Training&Education

Hands-on automation and control technical training
2014 Catalog

World-class instruction.

Real-world application.

Get the real-world, hands-on automation and control training you need— developed and taught by industry experts.

Standards

Certification

Education & Training

Publishing

Conferences & Exhibits

Setting the Standard for Automation™

Get knowledge directly from the experts with ISA Training!

World-class instruction.
Real-world application.

The International Society of Automation (ISA) is a recognized worldwide leader in non-biased, vendor-neutral automation training and education, enabling automation and control professionals to optimize their performance and productivity, and helping organizations improve their competitive edge and operating results.

No other organization is better able or more qualified to deliver comprehensive training opportunities with real-world application than ISA. Our training programs provide access to more than 100 subject matter experts across virtually all technical fields in automation. ISA's instructors and consultants are preeminent in their field. They're tried-and-true professionals, with unrivaled knowledge and industry experience, furnishing targeted instruction and practical skills that can be immediately put to use in today's demanding marketplace.

ISA's training offerings are as innovative—continually reflecting emerging industry dynamics and new technologies—as they are flexible. From one-day to week-long classroom instruction and onsite training programs to a wide array of online, instructor-assisted courses, as well as live and pre-recorded webinars, ISA provides the training to meet any organizational need and personal learning preference.

World-class instruction with real-world application. That's ISA training.

Education & Training

ISA is recognized worldwide as a leader in non-biased, vendor-neutral education and training programs for automation professionals. Industry professionals—whether an experienced engineer, practicing technician, or newcomer to the industry—can hone their skills at ISA's regional training centers, through onsite training programs at their company, or via distance education.

Save when you join ISA!

ISA Members **save 20%** and ISA Automation Affiliate Members **save 10%** on the Community Member/List price for all ISA training courses and products. To learn more about these ISA membership categories or to join, visit **www.isa.org/join/10.**

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For the most up-to-date course information, pricing, and schedules, visit www.isa.org/2014Training.

Note: Pricing and course schedule subject to change.

4 Ways to Register

Online: Register at www.isa.org/2014Training

Phone: Call ISA Customer Service with your credit card or purchase order information at +1 919-549-8411. Use promo code **TRNCAT14.**

Mail: Return your completed registration form with a check, purchase order, or credit card information to: ISA, P.O. Box 3561, Durham, NC 27702-3561.

Fax: Return a completed registration form along with a purchase order or credit card information to ISA at +1 919-549-8288.

Registration form can be found online at www.isa.org/2014Training/Form.

Your Course Registration Includes:
- Course workbook to support lecture and lab exercises
- Standards and other appropriate reference materials as noted
- A certificate of completion with Continuing Education Units (CEUs) upon successful course completion
- Complimentary lunch

Continuing Education Units

ISA has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 8405 Greensboro Drive, Suite 800, McLean, VA 22102. In obtaining this approval, ISA has demonstrated that it complies with the ANSI/IACET Standards which are widely recognized as standards of good practice internationally. As a result of their Authorized Provider membership status, ISA is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standards.

AUTHORIZED
IACET
PROVIDER
Provider #1001262

Class sizes are limited to maximize individual attention, so register early!

Save on Registration*

Become an ISA Member

Join ISA and Save on Training!
An ISA membership entitles you to free webinar recordings, a free subscription to *InTech* magazine, member rates on training (a 20% savings), and more. To join ISA, visit www.isa.org/MemberPrice.

Save with ISA's Multi-Registration Rate!

When you register for more than one course offering in a single registration—whether you are registering yourself for two or more different courses, or registering you and at least one colleague for either the same or a different course—the ISA Multi-Registration rate can be applied to the additional registrations. Look for this special rate listed in the pricing section for each course throughout the catalog. Learn more at www.isa.org/Training/MultiReg.

Take Advantage of Combo Pricing

Register to take two related courses and save!
When you enroll in one course, consider registering for the related course to build on the skills you just learned and save with combo pricing. We've made it even easier to take advantage of these combination courses by offering the two classes on consecutive days. Look for these offerings noted throughout this catalog.

*Except when noted, these savings opportunities are mutually exclusive and cannot be combined.

Money Back Guarantee
Our goal is to exceed your expectations. If you are not completely satisfied with your ISA training course experience, ISA will issue a full refund.

What do our training students have to say?

"Having the physical instruments present in the classroom was an outstanding asset...it is an important diffferentiation between ISA's and other classes. Hands-on wins the day!"   —Bill Laumeister, FAE

"Increased my awareness of safety instrumented systems and their importance. Got my money out of this class. Definitely a class worth taking."
—David Sizemore, Instrument & Electrical Technician III (EC50, page 38)

"Great overview of I&C! Labs were very applicable to the course material. It was very helpful to have hands-on time. Best professional training course I've taken. Very well developed and organized."
—Laura Yee, Electrical Engineer (FG07, page 15)

"Practical approach to 'fixing' as-found loops. Instructor has real-world experience that really helps understanding course work. Good mix of lab vs. instruction."
—Timothy McSwain, Engineer (TC05, page 21)

"Well organized. Lab sessions were very educational. It was very enlightening to see all the equipment that I have seen in texts …put to use before me. Getting hands-on experience was invaluable."
—Rohan Verghese (ISA Technician Training Boot Camp, page 22)

"Excellent hands-on with state-of-the-art test equipment. The best training I've attended in years."
—Charles Butts, I&E Specialist (TS06, page 27)

"Course was very helpful. Labs were excellent"
—Joseph Naugle (TI06, page 19)

"Great course for understanding PLC basics and introduction to PLC programming. Lab sessions were very good and really helped me understand what we had just gone over in the course guide."
—John Dunn, Electrical Inspector (TC30P, page 28)

"Good overview of symbology."
—Stephen Smith (FG15, page 14)

"Effective general overview of what is BAS, its elements, and how to implement them."
—Jenaro Parra, Automation Engineer (EA15, page 26)

"A very good overview of present day practices and things to come."   —Louis Santonastaso, Supervisor, Configuration Management (IC68P, page 34)

Onsite Training: **"All of the feedback I have received on the course has been positive. Thanks for being attentive to our daily feedback."**
— Andrea Hawkins, Manager, Automation, Instrumentation, and Electrical Systems,Conoco-Phillips

"A good practical approach to understanding how drives and motors interact."   —Paul Nozal, Senior Instrument Consultant (SP15, page 37)

"Great labs on valves and transmitters. Instructor was great."
—Troy Burton, Automation Tech (TS16, page 17)

"I thought this was a good overall course for an experienced and informed technician."
—Brian Beeson, I&E Superintendent (TS00, page 45)

"The course was very effective at helping me identify the knowledge areas that I am weak in and need to focus on. Very good sampling of practical exam questions. Homework (surveys) was very helpful." —Garth Gathers, Associate Process Controls Consultant (EN00, page 44)

Training Locations

ISA offers training in a variety of locations. ISA training is offered at our North Carolina headquarters, at our seven regional training centers, through our ISA Europe location, at your company through onsite training (see page 7), online through distance learning (see page 48), and through various training partners throughout the world. Below are our headquarters and US training center locations and related information. Additional training locations and partner information is available online at www.isa.org/2014/Locations.

