Self-paced, online training

ANYtime
ANYwhere

November – December 2017

ISA Online Training

Setting the Standard for Automation™
ISA Distance Learning
Classroom-quality technical training—without the classroom.

ISA online, instructor-assisted training is designed for today’s busy automation and control technicians and engineers who need expert ISA technical training, but have difficulty finding time to attend a classroom event.

Students can learn at their own pace, whenever their schedule permits, by accessing the expert-presented course content through pre-recorded online modules. And, students can enjoy the benefits of networking, through email, message board, and live Q&A sessions, with their instructor and classmates!

ISA CyberU Online, Instructor-Assisted Training provides:
• Learning to match your schedule and lifestyle
• Around-the-clock (24/7) access to ISA-quality expert instruction
• Professional networking opportunities
• Pre- and post-course exams to confirm knowledge transfer

Each course includes:
• Online, pre-recorded course modules
• Course noteset
• Reading/homework assignments
• Class discussions/networking through email groups
• Continuing Education Units (CEUs) and Professional Development Hours (PDHs)

Visit www.isa.org/isa-training/online-training/ or call +1 919-549-8411 for more information or to register.

Learn more about other ISA distance learning options. See page 23.

*Each course module has been pre-recorded for access on your schedule—24 hours a day, 7 days a week for the duration of the course. Each module is a web/audio session that takes approximately 60 minutes. Courses can be joined any time during the session, as long as completed before the last day of the offering.

Course schedule and pricing subject to change.
Course topics include:
Click on course name for details

<table>
<thead>
<tr>
<th>Fundamentals</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG05E Fundamentals of Industrial Process Measurement and Control</td>
<td>4</td>
</tr>
<tr>
<td>FG05M Fundamentals of Industrial Process Measurement and Control—New Modular Delivery!</td>
<td>5</td>
</tr>
<tr>
<td>FG15E Developing &amp; Applying Standard Instrumentation and Control Documentation</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cybersecurity</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC32E Cybersecurity for Automation, Control, and SCADA Systems</td>
<td>7</td>
</tr>
<tr>
<td>IC32V Using the ISA/IEC 62443 Standards to Secure Your Control System—NEW!</td>
<td>8</td>
</tr>
<tr>
<td>CERT Cybersecurity Certificate Program</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES10E Applying Instrumentation in Hazardous (Classified) Locations</td>
<td>10</td>
</tr>
<tr>
<td>EC50E Safety Instrumented Systems: Design, Analysis, and Justification (Online Version)</td>
<td>11</td>
</tr>
<tr>
<td>EC50ESP Sistemas Instrumentados de Seguridad–Diseño, Análisis y Justificación (Online Version—Spanish)</td>
<td>11</td>
</tr>
<tr>
<td>CERT Safety Certificate Program</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EI05E Introduction to Industrial Pressure, Level, and Density Measurement Technologies</td>
<td>13</td>
</tr>
<tr>
<td>EI10E Overview of Industrial Flow Measurement Engineering</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control Systems Integration</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC40E Batch Control Systems: Using the ANSI/ISA 88 Standards</td>
<td>15</td>
</tr>
<tr>
<td>IC55E Implementing Business to MES Integration Using the ANSI/ISA95 Standard (Online)</td>
<td>16–17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Certification Exam Preparation</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS00E Certified Control Systems Technician (CCST®) Level I Online Exam Review Course</td>
<td>18</td>
</tr>
<tr>
<td>TS02E Certified Control Systems Technician (CCST®) Level II Online Exam Review Course</td>
<td>19</td>
</tr>
<tr>
<td>TS03E Certified Control Systems Technician (CCST®) Level III Online Exam Review Course</td>
<td>20</td>
</tr>
<tr>
<td>EC00E Certified Automation Professional® (CAP®) Exam Online Review Course</td>
<td>21</td>
</tr>
<tr>
<td>EN00E Control Systems Engineering (CSE®) Exam Online Review Course</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>More Distance Training Options</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>More Distance Training Options</td>
<td>23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Publications</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publications</td>
<td>24–25</td>
</tr>
</tbody>
</table>
Fundamentals of Industrial Process Measurement & Control (FG05E)

Dates:  2018 schedule coming soon!

This self-paced, online course provides an overview of industrial measurement and control for technicians, engineers, and managers, and lays a foundation for improved communication with control systems professionals.

You will be able to:
- Communicate the latest trends in measurement and control
- Recognize the role of measurement and control in industrial processes
- Compare continuous, batch, and discrete control and how they are used in industry
- Interpret measurement and control terminology
- Compare the methods and devices used in temperature, pressure, level, and flow measurement
- And more…

You will cover:
- Week 1: Pre-Exam/Module 1: Concepts of Process Control
- Week 2: Module 2: Documentation
- Week 3: Module 3 & 4: Industrial Measurement Systems (Parts I & II)
- Week 4: Module 5: Temperature Measurement (Part I)
- Week 5: Module 6: Temperature Measurement (Part II)
- Module 7: Pressure Measurement
- Week 6: Module 8 & 9: Level Measurement (Parts I & II)
- Week 7: Module 10 & 11: Flow Measurement (Parts I & II)
- Week 8: Module 12 & 13: Control Valves (Parts I & II)
- Week 9: Module 14 & 15: Feedback Control Strategies (Parts I & II)
- Week 10: Module 16: Advanced Control Strategies
- Week 11: Module 17: Smart Field Devices
- Module 18: Control System Hardware
- Week 12: Final Examination

Course details:
Course Number: FG05E
Length: 12 weeks
CEUs: 2.1 (21 PDHs)
Price: $1,680 ISA Member
$1,890 Affiliate Member
$2,105 Community Member/List

Register Now
Fundamentals of Industrial Process Measurement & Control (FG05M)

On-demand modular training you can register for anytime.
You can buy the entire course or choose only the modules that meet your individualized needs, budget, and time constraints.

