condensing turbines work, how turbine speed is controlled, and how the over-speed trip protects the turbine against failure of other speed controls.	3

STATIONARY EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
BOILERS			
A1145	Steam Boiler Operations	Steam boilers are used in stationary applications to provide heat, hot water, or steam. A boiler provides an efficient way to transfer stored thermal energy from a fuel source to the water in the boiler, and then to an end application. In this program, you will learn about steam boiler process chemistry and process flow.	4
PS-MNT-SBO-101	Steam Boilers	In Steam Boilers, you will learn about steam boiler operation and classification, routine and extended maintenance, troubleshooting and causes of corrosion failure.	2.5
FIRED HEATERS			
A1165	Fired Heaters: Equipment and Design	The major source of energy consumption in a refinery, chemical, or petrochemical plant is fuel for fired heaters. Fired heaters are used in many process operations such as distillation, reforming, olefins manufacturing and hydrocracking. Almost every unit in a plant or refinery is equipped with some type of fired heater. With the rising cost of fuel, efficient operation of these furnaces can save hundreds of thousands of dollars for a company each year. In this program, you will learn about basic furnace operating principles of fired heaters and details of equipment construction and function.	3
A1166	Fired Heaters: Operating Techniques	The major source of energy consumption in a refinery, chemical, or petrochemical plant is fuel for fired heaters. Fired heaters are used in many process operations such as distillation, reforming, olefins manufacturing and hydrocracking. Almost every unit in a plant or refinery is equipped with some type of fired heater. With the rising cost of fuel, efficient operation of these furnaces can save hundreds of thousands of dollars for a company each year. In this program, you will learn about safe and efficient operating procedures for fired heaters, including variables that are monitored on the process and combustion sides of the furnace, and the major steps and safety measures in furnace startup, shutdown, and emergency shutdown.	4
FURNACE			
A1032	Furnace Operations: Working With Furnaces	Few aspects of operation are more sensitive or more potentially hazardous than furnace startup and shutdown. This program leads you through these two important procedures to a complete understanding of the rigorous order of successive steps required and the way to accomplish each step prudently. Finally, you will be presented with several situations that can be brought under control by an astute application of the general principles of furnace operation. Each situation is adapted from an actual incident from the history of petroleum refining. You will examine real symptoms, consider their significance and choose a course of action that results in proper and economical firing of the furnace.	4
A1031	Introduction to Furnace Operations	This program describes the furnace and its components. You will learn about how the components function in the total process of making heat and transferring it to the petroleum materials being processed into useful products. Also discussed are the three elements of combustion - fuel, air, and a source of ignition - and the way these elements are combined under controlled conditions in the furnace. Providing air for combustion in sufficient quantity for maximum release of heat is the normal day-to-day task of the operator. This program discusses the operation and use of air control equipment and the indicators and analyzers that make strict regulation of the air supply possible. Proper control of air minimizes the consumption of fuel and extends the life of furnace equipment. Operators who develop the ability to regulate air supply within narrow limits contribute to the economy of heat production and extended life of the equipment.	4
HEAT EXCHANGERS			
A1160a	Heat Exchangers: Introduction	In this program, you will learn about heat transfer as it is applied in modern refining techniques, conduction and convection as methods of heat transfer and heat transfer in tubes. You will also learn the various parts of heat exchangers and their functions, as well as the various types of shell and tube heat exchangers.	4
A1160b	Heat Exchangers: Operations and Maintenance	In this program, you will learn about startup and shutdown procedures in heat exchanger operation and maintenance, the various problems of exchanger maintenance, and the flow and mechanisms of various heat exchange systems.	3
PS-MNT-THE-101	Shell and Tube Heat Exchangers	In Shell and Tube Heat Exchangers, you will learn about shell and tube components, exchanger operation and flow paths; cleaning procedures and requirements; contaminants, testing and repairs.	3

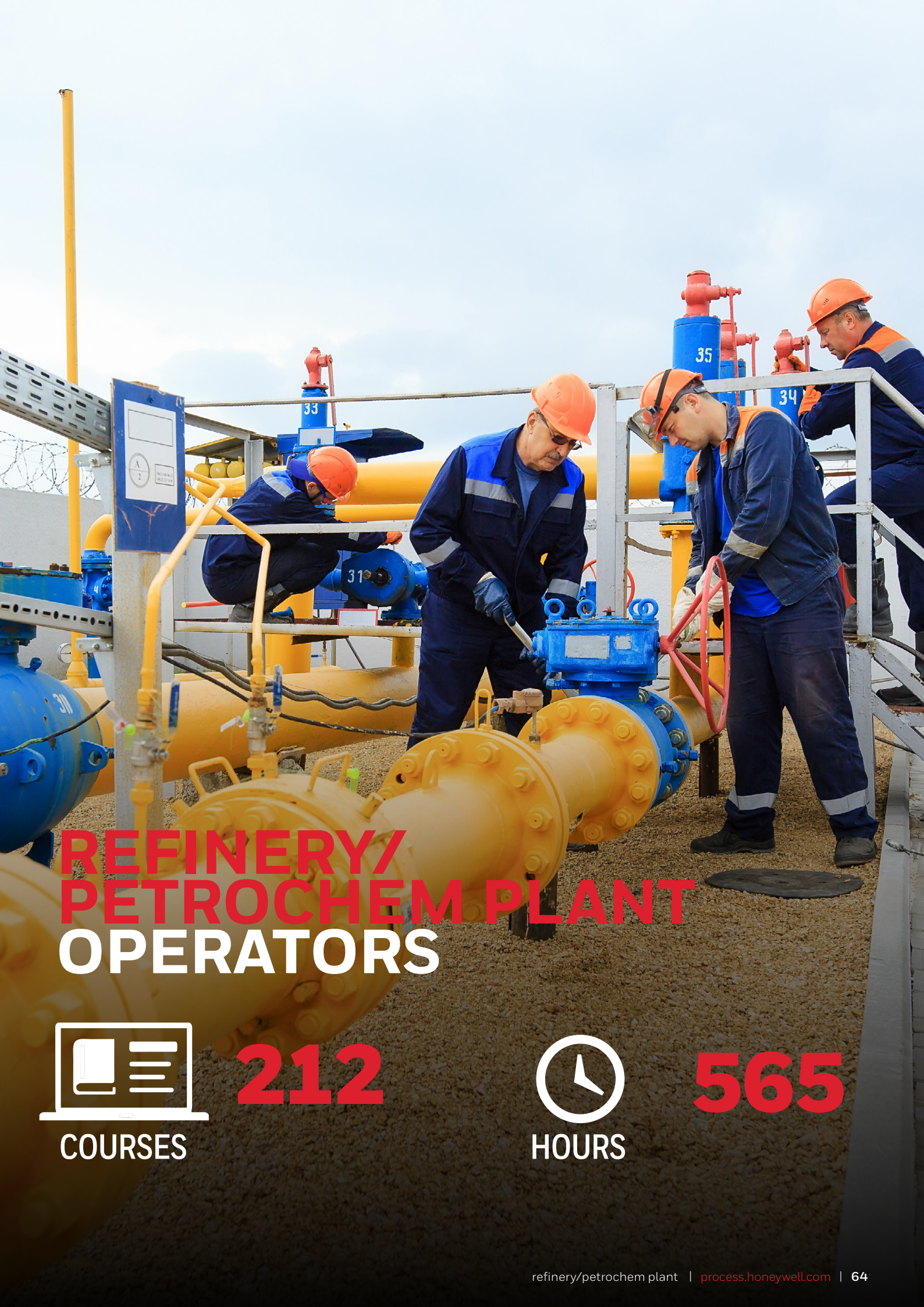
COURSE #	COURSE TITLE	DESCRIPTION	HRS
PS-MNT-HEX-101	Heat Exchangers for Technicians	In Heat Exchangers for Technicians, you will learn about types and functions of heat exchangers, contaminants, cleaning requirements, testing and repairs.	3
OIL AND GAS SEPARATORS			
A1470	Oil and Gas Separators	In Oil and Gas Separators, you will learn the effects of pressure, temperature, and density on fluid separation and the function of separator components, such as baffles and mist extractors. You will learn how the backpressure regulator and the liquid level controller operate to maintain optimum separation conditions. You will also learn to recognize such basic separators as vertical, horizontal, spherical, double-tube, baffling, and metering separators. And, you will be introduced to the related processes of liquid stabilization, stage separation, low temperature separation, gas dehydration, and crude oil dehydration.	3
VALVES			
A1206	Valve Maintenance	This program reviews the various types of valves in piping systems and the maintenance required to keep them in good operating condition. You will learn how to lubricate valves, adjust valve packing, and inspect steam traps.	2
A1140a	Valves: Introduction to Valves	Valves are used to control the flow of liquids and gases. In this program, you will learn about the construction and operation of the most widely used valves, such as gate, globe, plug, and check valves.	4
A1140b	Valves: Operating Valves	Valves are used to control the flow of liquids and gases. In this program, you will learn to operate and maintain valves. You will also learn what valves should be used with various types of service and how to troubleshoot difficulties that may develop due to fouling, leakage, or wear.	3
PS-MNT-VDC-101	Valve Design and Characteristics	In Valve Design and Characteristics, you will learn about fluid flow in pipes, selecting a valve, valve body materials, mounting styles, sizing, cavitation, flashing, noise, and flow characteristics.	1.5
PS-MNT-VLA-101	Valve Accessories	In Valve Accessories, you will learn about valve accessories, including hand wheels, manual levers and loading stations, transducers, air sets, volume boosters, fail-safe systems, limit switches, and positioners; and calibrating and troubleshooting valve accessories.	2
PS-MNT-VLV-101	Valves Inspection, Testing and Repair	In Valves Inspection, Testing and Repair, you will learn about types of valves, valve components, specifications and standards; visual inspection, repairs and maintenance, removing and installing valves, and pressure testing.	3
SEPARATORS			
PS-MSO-CTS-101	Two Phase and Three Phase Separators	In Two and Three Phase Separators, you will learn about separator function, operating pressure; vertical, horizontal, and spherical separators; primary separation, secondary separation, mist extraction, and liquid accumulation sections, and separator external components and controls.	2
COLUMNS AND PROCESS VESSELS			
PS-MNT-CPV-101	Columns and Process Vessels	In Columns & Process Vessels, you will learn about components and functions of process vessels; regulations and standards for performing inspections, internal and external inspections; and packed and tray tower internal and external repairs and maintenance.	3

UTILITY, SAFETY AND FACILITY SYSTEMS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
BOILERS			
PS-MNT-BOI-101	Introduction to Auxiliary Boiler Systems	In Introduction to Auxiliary Boiler Systems, you will learn about the purpose of an auxiliary boiler system, the different classifications, common boiler accessory equipment, heat recovery equipment, the burner management system, and the operating limits on the typical auxiliary package boiler.	1
COMPRESSED AIR SYSTEMS			
PS-MNT-AIR-101	Utility and Instrument Air Systems	In Utility and Instrument Air Systems, you will learn about compressed air systems, components, piping configuration, methods of moisture removal, and the hazards and risks associated with them.	1.5
COOLING TOWERS			
PS-MNT-CTW-101	Cooling Towers for Technicians	In Cooling Towers for Technicians, you will learn about natural draft, louver covered natural draft, mechanical draft, and induced draft types of cooling towers, components, classification and modes of operation; maintaining water and filtration systems, fan and drive systems, heat transfer surfaces, fill pack, drift eliminator, and air inlet louver maintenance, and cooling tower troubleshooting.	5
A1150a	Cooling Towers: Introduction	A great deal of process water is used daily within industry to cool process products and equipment. To conserve this potentially scarce resource and to minimize the costs of industrial cooling, much of the water is recycled and used again. This recycling operation is accomplished by utilizing a recirculating water cooling system. The system is composed of two major parts - a heat exchanger that transfers heat from a hot liquid to the cooling water and a cooling tower, which cools the water so that it can be reused. In this program, you will learn about various types of cooling towers and their construction, how they cool to save water and the factors that affect cooling tower performance.	5
A1150b	Cooling Towers: Water Conditioning	Billions of gallons/liters of water are used daily by industry to cool process products and equipment. To conserve this potentially scarce resource and to minimize the costs of industrial cooling, much of the water is recycled and used again. This recycling operation is accomplished by utilizing a recirculating water cooling system. The system is composed of two major parts - a heat exchanger that transfers heat from a hot liquid to the cooling water and a cooling tower, which cools the water so that it can be reused. Because cooling water is recirculated throughout the cooling system, it must be treated to remove or neutralize impurities that would otherwise damage the heat transfer equipment. In this program, you will learn about water conditioning and its effect on the efficiency and upkeep of cooling tower units.	5
FIRE AND GAS SYSTEMS			
PS-EIA-FDE-101	Fire Detection	In Fire Detection, you will learn about fire detection systems, including heat, smoke, and flame detectors; hydrocarbon emissions, UV/IR sensors and how to calibrate and troubleshoot these systems.	2
PS-MNT-FPS-101	Fire Protection Systems	In Fire Protection Systems, you will learn how about fire protection system components, fire pump types, operation, and maintenance; gas detector system types and sensors; Fire/gas detection system types, control, and operation; fire/gas protection systems, extinguishers, and maintenance, and fire/gas panels and maintenance.	6
PS-EIA-GDE-101	Gas Detection	In Gas Detection, you will learn about gas terminology, combustible gas detection, sensor types and features; detector and sensor calibration and troubleshooting.	1.5
FLARE SYSTEMS			
PS-MSO-FSF-101	Flare System Fundamentals	In Flare System Fundamentals, you will learn about applications for gas flaring, such as high pressure protection, natural gas processing, solution gas, and well testing; flare systems; flame monitoring; fuel, pilot, makeup, and purge gases; and flare system equipment.	2
PS-MSO-FSH-101	Flare System Hazards and Ignition	In Flare System Hazards and Ignition, you will learn about gas flaring and flare system safety, including thermal radiation, explosion hazards, liquid carryover, noise, temperature limits and incomplete combustion; flame ignition and detection systems, pilot flame ignition systems, and flare ignition systems.	1
PS-MSO-FSP-201	Flare System Purging Startup and Shutdown	In Flare System Purging Startup and Shutdown, you will learn about general purging considerations; purging methods, including displacement, dilution, and pressure cycle purging; and flare system startup and shutdown inspection, preparation, and procedures.	1
PS-MSO-PKD-201	Pumping Out Flare Knockout Drums	In Pumping Out Flare Knockout Drums, you will learn about flare knockout drum function, hazards, knockout drum liquid disposal considerations, ambient air monitoring, and general procedures.	0.5