> • All classes are held from 8:00 a.m.– 4:00 p.m. local time.
> • Location/dates subject to change.

USA

Research Triangle Park, North Carolina

ISA Headquarters
67 T.W. Alexander Drive
Research Triangle Park, NC 27709

Nearest Airport:
• Raleigh-Durham International Airport (RDU)

Area Hotel:
• Fairfield Inn & Suites by Marriott
RDU Airport/Brier Creek
10040 Sellona Street
Raleigh, NC 27617
+1 919-246-0107
www.marriott.com/rdubc
ISA Student Rate: $91.00

Burbank, California

Pickwick Gardens Conference Center by Sodexho
1001 West Riverside Drive
Burbank, CA 91506

Nearest Airport:
• Burbank (Bob Hope) Airport (BUR)

Area Hotels:
• The Coast Anabelle Hotel
2011 W. Olive Avenue
Burbank, CA 91506
+1 818- 845-7800
• Courtyard by Marriott
2100 Empire Avenue
Burbank, CA 91504
+1 818-843-5500
• Hotel Armarano
322 North Pass Avenue
Burbank, CA 91505
+1 818-842-8887
• Residence Inn Marriott
321 S. First Street
Burbank, CA 91502
+1 818-260-8787

Newark, Delaware

Applied Controls Engineering, Inc. (ACE)
700 Creek View Road
Newark, DE 19711

Nearest Airports:
• Philadelphia International Airport (PHL)
• Baltimore/Washington International Thurgood Marshall Airport (BWI)

Area Hotel:
• Courtyard Newark-University of Delaware
200 New London Road
Newark, DE 19711
+1 302-737-0900

Columbia, Illinois

Maverick Technologies
265 Admiral Trost Road
Columbia, IL 62236

Nearest Airport:
• St. Louis International Airport (STL)

Area Hotels:
• Hampton Inn
165 Admiral Trost Drive
Columbia, IL 62236
+1 618-281-9000
• Holiday Inn St. Louis South I-55
4234 Butler Hill Rd.
St. Louis, MO 63129
+1 314-894-0700
• Holiday Inn St. Louis South County Center
6921 S. Lindbergh Blvd.
St. Louis, MO 63125
+1 314-892-3600

Westwood, Massachusetts

Crosspoint Engineering
15 Perwal Street
McMackin Building
Westwood, MA 02090

Nearest Airport:
• General Edward Lawrence Logan International Airport (BOS)
• Norwood Memorial Airport (OWD)

Area Hotels:
• Courtyard by Marriott – Norwood
300 River Ridge Drive
Norwood, MA 02062
+1 781-762-4700
• Holiday Inn
55 Ariadne Road
Dedham, MA 02026
+1 781-329-1000
• Four Points by Sheraton Norwood
1125 Boston Providence Turnpike
Norwood, MA 02062
+1 781-769-7900

Columbus, Ohio

Kenexis
3366 Riverside Drive
Columbus, OH 43221

Nearest Airport:
• Port Columbus International Airport (CMH)

Area Hotels:
• Homewood Suites by Hilton Columbia-Hilliard
3841 Park Mill Run Drive
Hilliard, OH
+1 614-529-4100
• Comfort Suites
3831 Park Mill Run Drive
Hilliard, OH
+1 614-529-8118
• Courtyard Columbus West
2350 Westbelt Drive
Columbus, OH
+1 614-771-8989
• Hampton Inn & Suites Columbus-Hilliard
3950 Lyman Drive
Hilliard, OH
+1 614-334-1800

King of Prussia, Pennsylvania

Ives Equipment Corporation
601 Croton Road
King of Prussia, PA 19406

Nearest Airport:
• Philadelphia International Airport (PHL)

Area Hotels:
• Best Western Plus
127 S Gulph Road
King Of Prussia, Pennsylvania, 19406
Phone: +1 610-265-4500
• Comfort Inn Valley Forge National Parkmore
550 West Dekalb Pike
King of Prussia, PA 19406
+1 610- 962-0700

Houston, Texas

Phoenix Contact
Customer Technology Center
3993 W. Sam Houston Pkwy N. Suite 500
Houston, TX 77043

Nearest Airports:
• William P. Hobby Airport (HOU)
• George Bush International Airport (IAH)

Area Hotels:
• Comfort Suites
11440 Clay Road
Houston, TX 77043
+1 832-467-1200
• La Quinta
4424 Westway Park
Houston, TX 77041
+1 713-939-1400
• Sheraton West
(free shuttle to center)
11191 Clay Road
Houston, TX 77041
+1 281-501-4200
• Four Points by Sheraton
(free shuttle to center)
10655 Katy Freeway
Houston, TX 77024
+1 281-501-4600

Houston, Texas

University of Houston
Engineering Technology
Technology 1 Annex Building
Room 110H
Houston, TX 77204

Nearest Airport:
• William P. Hobby Airport (HOU)

Area Hotels:
• Hilton University of Houston
4800 Calhoun Street
Houston, TX 77204
+1 713-741-2447
• Holiday Inn Express Downtown Convention Center
1810 Bell Street
Houston, TX 77003
+1 713-652-9400
+1 800-864-8165
• Hilton Americas-Houston
1600 Lamar
Houston, TX 77010
+1 713-739-8000
• Courtyard Houston Downtown/Convention Center
916 Dallas Street
Houston, TX 77002
+1 832-336-1600

EUROPE

**ISA Europe
The Netherlands**
For information on available courses, visit **www.isaeurope.org**.

ISA Onsite Training Brings the Experts to You

Through our Onsite Training services, ISA can bring our industry-leading instructors, proven training materials, and indispensable hands-on training devices directly to you. You gain a customized solution that is highly convenient, cost effective, and flexible—and one specially designed to help you improve your productivity and efficiency and avoid unscheduled downtime.