Choose from among 12 highly-informative modules.
Those who purchase all 12 modules will receive a 10% discount.* You have one year from date of purchase to complete the module(s).

All Modules: FG05M Full Course
Module 1: Concepts of Process Control
Module 2: Documentation
Module 3: Industrial Measurement Systems (Parts I & II)
Module 4: Temperature Measurement (Parts I & II)
Module 5: Pressure Measurement
Module 6: Level Measurement (Parts I & II)
Module 7: Flow Measurement (Parts I & II)
Module 8: Control Valves (Parts I & II)
Module 9: Feedback Control Strategies (Parts I & II)
Module 10: Advanced Control Strategies
Module 11: Smart Field Devices
Module 12: Control System Hardware

With ISA’s modular approach to online training, you’ll:
• Create your own learning experience, one relevant to your professional and personal needs
• Be able to purchase-on demand-as few or as many modules offered within a course
• Receive ISA training without the expense or time commitment of attending out-of-town classes
• Enjoy advanced, highly interactive instruction with built-in content reviews and knowledge checks
• Pause and resume training at your own schedule and pace. All instructional progress is automatically tracked and saved
• Have one year from date of purchase to complete the module(s)
• Earn CEU and PDH credits

A new flexible way to learn the fundamentals of industrial measurement and control
The new modular delivery of the (FG05M) course—is ideally suited for those looking for introductory learning in the field of automation and control. As overview instruction for technicians, engineers, and managers, the course provides the fundamental knowledge understanding and a foundation for communicating with other control systems professionals.

Course details:
Course Number: FG05M
Length: On demand
CEUs: Varies depending on the number of modules taken
Price: Varies per full course
Module: $1,080 ISA Member
$1,350 Community Member/List

*10% Discount is already calculated in the full course price.
Developing & Applying Standard Instrumentation and Control Documentation (FG15E)

Dates: 4 December 2017 – 26 January 2018

This course will present the methodology for designing and developing control systems documentation. The development of piping and instrument diagrams (P&IDs) and related ISA drawings are emphasized. This course covers both the development and the reading/interpreting of these documents, making it beneficial to engineers, designers, software programmers, system integrators, and technicians.

You will be able to:

- Design, develop, and interpret the documents used to define instruments and control systems for a typical project, including P&IDs, loop diagrams, specification forms, instrument lists, logic diagrams, installation details, and location plans
- Explain the information included on each document
- Plan document development as it relates to project management
- Apply ISA standards for symbols and terminology to documentation
- Describe the relationship of ISO 9000, OSHA process safety management (PSM), and API 750 to control systems documentation

You will cover:

- P&IDs: Definition and Use | ISA Standard Symbols and Identification | Contents and Piping Information | Design and Construction | Developing from Flow Diagrams | Scheduling Considerations | Hazardous Area Considerations
- Instrument Lists: Definition and Use
- Control System Software: PLC/DCS Functional Requirement Documentation Development
- Logic Diagrams: Definition and Use | Symbology | Interpretation | ISA Standards
- Installation Details: Use | Development | Materials of Construction | Valves | Scheduling
- Location Plans: Purpose and Development | Structural Considerations | Electrical and Other Trays | Panel Location
- Instrument List: Specification Forms | An ISA20 Specification Form
- Loop Diagrams: Purpose | Interpretation | Development | ISA Standards | Scheduling Considerations
- Control Methods: Feedback | Feedforward | Ratio | Cascade | Control Valves
- Standards and Documentation: ISA5.1 - ISA5.6 | ISO 9000 | OSHA | Process Safety System Management | API 750

Course details:
Course Number: FG15E
Length: 8 weeks
CEUs: 1.4 (14 PDHs)
Price:
- $1,440 ISA Member
- $1,620 Affiliate Member
- $1,800 Community Member/List

Register Now
Using the ISA/IEC 62443 Standards to Secure Your Industrial Control System (IC32E)

**Dates:**
- 20 November 2017 – 12 January 2018

This online, instructor-assisted course provides a detailed look at how the ANSI/ISA-62443 (formerly ANSI/ISA99) standards can be used to protect your critical control systems. It also explores the procedural and technical differences between the security for traditional IT environments and those solutions appropriate for SCADA or plant floor environments. The course also explores the move to using open standards such as Ethernet, TCP/IP, and web technologies in SCADA and process control networks and how this has begun to expose these systems to the same cyberattacks that have wreaked so much havoc on corporate information systems.

**You will be able to:**
- Discuss the need and importance for control system security
- Learn about current principles and best practices
- Understand the structure and content of the ANSI/ISA-62443 series of documents
- Discuss the principles behind creating an effective long-term security program
- Learn the basics of risk analysis, industrial networking, and network security
- Define the concepts of defense in depth and zones and conduits
- Learn how to apply key risk mitigation techniques such as anti-virus, patch management, firewalls, and virtual private networks

**You will cover:**
- **Week 1:** Pre-Exam/Introduction to Control Systems Security and the ANSI/ISA-62443 Standards
- **Week 2:** Terminology, Concepts, Models, and Metrics
- **Week 3:** Networking Basics
- **Week 4:** Network Security Basics
- **Week 5:** Industrial Protocols
- **Week 6:** Creating an ICS Security Management Program
- **Week 7:** Designing/Validating Secure Systems
- **Week 8:** Developing Secure Products and Systems/Final Course Evaluation

**Course materials:**
- Course Noteset and Syllabus
- ISA Text: *Industrial Network Security* by David J. Teumin
- ISA Standards and Technical Reports:
  - ANSI/ISA-62443-3-3 (99.03.03)-2013, *Security for Industrial Automation and Control Systems Part 3-3: System Security Requirements and Security Levels*

**Course details:**
- **Course Number:** IC32E
- **Price:**
  - 1.4 CEUs (14 PDHs)
  - $1,440 ISA Member
  - $1,620 Affiliate Member
  - $1,800 Community Member/List

**Certificate Program Price:** $200 + Course Registration (see next page)

Visit www.isa.org/IC32course.
This VILT course provides a detailed look at how the ANSI/ISA99 standards can be used to protect your critical control systems. It also explores the procedural and technical differences between the security for traditional IT environments and those solutions appropriate for SCADA or plant floor environments.