COURSE #	COURSE TITLE	DESCRIPTION	HRS
LIQUID NITROGEN SYSTEMS			
PS-MNT-LNN-101	Liquid Nitrogen Storage Systems	In Liquid Nitrogen Storage Systems, you will learn about the properties and characteristics of nitrogen, the major health hazards and precautions for handling, common industry applications for nitrogen, and the major system equipment in a liquid nitrogen storage system.	0.75
PLANT COMMUNICATION SYSTEMS			
A1192	Plant Radio Communication	In Plant Radio Communication, you will learn how to operate plant radio equipment to communicate effectively and according to FCC rules.	1
POWERED INDUSTRIAL EQUIPMENT			
PS-MNT-FOM-101	Forklifts	In Forklifts, you will learn about basic principles of forklift operation, applications, pallets and stillages, palletless handling, hydraulically powered fork options, telescopic handlers, inspection and certification.	1
PRESSURE SAFETY DEVICES			
PS-MNT-PRS-101	Pressure Relief Safety Devices	In Pressure Relief Safety Devices, you will learn about the purpose of pressure relief safety devices, common types including conventional relief valve, balanced relief valve, pilot operated relief valve and rupture disk; the difference between a full lift, high lift, or low lift pressure relieving safety device, internal material options for the different service conditions and major factors involved in the selection of a pressure relieving safety device.	0.5
STEAM LINES			
PS-MNT-SCH-101	Steam Condensate Hazards and Removal	In Steam Condensate Hazards and Removal, you will learn steam condensate and the risks associated with its presence in a steam system including the formation of condensation and how various types of steam traps are used for steam condensate removal.	0.5
PS-MNT-STR-101	Steam Traps	In Steam Traps, you will learn about the purpose, types and classifications of steam traps, how to perform routine and extended maintenance, and how to troubleshoot and test steam traps.	3
VENT AND RUNDOWN SYSTEM			
PS-MNT-VSR-101	Vent System and Rundown System	In Vent and Rundown System, you will learn about vent stacks and rundown vessels, including vertical and horizontal flash tank operation; internal and external inspections; maintaining stacks and rundown vessels, and packed tower repairs.	2.5
WATER TREATMENT			
PS-MNT-DWT-101	Fundamentals of Demineralized Water Treatment Systems	In this course, you will learn about the fundamentals of demineralized water treatment systems including the need for boiler water treatment, reverse osmosis process and ion exchange cycle operation, regeneration, mixed bed polishing, and selective ion exchange.	0.75
PS-MNT-ROS-101	Fundamentals of Reverse Osmosis Systems	In Fundamentals of Reverse Osmosis systems, you will learn about the reverse osmosis process, the differences between natural and reverse osmosis, pre-treatment options and system maintenance.	1
PS-MNT-PWT-101	Potable Water Treatment System	In Potable Water Treatment Systems, you will learn about the need for potable water treatment, types of water contamination, potable water treatment process, water disinfection, and reverse osmosis.	1
A1102	Wastewater Treatment: Biological Treatment Process	Following preliminary treatment, the different wastewater streams are mixed together to a more or less uniform consistency for further treatment by a process called biological oxidation, also known as the activated sludge process. This process uses microorganisms to digest and break down the organic chemicals in the wastewater, producing treated effluent and sludge. This program examines the equipment used in the activated sludge process and its operation. You will also learn about sludge treatment and disposal methods and examine the various methods of effluent polishing, which further remove suspended solids and hard-to-treat organics before the treated wastewater is discharged as effluent into the environment.	3
A1101	Wastewater Treatment: Preliminary Treatment	Wastewater treatment is an increasingly important aspect of refinery and chemical plant operations. An efficient wastewater plant is not only important from the standpoint of environmental conservation, but also represents an opportunity to recover and recycle some resources that might otherwise be lost, thereby contributing to the economic success of the overall process operation. In this program, you will learn about important sources of contamination within a typical refinery, and contaminants that various process operations may generate. You will also learn about the various preliminary, or physical, treatment processes that the different wastewater streams must undergo before they are suitable for further processing. The program also covers methods used to remove and recover emulsified oil from wastewater and the different chemical unit operations that are used to improve the operation of the physical treatment processes.	4

COURSE #	COURSE TITLE	DESCRIPTION	HRS
A1103	Wastewater Treatment: Process Control	The effectiveness of the biological oxidation process is affected by a number of control factors. These factors can be divided into two basic categories, environmental and process-related. The environmental control factors include the organic loading, pH, availability of nutrients, temperature, and presence of toxic substances, and determine the environment in which the biox process takes place. The process-related control factors are adjusted by the operator to achieve the best effluent quality, and include the influent rate, the return activated sludge rate, and the waste activated sludge rate. This program examines the effect each variable has on the process, and the relationship between them. You will also learn strategies that you can use to monitor and optimize the process operation. The program includes some simple calculations that you can perform to determine the operating target levels.	3
A1104	Wastewater Treatment: Testing and Troubleshooting	Testing is an important responsibility of the wastewater treatment operator. The biological oxidation (activated sludge) process is very sensitive to changes in its operation, so it is critical that you know what tests to run, how to run them, and how to use the test results to keep the process operating effectively. This program covers important tests that a treatment plant operator commonly uses on a daily basis to monitor the operation of the unit. You will learn the units of measurement and the methods of calculating the results of the tests for total solids, volatile solids, and suspended solids. The BOD5 test procedure is covered for general information and methodology. The program also covers the 30-minute sludge-settling test and calculation of the sludge volume index. Because the 30-minute settleability test is a quick, easy test that can be performed without laboratory analysis, the program includes some of the troubleshooting steps you might take, based on some typical results of the 30-minute settleability test.	2
PS-MSO-WSS-101	Water Softening Systems	In Water Softening Systems, you will learn about "hard water" and how it is softened using ion exchange, lime softening and reverse osmosis processes	1.5
WEIGHING EQUIPMENT			
PS-MNT-WBS-101	Weigh Bridges, Docks Levelers & Scales	In Weighbridges, Dock Levelers and Scales, you will learn about the purpose of weighbridges, dock levelers, and scales, and how to maintain and troubleshoot them.	1
PS-MNT-WDV-101	Weighing Devices	In Weighing Devices, you will learn about weighing terminology, types of load cells, sensors, and feeders; truck and rail scales; calibrating weighing devices; and troubleshooting strain gages, load cell electrical problems, and instrumentation and communications problems.	2



REFINERY/ PETROCHEM PLANT OPERATORS



COURSES

212



HOURS

565

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ELECTRICITY AND ELECTRICAL EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
DRAWINGS AND DIAGRAMS			
A1186	Electrical System Basics and Diagrams	In Electrical System Basics, you will learn about electrical generation and transmission, system voltages, and building schematic diagrams; Single line drawings, electrical symbols, and logic symbols and gates; and low and medium voltage motor drives and drive circuits.	3
ELECTRICAL FUNDAMENTALS			
PS-EIA-EDO-101	Electrical Documentation	In Electrical Documentation, you will learn about types of electrical documentation, electrical loop numbers and symbols; power distribution and cable layout diagrams; control/schematic diagrams; protection and hazardous area diagrams; updating, storing, and controlling diagrams.	1.5
A1620	Electrical Fundamentals	The first section of Electrical Fundamentals describes units of electrical measurement, states Ohm's law and shows some of its uses, and describes and shows differences between series and parallel circuits. This section also shows some of the effects of resistance in series and parallel circuits, the use of resistance as voltage dividers, and ways to produce and make use of voltage drop. Next, the program describes how a magnetic field is produced and how magnetic fields are used in motors, measuring devices, and as resistors in electrical circuits and devices. You will also learn about the effects produced by alternating current, which describes alternating current, voltage and current phases, self-inductance, inductive reactance, the use of capacitors in AC circuits, and the use of induction coils as transformers. The program concludes with basic electronics, which briefly describes diodes and transistors and shows how they are used to rectify current and amplify electrical signals. This section also introduces simple transistor circuits and describes the use of capacitors in such circuits.	4
A1185	Understanding Electricity	In Understanding Electricity, you will learn how to safely work with electricity. You will learn about basic electrical terms, the effect of electric current on the human body, and why electricity is a potential hazard. Additionally, you will learn about grounding electrical equipment, the proper precautions you must take when working with electrical equipment, and how to act in an emergency. The Electric Power Distribution System section describes how electric power is distributed from a generating plant to a lease. Finally, you will learn about measuring electric usage, including units of measurement and how to read a meter.	4
MOTORS			
A1081	AC Motors for Operators	Designed for Operations Personnel, AC Motors describes how a motor changes the energy of electric current into mechanical power. This program describes how electric current produces magnetism and magnetism induces electric current. You will learn how motors are designed so that the attracting and repelling of magnetic fields sets up rotation of the shaft. Also covered is the starting and running characteristics of AC motors, and the speeds and horsepower of AC motors. The section on motor control describes starting and stopping mechanisms for AC motors, protective devices that may be found on motor controllers, and safety devices. You will learn proper procedures for starting, running, and stopping the motor. Finally, the program describes lubrication and maintenance procedures, and types of motor enclosures.	5

GAS PROCESSING OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PHASE BEHAVIOR			
A2501	Hydrocarbon Phase Behavior and Vapor-Liquid Equilibrium	In Hydrocarbon Phase Behavior and Vapor-Liquid Equilibrium, you will learn about the phase behavior, vapor-liquid equilibrium, the water content of gas, and hydrates.	4
PROCESS OVERVIEW			
A2500	Introduction to Gas Processing for Operations	In Introduction to Gas Processing, you will learn about gas processing hydrocarbons and about the equipment and process for gas conditioning and processing.	3
PROCESS SAFETY			
A2507	Gas Processing Hazards	In Gas Processing Hazards, you will learn about hazards within a typical gas processing facility.	4
SWEETENING			
A2506	Amine Sweetening Process	In the Amine Sweetening Process program, you will learn about amine sweetening, absorption in amine sweetening, primary absorption equipment, and controlling the sweetening process.	5
THERMODYNAMICS			
A2502	Gas Processing Thermodynamics	In Gas Processing Thermodynamics, you will learn about thermodynamics, heat transfer, the gas laws, and compression ratio.	5

