



PE095: Chemical Engineering for Non-Chemical Engineers





Training Description:

This course covers the fundamental concepts of chemical engineering and provide you with a solid working knowledge associated with it. If you are a non-chemical engineer, this course will enable you to confidently talk to and work effectively with chemical engineers and process equipment. Many technical professionals today find themselves working with large-scale chemical processes even-though they do not have formal training in Chemical Engineering.

The course intends to fill this gap and provide you with this knowledge in the chemical engineering fundamentals and the ability to apply this knowledge to specify, design, operate, maintain and troubleshoot chemical processes.

The course also discuss the specifications of pumps and heat exchangers; the mass transfer phenomena; the simple process calculations; troubleshooting process equipment and providing fixes; the process design activities; the process drawings; the safety guidelines to a process or chemical plant; and the basic chemical engineering jargon and terminology.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Apply and gain a good working knowledge on the fundamentals of chemical engineering
- ✓ Prepare specifications of pumps and heat exchangers
- ✓ Apply mass transfer phenomena including agitation scale-up
- ✓ Perform simple process calculations
- ✓ Troubleshoot process equipment and provide fixes
- ✓ Contribute to process design activities
- ✓ Determine process drawings and link them to plant operation
- ✓ Apply safety guidelines to a process or chemical plant
- ✓ Identify basic chemical engineering jargon and terminology

Training Designed for:

This course is intended for non-chemical engineers such as industrial engineers, electrical engineers, mechanical engineers, civil engineers, control & instrumentation engineers, plastics and material engineers, maintenance engineers, food scientists, environmental engineers, chemists, maintenance supervisor, shift trades people and other environmental, chemical, laboratory, operations, process and production technical staff.

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request”.

Please note that the below topics can be amended as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.



Training Designed for:

DAY ONE:

- ❖ PRE-TEST
- ❖ Introduction
- ❖ The Chemical Process
- ❖ Process Flow Sheet
 - Process Flow Diagrams (PFD's)
 - Piping and Instrumentation Diagrams (P& ID's)
 - Process Legends Used in Flow Sheets
- ❖ Stoichiometry
 - Dimensions and Units
 - Processes and Process Variable
 - Process Data Representation and Analysis
 - Basic Chemical Calculations
 - Material Balance without Chemical Reactions
 - Material Balance with Chemical Reactions
 - Energy Balance
 - Combustion

DAY TWO:

- ❖ Fluid Mechanics
 - Fluid Statics and its Applications
 - Fluid-Flow Phenomena
 - Basic Equations and Fluid Flow
 - Flow of Incompressible Fluids in Conduits and Thin Layers
 - Flow of Compressible Fluids
 - Flow Past Immersed Bodies
 - Transportation & Metering of Fluids
 - Agitation & Mixing
- ❖ Heat Transfer and Its Applications
 - Heat Transfer by Conduction in Solids
 - Principles of Heat Flow in Fluids
 - Heat Transfer to Fluids Without Phase Change
 - Heat Transfer to Fluids with Phase Change
 - Radiation Heat Transfer
 - Heat-Exchange Applications
 - Evaporation

DAY THREE:

- ❖ Mass Transfer and Its Applications
 - Equilibrium-Stage Operation
 - Distillation
 - Leaching & Extraction
 - Introduction to Multi Component Distillation



- Principles of Diffusion and Mass Transfer Between Phases
- Gas Absorption
- Humidification Operations
- Adsorption
- Drying of Solids
- ❖ **Chemical Engineering Thermodynamics**
 - Fundamental Quantities
 - First Law of Thermodynamics
 - Volumetric Properties of Pure Fluids
 - Heat Effects
 - Second Law of Thermodynamics
 - Thermodynamic Properties of Fluids
 - Thermodynamic Properties of Homogenous Mixtures
 - Phase Equilibria
 - Chemical Reaction Equilibrium
 - Thermodynamics of Flow Processes
 - Conversion of Heat into Work by Power Cycles
 - Refrigeration & Liquification
 - Thermodynamic Analysis of Processes

DAY FOUR:

- ❖ **Chemical Kinetics**
 - Basic Definitions
 - Kinetics of Homogenous Reactions
 - Interpretation of Batch Reactor Data
 - Introduction to Reactor Design
 - Single Ideal Reactors
 - Design for Single Reactions
 - Design for Multiple Reactions
 - Temperature and Pressure Effects
 - Non-Ideal Flow
 - Mixing of Fluids
 - Introduction to Design for Heterogeneous Reacting Systems
 - Fluid-Particle Reactions
 - Fluid-Fluid Reactions
 - Solid-Catalyst Reactions
 - Reactivating Catalysts
- ❖ **Process Equipment Design**
 - Design Considerations
 - Storage Vessels
 - Pressure Vessels
 - Reactors
 - Heat Exchangers
 - Evaporators and Crystallizers





- Distillation and Fractionation Equipments
- Agitators
- Filters
- Dryers
- Process Hazards and Safety Measures
- Fundamentals of Computer Aided Design

❖ Practical Sessions

- This hands-on, highly-interactive course includes real-life case studies and exercises

DAY FIVE:

❖ Process Control and Instrumentation

- Quantities of Measurement
- Process Instrumentation
- Temperature
- Pressure
- Level
- Flow

❖ Process Economics

- Investment & Profitability
- Manufacturing -Cost Estimation
- Accounting & Cost Control
- Fixed & Capital Cost Estimation

❖ Course Conclusion

❖ POST-TEST and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

As per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.





Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:30	Recess (Prayer Break & Lunch)
13:30 - 15:00	Last Session

For training registrations or in-house enquiries, please contact:

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Training & Career Development Department

