IICA / ISA ONE DAY COURSE SUMMARY

Instrumentation Diagrams and Symbols (FG15C)

This course presents the methodology for developing and applying instrument and control drawings. You will develop actual documents for a simple project to aid your understanding.

You will be able to:

- Familiarize yourself with the documents used to define instrument and control systems, including: Process Flow Diagrams, Piping & Instrumentation Drawings, Instrument Lists, Specification Forms, Logic Diagrams, Location Plans, Installation Details, Loop Diagrams
- Explain the type of information included on each document
- Identify the sequence of document development for a typical project
- Identify some process control devices and the symbols used to define them
- Identify the ISA Standards available to assist you in developing and understanding instrument and control documents

Overview of Measurement & Control Fundamentals (FG05C)

This overview of industrial measurement and control uses a generally non-mathematical approach to the following topics:

- Concepts of Process
- Documentation
- Flow Measurement
- Level Measurement
- Pressure Measurement
- Temperature Measurement
- Final Control Elements
- Overview of Process Dynamics
- Control System Hardware
- Controller Modes and Tuning

Industrial Flow Measurement Overview (EI10C)

Applications of modern flow measurement systems are presented.

Flowmeter accuracy, performance, sizing, specification, selection, and installation considerations are covered. Focus is on productivity improvement, cost efficiencies of measurement and control, and whether, when, and how to use the technologies looking at measuring flow, the effect of fluid properties and engineering practices required to optimize flowmeter performance.

The course includes practical examples of flow meter selection and problem solutions, with emphasis on basic principles or alternative technologies based on class preference.

Project Management for Engineering Professionals (MT10C2)

This course teaches project management as specifically applied to automation projects.

Because automation projects require specialized approaches, it is critical for lead automation project engineers to take responsibility for implementing those techniques and approaches; and it is critical for their employers and their clients to ensure that they have both the skills and the motivation to do those tasks, meshing the project leadership/management role with technical work.

Since many projects employ levels of project managers, this course will also help you to work effectively with senior project managers who are responsible for high-level planning and other management tasks. While this course is focused on lead automation engineers and others in the project management role, it is equally valuable for customers and stakeholders of the automation project who want to work effectively with the project team and ensure that the project team focuses on the real deliverables.

Overview of Grounding and Noise Reduction for Control Equipment (TI21C)

This course provides an understanding of grounding, both from an electrical systems relationship and from an instrument loops relationship. The purpose of grounding and electrical systems, grounding for safety, signal noise, signal wiring systems. and methods used to reduce noise will be covered.

Topics examined include

- NEC definitions | Earth Ground
- Considerations Relevant to Grounding and Protection from Electrical Shock
- Techniques of Grounding Wye and Delta Transformers
- Methods of Grounding Electrical Systems
- Isolated Grounding and Resistance (Impedance)
- Ground Loops in Instrumentation Systems
- Noise: What is Electrical Noise | What is Interference
- How is Noise/Interference Transmitted
- Methods of Shielding and Grounding of Instrument Systems to Reduce Noise/Interference
- Power Quality for Electronic Equipment: Need for Power Conditioners | UPS Systems, and Surge Suppression Devices
- Power System Harmonics: Their Cause and Effects | Measuring Total Harmonic Distortion and Pinpointing Various Sources of Harmonics

Industrial Wireless Systems (IC85C)

Wireless systems and wireless technologies have advanced to the point where stable, robust and secure networks are ready for deployment in industrial settings. As such, professionals crossing many disciplines (e.g., process, automation, IT, controls) come face to face with understanding the implications and opportunities that such wireless networks may provide to them and their plant.

This course will cover the most relevant details associated with industrial wireless systems with an emphasis on operation, reliability and security aspects, and how the various technological choices coexist and interact with each other.

Numerous examples of real-world deployments are covered for facilities such as SCADA systems, petrochemical plants, electrical power generation and transmission systems. The operational differences posed to the wireless systems' performance by discrete manufacturing needs, monitoring of devices and even control systems are addressed.

Wireless standards covered are 802.11, 802.15.1 (Bluetooth), 802.15.4 (ZigBee, Wireless HART, ISA100), 802.16 (WiMax) and cellular technologies such as GPRS and G3. Licensed and proprietary industrial solutions are also examined.

Safety Instrumented Systems - The Must Know for Implementation (EC50C)

There are many different ways of designing safety instrumented systems. This course covers the basics of what needs to be done in the design and selection of safety systems.