GENERAL KNOWLEDGE AND SKILLS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
BEST PRACTICES			
A1100	Cost Reduction for Operators	In Cost Reduction for Operators, you will learn important strategies for reducing the waste of time, materials, and labor by running equipment at top efficiency and supporting a preventive maintenance program. Emphasis is placed on using instruments to accurately determine at which point in a process enough becomes too much. You will also learn ways to avoid fuel and steam waste, heat loss, waste of utilities, and ways to avoid excess equipment loss and repair through a preventive maintenance program.	2
A1137	Performing Skills Assessment	A performance assessment is a tool that is used to measure, maintain, and improve the behaviors associated with completing a task. Within a process facility, it is imperative that tasks be completed in a safe manner. Safety procedures specify how employees must complete each task within a process facility. In this program, you will learn how to assess job performance to ensure that each employee performs their assigned tasks in a safe manner.	1
A1200	Process Operator Responsibilities	In Process Operator Responsibilities, you will learn about general duties, training, and task observance competency; safety (process, environmental, personal, fire, and chemical); and process and maintenance operations, including shift turnover responsibilities and unit checks. You will also learn about communication and documentation, including radio communication practices, log sheet entries, checklists, and permits.	1
PS-MNT-RAC-101	Reports and Communication	In Reports and Communication, you will learn about giving oral reports, including preparation, delivery, visual aids, and handouts; how to structure technical reports; and how to update and mark up diagrams and schematics.	1
DRAWINGS AND DIAGRAMS			
PS-MNT-ENG-101	Engineering Drawings and Symbols	In Engineering Drawings and Symbols, you will learn about the different types of engineering drawings, different drawing formats used in creating engineering drawings, the different areas of the drawing, the types of symbols used.	0.5
GENERAL OPERATIONS KNOWLEDGE			
PS-EIA-EFA-101	EI&A Field Awareness	In EI&A Field Awareness, you will learn about electrical power systems, emergency power systems, AC and DC UPS; cathodic protection, heat tracing, lighting and grounding systems; types of instrumentation systems; types of analyzer systems, and hazard awareness.	4
PS-MSO-HAC-101	Fundamentals of Hazardous Area Classifications	In Fundamentals of Hazardous Area Classifications, you will learn about the fundamentals of Hazardous Areas and equipment protection classifications including explosive limits, flashpoint, auto-ignition temperature, ignition energy, and vapor density of material properties; the three different zones of hazardous areas and source of release classification.	0.5
HAND TOOLS AND EQUIPMENT			
A1201	Working with Hand Tools	This program covers the basic hand tools that are normally found in an operator's tool box. You will learn to identify each tool and how to use it properly.	2
A1208	Working with Power Tools	Maintenance activities usually involve the use of some tools. Each of these tools is designed to perform a specific job. You must be able to select and operate the correct power tool for a particular job. In this program, you will learn the purpose, function and proper orientation of power tools. You will learn specific requirements of each type of power tool and how to use them safely.	2
QUALITY ASSURANCE AND CONTROL			
A1090	Process Control Tests	Process Control Tests is designed to provide operators with knowledge about how process control tests are used to aid in the production of high-quality products. You will learn about common tests – what they are, when they are used, and what the tests results mean. You will learn why products are tested, the different kinds of tests, how to obtain a good sample, and to interpret test results. You will also learn some of the more common physical tests, how they are run, what the results mean and how you can use these results as an operating tool. Also covered are some of the more common impurities found in petroleum products, how these impurities affect product quality, and how products are tested for the presence of these impurities. Finally, you will learn about the structure of hydrocarbons, how product composition affects product quality, and some of the tests used to determine product composition.	5
A1191	Statistical Process Control	In Statistical Process Control, you will learn about the operator's role in gathering and analyzing process information and taking corrective action when process problems occur.	3

GENERAL MAINTENANCE SKILLS AND KNOWLEDGE

COURSE #	COURSE TITLE	DESCRIPTION	HRS
CLEANING ACTIVITIES			
A1207	Cleaning Activities	This program identifies the tools and procedures for cleaning pipes, burners, and other equipment. Major topics include cleaning gauge/sight glasses, strainer and burner cleaning, and changing filter elements.	1
CORROSION CONTROL			
A1122	Corrosion Control	This program will teach you the basics of the corrosion process, the methods used to monitor the rate of corrosion and the control techniques used to protect equipment. By successfully controlling corrosion, the destructive effects can be minimized, and facility operations can be more profitable.	4
COUPLINGS AND GEARS			
PS-MNT-GEA-101	Gears	In Gears, you will learn about gear purpose, classifications, and applications; routine maintenance; gear installation and removal; gearbox maintenance, overhaul, and assembly; and gear troubleshooting.	4
DRAWINGS AND DIAGRAMS			
PS-MNT-MND-101	Manuals and Drawings	In Manuals and Drawings, you will learn about maintenance drawings, orthographic, process flow, piping and instrumentation, and schematic drawings; reading drawings and blueprints; standards organizations; and operations and maintenance manuals.	2
FILTERS			
PS-MNT-DCF-101	Dust and Coalescer Filters	In Dust and Coalescer Filters, you will learn about the application and workings of coalescing filters, the purpose of dust filters, and how to safely remove and install filter elements.	1
PS-MNT-FTS-101	Filters and Strainers	In Filters and Strainers, you will learn about filtration, filter media, and operation; mechanical, absorbent, and adsorbent filters; Y-basket and temporary (geometric) strainers; filter and strainer cleaning and maintenance.	2
GENERAL MAINTENANCE CONCEPTS			
PS-MNT-BLD-101	Blinding and De-blinding	In Blinding and Deblinding, you will learn about slip blinds, spectacle blinds, and blind flanges, blind and flange sizes, and blind installation and removal.	1
PS-MNT-CMG-101	Condition Monitoring - General	In Condition Monitoring - General, you will learn about life, preventive, reactive, and predictive maintenance; potential fault analysis (PFA); vibration analysis, including imbalance, misalignment, and looseness analysis; and maintenance and maintainability data.	3
PS-MNT-FDT-101	Fault Diagnosis, Troubleshooting and Machine Inspections	In Fault Diagnosis, Troubleshooting and Machine Inspections, you will learn about common techniques of diagnosing and troubleshooting machine failures including Fault Tree Analysis (FTA) and Failure Mode and Effects Analysis (FEMA), machine performance monitoring, troubleshooting techniques using operation records, vibration analysis, and lubricating oil analysis and the non-destructive testing (NDT) methods of visual inspection, liquid penetrant, magnetic particle, ultrasonic, radiography and eddy current.	1.5
PS-MNT-CPM-101	Fundamentals of Condition and Predictive Monitoring	In Fundamentals of Condition and Predictive Monitoring, you will learn about the many different ways of monitoring the mechanical condition of equipment including vibration analysis, oil and wear debris analysis, ultrasonics, and infrared thermography.	1
PS-MNT-MFD-101	Maintenance Fundamentals	In Maintenance Fundamentals, you will learn about the principles and types of maintenance, including proactive, preventative, corrective, breakdown, and turnaround maintenance; and maintenance workflow planning and strategies.	1
PS-MNT-PCB-101	Planned, Corrective, and Breakdown Maintenance	In Planned, Corrective, and Breakdown Maintenance, you will learn planned, corrective, and breakdown maintenance, including planning, implementing, and executing maintenance schedules.	1.5
PS-MNT-PMP-101	Preventative Maintenance Plans	In Preventative Maintenance Plans, you will learn about the basic steps involved with the development of a preventive maintenance plan as well as the benefits of such a plan including: benefits, purpose, the Development process and principles of the program.	0.5

COURSE #	COURSE TITLE	DESCRIPTION	HRS
LEAK DETECTION			
A1198	Leak Detection and Repair	In this program, you will learn about controlling hazardous emissions through leak detection and repair.	1
LUBRICATION			
A1210	Lubrication Concepts	To ensure proper operation, all machines must be lubricated. Metal parts must be separated from one another when in operation, or rapid wear and deterioration will result. This separation can be provided with oil lubricant. In this program, you will learn about the different lubricants and their qualities so that you can choose the proper lubricant for the equipment you operate.	1
PIPES, HOSES AND FITTINGS			
A1205	Flange Piping	This program explains the use of flange piping and the procedures for connecting flanges. Major topics include types of fittings and flanges, flange gaskets, and blinding lines.	2
A1202	Pipe Fitting Basics	This program covers the various pipes and fittings that make up a piping system and explains how to read piping diagrams. You will learn how pipe connections are made and how to select the proper equipment.	1
PS-MNT-PTF-101	Pneumatic Tubing and Fittings	In Pneumatic Tubing and Fittings, you will learn about pneumatic tubing applications, tubing types, how to select the proper tubing, types of pneumatic fittings, and tubing installation guidelines.	1
A1204	Small Threaded Pipe	This program covers applications for small threaded pipe and how to cut and thread piping joints. You will learn how to replace temperature and pressure indicators and how to operate pipe threading equipment.	2
A1203	Tubing	This program explains the various uses for tubing and how to make up a small tubing run. Major subjects include types of tubing and fittings, tubing applications, tube bending, and how to assemble and tighten tubing.	2
STRUCTURAL SAFETY			
PS-MNT-ST-101	Structural Safety	In Structural Safety, you will learn about OSHA requirements for ladders and stairways, handrail requirements; corrosion prevention and treatment; rebar corrosion and concrete damage, and structural repairs and inspection techniques.	3

HYDROCARBON STORAGE AND LOADING

COURSE #	COURSE TITLE	DESCRIPTION	HRS
SAFE TANK CLEANING			
A1133	Safe Tank Cleaning: Cleaning the Tank	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas freeing and cleaning stationary storage tanks. Cleaning the Tank covers the physical removal of sludge and other residue from the tank interior. You will learn about the proper tank cleaning supplies, personal protective equipment, and tests required prior to tank entry. You will also learn general safety precautions to be taken throughout the tank cleaning job.	1
A1132	Safe Tank Cleaning: Gas-Freeing	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas freeing and cleaning stationary storage tanks. In Gas Freeing, you will learn specific information on gas freeing three different tank designs, with the assumption that each tank contains a low-sulfur crude oil. The program emphasizes the importance of accurately performing tests for flammable vapors, toxic substances, and oxygen deficiency.	2
A1134	Safe Tank Cleaning: Hazardous Materials	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas freeing and cleaning stationary storage tanks. In Hazardous Materials, you will learn how a specific tank design, combined with the specific material that the tank contains, determines what gas freeing and tank cleaning procedures will be necessary. You will also be introduced to a chart that cross-references tank designs with specific materials a tank may contain. You will learn how to use the chart and its accompanying data sheets to obtain information on a variety of tank cleaning situations.	2
A1131	Safe Tank Cleaning: Preparing for Cleaning	Safe Tank Cleaning is a series of four learning programs designed to teach anyone involved in the planning or supervision of a tank cleaning job the safety procedures for gas-freeing and cleaning stationary storage tanks. Preparing for Cleaning explains why tank cleaning is necessary and outlines the steps that must be carried out before any tank cleaning work begins. You will also learn about the hazards that must be minimized or eliminated at the tank cleaning site, and the ways to handle those hazards. The program also covers basic test equipment and discusses the use and importance of permits as they apply to tank cleaning.	2
STORAGE TANKS			
PS-MSO-APS-101	Atmospheric and Pressure Storage Tanks	In Atmospheric and Pressure Storage Tanks, you will learn about storage tank construction, pressurized and atmospheric storage tanks, and tank classification; effects of water and storage tank water detection and removal; and storage tank roof inspection, including safety precautions, visual and non-destructive inspection, and external tank roof inspection.	3
PS-MNT-STT-102	Maintaining Storage Tanks	In Maintaining Storage Tanks, you will learn about corrosion, internal coatings, tank inspection and repair, emissions, removing a tank from service, tank cleaning, silo maintenance and inspection, and safety.	1.5
PS-MNT-STT-104	Purging Storage Tanks	In Purging Storage Tanks, you will learn about the purpose of purging, isolating the tank; the purging process, including water fill, air ventilation, inert gas fill, handling tanks containing sulfur or hydrogen sulfide, and atmospheric testing the tank interior.	0.75
PS-MNT-STT-101	Storage Tanks	In Storage Tanks, you will learn about tank designs, including cone roof, floating roof, dome roof, and pressure vessels; fire protection and hazards, flammable vapor testing, auxiliary equipment, and environmental hazards.	1.5
PS-MNT-STT-103	Tank Roof Inspection	In Tank Roof Inspection, you will learn about the purpose, procedures, regulatory requirements and methods involved with tank roof inspections including visual inspection, non-destructive techniques, and safety precautions.	1
A1565	Vapor Recovery Systems	For years, the vapors escaping from oil storage tanks through hatches, vents and flare systems were given little attention. Specialists have since learned that if the vapors existed in sufficient quantities, the recovery of the vapors was economically feasible. The recovered vapors represented a valuable source of energy that previously had been "lost." This program explains the operation and routine maintenance of Vapor Recovery Systems. It describes the principles behind vapor recovery, the component parts of vapor recovery units, a method of determining quantities of vapors recovered, and how to keep the equipment operating efficiently.	3