ISA's Onsite Training leverages the in-depth knowledge and vast experience of more than 100 subject matter experts across a wide variety of technical fields, including:
- Petro-Chemical
- Energy
- Utility
- Pharmaceutical
- Pulp/Paper
- Food/Beverage
- Military/Defense
- Manufacturing

Our internationally recognized training solutions will enable your organization to:
- Increase productivity of your most valuable asset—your employees
- Reduce turnover of your most qualified, valuable, and skilled employees
- Boost your employee retention program
- Implement a cost-effective program for rapid knowledge and skills development for new employees
- Minimize system downtime by providing your employees with familiarity of fundamental theories—the "whys" and "hows"—behind what they do
- Reduce dependence on outside vendors
- Minimize the impact of the knowledge gap as new hires start and seasoned workers retire
- Increase cross-training activities to enhance and diversify the skills of your workforce
- Establish measurable, common skill levels for employees
- Provide certification documentation
- Implement a pay-for-skills program or defined career path development program
- Establish well-defined promotion and hiring criteria

Learn more:
www.isa.org/2014/OnsiteTraining

ISA continues to build upon its proven track record of identifying each organization's specific training needs and working with leading content experts to deliver rapid, customized solutions.

ISA's professional development consultants are acutely aware of the industry's critical workforce challenges and are uniquely capable of understanding and addressing specialized concerns. They collaborate with organizations to identify their most urgent needs and leverage ISA's vast resources and experience to develop the timely and reliable solutions that will work best for each company.

To move your company forward, let ISA assess your needs and develop a customized training program for your employees.

Contact us at +1 919-549-8411 or info@isa.org, or visit **www.isa.org/2014/OnsiteTraining** to download our onsite training solutions brochure.
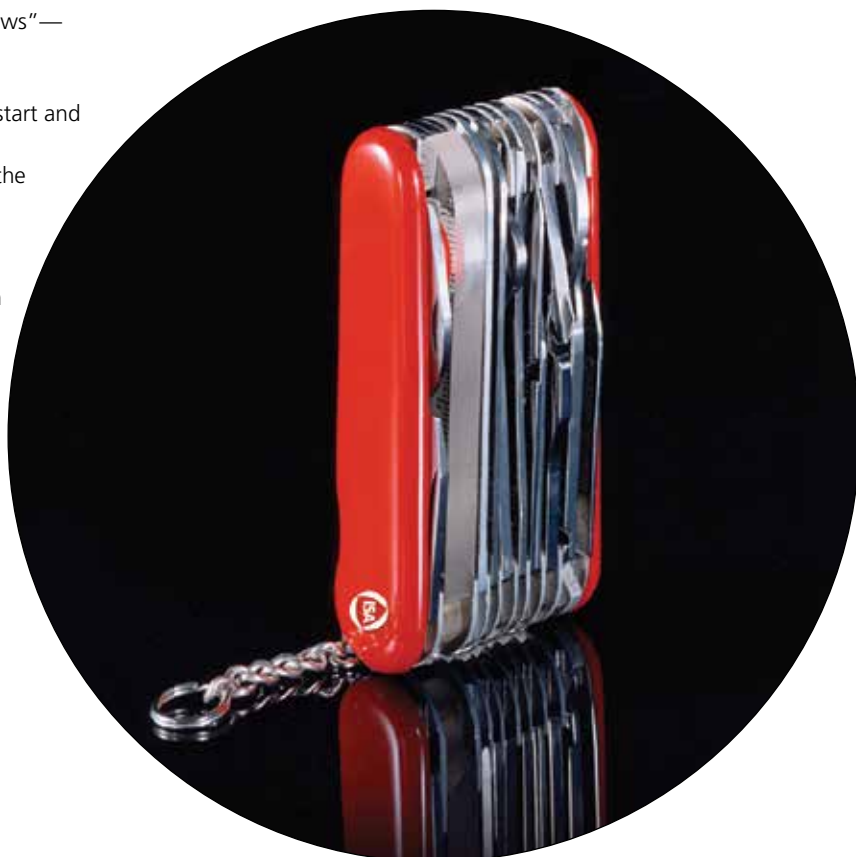
Meet Our Industry Experts

ISA prides itself in bringing you top-notch, qualified subject matter expertise with a wealth of industry experience. Below is a list of some of our instructors who are currently assigned or teach through our public and private classroom training. ISA also works with numerous other technical experts in various fields for as needed, special and distance learning assignments, who may not be listed below.

John Bogdan has significant experience in alarm management, advanced process control, safety systems, and process optimization, as wells as Six Sigma certification.

Jerry Booher has an extensive background in electronics and instrumentation and maintaining plant process instrument equipment/systems including lab analyzers, burner management control, automatic drumming lines, PLC, DDC, and DCS systems.

Dennis Brandl has been an active member of the ISA88 Batch Control Systems standards committee and a US expert in batch control to IEC SC65A/WG11. He is also an editor of ISA's ANSI/ISA95 Enterprise-Control System Integration standard.

Richard Brown has many years of experience with a primary emphasis on risk identification and mitigation approaches for industrial control systems, plant cybersecurity architecture, and defining and implementing standards/policies for manufacturing cybersecurity.

John Campbell, P.E., CAP, FSE, ISA84 SIS Expert, began his career as a process engineer moving to the instrumentation design group and recently retired as a principal engineer. He has been an active ISA member for over 34 years, holding a variety of leadership positions on the Section, District, Division, and Society levels.

Dick Caro is currently the CEO of a business strategy and professional services firm. He has also served as Vice President of ARC Advisory Group and in various roles on industry standards committees. He has also held past positions from management to marketing to development with numerous industry organizations.

Dale Carson has significant experience as a plant instrument engineer in specialty chemical manufacturing. He has also been involved with using PLC-based systems for regulatory control, and responsible for coordinating proper installation, commissioning, and start-up activities.

Gerald Cockrell served as Professor of Electronics and Computer Engineering Technology at Indiana State University for over 30 years. His areas of specialization are Process Automation Systems and Project Management.

