

Instrumentation and Controls Fundamentals for Facilities Engineers **- IC-3**

This course applies fundamental instrumentation and control engineering principles to liquid facilities design and operation, and is designed to accelerate the development of new Facilities Instrumentation and Control Engineers. Through the use of individual and group problem solving, attendees will learn about field measurement devices, valves and actuators, documentation, programmable logic controllers, power supplies, PLC, SCADA, DCS, SIS, hazardous areas, and installation methods.

Designed For

Facilities and Project Engineers as well as newly graduated Electrical, Controls and Instrument Engineers (0-5 years) with a need to improve basic understanding of instrumentation and control systems within oil and gas facilities.

You will learn

- Operating principals and specification criteria for field measurement devices including level, pressure, temperature, and flow
- Final elements and actuators including control loops, control valves, shutdown valves, actuators, and transducers
- P&ID symbols and instrument tags, loop and logic diagrams, pitfalls and best practices, ISA symbology, and creation of instrument and I/O lists
- Signal types and wiring requirements for analog/discrete inputs and outputs as well as other signals such as thermocouple, RTD, pulse, and digital communications
- Typical control system functions, limitations, and architectures for PLC and DCS systems including programming methods such as ladder logic and function block
- Process control basics with an emphasis on control loops, types, and configurations for common oil and gas process equipment such as separators, pumps, distillation towers, filters, contactors, compressors, heat exchangers, and fired heaters

- Understanding of the PID algorithm, loop tuning, and advanced process control techniques such as feed forward, cascade, selective, and ratio control
- Supervisory Control and Data Acquisition (SCADA) Systems to include telemetry, RTUs, internet, and web based communications
- Common networking systems including Ethernet, Modbus, and Fieldbus
- Risk mitigation, technologies, and architecture of Safety Instrumented Systems (SIS)
- The concepts, terminology, and application of hazardous area classification standards, equipment protection methods, and installation requirements for NEC and IEC projects

Course Content

- Fundamentals of control signals and wiring
- Control system basics
- Field measurement devices
- Control and shutdown valves
- Programmable electronic systems (PLC, DCS, SIS, SCADA)
- Control system networking
- Instrumentation and control strategies for common oil and gas equipment
- Installation and infrastructure requirements
- Drawings and documentation for IE&C projects
- Hazardous area installations

Course Duration:

5 Days