INSTRUMENTATION AND CONTROL

COURSE #	COURSE TITLE	DESCRIPTION	HRS
ANALYZERS AND INFERENTIALS			
A2065	Instrumentation: Analyzers and Inferentials	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. Process analysis is continuously performed to determine the quality of raw materials, intermediates, and finished products. In Analyzers and Inferentials, you will learn about working with analyzers and analytical instruments, key tools in instrumentation process control.	2
CONTROL SYSTEMS			
PS-EIA-CTL-101	Control Loops	In Control Loops, you will learn about control loops and controller action, including control types, controllers, variables, control modes; types of control schemes, including cascade, ratio, split range, feedforward, multivariable and adaptive control; and control loop tuning techniques.	3
A2066	Instrumentation: Regulatory Control	In this program, you will learn about regulatory control, including valves, signal transmission, and basic and advanced control systems.	4
A2060	Instrumentation: Fundamentals of Control	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Fundamentals of Control, you will learn about the basics of instrumentation, including the control loop, process variable indicators, process instrument equipment, and piping and instrumentation diagrams.	3
PS-EIA-SIC-101	Safety in Instrumentation and Control Systems	In Safety in Instrumentation and Control Systems, you will learn about emergency shutdown systems, standards, safety system technologies, SIS architecture; system integrity levels (SIL), equipment failure modes and analysis, SIS factors, and procedures for overriding ESD and SIL systems.	3
PS-EIA-SCS-101	Simple Control System (PLC)	In Simple Control Systems, you will learn about PLC fundamentals, including architecture, basic PLC control and programming, external functions and hardware; PLC maintenance, and general troubleshooting.	2
COURSE #	COURSE TITLE	DESCRIPTION	HRS
DRAWINGS AND DIAGRAMS			
A2067	Instrumentation: Process and Instrumentation Drawings	A company may have several production processes. Having uniform standards for instrumentation systems used for measurement and control simplifies and helps explain the process. In this program, you will learn standard symbols used in instrumentation systems how to apply them.	2
FLOW MEASUREMENT			
A2064	Instrumentation: Measuring Flow	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Measuring Flow, you will learn about flow rate and measurements, including differential pressure and positive displacement flow meters.	3
LEVEL MEASUREMENT			
A2063	Instrumentation: Measuring Liquid Level	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. Effective control of liquid level is important to good process unit operation and safety. It is important that you understand how the different types of level measures function and how they can produce incorrect levels. In Measuring Liquid Level, you will learn about the different ways to measure liquid level.	3
COURSE #	COURSE TITLE	DESCRIPTION	HRS
PRESSURE MEASUREMENT			
A2062	Instrumentation: Measuring Pressure	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Measuring Pressure, you will learn about the basics of measuring pressure, including the tools used for sensing pressure and pressure gauges.	3
TANK GAUGING			
A1196	Tank Gauging	Every oil and gas company must accurately and correctly report inventory. To do this, companies rely on tank gauging to measure all hydrocarbon inventory. Because the volume of inventory is high, the value can be in the billions of dollars. Any errors made in tank gauging mean that investors may not have the proper financial information with which to make decisions. In this program, you will learn about properly and safely gauging tank inventory.	4
TEMPERATURE MEASUREMENT			
A2061	Instrumentation: Measuring Temperature	Instrumentation is a series of learning programs designed to provide operators with a general sense of how instrumentation plays its role in the efficient operation of a refinery. In Measuring Temperature, you will learn about instruments designed to sense temperature, including electrical temperature sensors.	2

MATH AND SCIENCE FUNDAMENTALS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
BASICS OF MATHEMATICS			
A1130	Process Plant Mathematics	In Process Plant Mathematics, you will learn about the principles and operations involving mathematics within a process facility, including addition, subtraction, multiplication, and division of fractions and decimals. You will also learn about using percentages, ratios, proportions, and triangles to solve problems involving process plant activities, such as mixing liquids, determining actual amounts in storage, and angle fitting.	5
A1181	Hydrocarbon Chemistry 101	In Hydrocarbon Chemistry 101, you will learn about basic hydrocarbon composition and properties; carbon and hydrocarbon bonding; hydrocarbon structures and types of formulas. You will also learn about alkanes/paraffins, saturation, alkenes/olefins, alkynes/acetylenes, structural (constitutional) isomers and stereoisomers; and saturated and unsaturated ring hydrocarbons. Finally, you will learn about hydrocarbon nomenclature: naming conventions, how isomers and ring hydrocarbons are named, IUPAC naming rules, and nomenclature for other organic compounds.	3
BASICS OF HYDROCARBON CHEMISTRY			
A1180	Process Plant Chemistry	In this program, you will learn about the basic chemistry behind the refining process. You will learn basic chemical terminology, molecular formulas, structural formulas, some common chemical symbols, and the various hydrocarbon groups used within the petrochemical industry. This program is designed to provide a background in the chemical nature of the operator's job, work environment, and products of refining.	2
HEAT EXCHANGERS			
A1022a	Nature of Heat: Heat Exchange Equipment	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of learning programs including Heat and Temperature, Heat Transfer, and Fuels and Combustion. Efficient use of heat energy includes not only efficient combustion, but also the efficient transfer of heat energy from one place to another. In this program in the series, different types of heat exchangers, including fixed shell-and-tube, U-tube and floating head are examined.	1
PHYSICS OF FLUID AND FLOW			
A1610a	Fundamentals of Fluids for Production Operations: Fluid Behavior	In this program, you will learn about the types of fluids and their chemical and physical nature, the nature of phase, how phase change is used, and how it can be controlled. The program goes on to cover the instruments and units for measuring fluids. This includes units for measuring pressure, temperature, density, and viscosity. You will also learn about the nature of absolute measurements and how to convert measurements from one unit to another.	4
A1610b	Fundamentals of Fluids for Production Operations: Gases and Static Pressure	In this program, you will learn how to predict pressure, temperature, and volume changes that occur in gas compression and storage. You will also learn to recognize hazards in gas handling and the precautions used to avoid these hazards. This program also covers the nature, calculation, and uses of static pressure, including how to calculate pressure from liquid level and liquid level from bottom gauge pressure, the instruments that operate on the principle of static pressure, the nature and hazards of vacuum; and the uses of static pressure in handling and transporting fluids.	3
A1044	Mechanics of Fluids: Fluids in Motion	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In this final program, Fluids in Motion, you will learn the factors affecting flow rate and how these can be controlled, the basic principles and instruments of flow measurement, and the control of rate through valves and through pumping.	4
A1041a	Mechanics of Fluids: Introduction to Process Fluids	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. In Introduction to Process Fluids, you will learn about types of fluids and their chemical and physical nature, including gas compressibility and liquid incompressibility. You will learn about the nature of phase, how phase change is used, and how it can be controlled. You will also learn about the fluid distillation process, types of fluid systems and emulsions.	4
A1043	Mechanics of Fluids: Static Pressure and Head	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In Static Pressure and Head, the fourth program in the Mechanics of Fluids Series, you will learn about the nature, calculation, and uses of static pressure. Topics include how to calculate pressure from liquid level, and how to calculate liquid level from bottom gauge pressure, the instruments that operate on the principle of static pressure, the nature and hazards of vacuum, and the uses of static pressure in handling and transporting fluids.	5

COURSE #	COURSE TITLE	DESCRIPTION	HRS
A1041b	Mechanics of Fluids: Units of Fluid Measurement	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In Units of Fluid Measurement, you will learn about pressure measurements, temperature measurements, density and gravity measurements, and viscosity measurements. You'll also learn about the nature of absolute measurement and how to convert measurements from one unit to another.	4
A1042	Mechanics of Fluids: Behavior of Gases	Hydrocarbon processing involves many types of fluids. Mechanics of Fluids is a series of five learning programs covering the principles of fluid handling in refineries and other process industries. The courses in this series include: Introduction to Mechanics of Fluids, Units of Measurement, Behavior of Gases, Statics, and Fluids in Motion. In Behavior of Gases, the third program in the Mechanics of Fluids Series, you will learn how to predict the pressure, temperature, and volume changes that occur in the compression and storing of gases. You will also learn to recognize hazards in gas handling and the precautions used to avoid these hazards.	4
PHYSICS OF GASES & COMPRESSORS			
A1051	Introduction To Compression	In Introduction to Compression, you will learn about the construction and operation of gas compressors. You will learn about the basic laws of gas behavior and the units of gas measurement. You will learn the nature of compression, including the compression ratio, the heat effects of compression, and the factors affecting compressor horsepower requirements.	4
PHYSICS OF HEAT & TEMPERATURE			
A1023	Nature of Heat: Fuels and Combustion	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of three learning programs covering Heat and Temperature, Heat Transfer, and Fuels and Combustion. Fuels and Combustion, the third program in the series, covers the nature of combustion. Major topics include basic chemical reactions, combustion requirements, combustion of solid, gas and liquid fuels, combustion reactions, combustion control, and analysis of combustion products.	4
A1021	Nature of Heat: Heat and Temperature	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of three learning programs including Heat and Temperature, Heat Transfer, and Fuels and Combustion. This program, Heat and Temperature, introduces heat as a form of energy, describes its effects on the phases of matter, introduces the differences between amount of heat and intensity of heat, and describes heat of transformation. Evaporation, pressure considerations, superheat, specific heat, the thermal properties of refinery products, and temperature measurements and expansion are also described.	4
A1022	Nature of Heat: Heat Transfer	The economical operation of a modern plant or refinery depends upon the efficient use of heat energy. Nature of Heat is a series of three learning programs including Heat and Temperature, Heat Transfer, and Fuels and Combustion. Efficient use of heat energy includes not only efficient combustion, but also the efficient transfer of heat energy from one place to another. In this second program in the series, Heat Transfer, three methods of heat transfer are presented - conduction, convection and radiation. Other topics include heat transfer in furnaces, heat transfer rate, and heat exchangers, including fixed shell-and-tube, U-tube and floating head.	2

PETROCHEMICAL PROCESS EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
EXTRUDER			
PS-MNT-EXE-101	Extruder Equipment	In Extruder Equipment, you will learn about types of extruders, sections, components, and lubrication systems; safety and utilities; extruder operation, and building vacuum system.	1.5
PELLET DRYER			
PS-MNT-GPD-101	Gala Pellet Dryer for Technicians	In Gala Pellet Dryers, you will learn about the pellet dryer process, lubrication, cleaning, inspection, and routine and extended maintenance, part replacement, and troubleshooting.	2.5
REACTORS			
PS-MNT-REA-101	Reactors	In Reactors, you will learn about reactor classification, preventative and routine maintenance, including external and internal inspections, EFS assessment for corrosion; enhanced inspection methods and repairs; and reactor troubleshooting.	1.5
REGENERATIVE THERMAL OXIDIZER			
PS-MNT-RTO-101	Regenerative Thermal Oxidizer	In Regenerative Thermal Oxidizers, you will learn about waste gas treatment processes, oxidizer components, safety precautions, routine maintenance and troubleshooting.	2

PETROLEUM INDUSTRY OVERVIEW

COURSE #	COURSE TITLE	DESCRIPTION	HRS
INDUSTRY OVERVIEW			
PS-EPT-INO-101	Modern Oil and Gas Industry	In Modern Oil and Gas Industry, you will learn about the historical, geographical, and modern context of the petroleum industry; its organization, the petroleum value chain, and economic drivers.	2
PETROCHEMICALS			
PS-EPT-INO-117	Steam Cracking	Steam cracking is the main production process for petrochemicals, including ethylene, propylene and butadiene. The process involves breaking long chain hydrocarbons into shorter chains. In "Steam Cracking", you will learn about types of steam crackers and the functions performed in key areas, including the furnace, quench, compression, and chilling and separation sections. You will also learn about the difference between conversion and selectivity and the factors that affect ethane selectivity.	1
PIPELINE SYSTEMS			
PS-EPT-INO-113	Pipelines and Storage Systems	In Pipelines and Storage Systems, you will learn about the different hydrocarbon transportation systems, advantages of pipelines, pipeline projects, pipeline construction and types of pipelines; pipeline system design and components; pipeline problems and protection; and pigging. In addition, you will learn about hydrocarbon storage systems for liquids and gases, including appropriate types of tank designs and use of depleted reservoirs and salt caverns.	2
REFINING			
PS-EPT-INO-115	Fundamentals of Refining	In Fundamentals of Refining, you will learn about the refining industry as part of the downstream petroleum value chain including characteristics of crude oil and the refining products made from it, refining economics, a typical refinery configuration with its process streams and units.	2

