



## PROFESSIONAL DEVELOPMENT:

**Two classroom days** providing 1.6 CEU (Continuing Education Units) or 16 PDH (Professional Development Hours)



## BENEFITS OF THE FUNDAMENTALS OF I&C COURSE:

This training course will provide participants with the opportunity to understand how process measurements and controls can assure the reliable, efficient and safe operation of their facilities.

Without basic I&C knowledge technicians, Junior I&C engineers, facility engineers, and project managers, are often left with only a minimal understanding of I&C fundamentals. A greater understanding of these fundamentals is a requirement for the improvement of plant operations, the analysis of emergency situations and the assessment of safety, environmental and regulatory compliance issues such as the ones related to Process Hazards Analysis / HAZOP studies.

This workshop will provide the foundation for basic level learning and consistent and improved communications between staff.

This course will provide improvement in quality and consistency at the facility, which will enhance the other processes that rely on instrumentation and controls.



## COURSE OVERVIEW:

This 2-day course includes instruction on the fundamentals of instrumentation and controls as they apply to the oil and gas industry. Instrumentation and controls provide the basic building blocks for all automated control systems which we observe in every modern operating oil and gas facility. Solid robust and reliable instrumentation and controls not only ensures efficient and profitable plant operations, but also includes safe functionality of the process, protection of the environment and regulatory compliance when required. This course provides the opportunity for the participants to obtain a solid understanding of various technologies used for process measurements, final control elements and basic regulatory controls, including an understanding of common pitfalls related to design, maintenance and operational issues of instrumentation and controls.

## LEARNING OUTCOMES:

- Field measurement devices including level, pressure, temperature flow
- Final control elements, including a step by step approach to sizing control valves
- Basic control theory
- Common control algorithms
- Key design, maintenance and operations I&C considerations



## PREREQUISITES OR RELATED COURSES:

The following course, or equivalent knowledge, experience and training, is a prerequisite.

- P&ID (Piping and Instrumentation Diagram) and Engineering Drawings Interpretation
- In addition, this course provides the basic foundation for:
  - PHA / HAZOP Facilitation
  - PH & RA ENG TÜV (Rheinland) Certificate



## WHO SHOULD ATTEND?

This course focuses on instrumentation and controls used in the oil and gas process industries. The knowledge and understanding provided is typically required by engineers and technologists in the design phase and by operations and maintenance staff once facilities are up and operating. This course is suitable for anyone with an interest in wanting to know how instrumentation and control systems should be designed, maintained and improved. This provided knowledge can also be used in assessing process safety, emergency situations and regulatory compliance issues.

- Facilities, Operations and Maintenance Professionals
- Engineers In Training (EITs)
- I & C, Mechanical Engineers and Technologists
- Engineering Managers, Project Engineers and Project Managers
- Professionals responsible for Process Hazards Analysis/HAZOP/ Safeguarding studies
- Health & Safety / HSE Professionals



## COURSE OUTLINE:

### I. INTRODUCTION

- Course overview
- Definitions

### II. PROCESS MEASUREMENTS

- Purpose
- Types of process measurements
- Terminology
- Design Considerations
- Maintenance/Operations Considerations
- Pressure
- Temperature
- Level
- Flow
- Custody Transfer
- Other
- Signal Communication
- Quiz/Review

### III. FINAL: CONTROL ELEMENTS

- Terminology
- Manipulated Variables
- Final Control Elements
- Control Valves
- Maintenance/Operations Considerations
- Types
- Characterization
- Sizing
- Design Considerations
- Variable Frequency Drives
- Quiz/Review

### IV. BASIC REGULATORY CONTROL

- Purpose
- Terminology
- Basic Control Theory
- Control Algorithms
- Control Strategies
- Loop Tuning
- Design Considerations
- Operation/Maintenance Considerations
- Advanced Regulatory Control
- Quiz/Review

### V. COURSE SUMMARY



#### THE ACM EXPERIENCE:

Our courses and workshops are experiential, interactive and provide participants with practical knowledge and tools that can be immediately applied back at work.



#### COURSE TESTIMONIALS:

Here are a few quotes from over 3,300 participants we've trained;

- *"Very helpful instruction and activities in this course helped me get what I was looking for from it!"*  
**Project Coordinator**
- *"The instructor was very interactive, encouraged discussion and welcomed feedback."*  
**Process Engineer**
- *"Great course! The instructor made the course very enjoyable. With their wealth of knowledge and experience they could answer all of the questions, as well as provide a real life situation in which it applied."*  
**New Grad EIT**
- *"Great course content, coverage and length. Superb instructor who presented material as it applies to real world scenarios."*  
**I&C Engineer**

- *“Overall a great course. Probably the most valuable course I have taken with ACM. I will recommend this course to my coworkers.”*  
**Compliance Specialist**
- *“Very knowledgeable and engaging. Delivery was good due to engaging nature of presentation.”*  
**Process Engineer**
- *“Really knowledgeable and experienced professional!”*  
**Team Lead - Operational Integrity**
- *“High quality workbook which will be a great reference for future.”*  
**Operations Engineer**
- *“Overall a phenomenal instructor, very well presented.”*  
**Hydraulics EIT**
- *“Best catering I’ve had at a course!”*  
**Process EIT**



## COURSE INSTRUCTORS:



**David Clarke**

**B.Sc. Elect. Eng., P. Eng. / Engineering Manager / Executive / Instructor**

Mr. Clarke is a professional engineer with over 35 years’ experience in Automation (Instrumentation, Controls and Telecommunications). David has worked for major operating companies both in the Alberta oilsands and in the Middle East. He worked for 20 years with a major EPC company in Calgary first as Automation Lead on major oilsands, pipeline and midstream projects, then as Automation Department Director and later as VP Engineering and Sr. Project Manager. David has significant knowledge and expertise in all aspects of automation project design and implementation including SIL determination and safety system design. David is a senior member of ISA.

[View instructor profiles online.](#)

**CONTACT FOR FURTHER INFORMATION:** [info@acm.ca](mailto:info@acm.ca)

**CALL TOLL FREE AT 1-877-264-9637**

### **PRIVATE IN HOUSE TRAINING COURSES:**

<http://www.acm.ca/institute-of-hazard-prevention/private-courses>