Course details:
Course Number: IC32V
Length: 4 half-days (Tuesday, Wednesday, and Thursday) over a two-week time period
Course Hours: 1:00 p.m. – 5:00 p.m. Eastern Daylight Time (EDT)
Session Dates: December 5, 7, 12, and 14, 2017
ISA Certificate Programs

ISA has developed several certificate programs designed to increase knowledge and awareness of ISA’s industry-vital safety and cybersecurity standards. Certificate program applicants must successfully complete the required ISA training course prior to taking the certificate exam. Those candidates who successfully pass the certificate exam will be issued an ISA certificate specifying that they have earned that specific designation.

ISA/IEC 62443 Cybersecurity Certificate Program

Certificate 1:
ISA/IEC 62443 Cybersecurity Fundamentals Specialist
Required Course: Using the ISA/IEC 62443 Standards to Secure Your Control System (IC32) or its online equivalents (IC32E) or (IC32V).

Certificate 2:
ISA/IEC 62443 Cybersecurity Risk Assessment Specialist
Required Course: Assessing the Cybersecurity of New or Existing IACS Systems (IC33). ISA/IEC 62443 Cybersecurity Fundamentals Specialist Certificate is a prerequisite.

Certificate 3:
ISA/IEC 62443 Cybersecurity Design Specialist
Required Course: IACS Cybersecurity Design & Implementation (IC34). ISA/IEC 62443 Cybersecurity Fundamentals Specialist Certificate is a prerequisite.

Certificate 4:
ISA/IEC 62443 Cybersecurity Maintenance Specialist
Required Course: IACS Cybersecurity Operations and Maintenance (IC37). ISA/IEC 62443 Cybersecurity Fundamentals Specialist Certificate is a prerequisite.

ISA/IEC 62443 Cybersecurity Expert
Individuals who achieve all four ISA/IEC 62443 certificates are designated as ISA/IEC 62443 Cybersecurity Experts.

Learn more about these certificate programs, eligibility criteria, renewal, and upcoming courses at www.isa.org/ISACertificatePrograms.

The road to...

Fundamental Specialist IC32 + Risk Assessment Specialist IC33 + Design Specialist IC34 + Maintenance Specialist IC37 = Cybersecurity Expert

Back to Table of Contents
Applying Instrumentation in Hazardous (Classified) Locations (ES10E)

Dates:  • 2018 schedule coming soon!

This self-paced, online course provides a systematic approach to specifying and implementing instrumentation in hazardous locations. Related standards from National Fire Protection Association (NFPA), National Electrical Manufacturers Association (NEMA), International Electrotechnical Commission (IEC), American Petroleum Institute (API), and ISA are discussed.

You will be able to:
• Identify process and environmental factors that determine classification
• Describe and use procedures for electrical classification
• Use applicable standards to develop classification drawings for gases, dusts, and fibers
• Describe the basic principles of protection
• And more…

You will cover:
• Week 1: Pre-Exam
  Module 1: Introduction
  Location Classification Standards
• Week 2: Module 2: Class I Division
  Zone Classification
• Week 3: Module 3: Class I Zone (Alternative)
  Class II Division Classifications
• Week 4: Module 4: Class III Division
  Zone Classification for Dusts
  Module 5: Protection Technique Standards
  Enclosure Types
• Week 5: Module 6: Explosion Proof Enclosures
  Module 7: Intrinsic Safety
• Week 6: Module 8: Non-incendive Systems
  Module 9: Pressurization & Purging
• Week 7: Module 10: Other Types of Protection
  Module 11: Maintenance Considerations
• Week 8: Final Examination

Course materials:
• Course noterset with slides from course modules and course syllabus
• ISA Standards: ANSI/ISARP12.06.01-2003, Intrinsic Safety; ANSI/ISATR12.24.01-1998 (IEC 60079-10 Mod), Class I, Zones 0, 1, and 2; ANSI/ISA12.01.01-1999, Definitions and ANSI/ISA12.12.01-2000, Non-incendive

Course details:
Course Number: ES10E
Length: 8 weeks
CEUs: 1.4 (14 PDHs)
Price: $1,440 ISA Member
       $1,620 Affiliate Member
       $1,800 Community Member/List

Register Now
SAFETY

Safety Instrumented Systems—Design, Analysis, and Justification (EC50E)

Dates: 20 November 2017 – 12 January 2018

This course focuses on the engineering requirements for the specification, design, analysis, and justification of safety instrumented systems (SIS) for the process industries. Students will learn how to determine safety integrity levels (SILs) and evaluate whether proposed or existing systems meet the performance requirements.

You will be able to:
• Differentiate between process control and safety control
• Implement the ISA84 standard (IEC61511)
• Evaluate process risk levels
• And more...

You will cover:
• Week 1: Pre-Exam/Intro and Background
• Week 2: Hazard, Risk Assessment, and Determining SIL
• Week 3: Layer of Protection Analysis—LOPA
• And more...

Course details:
Course Number: EC50E
Length: 8 weeks
CEUs: 3.5 (35 PDHs)
Course Price: $2,900 ISA Member
$3,265 Affiliate Member
$3,630 Community Member/List

Certificate Program Price: $200 + Course Registration
(see page 12)

Register Now

Sistemas Instrumentados de Seguridad—Diseño, Análisis y Justificación (EC50ESP)

Fechas: 2018 schedule coming soon!