PROCESS OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
CATALYTIC REFORMER			
A1096	Catalytic Reforming	Catalytic reforming is a process that converts a low octane feed into a high octane product called reformate. This is accomplished through a series of chemical reactions which rearrange the structure of hydrocarbon molecules. The reformate product is generally used as a gasoline blending component or as a feedstock for petrochemical operations. This program is a basic course on how catalytic reforming works. You will learn about the equipment in a reformer unit and how it operates. You will also learn how the unit is operated to maximize product yields and quality. Finally, you will learn what your duties are on a catalytic reformer.	5
CRUDE DISTILLATION			
A1014	Practical Distillation: Abnormal Operations	In Practical Distillation: Abnormal Operations, you will learn to recognize the symptoms of abnormal fractionating tower operation and learn how to make corrections. This program identifies and analyzes serious abnormalities which affect tower operation, including: flooded trays, high levels, dry trays, trapped water, loss of cooling water, loss of heat, and plugged outlets. The program also discusses the effects of these abnormalities on products, and on temperature, pressure, and flow rates. Abnormal Operating Conditions also outlines the procedures for discovering what is happening in the tower, which corrections are most likely to re-establish normal operation, and how to judge the effects of adjustments. Finally, the program provides practice in solving abnormal operating problems. Using the knowledge from this and the previous programs in this series, you will be able to meet the challenge of abnormal operation and restore the tower to efficient and economical fractionation.	4
A1012a	Practical Distillation: Fractionating Equipment	Practical Distillation: Fractionating Equipment, provides a fundamental knowledge of fractionating equipment, including the tower, temperature and pressure, bubble cap tray and other tray types, packed towers, and auxiliary equipment. To appreciate the precautions taken during normal operations, shutdown, and turnaround, the program provides a working knowledge of foreign deposits and liquid traps, explosive mixtures, and unnecessarily rapid changes. A thorough knowledge of these factors and a deep appreciation of the trouble they can cause will permit you to wisely adapt your actions to situations you will experience, especially as they affect the various stages of shutdown and turnaround.	3
A1013	Practical Distillation: Normal Operations	In Practical Distillation: Normal Operations, you will learn how to control the normal operation of a fractionating tower. This includes collecting data, considering the problem, correcting the operation, and checking the results. This program also identifies and analyzes the three key variables in tower operation - pressure, flow rates, and temperature - and illustrates their effects on the material balance, the heat balance, and the quality of the product. The basic tests of product quality are described, as well as the kinds of checks and adjustments the operator performs in controlling normal tower operations. Finally, the program presents operating situations that you are likely to encounter on a distillation unit. You will practice solving normal operating problems. These practice exercises will help you recognize and respond quickly to actual distillation problems.	4
A1012b	Practical Distillation: Operating Procedures	The goal in any distillation process is to produce the maximum amount of "on-spec" products at the lowest possible cost. It is an operator's duty to see that this goal is met. An operator is responsible for collecting data on tower operating conditions and analyzing this data to determine if there is an operating problem. If the operating conditions inside the tower need to be changed, an operator must decide which adjustment to make and then correct the operation. An operator who understands what happens inside a distillation column, and why it happens, is in a much better position to keep the unit running smoothly and efficiently. Operating Procedures covers the basic principles of distillation, the control procedures followed during normal and abnormal operations, extractive and azeotropic distillation processes, shutdown and startup operations, and computer control of distillation columns.	3
A1012c	Practical Distillation: Concepts and Quality	The physical law behind distillation is that heat can be used to separate a mixture of hydrocarbons by their respective boiling points or boiling point ranges. In a distillation column, there must be a balance of heat and material into and out of the tower. These heat and material balance concepts are the same for every column and can be used to predict how a tower will react to any operating change. The concepts of sensible and latent heat, partial pressure, and vapor pressure explain how and why hydrocarbons react as they do during the separation process. In Concepts and Quality, you will learn about the major concepts that are common to all distillation processes, identify operational principles that can be utilized to conserve energy and improve quality, identify how the interaction of process variables can affect product quality, and learn how to identify and correct operating problems.	3

COURSE #	COURSE TITLE	DESCRIPTION	HRS
DISTILLATION			
A1011a	Practical Distillation: Behavior of Hydrocarbons	Practical Distillation: Behavior of Hydrocarbons, begins by explaining how crude oil is processed. Next, it discusses the different properties of oil, giving special attention to the properties often referred to or measured in the refining process. The program also explains sensible heat, latent heat, vapor pressure, and partial pressure. These lessons form a review of the basic principles of the distillation process, and are presented as background for future programs in the series that explain the actual practical operation of distillation units. The final section of this program is about the process of distillation and how it works. This unit is designed to logically develop the knowledge of the distillation process from the elementary shell still through to the mechanisms of reflux, reboiling, and sidestream drawing of the sophisticated fractionator. An important lesson describes the temperature profile of the tower in distillation, showing the nature of the flow of liquid and vapors in the tower and the reasons for the flow. The final lesson is a review and summary of the entire distillation process.	2.5
A1011b	Practical Distillation: Principles and Practices	Practical Distillation: Principles and Practices, will provide you with general knowledge of how a distillation column is designed and how the distillation process works. You will learn how heat balance adjustments affect product composition. Finally, you will be introduced to several different types of columns and the basic instrumentation used to control a distillation tower. The distillation columns and related equipment shown in this program may not be the same as the columns and equipment used in your plant. However, the principles and practices presented in this program are applicable to any normal distillation process.	3
FCC			
A1095	Fluid Catalytic Cracking	In terms of barrels per day, fluid catalytic cracking is the largest petroleum conversion process in the world. Nearly every major refinery is equipped with a cat cracking unit which processes gas oils of marginal value into more valuable petrochemical feedstocks, distillate fuels, and high octane gasoline blending components. In this program, you will learn about fluid catalytic cracking. You will learn about the equipment that makes up a cat cracking unit and how it operates. You will also learn how the unit operating variables affect conversion and product yields. Finally, you will learn about methods you can use to identify and correct abnormal operating problems.	5

PROCESS SAFETY

COURSE #	COURSE TITLE	DESCRIPTION	HRS
EMERGENCY PLANNING & RESPONSE			
A1112	Fire Fighting: Extinguishing Agents	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. In this program, Extinguishing Agents, you will learn about the use of water, foam, carbon dioxide, dry chemicals, halons, and dry powders for controlling or extinguishing fires and for protecting men and equipment. You will also learn about proper hose handling and how to use small and large handlines, monitors, and fixed spray systems.	4
A1111	Fire Fighting: Fuels and Combustion	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. In this program, Fuels and Combustion, you will learn that fire is combustion requiring fuel, oxygen, and a source of ignition. You will also learn about the flammability of typical liquid and vapor fuels, the sources of oxygen, the sources of ignition, and the causes and effects of various kinds of explosions and detonations. Finally, you will learn the three ways of extinguishing fires—quenching, smothering, and starving—and the techniques of dispersing flammable vapors to keep them from igniting or re-igniting during a fire.	3
A1113	Fire Fighting: Portable Fire Extinguishers and Foams	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. In this program, you will learn about portable fire extinguishers, which are the first line of defense in many fire situations. This program covers how to select and operate them properly. You will also learn about the construction of CO2 and dry chemical extinguishers and how they are used for putting out small fires. Finally, you will learn about the use of foam for extinguishing large area flat fires, and how both chemical foams and air foams are prepared and applied.	4
A1114b	Fire Fighting: Strategies	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. Your ability to prevent a fire or react to a fire emergency may depend on how well you planned ahead for that particular situation. Planning ahead means that you have identified fire problem areas, developed the appropriate action plans, and prepared to fight a fire with the proper firefighting equipment, techniques and tactics. In this program, you will learn pre-fire planning and basic strategy. You will also learn strategies for fighting tank and dike fires. Finally, you will apply what you have learned in exercises that cover all different types of fires.	3
A1114a	Fire Fighting: Tactics	Fire Fighting is a series of five learning programs which primarily focus on the principles of fighting Class B fires involving oils and gases. The way you attack a fire depends on several different factors, including how the fuel is burning and the location of the fire. It is important that you know and can implement the correct attack for any type of fire. In this program, you will learn the tactics of hose handling, of operating valves under fire exposure, of using dry chemical and foam, and of protecting pressure vessels.	3
SAFE WORK PRACTICES			
A1197	Job Hazard Analysis and Stop Work Authority	Working within the process industry can result in exceptionally high safety risks, and employers put programs in place to reduce the likelihood of accidents and injuries. Job Safety Analysis (JSA) and Stop Work Authority (SWA) require all employees to watch for safety risks and potential hazards. In this program, you will learn about JSAs and SWA and how you can help implement both.	1
A1170	Safe Handling of Light Ends	In this program, you will learn the physical properties of gaseous hydrocarbons that create hazards, and the special handling and safety procedures that are required.	3
A1190	Safe Laboratory Operations	Laboratory analysis of incoming raw materials and outgoing products has always been a vital concern in the refining, petrochemical and chemical industries. Due to the nature of the materials being tested and the equipment required to perform the necessary tests, safety in the laboratory is a must. Safe Laboratory Operations approaches laboratory safety from the viewpoint that most laboratory procedures involve common safety considerations - personnel attitude, handling hazardous materials, flammability of samples, sources of ignition, handling compressed gases, hazards associated with glassware, personal protective equipment and mechanical safeguards. The program concludes by providing safety information on a variety of specific tests and test equipment: LPG sampling, flash point test, Reid vapor pressure test, test for viscosity, distillation apparatus and vacuum distillation test equipment.	4

PRODUCTION OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PROCESS SAFETY MANAGEMENT			
PS-PSM-PSO-101	Process Safety in Operations: Introduction	Understanding Process Safety is important at all levels of the organization. This program introduces Process Safety in the industry, reviews global Process Safety incidents and consequences, and acquaints the learner with components of Process Safety Management (PSM) including concept design, detailed design and steps to manage Process Safety in operations.	0.75
PS-PSM-PSO-102	Process Safety in Operations: Hazards	In this program, you will review hazard identification within the Risk Assessment process and explore various hazards, material properties and reactions, and how these conditions and failures impact process safety. You will be introduced to the use of hazard scenario used when designing a plan and the tools used to identify hazards for Process Safety Management (PSM).	1
PS-PSM-PSO-103	Process Safety in Operations: Risk Management	Once we have identified hazards and scenarios, we move toward Risk Assessment and Risk Management steps to reduce risks and identify barriers of protection. In this program you will be introduced to the role of Risk Analysis in the Risk Assessment process and become acquainted with key Risk Analysis tools. With these tools, we will review and select risk reduction measures and how to use the Bow-Tie model and its use in Risk Management.	1.5
PS-PSM-PSO-104	Process Safety in Operations: Projects, Construction and Operations	From an Operations perspective, process safety is critical. This program will review the role of Process Safety during Project initiation and construction phase into Operations. Operations teams must operate, inspect and maintain the equipment, plant and risk reduction measures to ensure they are working effectively in order to manage the risk of a major incident.	1.5
PS-PSM-PSO-105	Process Safety in Operations: Management of Change	To ensure that change (equipment, procedural, or organizational) does not bring risk with it, we have processes for managing the change. Process Safety is a key piece throughout the required steps. This program will introduce change and the management of change in the plant in light of Process Safety Management.	0.75
PS-PSM-PSO-106	Process Safety in Operations: Emergency Response and Incident Investigation	The plant and facilities need to be prepared to deal with unforeseen events and have plant, equipment and procedures in place to mitigate the consequences of an incident. This is commonly referred to as an Emergency Response Program. This program reviews typical steps with in emergency response and preparedness and how these take Process Safety into consideration. We also examine the importance of incident investigation in process safety.	1
PS-PSM-PSO-107	Process Safety in Operations: Audits and Key Performance Indicators	It is important to monitor systems and establish performance measurements so that we can improve. In Operations, the plant, procedures and practices can degrade over time. This program will review steps we take in order to be alert to changes and correct deficiencies.	0.5

