Introduction to Oil and Gas Processing

Course general description:

Chemical process design is a cornerstone of the process industries, encompassing oil and gas, petrochemicals, pharmaceuticals, food processing, and renewable energy. This course provides participants with a comprehensive understanding of the principles, functions, methods, and techniques used in designing chemical processes. It also emphasizes engineering responsibilities and advancements in sustainable and innovative process design. Through lectures, practical case studies, tutorials, and discussions, participants will gain the knowledge and skills necessary to contribute effectively to process design projects.

Audience:

This course is designed for:

1. Petroleum engineers
2. Operation & Production Engineers
3. Maintenance Engineers
4. Technical and Managerial Staff those seeking to enhance their knowledge in OIL & GAS Processing Fundamentals.

Course objectives:

By end of the course participants will gain:

1. Understand the fundamental principles of chemical process design.
2. Identify key functions and components of process systems.
3. Apply systematic methods and techniques for process design.
4. Recognize the roles and responsibilities of engineers in process design.
5. Explore advancements in process design, including sustainability and digital tools.
6. Develop problem-solving skills through real-world case studies and practical exercises

Course duration:

5 days

Course location:

Cairo-Dubai-Istanbul

Course contents:

Day 1: Fundamentals of Chemical Process Design

- Introduction to Process Design – Definition, importance, and principles like mass/energy balances, thermodynamics, and fluid dynamics.
- Process Flow Diagrams (PFDs) & Piping & Instrumentation Diagrams (P&IDs) – Understanding symbols, notations, and standards, and their role in process design.
- Pretest & Group Discussion – Baseline knowledge assessment and challenges in interpreting PFDs/P&IDs.
- Case Study – Analyzing a simple process flow diagram.
- Interactive Learning – Discussion and analysis of process design challenges.

Day 2: Process Equipment and Unit Operations

- Types of Process Equipment – Reactors, heat exchangers, pumps, compressors, separators, and storage tanks with selection criteria.
- Unit Operations – Distillation, absorption, adsorption, drying, and crystallization, and their integration in systems.
- Practical Exercises – Sizing heat exchangers and simulating distillation column operation.
- Quiz – Testing knowledge on equipment and unit operations.
- Interactive Learning – Hands-on exercises and group activities for deeper understanding.

Day 3: Process Safety, Control, and Optimization

- Process Safety and Risk Management – Hazard identification, risk assessment, and safety instrumented systems.
- Process Control and Optimization – Basics of process control, sensors, controllers, and optimization techniques for efficiency.
- Case Study – Investigating process safety incidents and proposing solutions.
- Group Discussion – Balancing safety, cost, and performance in process design.
- Quiz – Testing understanding of process safety and control concepts**.**

Day 4: Sustainability and Digital Tools in Process Design

- Sustainable Process Design – Green chemistry, circular economy, and energy-efficient design practices.
- Digital Tools and Innovations – Introduction to simulation software (e.g., Aspen HYSYS) and the role of AI and machine learning.
- Hands-On Simulation – Using simulation software for process modeling.
- Group Activity – Brainstorming sustainable process design solutions.
- Interactive Learning – Exploration of digital tools and sustainable design concepts.

Day 5: Engineering Responsibilities and Final Assessment

- Engineering Roles and Responsibilities – Ethical considerations, collaboration with teams, and regulatory compliance.
- Advancements in Process Design – Modular plants, bio-based processes, and carbon capture technologies.
- Final Assessment – Comprehensive written test and post-test comparison to measure progress.
- Feedback Session – Discussing key takeaways and addressing participant questions.
- Career Development – Exploring career pathways and professional growth in process design**.**

Methodology:

- 50% lectures & concepts
- 10% Videos
- 15% Case studies
- 15% Exercises
- 10% Discussions

Course code: (TPRS001)