Este sistema utiliza módulos de entrenamiento en línea, libros de texto adicionales, evaluaciones en línea y discusiones por correo electrónico. El curso se enfoca en las especificaciones de diseño, el análisis y la justificación de sistemas instrumentados de seguridad para aplicaciones en la industria de procesos continuos. Los estudiantes aprenderán cómo determinar los niveles integrales de seguridad funcional (O SIL por sus siglas en Ingles) y determinar si dichos niveles de rendimiento son alcanzados, tanto en sistemas existentes como en sistemas propuestos.

Ud. podrá:
• Diferenciar entre control de Proceso y Control de seguridad funcional
• Implementar el estándar ISA84
• Evaluar Los niveles de riesgo del proceso
• y más...

Ud. cubrirá:
• Semana 1: Introducción y antecedentes
• Semana 2: Evaluación de los peligros, riesgos y determinación del SIL
• Semana 3: Capa de protección Análisis—LOPA
• y más...

Incluye las normas ISA (en Ingles):
• ANSI/ISA-91.00.01-2001
• ANSI/ISA-84.00.01-2004, Parte 1, 2 y 3

Detalles del curso:
Número del curso: EC50ESP
Duración: 8 semanas
Créditos CEU: 3.5

Registro: $2900 para miembro de ISA
$3,265 para Affliate Member
$3,630 para Community Member/el precio de lista

Programa del certificado*: $200 + la registracion del del curso (vea la página 12)

Register Now

Back to Table of Contents
ISA Certificate Programs

ISA has developed several certificate programs designed to increase knowledge and awareness of ISA’s industry-vital safety and cybersecurity standards. Certificate program applicants must successfully complete the required ISA training course prior to taking the certificate exam. Those candidates who successfully pass the certificate exam will be issued an ISA certificate specifying that they have earned that specific designation.

ISA84 Safety Instrumented Systems Certificate Program

Certificate 1:
ISA84 SIS Fundamentals Specialist
This certificate program requires the completion of the 4.5 day, instructor-led ISA training course, EC50 (or the online, instructor-assisted version, EC50E), and exam. See page 11 for EC50E course details.

Certificate 2:
ISA84 SIL Selection Specialist
This certificate requires the completion of the two-day, instructor-led ISA training course, EC52 and exam. ISA84 SIS Fundamentals Specialist certificate is a prerequisite.

Certificate 3:
ISA84 SIL Verification Specialist
This certificate requires the completion of the two-day, instructor-led ISA training course, EC54 and exam. ISA84 SIS Fundamentals Specialist certificate is a prerequisite.

ISA84 SIS Expert
Individuals who earn all three ISA84 certificates are designated as ISA84 Safety Instrumented Systems (SIS) Experts.

Learn more about these certificate programs, eligibility criteria, renewal, and upcoming courses at www.isa.org/ISACertificatePrograms.

The road to...

ISA84 SIS Fundamentals Specialist + ISA84 SIL Selection Specialist + ISA84 SIL Verification Specialist = ISA84 SIS Expert
Introduction to Industrial Pressure, Level, and Density Measurement Technologies (EI05E)

Dates:  2018 schedule coming soon!

This course presents an overview of the principles and applications of modern pressure, level, and density measurement systems, emphasizing underlying instrument technologies; device performance and design; and specification, selection, installation, and maintenance requirements for instruments and transmitters.

You will be able to:
- Identify the importance of measurement for monitoring, control, and custody applications
- Apply the characteristics of fluid properties that relate to pressure and level measurement
- Identify various types of transducers used in pressure and level measurement
- Describe the operation of various types of level measurement devices
- Use specified criteria in the selection of a method for pressure and level measurement
- Apply general maintenance, calibration, and safety requirements for specification and selection of various types of pressure and level measuring instruments
- Engineer fundamental level and pressure measurement installations
- Calculate calibration data for different process and installation conditions
- Explain the signal generation and conditioning involved in pressure, differential pressure, and level transmitters
- Select and apply devices and systems for industrial pressure and level measurement
- Specify and use smart transmitters in level and pressure measurement processes

You will cover:
- Week 1: Pre-Exam/Measurement Principles
- Week 2: Primary and Secondary Pressure Transducers
- Week 3: Technologies for Communication and Introduction to Level Measurement
- Week 4: Level Measurement Technologies
- Week 5: High-Tech Level Measurement and Hydrostatic Tank Gauging
- Week 6: Transmitters and Density Measurement
- Week 7: Final Course Examination

Course materials (included with registration):
- Course Noteset and Syllabus
- ISA Text: Industrial Pressure, Level & Density Measurement, by Donald R. Gillum
- ISA Standard: ISA-20-1981, Specification Forms for Control Instruments, Primary Elements, and Control Valves

Course details:
- Course Number: EI05E
- Length: 7 weeks
- CEUs: 1.8 (18 PDHs)
- Price:
  - $1,440 ISA Member
  - $1,620 Affiliate Member
  - $1,800 Community Member/List

Visit www.isa.org/EI05course.
Overview of Industrial Flow Measurement Engineering (EI10E)

Dates: * 13 November 2017 – 19 January 2018

This course presents an overview of the principles and applications of modern flow measurement systems. Course emphasis is on flowmeter accuracy, performance, system design, sizing, specification, installation, and maintenance requirements.