REFINERY OPERATIONS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
COKER OPERATIONS			
PS-REF-COK-104	SYDEC Delayed Coking Process Auxiliary Equipment	In this program, you will learn about coker unit auxiliary equipment related to the fractionator and the code drums, including coke cutting and handling.	2
PS-REF-COK-105	SYDEC Delayed Coking Process Consequences of Deviation	In this program, you will learn how to prevent an abnormal operation in the coker unit, including within the fractionator. You will also learn about hazards specific to the coking process.	2
PS-REF-COK-103	SYDEC Delayed Coking Process Operations	In this program, you will learn about the process flow through the fractionator, heater, and code drums. You will also learn about operating procedures and gas plant operations.	7
PS-REF-COK-101	SYDEC Delayed Coking Process Overview	In this program, you will learn about the basics of SYDEC delayed coking, including coker systems, process flow, and chemistry.	3
PS-REF-COK-102	SYDEC Delayed Coking Process Primary Equipment	In this program, you will learn about the primary equipment involved in the SYDEC delayed coking process, including the fractionator, heater, coke drum, and gas plant equipment.	5
PS-REF-COK-106	SYDEC Delayed Coking Process: Process Hazards	In this program, you will learn how to about the process hazards in the coking process.	1
CRUDE UNIT			
PS-REF-CRU-105	Crude Distillation: Consequences of Deviation	In this program in the Crude Distillation series, you will learn to recognize the symptoms of abnormal fractionating tower operation and learn how to make corrections. This program identifies and analyzes serious abnormalities which affect tower operation, including: flooded trays, high levels, dry trays, trapped water, loss of cooling water, loss of heat, and plugged outlets. The program also discusses the effects of these abnormalities on products, and on temperature, pressure, and flow rates. Consequences of Deviation also outlines the procedures for discovering what is happening in the tower, which corrections are most likely to re-establish normal operation, and how to judge the effects of adjustments. Finally, the program provides practice in solving abnormal operating problems. Using the knowledge from this and the previous programs in this series, you will be able to meet the challenge of abnormal operation and restore the tower to efficient and economical fractionation.	2
PS-REF-CRU-103	Crude Distillation: Operating Procedures	Crude oil is made up of a variety of hydrocarbons. In its raw form, however, crude oil is of very little value. To make useful products, the oil must be separated into "cuts," or fractions, that contain similar types of hydrocarbons. This is accomplished by a process called distillation, or fractionation. Distillation uses heat to separate a mixture of hydrocarbons according to their respective boiling points. Crude Distillation is a series of learning programs covering the principles of distillation. This program, Distillation: Operating Procedures, provides a fundamental knowledge of tower instrumentation and procedures for monitoring tower operations. You will also learn about standard operating practices for shutdown, cleaning, testing, and start-up. Finally, you will practice your skills in different situations. To appreciate the precautions taken during normal operations, shutdown, and turnaround, the program provides a working knowledge of foreign deposits and liquid traps, explosive mixtures, and unnecessarily rapid changes. A thorough knowledge of these factors and a deep appreciation of the trouble they can cause will permit you to wisely adapt your actions to situations you will experience, especially as they affect the various stages of shutdown and turnaround.	3
PS-REF-CRU-101	Crude Distillation: Overview	Crude oil is made up of a variety of hydrocarbons. In its raw form, however, crude oil is of very little value. To make useful products, the oil must be separated into "cuts," or fractions, that contain similar types of hydrocarbons. This is accomplished by a process called distillation, or fractionation. Distillation uses heat to separate a mixture of hydrocarbons according to their respective boiling points. Crude Distillation is a series of learning programs covering the principles of distillation. This program, Distillation: Overview, begins by explaining the nature of oil, how it is made up and what happens to its structure when it is cracked or reformed. Next, it discusses the different properties of oil, giving special attention to the properties often referred to or measured in the refining process. The program also explains sensible heat, latent heat, vapor pressure, and partial pressure. These lessons form a review of the basic principles of the distillation process, and are presented as background for future programs in the series that explain the actual practical operation of distillation units. The final section of this program is about the process of distillation and how it works. This unit is designed to logically develop the knowledge of the distillation process from the elementary shell still through to the mechanisms of reflux, reboiling, and sidestream drawing of the sophisticated fractionator. An important lesson describes the temperature profile of the tower in distillation, showing the nature of the flow of liquid and vapors in the tower and the reasons for the flow. The final lesson is a review and summary of the entire distillation process.	3

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PS-REF-CRU-102	Crude Distillation: Process Equipment	Crude oil is made up of a variety of hydrocarbons. In its raw form, however, crude oil is of very little value. To make useful products, the oil must be separated into "cuts," or fractions, that contain similar types of hydrocarbons. This is accomplished by a process called distillation, or fractionation. Distillation uses heat to separate a mixture of hydrocarbons according to their respective boiling points. Crude Distillation is a series of learning programs covering the principles of distillation. This program, Distillation: Process Equipment, will provide you with general knowledge of how a distillation column is designed and how the distillation process works. It provides a fundamental knowledge of fractionating equipment, including the tower, temperature and pressure, bubble cap tray and other tray types, packed towers, and auxiliary equipment. Finally, you will be introduced to special distillation applications. The distillation columns and related equipment shown in this program may not be the same as the columns and equipment used in your plant. However, the principles and practices presented in this program are applicable to any normal distillation process.	3
PS-REF-CRU-104	Crude Distillation: Process Variables	In any refinery, petrochemical or chemical plant, distillation columns dominate the skyline. While there are many different types of columns and an even larger variety of feeds, the principles that make distillation work are the same in every application. The physical law behind distillation is that heat can be used to separate a mixture of hydrocarbons by their respective boiling points or boiling point ranges. In a distillation column, there must be a balance of heat and material into and out of the tower. These heat and material balance concepts are the same for every column and can be used to predict how a tower will react to any operating change. The concepts of sensible and latent heat, partial pressure, and vapor pressure explain how and why hydrocarbons react as they do during the separation process. In Process Variables, you will learn about the major concepts that are common to all distillation processes, identify how the interaction of process variables can affect product quality, identify factors like reflux and pressure that affect distillation, and describe operational principles that can be utilized to conserve energy and improve quality.	5
PS-REF-CRU-106	Crude Distillation: Troubleshooting Trays and Towers	In this program in the Crude Distillation series, you will learn to recognize the symptoms of abnormal fractionating tower operation and learn how to make corrections. This program identifies and analyzes serious abnormalities which affect tower operation, including: flooded trays, high levels, dry trays, trapped water, loss of cooling water, loss of heat, and plugged outlets. The program also discusses the effects of these abnormalities on products, and on temperature, pressure, and flow rates. Troubleshooting Trays and Towers also outlines the procedures for discovering what is happening in the tower, which corrections are most likely to re-establish normal operation, and how to judge the effects of adjustments. Finally, the program provides practice in solving abnormal operating problems. Using the knowledge from this and the previous programs in this series, you will be able to meet the challenge of abnormal operation and restore the tower to efficient and economical fractionation.	2
FCC			
PS-REF-FCC-106	Fluid Catalytic Cracking Abnormal Operations	In the Abnormal Operations module of the Fluid Catalytic Cracking series, you will learn how to properly respond to process problems.	1
PS-REF-FCC-104	Fluid Catalytic Cracking Auxiliary Equipment	In the Auxiliary Equipment module of the Fluid Catalytic Cracking series, you will learn about the equipment used in fluid catalytic cracking operation, including the feed preheat system, the flue gas system, catalyst storage and handling, and refinery headers.	4
PS-REF-FCC-105	Fluid Catalytic Cracking Consequences of Deviation	In the Consequences of Deviation module of the Fluid Catalytic Cracking series, you will learn about how to prevent and react to improper system operation, including equipment problems. You will also learn about events inside and outside that can adversely affect the fluid catalytic cracking operation.	4
PS-REF-FCC-103	Fluid Catalytic Cracking Key Process Variables	In the Key Process Variables module of the Fluid Catalytic Cracking series, you will learn about the variables and conditions that can impact fluid catalytic cracking operations and how those variables are controlled.	3
PS-REF-FCC-102	Fluid Catalytic Cracking Primary Equipment	In the Primary Equipment module of the Fluid Catalytic Cracking series, you will learn about the main components of the FCC process: the reactor, regenerator, and fractionator.	4
PS-REF-FCC-107	Fluid Catalytic Cracking Process Hazards	In the Process Hazards module of the Fluid Catalytic Cracking series, you will learn about how to work safely with a fluid catalytic cracker, including its unique process hazards, its safety systems and equipment, pressure integrity, and handling hot steam condensate.	4
PS-REF-FCC-101	Fluid Catalytic Cracking Process Overview	In the Process Overview module of the Fluid Catalytic Cracking series, you will learn about the basic function of fluid catalytic cracking, including process chemistry, and fluid catalytic cracking equipment and systems.	2

COURSE #	COURSE TITLE	DESCRIPTION	HRS
GASOLINE BLENDING			
PS-REF-GAS-101	Gasoline Blending Operations	In this program, you will learn about the process and operations involved in gasoline blending, including the metrics and cost of a blend, blending systems, quality tests, and the mathematics of gasoline blending.	5
REFINERY OVERVIEW			
PS-REF-OVR-104	Refinery Process Overview: Catalytic Reforming	In Catalytic Reforming, you will learn about the basics of catalytic reforming, catalytic equipment, and the reforming process.	2
PS-REF-OVR-103	Refinery Process Overview: Fluid Catalytic Cracking	In this program, you will learn about refining operations and the hazards they pose. You will also be introduced both simple and complex refineries, and gain a basic understanding of the systems within these facilities.	4
PS-REF-OVR-106	Refinery Process Overview: Gasoline Blending	In this program, you will learn about refining operations and the hazards they pose. You will also be introduced both simple and complex refineries, and gain a basic understanding of the systems within these facilities.	2
PS-REF-OVR-101	Refinery Process Overview: Introduction	In this program, you will learn about refining operations and the hazards they pose. You will also be introduced both simple and complex refineries, and gain a basic understanding of the systems within these facilities.	2
PS-REF-OVR-107	Refinery Process Overview: Refinery Process Hazards	In this program, you will learn about refining operations and the hazards they pose. You will also be introduced both simple and complex refineries, and gain a basic understanding of the systems within these facilities.	4
PS-REF-OVR-102	Refinery Process Overview: Crude Distillation	In this program, you will learn about refining operations and the hazards they pose. You will also be introduced both simple and complex refineries, and gain a basic understanding of the systems within these facilities.	2
PS-REF-OVR-105	Sulfur Recovery and Tail Gas Processing Overview	In the Sulfur Recovery and Tail Gas Processing Overview program, you will learn about the primary purpose of the sulfur recovery unit, including a process chemistry, and an overview of the tail gas process.	4
SOLVENT DEASPHALTING			
PS-REF-SDA-101	Introduction to Solvent Deasphalting	In Introduction to Solvent Deasphalting, you will learn the purpose and function of the Solvent Deasphalting (SDA) unit within a refinery, the main steps in the SDA process, its principal products, and the main chemical reactions.	1
PS-REF-SDA-105	Solvent Deasphalting Analytical Methods and Sample Frequency	In Solvent Deasphalting Analytical Methods and Sample Frequency, you will learn about the testing types, frequencies and methods in the solvent deasphalting unit.	0.5
PS-REF-SDA-102	Solvent Deasphalting Primary Equipment	In Solvent Deasphalting Primary Equipment, you will learn about the main sections within the solvent deasphalting process including extraction, resin recovery, DAO recovery, pitch recovery, and solvent recovery; the different circulation loops used in the SDA process; the purpose and function of the extractor. In addition you will learn about the SDA's primary recovery equipment including the resin settler, resin feed flash drum, resin stripper, DAO stripper, flash drum, separator, pitch stripper, pitch stripper feed flash drum, hot oil heater, hot oil drum, the solvent drum and coolers.	2
PS-REF-SDA-104	Solvent Deasphalting Process Operations	In Solvent Deasphalting Process Operations, you will learn about solvent flow through the SDA unit and process flow through the extractor, the DAO separator and stripper, resin stripper and pitch stripper.	1
PS-REF-SDA-103	Solvent Deasphalting Process Variables	In Solvent Deasphalting Process Variables, you will learn about SDA process variables including extraction system temperature, feed composition, and pressure requirements; and SDA solvent process variables including solvent recovery variables, solvent composition importance, solvent-to-oil ratio importance and solvent handling.	1
PS-REF-SDA-106	Solvent Deasphalting Unit Hazards	In Solvent Deasphalting Unit Hazards, you will learn about the process hazards in the SDA unit including safely responding to emergency situations, hydrocarbon and hydrogen sulfide hazards unique to SDA operations, and the chemical and other hazards present.	0.75
SULFURIC ACID PLANT			
PS-REF-SAP-103	Sulfuric Acid Plant: Auxiliary Equipment	In the Auxiliary Equipment module of the Sulfuric Acid Plant series, you will learn about sulfur and acid storage, sulfur pumps, and the economizer.	1
PS-REF-SAP-101	Sulfuric Acid Plant: Introduction and Process Overview	In the Process Overview module of the Sulfuric Acid Plant series, you will learn about characteristics, uses, and types of sulfuric acid; and the production and chemical processes used to manufacture it.	2
PS-REF-SAP-102	Sulfuric Acid Plant: Primary Equipment	In the Primary Equipment module of the Sulfuric Acid Plant series, you will learn about the main components of the sulfuric acid plant including the drying tower, sulfur burner, converter, absorption towers, and the associated heating and cooling equipment.	2