John Cusimano, CFSE, CISSP, is a process automation safety, security, and reliability expert who leads a team devoted to improving the security of control systems for companies worldwide. He is also a qualified Achilles™ communication robustness test engineer.

Conrad DeGrace has extensive experience in developing PLC/PAC process automation applications, and teaches college-level courses on computer systems, programming, data acquisition, and processing.

Richard Eiden, P.E., CEM, LEED-AP, has vast experience in the building-trades sector holding engineering licensures in numerous states. He is very passionate about sustainability in schools, both infrastructure and STEM curriculums.

James Federlein, P.E., is recognized both for his in-depth knowledge of measurement and control and for his ability to clearly explain concepts to and share his experience with students. Jim develops custom training courses for manufacturing and engineering companies, and is a representative on many industry standards committees.

Charles Fialkowski, CFSE, has been a Safety Systems Specialist for many years, with a focus on process safety. He has also served as Chairman for ISA's Safety Division and as a member of ISA's ISA84 technical committee on Safety Instrumented Systems.

Paul Franklin has worked in wastewater, water reclamation, and hydroelectric facilities; has been involved in a multitude of major DCS/PLC upgrade projects; and has to his credit thousands of calibrations of gauges, sensors, transmitters, and analytical equipment.

Peter Fuhr, Ph.D., has been working in the areas of wireless communications, sensors, and photonics for longer than he cares to admit. He was among the earliest group of individuals to embed sensors into various civil structures.

Luis Garcia has been working extensively in the oil and gas, chemical, and petrochemical sector for many years, helping to develop standards, procedures, and projects all around Latin America and Europe.

Rod Garcia began his career in power generation operations and in the field of instrumentation through a utility apprenticeship program. He has experience in early and current technologies, pneumatic standards, early generation electronic control systems, PLCs, and distributed control systems.

Manuel Garza has extensive work experience in the areas of project development, engineering, construction, and start-up. His professional background includes positions from Instrument Trainee, I&E Technologist, and Engineering Technologist. He provides consultation and services in the areas of process automation, needs assessment, and technical training course development.

Jerry Gerlich has many years of experience in process control and petrochemical instrumentation. His vast background includes troubleshooting, maintenance, repair and calibration of control systems and custody transfer equipment, as well as engineering plant change and project packages.

> Our instructors have a combined 1,100+ years of industry experience!

Jerry Gilman, P.E., has extensive experience with burner management and boiler control systems and startups, as well as control and information systems. He also has experience with safety instrumented systems and safety standards in the food and pulp and paper process industries.

Paul Gruhn, P.E., ISA84 SIS Expert, is a Safety Product Specialist, a member of the ANSI/ISA84 Standards committee, co-author of an ISA textbook, author of many articles, and developer of numerous ISA SIS courses and a control and safety system modeling software package.

Alex Habib, P.E., has business and professional experience working on several automation-related projects, in various engineering and consultancy roles. He has served as the Director of the ISA Food & Pharmaceutical Division, as well as President of the ISA Central New Jersey Section.

John Halajko, during his long career, has served as a member of fifteen grass roots design, build, and commission teams. He has also contributed to the hardware and software design of control systems from P&ID development to SIS auditing.

Joseph Heitz has to his credit many years of experience in the instrumentation, electrical, and automation fields. Starting out as an instrument technician in a petro-chemical plant, he has embodied roles of project designer, project manager, field engineer, instrument engineer, and quality assurance representative for metrology.

Lon Hemphill, CCST Level III, began his career in the field of instrumentation in the US Army as a navigation equipment repairman. After army life, he gained his experience through the instrument department at an Army ammunitions plant.

Sam Herb has considerable years' experience in the utility and process controls industries, with various roles in marketing, business development, control applications, product management, systems engineering, project management, product evaluation, technical publications, and education.

Cameron Kamrani has project experiences which include master planning, design, construction, commissioning, and validation of field instruments, control systems, automation software, networks, and the associated electrical distribution design and hardware.

Chuck Kirby is a CCST Level III whose background includes troubleshooting, repair, calibration, design, installation, and modification of process instruments and electrical controls associated with industrial and municipal operations. His vast experience also includes the areas of project management, scheduling, technical writing, quoting, specifying, engineering, CAD, and training.

Ken Kolkebeck, CAP, CBCP, has spent many years in the control field, most of it in the specialized area of controls for critical ventilation systems. He has participated in hundreds of critical control projects for research laboratories, vivariums, pharmaceutical manufacturing facilities, clean rooms, industrial plants, and hospitals.

Kristinn Kristinsson has many years of experience in advanced control in the paper and chemical industries using multivariable control technology to optimize process operations.

Stephen Lisko has served as a process controls engineer and project engineer for large and small-scale automation projects. He has a variety of experience designing, developing, and commissioning automated control systems for food and beverage, oil and gas, petrochemical, chemical, and specialty chemical industries.

Don Lovell has been involved in the process automation field for numerous years with experience in both batch and continuous process applications. Industry experience includes beverage, cement, fine chemical, food, paper, and industrial boilers.

Wayne Manges works extensively with steel, paper, and other industries to bring robust, wireless technology to their markets, and is committed to the deployment of integrated systems that solve real problems. He has worked on systems from one-of-a-kind uranium enrichment processes to intelligent robotics.

Ed Marszal, P.E., ISA84 SIS Expert, has a multitude of experience in safety instrumented systems design and risk analysis. He has developed and teaches many courses on process safety management and safety instrumented system design and analysis.

Greg McMillan received the ISA "Kermit Fischer Environmental" Award for pH control in 1991, received the *Control Magazine* "Engineer of the Year" Award for the Process Industry in 1994, was inducted into the *Control* "Process Automation Hall of Fame" in 2001, and was honored by *InTech* Magazine in 2003 as one of the most influential innovators in automation.

Curt Miller, P.E., CFSE, has to his credit many years of experience in process instrumentation, control and automation, safety instrumented systems design/application, and project execution.

Kevin Mitchell has many years of experience in process safety management and safety instrumented systems in the refining, oil & gas, and chemical industries.

Lewis Natiello, P.E., has broad engineering and project management experience with major petrochemical, consumer products, and pharmaceutical corporations. He has served as the lead engineer on capital projects and consulting assignments, with principal focus on automation, control, and laboratory instrumentation.