You will be able to:
- Describe principles of operation for different flowmeter technologies
- Design a system to make practical and precise industrial flow measurements
- Calculate the effects of fluid properties on flowmeter performance
- Evaluate flowmeter performance statements and compare them with application requirements
- Specify and select the appropriate flowmeters for different applications
- Create installation detail drawings to obtain flowmeter accuracy and performance
- Identify requirements for flowmeter calibration
- Solve typical flow measurement problems

You will cover:
- Week 1: Pre-Exam/Fluid Properties
- Week 2: Instrument Performance Measures, Linearization, Compensation, and Totalization
- Week 3: Flowmeter Introduction and Calibration
- Week 4: Differential Pressure Flowmeters
- Week 5: Magnetic Flowmeters | Mass and Open Channel Flowmeters
- Week 6: Oscillatory Flowmeters
- Week 7: Positive Displacement, Target, Thermal, and Turbine Flowmeters
- Week 8: Ultrasonic, Variable, and Correlation Flowmeters | Insertion and Bypass Flowmeters
- Week 9: Flowmeter Selection
- Week 10: Final Course Examination

Course materials (Included with registration):
- Course Noteset and Syllabus
- ISA Text: Industrial Flow Measurement, by David W. Spitzer
- ISA Standards and Technical Reports:
  - ISA-20-1981, Specification Forms for Control Instruments, Primary Elements, and Control Valves
  - ISA-TR20.00.01-2006, Specification Forms for Process Measurement and Control Instruments Part 1: General Considerations

Course details:
- Course Number: EI10E
- Length: 10 weeks
- CEUs: 2.4 (24 PDHs)
- Price:
  - $1,680 ISA Member
  - $1,890 Affiliate Member
  - $2,105 Community Member/List

[Register Now]

Back to Table of Contents
Batch Control Systems: Using the ANSI/ISA88 Standards (IC40E)

Dates: 6 November – 22 December 2017

This course presents an approach to developing functional requirements/specifications using the models and terminology defined in the ANSI/ISA88 batch control standards. A review of the characteristics of batch manufacturing systems is included. Participants will explore the ANSI/ISA88 concept that separates the recipe from the equipment. This course includes a methodology that defines an object approach based on ANSI/ISA88 that promotes the reuse of these objects from one project to the next.

You will be able to:
- Specify the requirements for a batch control system
- Effectively structure and subdivide equipment entities
- Define procedural elements that can be effectively used with the above equipment entities
- Describe modes and states and how they are applied at the equipment level
- Develop phase logic that executes in equipment and that can deal with both normal and abnormal operations
- Recognize the various control languages that are available
- Identify the alternative architectures for programmable logic controllers (PLCs), distributed control systems (DCSs), and PC-based control systems
- Describe the interfaces that are needed between batch control and other systems within an enterprise

Course details:
Course Number: IC40E
Length: 7 Weeks
CEUs: 2.1 (21 PDHs)
Price: $1,560 ISA Member
$1,755 Affiliate Member
$1,955 Community Member/List

Register Now
Implementing Business to MES Integration Using the ANSI/ISA95 Standards – Online (IC55E)

Dates: 6 November – 22 December 2017

This course introduces the fundamental concepts of the ANSI/ISA95 standards so that students can apply them to implementing an integration between plant manufacturing systems and business systems.

By understanding the object models and information flows defined in the ANSI/ISA95 standards, you will have the tools you need to specify, design, and execute a successful business to manufacturing integration project.

This course is ideal for Integration Project Managers; Manufacturing Information Systems Analysts; Information Design Engineers and IT Professionals

You will be able to:
- Specify the requirements for an enterprise/control integration solution
- Identify the issues involved in the integration of logistics to manufacturing control
- Identify the business processes that need information from manufacturing systems
- Identify the manufacturing control processes that need information from business systems
- Explain the business drivers involved in integration
- Identify the detailed information associated with enterprise/control integration
- Discuss the roles of UML, XML, and B2MML in vertical integration
- Apply the ISA95 object models

You will cover:
- Standards and Models
  ANSI/ISA95 Standards | MESA International Model | WBF B2MML XML Schemas
- Business Processes
  Procurement | Product Cost Accounting | Product Inventory Control | Maintenance | Production Planning and Scheduling
- Production Processes
  Detailed Production Scheduling | Production Tracking | Production Resource Management | Product Definition Management
- Information Model
  Production Resources | Process Segments | Product Definition and Capability | Production Schedules | Production Performance

Lab and Classroom Exercises:
- Identify key business drivers for integration
- Identify key business processes and objects
- Identify process segment definitions
- Develop shared product definition information

(continued)
Course Schedule/Outline:

Pre-Exam  Students are asked to take the pre-exam, which includes questions related to the subject matter areas. Answers will be provided for students to assess their knowledge, prior to beginning the course material.

- Week 1: **Module 1:** Overview and Introduction
- Week 2: **Module 2:** Domain Model
  **Module 3:** Functions, Activities and Data Flow
- Week 3: **Module 4:** Major Object Definitions
  **Module 5:** Operations Definitions Model
- Week 4: **Module 6:** Overview and Review
  **Module 7:** UML and XML
- Week 5: **Module 8:** Modeling the Objects
- Week 6: **Module 9:** Models of Exchanged Information
  **Module 10:** Implementing ISA95
- Week 7: Final Examination

Course materials:

- **Course notes**et with slides from course modules and course syllabus
- **Standards**
  - ANSI/ISA-95.00.01-2010
  - ANSI/ISA-95.00.02-2010
  - ANSI/ISA-95.00.03-2013
  - ANSI/ISA-95.00.04-2012
  - ANSI/ISA-95.00.05-2013
  - ANSI/ISA-95.00.06-2014
- **Books**
  - *The Road to Integration: A Guide to Applying the ISA-95 Standard in Manufacturing*, Bianca Scholten
  - *Design Patterns for Flexible Manufacturing*, Dennis Brandl

Course details:

- **Course Number:** IC55E
- **Length:** 7 weeks
- **CEUs:** 1.4 (14 PDHs)
- **Price:**
  - $1,440 ISA Member
  - $1,620 Affiliate Member
  - $1,800 Community Member/List

[Register Now]
Certified Control Systems Technician® (CCST®) Level I Online Exam Review Course (TS00E)

Dates:  • 2018 schedule coming soon!