- Introduction: What is a Safety System? | Danger of Overconfidence and Complacency | Lessons Learned from Past Accidents
- Guidelines and Standards: ANSI/ISA | IEC
- General SIS Design Considerations: Design Life Cycle | Independent Safety Layers
- Hazard and Risk Assessment: Hazard Identification | Risk Assessment | Determining SILs | Layer of Protection Analysis (LOPA)
- Failure Modes: Safe vs. Dangerous | Redundancy Issues

- System Technologies: Relay | Microprocessor | Field Devices | Certification vs. Prior Use
- Operation and Maintenance: Installation | Testing | Management of Change

Picking the Right Bus - A Comparison of Field and Device Networks (FG30C)

The industrial market is flooded with different field, device and sensor buses, all being promoted as the ideal solution for the plant floor. There is little doubt that buses can save your company money, but how do you select the right one and will it really have a significant economic impact?

This course provides an unbiased view of the fieldbus marketplace so you can make an informed decision. We will take an in-depth look at today's dominant fieldbus technologies and compare their features. We will also look at the emerging Ethernet-based fieldbuses.

The basic strategy behind each bus is outlined including the type of applications where each field bus system is best and least suited. The seminar will look at the wiring and installation requirements for each bus, as well as the highest levels of application interface for each bus. The bus protocol will be reviewed, but only enough to help you understand the differences. Several case histories of fieldbus applications in new and existing plant sites illustrate the potential benefits and pitfalls of each bus technology.

Overview of FOUNDATION® Fieldbus Technology (FG25C)

This course covers the development of the ANSI/ISA-50 standard, which is the driving force behind the Foundation Fieldbus technology.

Both Foundation Fieldbus H1 (31.25 kbits/s) and HSE (High-Speed Ethernet) buses are discussed.

Benefits and cost savings of Foundation Fieldbus technology compared to system architectures of the past (e.g. asset management) are covered, as well as how Foundation Fieldbus networks are put together and configured. Operation, troubleshooting, availability, and safety aspects are also covered

Ethernet and TCP/IP on the Plant Floor (FG21C)

Ethernet is fast becoming the new standard for industrial control networking worldwide. Using process control concepts, this course explains both Ethernet and TCP/IP as they apply to the plant floor.

Included are topics such as the various types of copper and fiber based Ethernet, how to design Ethernet cabling systems, and principles of network security. You'll also look at the differences between repeaters, bridges, switches, and routers and how to correctly implement them. Different stack designs are examined and different industrial Ethernet solutions are compared with reference to operability and determinism.

Real life examples and case histories will help you understand the truth about Ethernet and TCP/IP and how to use both effectively in your plant.

OPC: The Windows to the World are Open (IC50C)

Sharing data between current control system offerings requires a myriad of hardware, software drivers, and configuration tools from each vendor.

OLE for Process Control (OPC) is an industry-wide standard that breaks this proprietary lock by offering open connectivity based on principles adapted from MS Windows integration standards. Using case studies and an OPC client/server demonstration, this course shows you the benefits and drawbacks of using OPC in your plant, how to link diverse industrial equipment into an effective plant-wide communications network, securely share plant data on the Internet, and how to justify the economics to move to OPC.

Introduction to SCADA Systems Integration (IC30C1)

This course provides an in-depth introduction to Supervisory Control and Data Acquisition (SCADA) systems. Participants will learn how remote sensing and actuation are combined with modern communication techniques to effectively monitor and control very large industrial processes—like those used in oil fields, pipelines, and electrical power systems.

This course covers most major SCADA applications, SCADA system components, and architecture.

- Basic Concepts of SCADA: Definitions | SCADA Architecture and Components | Control limitations
- Communication: Importance | System Components | System Standards | Data interoperability
- Field Devices: Sensors | Discrete | Analog | Pulse | Serial I/O | Signal Conditioning
- Wiring Methods: Types | Electrical Aspects | Technical and Mechanical Process | Grounding | Safety
- Remote Terminal Units (RTU): Introduction | Communication Modes | Monitoring and Controlling
- Data Communication Concepts: Modulation | Handshaking | Modem Specs | Common Protocols | Error Detection | Signal Codes
- Master Terminal Units (MTU): Concepts | Communication | Functions | Scan Periods | Configuration | Applications
- Application examples: Oil & gas | Electricity distribution | Water resources and management