Paul Nowicki has extensive experience in manufacturing information, process automation, and control systems, where he has applied his problem solving capabilities to a wide variety of industrial challenges. Paul has worked in specialty chemical, pharmaceutical, food/beverage, paper, and consumer products facilities.

Rich Palluzi, P.E., has been responsible for the design, construction, and support of pilot plants and laboratories, and consults on issues related to laboratory design and pilot plants.

Elden A. Plettner, Jr. holds a wealth of technical training experience in the nuclear industry arena. His work and professional experience include positions of I&C Design Engineering Supervisor, Licensed Senior Nuclear Reactor Operator, and Licensing Examiner.

Nicholas Sands is currently a process control engineer with many years of experience as a business process control leader, site process control leader, process control consultant, and plant control engineer across several different businesses.

Bianca Scholten advises industrial companies on how to select and implement manufacturing operations management systems in order to support improvement possibilities. She is a voting member of the ANSI/ISA95 standards committee, and has published more than seventy papers on vertical integration and technical automation.

Ken Schultz has many years' of industrial and electrical experience, much of it in the oil & gas industry. He has been involved in a wealth of projects and responsibilities involving general instrumentation, analyzers, PLCs, DCS, data communications, and incident investigations and behavior safety as it relates to process development.

Mike Scott has many years of experience in control systems engineering where he performed/implemented conceptual design, detailed design, configuration, and startup/commissioning exercises for the chemical process industry.

Tim Shaw, Ph.D., CISSP, has to his credit many, many years of experience with computer-based automation systems including developing three generations of DCS systems and two generations of SCADA systems.

Bryan Singer, CISM, CISSP, CAP, has extensive experience in information technology security, including a specialization in industrial automation and control systems security, critical infrastructure protection, and counter-terrorism. His industry experience includes healthcare, telecommunications, water/wastewater, automotive, food and beverage, pharmaceuticals, fossil and hydro power generation, and oil and gas.

Dan Smith has many years of experience in advanced control in the paper, mining, and chemical industries, using multivariable control technology to optimize process operations.

Scott Sommer, CAP, has to his credit extensive experience in automation, instrumentation, and process control design and applications, including batch control experience.

Todd Stauffer, P.E., has held marketing and business development and product management roles. He is an editor and voting member of the ISA18.2 standards committee on alarm management, and co-chair of the ISA18 WG 3 chartered with creating the Basic Alarm Design technical report (ISA TR18.03).

Thomas Stokes has numerous years of industrial control systems experience in production, maintenance, and supervision with extensive teaching credentials as an adjunct college faculty member, as well as industry short course instructor in the area of instrumentation technology.

Jerry Thomas has developed and taught courses in microprocessor systems, digital electronics, and industrial control systems to engineers and technicians throughout a variety of industries.

Larry Thompson, CAP, has an extensive background as a technician, technical trainer, and course developer in electronics, measurement/control, and computer networking. A 20-year veteran of the US Air Force, his military specialty was the maintenance of electronic encryption equipment.

Iwan van Beurden has experience with the implementation of IEC 61508 dealing with SIS reliability calculations and the safety education of engineers and performing failure modes, effects, and diagnostic analyses as well as a variety of reliability analyses and SIL verifications.

Kalpen Vachharajani has extensive experience in engineering, installation, and commissioning of process control and instrumentation systems for total plant automation and control in the refining, petrochemical, oil & gas, chemical, power, food, brewing, pharmaceutical, and automotive industries.

Lou Verduzco has a wealth of instrumentation and control systems experience in a wide range of industries including petrochemical, chemical, and water and wastewater.

Jerry Voss is a highly qualified Instrumentation and control systems specialist with many years of experience in United States Naval and Commercial Nuclear Reactor facilities. Jerry specializes in project management and programmatic/design support in the areas of software quality assurance, digital process improvement, set point analysis, drift analysis, and licensing of instrumentation.

David Wechsler has been responsible for developing standards and overseeing technology programs addressing hazardous (classified) locations, electrical safety, and fire protection designs; and performing quantitative rise assessments (QRA).

Richard Weekly has vast work experience in the electrical/automation field. Some of his first control projects involved energy management and lighting control systems, then design and installation of systems for automated material handling.

Vic Wegelin, P.E., has to his credit extensive experience in the design, build, and support of industrial control networks through his consultancy services. In addition to instructing for ISA, he is also a faculty member of a state university Industrial Control Certificate program.

W. Gerald Wilbanks, P.E., has extensive experience in control systems engineering, personnel management, quality systems consulting, and instrumentation design in heavy industry and in the chemical, pulp and paper, power, and manufacturing fields. A former President of ISA (1995), he is a registered professional engineer in four states and is a member of NSPE and of ASQ.

Gary Woods, P.E., is a registered engineer in three disciplines: chemical, nuclear, and controls systems. He has extensive background in the fields of chemical process and power generation engineering, with previous experience as a instrumentation and controls hardware specialist.

ISA is always looking to expand its pool of technical expertise!

Are you interested in joining this elite list of qualified subject matter experts, by becoming an ISA instructor?

If so, contact ISA at info@isa.org or +1-919-549-8411 or visit: **www.isa.org/instructor** for more information or details relating to ISA instructional guidelines.

Discover the heights of your true potential.

Attend an ISA Technical Training Camp in 2014!

Register for one or more of these knowledge-intensive automation and control training events in 2014

ISA Technician Training Boot Camp
Denver, CO: 3–7 March
Houston, TX: 2–6 June; 8–12 September
Carson, CA: 13–17 October

ISA Automation Engineering Survival Training
Denver, CO: 10–14 March
Houston, TX: 9–13 June; 15–19 September
Carson, CA: 6–10 October

ISA Safety Instrumented Systems Boot Camp—Part 1
Denver, CO, USA: 17–21 March
Houston, TX: 16–20 June; 22–26 September
Carson, CA: 20–24 October

ISA Safety Instrumented Systems Boot Camp—Part 2
Denver, CO, USA: 24–27 March
Houston, TX: 23–26 June; 29 September – 2 October
Carson, CA: 27–30 October

By attending one or more of the intensive, knowledge-based training courses that make up **ISA Technical Training Camp**, you'll attain the comprehensive, in-depth training you need to reach your true potential.