This course is a fast-paced review of the knowledge and practical skills necessary to install and maintain standard measurement and control instrumentation. It is intended for practicing technicians preparing for the ISA Certified Control Systems Technician® (CCST®) Level I exam. Practice certification-type exams and an explanation of the examination process are provided.

You will be able to:
• Cite principles and theory that explain measurement and control instrument functions
• Describe procedures required to properly maintain the function of measurement and control instrumentation
• Identify the procedures and safety requirements for loop checking and its purpose
• Perform calculations and other analyses of information related to the calibration and troubleshooting of measurement and control instruments and systems
• Describe procedures required to safely start-up and shut-down a new or existing process
• Define the education, experience, and examination requirements for becoming a CCST
• Identify important knowledge and skill requirements of a practicing CCST
• Describe the procedures involved in taking the CCST Level I exam
• Identify any need for further study or training in specific knowledge areas
• Complete simulated CCST Level I practice exams

You will cover:
• Week/Module 1: Overview of CCST certification/concepts of process control
• Week/Module 2: Domain 1—Calibration, maintenance, repair and troubleshooting
• Week/Module 3: Domain 1—Calibration, maintenance, repair and troubleshooting (cont’d)
• Week/Module 4: Domain 1—Calibration, maintenance, repair and troubleshooting (cont’d)
• Week/Module 5: Domain 2—Project start-up, commissioning, loop-checking, project organization and planning
• Week/Module 6: Domain 2—Project start-up, commissioning, loop-checking, project organization and planning (cont’d)
• Week/Module 7: Domain 2—Project start-up, commissioning, loop-checking, project organization and planning (cont’d)
• Week/Module 8: Domain 3—Documentation
• Week/Module 9: Domain 3—Documentation (cont’d)
• Week/Module 10: Domain 3—Documentation (cont’d)
• Week/Module 11: Final Examination

Course materials (included with registration):
• Course Noteset and Syllabus
• ISA Text: CCST® Study Guide Level I — A $39 Value!

Course details:
Course Number:  TS00E
Length:  11 weeks
CEUs:  2.1 (21 PDHs)
Price:  $2,380 ISA Member
       $2,680 Affiliate Member
       $2,980 Community Member/List

Learn more about ISA CCST® certification at www.isa.org/CCST

Four-day, instructor-led course also available. Visit www.isa.org/TS00course.
Certified Control Systems Technician® (CCST®)
Level II Online Exam Review Course (TS02E)

**Dates:**
- 2018 schedule coming soon!

This is a fast-paced review of the knowledge and skills necessary for technicians with 7+ years of practical experience who are preparing to sit for the CCST® Level II exam. An explanation of the requirements, examination process and practice certification-type exams are provided.

**You will be able to:**
- Explain multi-step troubleshooting methodology
- Evaluate control systems tuning and system response to changes in control parameters
- Describe the isolation of a process component from an operational system to perform proper testing, maintenance, or troubleshooting
- Evaluate installed industrial network data and performance using network diagnostic tools
- Explain the process to identify and correct problems that may arise during the commissioning of control systems
- Verify final control element functionality through manipulated variables using controller mode and output functions
- Define system documentation and symbology to effectively troubleshoot instrumentation, control loops, and electrical and pneumatic installations
- Identify electrical or hazard area classifications and determine appropriate procedures to be followed for safe and effective operation
- Identify any need for further study or training in specific knowledge areas

**You will cover:**
- Concepts of Process Control | Instrument Air
- Piping & Instrumentation Diagrams (P&ID) | Basic Measuring Units
- Fundamentals of Instrumentation
- Temperature | Pressure | Flow | Level
- Analyzers | Final Control Elements
- Safety | Electricity
- Advancing Technologies | Numbering Systems
- PLC Basics | Basic Requirements for Protocol
- Fieldbus | Communications Protocol
- Fiber Optics | SCADA
- Process Dynamics | Control Action
- PID | Tuning | Advanced Control Strategy
- Calibration | Instrument Performance
- Pressure Test & Calibration Equipment | Instrument Maintenance
- Best Procedures for LANs | Troubleshooting with Statistics | Tools
- DCS Troubleshooting | Hazardous Locations
- Installation | Start-Up | Loop Checking

**Classroom/Laboratory Exercises:**
- ISA CCST Level II practice exams
- ISA Text: CCST® Study Guide Level II—A $39 Value!

**Course details:**
- Course Number: TS02E
- Length: 13 weeks
- CEUs: 2.8 (28 PDHs)
- Price: $2,380 ISA Member
- $2,680 Affiliate Member
- $2,980 Community Member/List

**Learn more about ISA CCST® certification at [www.isa.org/CCST](http://www.isa.org/CCST)**

**Four-day, instructor-led course also available. Visit [www.isa.org/TS02course](http://www.isa.org/TS02course).**
Certified Control System Technician® (CCST®) Level III Online Exam Review Course (TS03E)

Dates

4 December 2017 – 16 March 2018

This online course reviews the knowledge and skills areas included on the Certified Control Systems Technician® (CCST®) Level III certification examination. The intent is to prepare an automation professional who meets the exam criteria to take the exam. The content is based on the latest Job Analysis Domains, Tasks, Knowledge Areas, and Skill Areas developed, and regularly reviewed and updated, as the basis for the CCST certification exams.