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PS-REF-SAP-104	Sulfuric Acid Plant: Process Safety	In the Process Safety module of the Sulfuric Acid Plant series, you will learn about how to work safely with in the sulfuric acid plant, including its unique process hazards, firefighting measures, spill containment, emissions, and acid mist removal.	1
TURNAROUND			
PS-REF-TUR-101	Turnaround Operations	During process operations, equipment becomes less flexible and increasingly unable to reach maximum production capacity because operating conditions deteriorate. To keep conditions optimal for production, process facilities schedule turnaround (T/A) operations to restore unit operating capabilities. In this series, you will learn about T/A operations, how they are implemented, and the overall impact a turnaround operation has on facility costs.	5

ROTATING & RECIPROCATING EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
AIR COMPRESSORS			
A1050	Air Compressors	In Air Compressors, you will learn about the different types and applications used in the oil and gas industry including their principles of operation based upon Boyle's and Charles gas laws, reciprocating and rotary positive displacement compressors, and centrifugal, ejector and axial flow dynamic compressors.	1
CENTRIFUGAL COMPRESSORS			
A1053a	Centrifugal Compressors: Introduction	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is about the construction and operation of compressors. In this program you will learn the construction, principal parts, and operation of reciprocating compressors.	3
A1053b	Centrifugal Compressors: Construction and Operation	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is about the construction and operation of compressors. In this program you will learn about the construction and operation of centrifugal compressors.	4
CENTRIFUGAL PUMPS			
A1071b	Centrifugal Pumps: Equipment and Operation	Centrifugal pumps are machines which use centrifugal force to move liquids. In this program, you will learn about the construction of pump parts, including packing boxes, seals, bearings, balancing drums, and couplings. You will learn the relation of alignment and misalignment to vibration, how pumps are lubricated, and how they are cooled in operation. Finally, you will learn the details of pump operation including start-up, normal operation, and shut-down. You will learn what the common problems of centrifugal pump operation are and how to spot and correct them, and how to maintain the pumps for dependable, safe operation.	4
A1071a	Centrifugal Pumps: Introduction	Centrifugal pumps are machines that use centrifugal force to move liquids. In this program, you will learn the principles, parts, and general operation of these pumps, what pump efficiency is, and how head and pressure are calculated.	3
COUPLINGS AND GEARS			
A1085b	Couplings, Gear Trains, and V-Belts: Gear Trains and V-Belt Drives	This program covers two different ways prime movers or drivers are connected to driven equipment, the special advantages and problems of each of the different ways, and the adjustment and preventive maintenance of different types of coupling equipment. Also covered are the physical principles of power transmission, and the relationship of speed and torque as different forms of power. You will learn about simple and compound gear trains, and how gear trains may be used as speed changers or torque increasers. You will learn about spur, helical, double-helical, bevel, and worm gears, and the uses of each. You will learn about gear lubrication and about handling the shock loads that your equipment applies to gears. Finally, you will learn about the construction and uses of the different types of single and multiple V-belt drives, the use of V-belt drives as speed changes, the adjustment and replacement of V-belts, and the control of slippage.	4
A1085a	Couplings, Gear Trains, and V-Belts: Machine Connections and Couplings	This program covers one way drivers are connected to driven equipment. You will learn about the special advantages and problems associated with couplings, and their adjustment and preventive maintenance requirements. In this program, you will learn about the causes and control of misalignment, end float, surges in torque, and the different basic types of rigid and flexible couplings.	3
DYNAMIC PUMPS			
A1070	Introduction to Dynamic Pumps	In Introduction to Dynamic Pumps, you will about fluid flow, dynamic pump classifications and properties of the two dynamic pump types - axial and centrifugal.	1
FANS AND BLOWERS			
PS-MNT-FBL-101	Fans and Blowers	In Fans and Blowers, you will learn about centrifugal, cross-flow, and axial flow fans, mechanical draft, positive displacement, and dynamic blowers; fan and blower system characteristics, and fan efficiency.	3
GAS TURBINES			
A1083b	Combustion Gas Turbines: Equipment and Operation	In Combustion Gas Turbines: Systems and Operation, you will learn about the functions of casing seals, bearings and lubrication in a combustion gas turbine. The program also covers the control and operation of combustion gas turbines, including start-up, operating, and shutdown procedures, and the control of vibration, critical speed, and turbine imbalance. Finally, you will learn about temperature control, the use of turning gears, and turbine control using the automated control panel. Through this understanding of turbine principles, construction, and control, you will be better able to secure efficient and safe turbine operation.	4

COURSE #	COURSE TITLE	DESCRIPTION	HRS
A1083a	Combustion Gas Turbines: Introduction	In Combustion Gas Turbines you will learn the operating principles of the compressor, the combustion chamber, and turbine section. You will also learn about the construction of the compressor, combustion chamber, and turbine section; the blading arrangement; and the use of the turbine as a driver and hot-gas generator. Also covered is turbine auxiliary equipment such as starting devices, governors, and overspeed mechanisms, and their functions.	4
INTERNAL COMBUSTION ENGINES			
A1084a	Internal Combustion Engines: Introduction	Internal combustion engines are engines which burn fuel in a cylinder to produce power. Presented in this program are the principles of the internal combustion engine, and its general operation and parts. You will learn how the combustion cycle differs in 2-cycle and 4-cycle engines. You will also learn some of the more common cylinder arrangements. Also covered are the details of the construction of an internal combustion engine, including the camshaft, carburetor, natural gas admission system, safety devices, and the electrical system. You will learn how each of these parts functions as a part of the total engine. Finally, you will learn the principles of a diesel engine, how it operates and how it differs from the traditional IC engine.	4
A1084b	Internal Combustion Engines: Operating Techniques	Internal combustion engines are engines which burn fuel in a cylinder to produce power. In this program, you will learn the details of the auxiliary systems of IC engines and how they operate, including the cooling system, lubrication system, air cleaners, superchargers and exhaust systems. You will also learn the operation and maintenance of the engine, how to read an instrument panel and interpret gauge readings, typical engine start-up and shut-down procedures, and preventive maintenance procedures for daily, weekly and monthly checks.	3
MIXERS AND BLENDERS			
PS-MNT-MXB-201	Mixers and Blenders	In Mixers and Blenders, you will learn about the difference between liquid and solid blending; solids mixing, including convective, shear, and diffusive mixing; fluids mixing, including bulk transport, molecular diffusion, and turbulent and laminar mixing; semi-solid mixing; advantages and disadvantages of batch and continuous mixing; types of mixing equipment, including blenders, agitators, and heavy duty mixers.	1
POSITIVE DISPLACEMENT COMPRESSORS			
A1052b	Positive Displacement Compressors: Construction and Operation	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is about the construction and operation of compressors. In this program you will learn the construction, principal parts, and operation of reciprocating compressors.	4
A1052a	Positive Displacement Compressors: Introduction	In the hydrocarbon processing and production industry, gas is compressed for transportation to consuming markets and for use in processing operations. This program is an introduction to positive displacement compressors. In this program you will learn the operating principles of reciprocating compressors, the different types of rotary compressors, and techniques for controlling compressor output.	3
POSITIVE DISPLACEMENT PUMPS			
A1072b	Positive Displacement Pumps: Equipment and Operation	Positive displacement pumps are reciprocating and rotary pumps that move liquid by the positive displacement of liquid volume. In this program, you will learn about packing, lubrication, and cooling systems, the construction and operation of pump valves, pulsation dampeners and suction stabilizers, variable displacement devices and bypasses and relief valves. Finally, you will learn startup and shutdown procedures, how to recognize and solve common pumping problems; and proper operating maintenance.	4
A1072a	Positive Displacement Pumps: Introduction	Positive displacement pumps are reciprocating and rotary pumps that move liquid by the positive displacement of liquid volume. In this program, you will learn the operating principles and performance characteristics of positive displacement pumps, what determines their capacity, pressure, horsepower and efficiency, and how NPSH is calculated. You will also learn the basic types of reciprocating and rotary pumps, including piston pumps, plunger pumps, diaphragm pumps, direct-acting steam and air pumps, and rotary lobe, vane, gear and screw pumps, and how these pumps differ from each other in design and performance.	4
STEAM ENGINES AND PUMPS			
A1086a	Steam Engines and Pumps: Introduction	In Introduction to Steam Engines and Pumps, you will learn about steam engine and pump basics, steam engine and pump valves, constructing steam engines and pumps, and steam engine control.	4

STEAM ENGINES AND PUMPS

A1086a	Steam Engines and Pumps: Introduction	In Introduction to Steam Engines and Pumps, you will learn about steam engine and pump basics, steam engine and pump valves, constructing steam engines and pumps, and steam engine control.	4
A1086b	Steam Engines and Pumps: Operation and Maintenance	In Steam Engines and Pumps: Operation and Maintenance, you will learn about steam engine control systems, steam engine lubrication, operation and maintenance, and steam pumps.	4

STEAM TURBINES

A1082b	Steam Turbines: Equipment and Operation	Steam turbines may differ from one another in size, appearance, and construction, but all steam turbines are similar in operation and work on similar principles. In this program, you will learn about the construction of the turbine, including rotor and casing, diaphragms, seals, and packing boxes, and labyrinth and carbon ring packing. You will also learn about the construction of the bearings and bearing combinations used in turbines, of single- and multi-valve governors, and of the oil circulation system. And finally, you will learn turbine operation and operating problems; the effects of pressure, heat, and steam condensation; uneven heating and cooling; leakage of steam; vibration; lubrication and lubrication problems; speed adjustment, instrumentation, and the visual inspections that must be conducted before startup. With this understanding of turbine principles, construction and control, you will be able to ensure the efficiency and safety of turbine operations.	4
A1082a	Steam Turbines: Introduction	Steam turbines may differ from one another in size, appearance, and construction, but all steam turbines are similar in operation and work on similar principles. In this program, you will learn how impulse and reaction turbines convert thermal energy to mechanical energy, how condensing and non-condensing turbines work, how turbine speed is controlled, and how the over-speed trip protects the turbine against failure of other speed controls.	3

STATIONARY EQUIPMENT

COURSE #	COURSE TITLE	DESCRIPTION	HRS
BOILERS			
A1145	Steam Boiler Operations	Steam boilers are used in stationary applications to provide heat, hot water, or steam. A boiler provides an efficient way to transfer stored thermal energy from a fuel source to the water in the boiler, and then to an end application. In this program, you will learn about steam boiler process chemistry and process flow.	4
PS-MNT-SBO-101	Steam Boilers	In Steam Boilers, you will learn about steam boiler operation and classification, routine and extended maintenance, troubleshooting and causes of corrosion failure.	2.5
FIRED HEATERS			
A1165	Fired Heaters: Equipment and Design	The major source of energy consumption in a refinery, chemical, or petrochemical plant is fuel for fired heaters. Fired heaters are used in many process operations such as distillation, reforming, olefins manufacturing and hydrocracking. Almost every unit in a plant or refinery is equipped with some type of fired heater. With the rising cost of fuel, efficient operation of these furnaces can save hundreds of thousands of dollars for a company each year. In this program, you will learn about basic furnace operating principles of fired heaters and details of equipment construction and function.	3
A1166	Fired Heaters: Operating Techniques	The major source of energy consumption in a refinery, chemical, or petrochemical plant is fuel for fired heaters. Fired heaters are used in many process operations such as distillation, reforming, olefins manufacturing and hydrocracking. Almost every unit in a plant or refinery is equipped with some type of fired heater. With the rising cost of fuel, efficient operation of these furnaces can save hundreds of thousands of dollars for a company each year. In this program, you will learn about safe and efficient operating procedures for fired heaters, including variables that are monitored on the process and combustion sides of the furnace, and the major steps and safety measures in furnace startup, shutdown, and emergency shutdown.	4
FURNACE			
A1032	Furnace Operations: Working With Furnaces	Few aspects of operation are more sensitive or more potentially hazardous than furnace startup and shutdown. This program leads you through these two important procedures to a complete understanding of the rigorous order of successive steps required and the way to accomplish each step prudently. Finally, you will be presented with several situations that can be brought under control by an astute application of the general principles of furnace operation. Each situation is adapted from an actual incident from the history of petroleum refining. You will examine real symptoms, consider their significance and choose a course of action that results in proper and economical firing of the furnace.	4
A1031	Introduction to Furnace Operations	This program describes the furnace and its components. You will learn about how the components function in the total process of making heat and transferring it to the petroleum materials being processed into useful products. Also discussed are the three elements of combustion - fuel, air, and a source of ignition - and the way these elements are combined under controlled conditions in the furnace. Providing air for combustion in sufficient quantity for maximum release of heat is the normal day-to-day task of the operator. This program discusses the operation and use of air control equipment and the indicators and analyzers that make strict regulation of the air supply possible. Proper control of air minimizes the consumption of fuel and extends the life of furnace equipment. Operators who develop the ability to regulate air supply within narrow limits contribute to the economy of heat production and extended life of the equipment.	4
HEAT EXCHANGERS			
A1160a	Heat Exchangers: Introduction	In this program, you will learn about heat transfer as it is applied in modern refining techniques, conduction and convection as methods of heat transfer and heat transfer in tubes. You will also learn the various parts of heat exchangers and their functions, as well as the various types of shell and tube heat exchangers.	4
A1160b	Heat Exchangers: Operations and Maintenance	In this program, you will learn about startup and shutdown procedures in heat exchanger operation and maintenance, the various problems of exchanger maintenance, and the flow and mechanisms of various heat exchange systems.	3
PS-MNT-THE-101	Shell and Tube Heat Exchangers	In Shell and Tube Heat Exchangers, you will learn about shell and tube components, exchanger operation and flow paths; cleaning procedures and requirements; contaminants, testing and repairs.	3

