



# Process Control of Chemical Engineering Operations in Oil & Gas Industry

03 - 07 Mar 2025  
Geneva (Switzerland)



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**Ref.:** 15362\_311855 **Date:** 03 - 07 Mar 2025 **Location:** Geneva (Switzerland) **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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