You will be able to:

• Define the scope and format of the CCST Level III exam
• Compare process variable measurements and control valve selections
• Discuss how the various types of control technologies are used in industrial automation, including process control from basic to advanced control and discrete, batch, motor, and motion control
• Determine the requirement for tuning and discuss tuning procedures
• Identify the range of digital communications used in automation and how these are used in system integration
• Explain when safety instrumented systems (SISs) are needed and how they are specified
• Apply the critical areas of regulatory procedures and project documentation
• Interpret the best practice methodology for troubleshooting automation projects

You will cover:

• Week 1: Pre-Exam/Review of Process Control Concepts
• Week 2: Documentation—Part 1
• Week 3: Documentation—Part 2
• Week 4: Industrial Measurement and Instrument Performance
• Week 5: Calibration Principles and Procedures
• Week 6: Fundamentals of Instruments—Part 1
• Week 7: Fundamentals of Instruments—Part 2 | Final Control Elements
• Week 8: Troubleshooting | Common Loop Checking Problems
• Week 9: Feedback and Advanced Control Strategies | Loop Check Concepts
• Week 10: Programmable Electronic Systems | Fieldbus | Start-up Concerns
• Week 11: Installation in Hazardous Areas | Tuning Methods
• Week 12: Instrument Maintenance
• Week 13: Installation Practices
• Week 14: Project Management | Safety Standards | Cybersecurity
• Week 15: Final Course Examination

Course materials:

• Course notest with slides from course modules and course syllabus
• ISA Text: CCST® Level III Study Guide—A $39 Value!

Course details:

Course Number: TS03E
Length: 15 weeks
CEUs: 2.1 (21 PDHs)
Price:
- $2,380 ISA Member
- $2,680 Affiliate Member
- $2,980 Community Member/List

Learn more about ISA CCST® certification at www.isa.org/CCST

Four-day, instructor-led course also available. Visit www.isa.org/TS03course.

Back to Table of Contents
Certified Automation Professional® (CAP®) Online Exam Review Course (EC00E)

Dates: 6 November 2017 – 2 February 2018

This online course reviews the knowledge and skill areas included on the CAP® certification examination. The intent is to prepare an automation professional who meets the exam criteria to take the exam. The content is based on the Job Analysis Domains, Tasks, Knowledge Areas, and Skill Areas developed as the basis for the CAP® certification exam.

You will be able to:
• Define the scope and format of the CAP® exam
• Compare process variable measurements and control valve selections
• Discuss how the various types of control technologies are used in industrial automation, including process control from basic to advanced, discrete, batch, motor, and motion control
• Identify the range of digital communications used in automation and how these are used in system integration
• Explain when safety instrumented systems (SIS) are needed and how they are specified
• Recognize the importance of electrical issues that relate to grounding and noise
• Apply the critical areas of automation opportunity identification and project justification
• Interpret the best practice methodology for automation project execution

You will cover:
• Week 1: Pre-Exam | Introduction | CAP Basics
• Week 2: Process Instrumentation | Analytical Instrumentation
• Week 3: Continuous Control | Control Valves and Analog Communications
• Week 4: Control System Documentation and Equipment
• Week 5: Discrete I/O Devices and General Manufacturing Measurements | Motor & Drive Control
• Week 6: Motion Control | Process Modeling and Advanced Process Control
• Week 7: Batch Control | Alarm Management and Reliability
• Week 8: Safety Instrumented Systems | Electrical Installations
• Week 9: Digital Communications | Industrial Networks
• Week 10: MES Integration and Network Security | Operator Interface | Data Management
• Week 11: Software | Operator Training | Checkout, System Testing, and Startup
• Week 12: Troubleshooting | Project Management | Interpersonal Skills
• Week 13: Final Course Examination

Course materials:
• Course notetset with slides from course modules and course syllabus
• ISA Text: CAP® Study Guide—A $39 Value!

Course details:
Course Number: EC00E
Length: 13 weeks
CEUs: 2.1 (21 PDHs)
Price: $1,680 ISA Member
$1,890 Affiliate Member
$2,105 Community Member/List

Learn more about ISA CAP® certification at www.isa.org/CAP

Visit www.isa.org/EC00course.
This online course reviews the knowledge and skills areas that are included on the Control Systems Engineer (CSE) Professional Engineer (PE) examination produced by the National Council of Examiners for Engineering and Surveying (NCEES) and administered by US state professional license boards each October. The intent of the class is to prepare an engineer with four or more years of experience to take the exam by providing instruction in the broad range of technical areas that will be tested.

You will be able to:
- Follow the guidelines for taking the CSE exam
- Identify the breadth of the knowledge and skills areas covered
- Apply recognized standards for symbols and documents
- Recognize the basic calculation techniques for measurement devices
- Apply process variable measurements and sensor selection
- Compare the various final control elements/valves
- Explain basic process control loops: their configuration, operation, and performance
- Follow discrete logic in motor and interlock control
- Describe various signal conversion and wiring arrangements
- Compare various installation methods and techniques
- Determine material requirements from physical parameters
- Use safety instrumented basics
- Interpret system scope statements and apply to design needs

You will cover:
- Week 1: Pre-Exam | CSE Professional Engineer Overview | Control Systems Concepts
- Week 2: Sensor Characteristics | Pressure Measurement
- Week 3: Level Measurement | Temperature Measurement
- Week 4: Flow Measurement
- Week 5: Signals and Transmission | Smart Transmitters | Wiring Considerations
- Week 6: Control Valves: Types, Characteristics, Sizing, Calculations, Selection, and Installation
- Week 7: Pressure Relief Devices | Variable Speed Drives | System Documentation
- Week 8: Control Types and Characteristics
- Week 9: Sample Loop Problems | Control Loop Tuning
- Week 10: Control Room: Ergonomics, System Architecture, Configuration, and Programming
- Week 11: Safety Instrumented Systems | Code Application (ISA, ANSI, NEC, NFPA)
- Week 12: Final Course Examination

Course materials:
- Course notest with slides from course modules and course syllabus

Course details:
Course Number: EN00E
Length: 12 weeks
CEUs: 2.1 (21 PDHs)
Price: $1,680 ISA Member
$1,890 Affiliate Member
$2,105 Community Member/List

Three-day, instructor-led course also available. Visit www.isa.org/EN00course.
More ISA Distance Training Options

In addition to online, instructor-assisted training courses, ISA offers additional distance learning options that bring the training out of the classroom and directly to you:

**Online Courses**
ISA offers over interactive, online, computer-based multimedia courses, across twenty plus languages (Czech, Danish, French, German, and Spanish, etc.), covering fundamental principles for control systems and automation professionals. These courses offer another low-cost, flexible training option with the benefit of convenience to train when and where you want. Take one course, two courses, a whole library, a whole curriculum, or any combination in between—it's up to you! Curricula include:

- Automation and Control Curriculum
- Electrical Maintenance Curriculum
- Machine Technology Curriculum
- Predictive Maintenance Curriculum
- Workplace Skills Curriculum
- and more!