COURSE #	COURSE TITLE	DESCRIPTION	HRS
PS-MNT-HEX-101	Heat Exchangers for Technicians	In Heat Exchangers for Technicians, you will learn about types and functions of heat exchangers, contaminants, cleaning requirements, testing and repairs.	3
OIL AND GAS SEPARATORS			
A1470	Oil and Gas Separators	In Oil and Gas Separators, you will learn the effects of pressure, temperature, and density on fluid separation and the function of separator components, such as baffles and mist extractors. You will learn how the backpressure regulator and the liquid level controller operate to maintain optimum separation conditions. You will also learn to recognize such basic separators as vertical, horizontal, spherical, double-tube, baffling, and metering separators. And, you will be introduced to the related processes of liquid stabilization, stage separation, low temperature separation, gas dehydration, and crude oil dehydration.	3
VALVES			
A1206	Valve Maintenance	This program reviews the various types of valves in piping systems and the maintenance required to keep them in good operating condition. You will learn how to lubricate valves, adjust valve packing, and inspect steam traps.	2
A1140a	Valves: Introduction to Valves	Valves are used to control the flow of liquids and gases. In this program, you will learn about the construction and operation of the most widely used valves, such as gate, globe, plug, and check valves.	4
A1140b	Valves: Operating Valves	Valves are used to control the flow of liquids and gases. In this program, you will learn to operate and maintain valves. You will also learn what valves should be used with various types of service and how to troubleshoot difficulties that may develop due to fouling, leakage, or wear.	3
PS-MNT-VDC-101	Valve Design and Characteristics	In Valve Design and Characteristics, you will learn about fluid flow in pipes, selecting a valve, valve body materials, mounting styles, sizing, cavitation, flashing, noise, and flow characteristics.	1.5
PS-MNT-VLA-101	Valve Accessories	In Valve Accessories, you will learn about valve accessories, including hand wheels, manual levers and loading stations, transducers, air sets, volume boosters, fail-safe systems, limit switches, and positioners; and calibrating and troubleshooting valve accessories.	2
PS-MNT-VLV-101	Valves Inspection, Testing and Repair	In Valves Inspection, Testing and Repair, you will learn about types of valves, valve components, specifications and standards; visual inspection, repairs and maintenance, removing and installing valves, and pressure testing.	3
COLUMNS AND PROCESS VESSELS			
PS-MNT-CPV-101	Columns and Process Vessels	In Columns & Process Vessels, you will learn about components and functions of process vessels; regulations and standards for performing inspections, internal and external inspections; and packed and tray tower internal and external repairs and maintenance.	3

UTILITY, SAFETY AND FACILITY SYSTEMS

COURSE #	COURSE TITLE	DESCRIPTION	HRS
BOILERS			
PS-MNT-BOI-101	Introduction to Auxiliary Boiler Systems	In Introduction to Auxiliary Boiler Systems, you will learn about the purpose of an auxiliary boiler system, the different classifications, common boiler accessory equipment, heat recovery equipment, the burner management system, and the operating limits on the typical auxiliary package boiler.	1
COOLING TOWERS			
PS-MNT-CTW-101	Cooling Towers for Technicians	In Cooling Towers for Technicians, you will learn about natural draft, louver covered natural draft, mechanical draft, and induced draft types of cooling towers, components, classification and modes of operation; maintaining water and filtration systems, fan and drive systems, heat transfer surfaces, fill pack, drift eliminator, and air inlet louver maintenance, and cooling tower troubleshooting.	5
A1150a	Cooling Towers: Introduction	A great deal of process water is used daily within industry to cool process products and equipment. To conserve this potentially scarce resource and to minimize the costs of industrial cooling, much of the water is recycled and used again. This recycling operation is accomplished by utilizing a recirculating water cooling system. The system is composed of two major parts - a heat exchanger that transfers heat from a hot liquid to the cooling water and a cooling tower, which cools the water so that it can be reused. In this program, you will learn about various types of cooling towers and their construction, how they cool to save water and the factors that affect cooling tower performance.	5
A1150b	Cooling Towers: Water Conditioning	Billions of gallons/liters of water are used daily by industry to cool process products and equipment. To conserve this potentially scarce resource and to minimize the costs of industrial cooling, much of the water is recycled and used again. This recycling operation is accomplished by utilizing a recirculating water cooling system. The system is composed of two major parts - a heat exchanger that transfers heat from a hot liquid to the cooling water and a cooling tower, which cools the water so that it can be reused. Because cooling water is recirculated throughout the cooling system, it must be treated to remove or neutralize impurities that would otherwise damage the heat transfer equipment. In this program, you will learn about water conditioning and its effect on the efficiency and upkeep of cooling tower units.	5
FIRE AND GAS SYSTEMS			
PS-EIA-FDE-101	Fire Detection	In Fire Detection, you will learn about fire detection systems, including heat, smoke, and flame detectors; hydrocarbon emissions, UV/IR sensors and how to calibrate and troubleshoot these systems.	2
PS-MNT-FPS-101	Fire Protection Systems	In Fire Protection Systems, you will learn how about fire protection system components, fire pump types, operation, and maintenance; gas detector system types and sensors; Fire/gas detection system types, control, and operation; fire/gas protection systems, extinguishers, and maintenance, and fire/gas panels and maintenance.	6
PS-EIA-GDE-101	Gas Detection	In Gas Detection, you will learn about gas terminology, combustible gas detection, sensor types and features; detector and sensor calibration and troubleshooting.	1.5
LIQUID NITROGEN SYSTEMS			
PS-MNT-LNN-101	Liquid Nitrogen Storage Systems	In Liquid Nitrogen Storage Systems, you will learn about the properties and characteristics of nitrogen, the major health hazards and precautions for handling, common industry applications for nitrogen, and the major system equipment in a liquid nitrogen storage system.	0.75
PLANT COMMUNICATION SYSTEMS			
A1192	Plant Radio Communication	In Plant Radio Communication, you will learn how to operate plant radio equipment to communicate effectively and according to FCC rules.	1
POWERED INDUSTRIAL EQUIPMENT			
PS-MNT-FOM-101	Forklifts	In Forklifts, you will learn about basic principles of forklift operation, applications, pallets and stillages, palletless handling, hydraulically powered fork options, telescopic handlers, inspection and certification.	1
PRESSURE SAFETY DEVICES			
PS-MNT-PRS-101	Pressure Relief Safety Devices	In Pressure Relief Safety Devices, you will learn about the purpose of pressure relief safety devices, common types including conventional relief valve, balanced relief valve, pilot operated relief valve and rupture disk; the difference between a full lift, high lift, or low lift pressure relieving safety device, internal material options for the different service conditions and major factors involved in the selection of a pressure relieving safety device.	0.5

COURSE #	COURSE TITLE	DESCRIPTION	HRS
STEAM LINES			
PS-MNT-SCH-101	Steam Condensate Hazards and Removal	In Steam Condensate Hazards and Removal, you will learn steam condensate and the risks associated with its presence in a steam system including the formation of condensation and how various types of steam traps are used for steam condensate removal.	0.5
PS-MNT-STR-101	Steam Traps	In Steam Traps, you will learn about the purpose, types and classifications of steam traps, how to perform routine and extended maintenance, and how to troubleshoot and test steam traps.	3
VENT AND RUNDOWN SYSTEM			
PS-MNT-VSR-101	Vent System and Rundown System	In Vent and Rundown System, you will learn about vent stacks and rundown vessels, including vertical and horizontal flash tank operation; internal and external inspections; maintaining stacks and rundown vessels, and packed tower repairs.	2.5
WATER TREATMENT			
PS-MNT-DWT-101	Fundamentals of Demineralized Water Treatment Systems	In this course, you will learn about the fundamentals of demineralized water treatment systems including the need for boiler water treatment, reverse osmosis process and ion exchange cycle operation, regeneration, mixed bed polishing, and selective ion exchange.	0.75
PS-MNT-ROS-101	Fundamentals of Reverse Osmosis Systems	In Fundamentals of Reverse Osmosis systems, you will learn about the reverse osmosis process, the differences between natural and reverse osmosis, pre-treatment options and system maintenance.	1
PS-MNT-PWT-101	Potable Water Treatment System	In Potable Water Treatment Systems, you will learn about the need for potable water treatment, types of water contamination, potable water treatment process, water disinfection, and reverse osmosis.	1
A1102	Wastewater Treatment: Biological Treatment Process	Following preliminary treatment, the different wastewater streams are mixed together to a more or less uniform consistency for further treatment by a process called biological oxidation, also known as the activated sludge process. This process uses microorganisms to digest and break down the organic chemicals in the wastewater, producing treated effluent and sludge. This program examines the equipment used in the activated sludge process and its operation. You will also learn about sludge treatment and disposal methods and examine the various methods of effluent polishing, which further remove suspended solids and hard-to-treat organics before the treated wastewater is discharged as effluent into the environment.	3
A1101	Wastewater Treatment: Preliminary Treatment	Wastewater treatment is an increasingly important aspect of refinery and chemical plant operations. An efficient wastewater plant is not only important from the standpoint of environmental conservation, but also represents an opportunity to recover and recycle some resources that might otherwise be lost, thereby contributing to the economic success of the overall process operation. In this program, you will learn about important sources of contamination within a typical refinery, and contaminants that various process operations may generate. You will also learn about the various preliminary, or physical, treatment processes that the different wastewater streams must undergo before they are suitable for further processing. The program also covers methods used to remove and recover emulsified oil from wastewater and the different chemical unit operations that are used to improve the operation of the physical treatment processes.	4
A1103	Wastewater Treatment: Process Control	The effectiveness of the biological oxidation process is affected by a number of control factors. These factors can be divided into two basic categories, environmental and process-related. The environmental control factors include the organic loading, pH, availability of nutrients, temperature, and presence of toxic substances, and determine the environment in which the biox process takes place. The process-related control factors are adjusted by the operator to achieve the best effluent quality, and include the influent rate, the return activated sludge rate, and the waste activated sludge rate. This program examines the effect each variable has on the process, and the relationship between them. You will also learn strategies that you can use to monitor and optimize the process operation. The program includes some simple calculations that you can perform to determine the operating target levels.	3
A1104	Wastewater Treatment: Testing and Troubleshooting	Testing is an important responsibility of the wastewater treatment operator. The biological oxidation (activated sludge) process is very sensitive to changes in its operation, so it is critical that you know what tests to run, how to run them, and how to use the test results to keep the process operating effectively. This program covers important tests that a treatment plant operator commonly uses on a daily basis to monitor the operation of the unit. You will learn the units of measurement and the methods of calculating the results of the tests for total solids, volatile solids, and suspended solids. The BOD5 test procedure is covered for general information and methodology. The program also covers the 30-minute sludge-settling test and calculation of the sludge volume index. Because the 30-minute settleability test is a quick, easy test that can be performed without laboratory analysis, the program includes some of the troubleshooting steps you might take, based on some typical results of the 30-minute settleability test.	2

Honeywell Process Solutions

2101 CityWest Blvd, Houston, TX 77042

Honeywell House, Arlington Business Park
Bracknell, Berkshire, England RG12

1EB Shanghai City Centre, 100Junyi
Road Shanghai, China 20051

process.honeywell.com

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