During four consecutive weeks in March, June, September, and October 2014, ISA's world-renowned subject-matter experts will assemble in one of three locations to provide intensive, world-class technician skills, automation engineering, and safety courses with these outstanding benefits:

- **Highly condensed, rigorous instruction that speeds learning and mastery of skills while saving time and expenses**
- **The opportunity to take multiple ISA training courses at one location, and at a discounted rate***
- **Pre-arranged local plant tours, which demonstrate how the instruction and skills taught are being applied in actual work environments**
- **CEUs and PDHs for each course successfully completed**

Register Today!

To register or learn more about ISA Technical Training Camp:
Visit: **www.isa.org/TechnicalTrainingCamp**
Email: info@isa.org
Call: +1 919-549-8411

*Save with ISA's Multi-Registration Rate!
When you register for more than one course—for you or for you and a colleague—the additional registrations may qualify for the Multi-Registration Rate. Learn more at **www.isa.org/Training/MultiReg**.

ISA has grouped its training courses into three curricula: fundamentals skills, technical skills, and automation professional skills. ISA also offers certification and licensure review courses. Depending upon your career needs and goals, you may opt to take all the courses in a curriculum or just a few in select areas.

Fundamentals Skills Courses

Technical Skills Courses

Instrumentation Maintenance

Control Systems

Industrial Data Communications

Automation Professional Skills Courses

Asset Management and Enterprise Integration

Building Automation Systems

Communications

Control Systems

Cybersecurity

Energy

Measurement and Control

Plant Maintenance

Safety

Certification And Licensure Preparation Courses

Register Online
www.isa.org/2014Training

*Not currently scheduled, but can be brought to your location through ISA Onsite Training. See Page 7.

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ISA's Fundamental Skills Training

All those working in the automation and control field need a foundational level of knowledge in order to adequately meet fundamental job requirements, perform baseline job tasks, and effectively interact and communicate with others in the field.

ISA's Fundamental Skills Training Path consists of **three core courses** that deliver a general overview of several key knowledge areas, and enable students to pursue more advanced ISA skills paths.

These courses include:

■ **Mathematics for Instrumentation Technicians (FG02)**
The course enables technicians to solve the fundamental math problems that instrument technicians face on a continuous basis. The course also provides the foundation for solving various math calculations covered in other ISA training courses.

■ **Introduction to Industrial Automation and Control (FG07)**
As a highly popular preamble to other ISA training classes, this course combines lecture and hands-on laboratory exercises to highlight the value and capabilities of industrial measurement and control.

■ **Developing and Applying Standard Instrumentation and Control Documentation (FG15)**
Ideal for engineers, designers, software programmers, system integrators, and technicians, this course explains how to design, develop, and interpret control systems documentation.

Developing and Applying Standard Instrumentation and Control Documentation

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 this course 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, control system software, 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
- Installation Details
- Loop Diagrams
- Control Methods
- Standards and Documentation
- And more…

> "The most valuable part of the course was seeing how control information is shown on P&IDs. For the most part, I've ignored that information—until this course."
>
> —Scott Lair,
> Automation/Electronics Professional

Classroom/Laboratory Exercises:
- Develop diagrams for flow, level, temperature, and pressure loops
- Develop documentation for sample instruments
- Design and develop a P&ID from a flow diagram and process description
- Design and develop logic diagrams
- And more…

Course Details:
Course No.: FG15
Length: 2 days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

Includes ISA Standards:
ANSI/ISA-5.1-2009, ANSI/ISA-5.4-1991, ANSI/ISA-5.5-1985, ANSI/ISA-20-1981, and ISA-TR20.00.01-2007—*A $565 Value*

• **Learn more at www.isa.org/training/FG15**

Introduction to Industrial Automation and Control
(Combines lecture and hands-on labs)

Most Popular!

This popular course combines lecture and hands-on labs to provide an overview of industrial measurement and control. Technicians, engineers, and managers are provided with a foundation for communication with other control system professionals. This course serves as a solid fundamental course for introduction to other ISA courses.

You Will Cover:

- **Concepts of Process Control:** Typical Industries • Definitions • Continuous vs. Batch • Feedback Loop
- **Documentation:** Instrument Line Symbols • Function Symbols • Identification Letters • Piping and Instrumentation Diagram (P&ID) • Loop Diagram
- **Industrial Measurement Systems:** Process Measurement • Standard Signals • Instrument Performance Terminology • Repeatability and Accuracy • Zero, Span, and Linearity Errors • Calibration Chart
- **Pressure Measurement:** Concepts • Instruments • Differential Pressure (D/P) Measurement • Pascal's Law • Absolute and Atmospheric Pressure • Relationship between Pressure and Column of Liquid • Hydrostatic Head Pressure • U-Tube and Well Manometers • Bourdon Pressure Gage • Spiral and Helical Elements • Bellows and Diaphragm Elements
- **Level Measurement:** Dip Stick Level Measurement • Basic Sight Glasses • Float and Cable Arrangements • Ultrasonic • Capacitance Probe • Radiation Point • Rotating Paddle • Radar Level System • Interface Measurement • Hydrostatic Pressure • Open Tank Level • Zero Suppression/Elevation • Air Bubbler System
- **Flow Measurement:** Types of Flow • Reynolds Number • Differential Pressure Flowmeters • Concentric and Eccentric Orifices • Flow Nozzle • Venturi and Pitot Tubes • Target Flowmeter • Rotameter or Variable Area Meter • Magnetic, Vortex, Turbine, and Ultrasonic Flowmeters • Doppler Effect • Flow Tube Vibration and Twist • Coriolis and Thermal Mass Flowmeters • Positive Displacement Flowmeters • Rotary Vane, Oval Gear, and Nutating Disc Designs • Open Channel Flow Measurement • Weirs • Parshall Flume • Flowmeter Selection
- **Temperature Measurement:** Temperature Scales • Liquid-in-Glass, Filled Bulb, and Bimetallic Thermometers • Resistance Temperature Detectors (RTDs) • Reference Junction Compensation • Thermocouples • Immersion and Insertion Lengths • Thermowells • Thermistors
- **Control Valves:** Types • Valve Characteristics • Inherent Flow Characteristics • Actuators • Air to Extend/Retract • Positioners • I/P Transducer
- **Feedback Control Strategies:** Control Hierarchy • Process Dynamics • Lags • Dead Time • Strategies • Direct/Reverse Acting • On-Off Control • Controller Modes • Proportional Control/Action • Level Control Offset • Integral and Derivative Action • Tuning
- **Advanced Control Strategies:** Control Hierarchy • Cascade Control • Applications: With and Without Cascade • Ratio Control • Feedforward Control
- **Control System Hardware:** Pneumatic Controller • Electronic Controller • Single Loop Controller • Distributed Control System (DCS) • Programmable Logic Controller (PLC) • Personal Computers for Control
- **Smart Field Devices:** Current Practice • Typical Smart D/P Transmitter • Smart Temperature Transmitter System • Benefits • Innovative Applications • Fieldbus Foundation—H1 and H2 • How is Fieldbus Different? • Fieldbus Control System (FCS)