Learn more and order online at [www.isa.org/Distance/OnlineCourses](http://www.isa.org/Distance/OnlineCourses).
READ anywhere and anytime

Check out the ISA Publication eBook library, which has titles to complement your online training experience! ISA adds titles as they become available, so be sure and visit the eBooks website (www.isa.org/ebooks) for the latest list of available titles.

101 Tips for a Successful Automation Career
Greg McMillan and Hunter Vegas

Advanced Control Foundation: Tools, Techniques, and Applications
Terrence Blevins, Willy K. Wojsznis, and Mark Nixon

Advanced Temperature Measurement and Control, Second Edition
Gregory K. McMillan

Applying S88: Batch Control from a User’s Perspective
Jim Parshall and Larry Lamb

Automation Made Easy: Everything You Wanted to Know about Automation—And Need to Ask
Peter G. Martin, PhD, and Gregory Hale

Dick Caro

Basic Electricity and Electronics for Control: Fundamentals and Applications, Third Edition
Lawrence (Larry) M. Thompson

 Boiler Control Systems Engineering, Second Edition
G. F. (Jerry) Gilman

Bottom-Line Automation, Second Edition
Peter G. Martin, PhD

Calibration: A Technician’s Guide
Mike Cable

Collaborative Process Automation Systems
Martin Hollender

Condensed Handbook of Measurement and Control, Third Edition
N. E. Battikha

Control Loop Foundation—Batch and Continuous Processes
Terrence Blevins and Mark Nixon
(A Chinese translation of this book is available in ePub or Mobi format.)

ISA

Bryon Lewis, PE, CMfgE, CNNA

Control Valve Primer, Fourth Edition
Hans D. Baumann

Dispersing Heat Through Conviction: The Funnier Side of Process Control
Gregory K. McMillan

Foundation Fieldbus, Fourth Edition
Ian Verhappen and Augusto Pereira

Fundamentals of Process Control Theory, Third Edition
P. W. Murrill
Future Energy: Opportunities and Challenges
Thomas W. Kerlin, PhD

The Hitchhiker’s Guide to Manufacturing Operations Management: ISA-95 Best Practices Book 1.0 or CD-ROM
Charlie Gifford, Editor and Contributing Author

How to Become an Instrument Engineer: The Making of a Prima Donna
Gregory K. McMillan and Stan Weiner

How to File Your Own U.S. Patent Application
Hans D. Baumann

Human-Machine Interface Design for Process Control Applications
Jean-Yves Fiset

IEC 61499 Function Blocks for Embedded and Distributed Control Systems Design, Third Edition
Valeriy Vyatkin

Industrial Automation and Control Systems Security Principles
Ronald Krutz, PhD

Industrial Data Communications, Fifth Edition
Lawrence (Larry) M. Thompson and Tim Shaw

Industrial Network Security, Second Edition
David Teumim

ISA Handbook of Measurement, Equations and Tables, Second Edition
Jim Strothman

Loop Checking: A Technician’s Guide
Harley M. Jeffery

Maintainability & Maintenance Management, Fourth Edition
Joseph D. Patton, Jr.

Measurement and Control Basics, Fifth Edition
Thomas A. Hughes

MES Guide for Executives: Why and How to Select, Implement, and Maintain a Manufacturing Execution System
Bianca Scholten

Practical Project Management: Learning to Manage the Professional, Second Edition
Gerald W. Crockrell

Preventive Maintenance, Third Edition
J. D. Patton

Paul Gruhn, PE, CFSE, and Harry L. Cheddie, PE

Safety Instrumented Systems Verification—Practical Probabilistic Calculations
William M. Goble and Harry Cheddie

SCADA: Supervisory and Control Data Acquisition, Fourth Edition
Stuart Boyer

Sell More Through Effective Technical Presentations, Second Edition
Paul Gruhn

Michael D. Whitt

The MOM Chronicles: ISA-95 Best Practices Book 3.0
Charlie Gifford, Editor and Contributing Author

The Tao of Measurement: A Philosophical View of Flow and Sensors
Jesse Yoder and Dick Morley

The Road to Integration: A Guide to Applying the ISA-95 Standard in Manufacturing
Bianca Scholten

William L. Mostia Jr., PE

The Control of Boilers, Second Edition
S. G. Dukelow

When World’s Collide in Manufacturing Operation: ISA Best Practices Book 2.0
Charlie Gifford, Editor and Contributing Author

Wireless Control Foundation: Continuous and Discrete for the Process Industry
Terrence Blevins, Deji Chen, Mark Nixon, and Willy Wojsznis

Wireless Networks for Industrial Automation, Fourth Edition
Dick Caro

Purchase ebooks
ISA has the self-paced distance learning you need to stay ahead of the pack in your industry!

ISA offers a wealth of distance learning courses for you to choose from in a format that meets your needs.

- On-demand Modular
- Online, Instructor-Assisted
- Virtual Instructor-Led (VILT)

These courses are sure to become a critical part of your technical training program!