



Process Control of Chemical Engineering Operations in Oil & Gas Industry

06 - 10 Jan 2025
Lisbon (Portugal)



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Ref.: 15362_311859 **Date:** 06 - 10 Jan 2025 **Location:** Lisbon (Portugal) **Fees:** 5200 **Euro**

Course Content:

Unit 1: Introduction to Chemical Engineering Controls:

- Overview of chemical engineering process control background
- The objectives of control
- Definitions & terminology
- Design methodology for process control
- Failures in process control; case studies of three major disasters
 - Bhopal case
 - Three Mile Island case
 - Texas city case
- Current significance:
 - Introduction
 - Automation
- Introduction to distributed control system DCS:
 - Control system hardware

Unit 2: Modeling Basics:

- Verbal modeling:
 - Process description
 - Control specifications
 - Connections
 - Prerequisite information regarding a process
 - Step-by-step method for describing controls and their purpose
 - Alternative method of verbal modeling
 - The Barkel method of verbal modeling
- Degrees of freedom:
 - Importance
 - Calculation procedure
 - Applications
- Incidence graphs:
 - Introduction
 - Monotonicity
 - Consistent graphs
 - Inconsistent graphs
 - Partially consistent graphs
 - Sensors & Actuators
- Measurement devices:
 - Industrial applications
 - Temperature control: thermocouples
 - Pressure control: pressure switch
 - Composition control: ratio control
 - Level control: level switches
 - Flow control: flow meters

- Temperature sensors:
 - Thermometers
 - Residence temperature detectors
 - Thermocouples
 - Pyrometers
- Temperature regulators:
 - Regulator structure
 - Regulator operation
 - Types of temperature regulators
 - Resistance temperature detectors
- Pressure sensors:
 - Sensor selection criteria
 - Process
 - Environment
 - Pressure range
 - Sensitivity
- Pressure measuring methods:
 - Height of liquid methods
 - Elastic distortion
 - Electrical methods
- Types of sensors:
 - Elastic sensors
 - Electric sensors
 - Differential pressure cells
 - Vacuum sensors
- Semi-batch reactor problem:
 - Shutdown point
 - Types of semi-batch reactor sensors
- Level sensors:
 - Visual level sensors
 - Common uses
 - Benefits of visual level sensors
 - Restrictions
 - Sight tube indicators
 - Float type level sensors
 - Buoyancy types
 - Static types
 - Formulas
 - Valve-based level sensors
- Electrical level sensors:
 - Conductive level sensing
 - Capacitance level sensing
 - Radiation-based level sensors
 - Flow sensors
 - Ultrasonic flow meters

Unit 3: Mathematics for Control Systems

- Measurement devices:
 - Dirac delta
 - First-order differential equations
 - Second-order differential equations
 - Optimization

• Unit 4: Optimization:

- Definition
- Engineering application
- Optimization across an organization
- Optimization design
- Constraints
- Optimization situations
- Real-time optimization
- Industry experience
- Pilot plant experience
- Linear optimization:
 - Introduction
 - characteristics
- Non-linear optimization:
 - Introduction
 - Quadratic optimization
 - Iterative methods
 - Applications



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