Classroom/Laboratory Exercises:

- Calibrate process measurement devices for level, temperature, pressure, and flow using a variety of state-of-the-art calibration equipment
- Interpret simple P&IDs
- Configure smart transmitters
- Operate digital controllers
- Tune control loops using software
- Build and tune an actual feedback control loop
- Review flow measurements and pressure scales

Course Details:

Course No.: FG07
Length: 4.5 Days
CEUs: 3.2
Price: $2,590 ISA Member; $2,915 Affiliate Member; $3,240 Community Member/List; $2,590 Multi-Registration Rate

Recommended Resource:

Measurement and Control Basics, Fourth Edition
by Thomas A. Hughes
(See pages 54–55 for more information.)

> **"This course is an excellent way for the entry level technician and/or engineer to familiar him/herself with the terminology and language used in the instrumentation field."**
>
> —Jerry Booher, ISA Instructor

ISA's Technical Skills Training

ISA's diverse range of technical skills training courses enable automation and control technicians who are new to the field as well as seasoned professionals—and everyone in between—to hone their skills, learn new techniques, and stay up-to-date on the most advanced technologies and techniques.

ISA's Technical Skills courses cover topics in the areas of:

■ Instrumentation Maintenance

■ Industrial Data Communications

■ Control Systems

For practicing automation and control technicians, the courses in this training path are highly effective in helping you prepare for for the ISA Certified Control Systems Technician® (CCST®) certification exam.

ISA Training is a Hands-on Experience!

In this course, you will spend approximately 40% of your time performing hands-on exercises on ISA's portable training labs.

Instrument Calibration and Documentation for FDA-Regulated Industries

NEW!

Do you really want an untrained technician working on equipment that directly affects the quality and integrity of the product being manufactured at your facility? Current statistics show that finding an out of tolerance calibration is a $40,000 investigation!

This course offers a combination of practical information and hands-on experience, covering fundamental principles of electronic process control instrumentation used in pharmaceutical and other life science industries. Proper calibration will be covered in hands-on lab exercises using common electronic instrumentation including analyzers. You will examine characteristics of electronic control systems and procedures for configuring transmitters, transducers, and controllers. A good portion of time is spent working hands-on with typical industry equipment.

Course Prerequisites:
• Basic understanding of FDA industry regulations

Who Should Attend?
• Technicians, engineers, supervisors, and managers who want to gain a better understanding of the field of process control and calibration standards necessary in FDA-regulated industries

You Will Be Able To:
• Select and operate test equipment to measure electrical properties and calibrate instruments
• Calibrate electronic transmitters
• Use piping and instrumentation diagram (P&ID), wiring, schematic, and installation detail drawings to install, calibrate, and verify proper operation of instruments
• Explain the relevance of ISO 9000 standards to maintenance practices and procedures
• And more…

You Will Cover:
• Fundamentals of Temperature, Pressure, Flow, Level, and Analytics
• Calibration and Configuration
• Instrument Maintenance
• Standards-Based Calibration Programming
• Measurement Uncertainty, Tolerances, and Validated Systems
• And more…

Classroom/Laboratory Exercises:
• Calculate, record, and graph instrument performance data to compare with specifications and identify errors
• Measure and record voltage, current, and resistance
• Calibrate differential pressure, RTDs, and thermocouples
• Configure smart differential pressure and temperature transmitters
• And more…

Course Details:
Course No.: TI24
Length: 4.5 Days
CEUs: 3.2
Price: $2,590 ISA Member; $2,915 Affiliate Member; $3,240 Community Member/List; $2,590 Multi-Registration Rate

• **Learn more at www.isa.org/training/TI24**

Most Popular!

Installing, Calibrating, and Maintaining Electronic Instruments

This popular course offers a combination of practical information and hands-on experience, covering proper installation, calibration, and maintenance of electronic instruments. You will examine characteristics of electronic control systems; techniques for installing electronic instruments; and procedures for configuring and calibrating transmitters, transducers, and controllers. **Approximately 40% of your time in this course is spent working with equipment.**

You Will Be Able To:
- Employ proper safety practices during installation, calibration, and maintenance procedures
- Select and operate test equipment to measure electrical properties and calibrate instruments
- Calibrate electronic transmitters and controllers
- Install electronic instruments using manufacturer's guidelines and ISA's recommended practices and procedures
- Use piping and instrumentation diagrams (P&IDs) and wiring, schematic, and installation detail drawings to install, calibrate, and verify proper operation of instruments
- And more...

> **"This is an excellent course that enables the participant to study and understand concepts related to individual instruments, instrument loop wiring, and common electronic instruments found in most operating plants."**
> —Jerry Booher, ISA Instructor

You Will Cover:
- Laboratory and Test Equipment
- Calibration and Configuration
- Instrument Maintenance
- Installation
- Electronic Controllers
- Safety in Hazardous Locations
- And more...

Classroom/Laboratory Exercises:
- Calibrate differential pressure, RTD, thermocouple, and I/P transmitters and transducers
- Configure smart differential pressure and temperature transmitters
- Construct a simple feedback flow loop, perform a loop check, and tune the loop using trial and error tuning
- Configure and calibrate a single loop digital controller
- And more...

Course Details:
Course No.: TI25
Length: 4.5 days
CEUs: 3.2
Price: $2,590 ISA Member; $2,915 Affiliate Member; $3,240 Community Member/List; $2,590 Multi-Registration Rate

Recommended Resource:
Calibration: A Technician's Guide by Mike Cable
(See pages 54–55 for more information.)

- **Learn more at www.isa.org/training/TI25**

Advanced Operation of Digital (Smart) Transmitters and Digital Valve Controllers

This lab-intensive course focuses on the configuration fundamentals, the calibration process, the measurements of multiple variables, and the utilization of computer-based configuration tools for **both digital transmitters and digital valve controllers.**

This course offers you a hands-on working knowledge of smart field devices with an emphasis on measurement accuracy, advanced information gathering, decreased maintenance time, ease-of-configuration and calibration, and diagnostic capabilities. You will cover use in conventional systems and enhancements/improvements when combined with digital control networks, including basic and multivariable digital transmitters and digital valve-positioners. You will also be exposed to various hand-held communicators and computer-based configuration and diagnostic software.

You Will Be Able To:
- Differentiate between analog and digital instruments
- Configure, re-range, and calibrate smart/digital field devices
- Configure and calibrate control valves fitted with digital valve controllers
- Communicate with digital devices utilizing computer-based software
- Test diagnostic capabilities of digital valve controllers
- And more...

You Will Cover:
- Analog vs. Digital Instruments
- Digital Signal Sampling
- Strengths and Weaknesses of Digital Instruments
- Serial Digital Communications
- Smart Multivariable Transmitters
- And more...

Classroom/Laboratory Exercises:
- Configure digital transmitters and digital valve controllers and control valves
- Perform sensor trims and calibrations
- Use various communication tools to configure smart field devices
- Perform diagnostic tests on smart control valves
- And more...

Course Details:
Course No.: TS16
Length: 4.5 days
CEUs: 3.2
Price: $2,590 ISA Member; $2,915 Affiliate Member; $3,240 Community Member/List; $2,590 Multi-Registration Rate

- **Learn more at www.isa.org/training/TS16**

Take courses TI15 and TI20 and save!
Combo Price: $2,665 ISA Member; $2,995 Affiliate Member; $3,330 Community Member/List

Electrical Systems and Principles

This course covers electrical principles and components used in industrial instrumentation, emphasizing safety. This course also covers using schematic symbols, the National Electrical Code (NEC), and basic test equipment. This course serves as an excellent overview for those who have never had electrical training and as a refresher/update for those who have had electrical training (though not too advanced) sometime ago. An understanding of basic Algebra is expected.

You Will Be Able To:
- Evaluate the direct current (DC) relationships between voltage, current, and resistance
- Determine alternating current (AC) characteristics including amplitude, frequency, and phase
- Apply safety considerations when measuring electrical values or working around electrical equipment
- Identify schematic symbols used for electrical devices
- Explain the purpose and use of the National Electrical Code (NEC)
- And more...

You Will Cover:
- Direct and Alternating Current Circuits
- Overcurrent Devices
- Measuring Equipment
- Polyphase Sources
- National Electrical Code (NEC)
- And more...

Classroom/Laboratory Exercises:
- Measure current, voltage, resistance, and impedance
- Use capacitors, inductors, and resistors to build circuits and observe the different results
- Connect DC parallel and series circuits and identify their different uses
- Troubleshoot circuits by determining proper voltage, current flow, power dissipation, resistance, and complete path
- Build a relay "seal in circuit" for lighting lights
- And more...

> **"Hands on labs helped with understanding the relationships and differences between voltages, current, resistance, inductance, and reactance."** —Deidrea Vanderbilt

Course Details:
Course No.: TI15
Length: 3 days
CEUs: 2.1
Price: $1,410 ISA Member; $1,585 Affiliate Member; $1,765 Community Member/List; $1,410 Multi-Registration Rate

Recommended Resource:
Basic Electricity and Electronics for Control: Fundamentals and Applications, Third Edition by Lawrence M. Thompson
(See pages 54–55 for more information.)

- **Learn more at www.isa.org/training/TI15**
- **Check out the Electrical Safety Webinar Series.** See page 49.

Industrial Electronics

This course introduces the theory and practical application of industrial electronic components. The emphasis is on safety, electrostatic discharge damage, and prevention. An understanding of basic electrical systems is assumed.

You Will Be Able To:
- Test the function of an operational amplifier
- Determine the operation of analog, digital, and conversion electronic circuits
- Apply safety considerations when working around electronic equipment
- Identify schematic symbols used for electronic devices
- Assemble electronic circuits and electronic devices (power supplies, amplifiers, and other applications)
- And more...

You Will Cover:
- Diode Operation
- Silicon Controlled Rectifier (SCR)/Triac
- Bipolar Triodes
- Operational Amplifiers
- Safety

Classroom/Laboratory Exercises:
- Use test equipment correctly, including digital multimeters, scopemeters, and function generators
- Construct different DC power supplies (half and full wave rectifiers using a center tapped transformer) using different capacitance/resistance filtering
- Build an open instrument loop using a power supply, an Op Amp, and a bridge circuit
- Demonstrate how electrical noise can affect the mV signal

> **"The course provided me with an awareness of component uses, actions, and outputs."** —Alton McGinty, Automation Tech

Course Details:
Course No.: TI20
Length: 2 days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List: $1,205 Multi-Registration Rate

Recommended Resource:
Basic Electricity and Electronics for Control: Fundamentals and Applications, Third Edition by Lawrence M. Thompson
(See pages 54–55 for more information.)

- **Learn more at www.isa.org/training/TI20**
- **Check out the Electrical Safety Webinar Series.** See page 49.

Electrical Noise Effects on Instrumentation Control Equipment

This course provides an understanding of electrical grounding from an electrical and instrumentation loop relationship. It also covers grounding for personnel and equipment protection as well as for electrical noise. Signal wiring and noise reduction methods are also presented. The material assumes the student has a basic understanding of electrical principles and signal wiring. The National Electrical Code (NEC) is referenced throughout the course.

You Will Be Able To:
- Explain why some electrical systems are connected to earth ground
- Use the National Electric Code (NEC) as standard for grounding instrument systems
- Illustrate how people become part of an electrical circuit and how to avoid it
- Compare noise and interference and how they are transmitted
- Identify the effects of harmonics on power systems, control systems, and computers
- And more...

You Will Cover:
- Grounding
- Electrical Noise
- Powering Sensitive Equipment

Classroom/Laboratory Exercises:
- Review the effects of various levels of electrical current flowing through the human body
- Use a circuit tester to understand how a GFCI works by checking circuits for improperly
- terminated leads
- Measure harmonic voltage distortion using a digital power analyzer

> "This class was great! I have a much better handle on the subject of grounding and noise. Keep up the good work."
> —Newell Collins, Technical Specialist, Instrumentation

Course Details:
Course No.: TI21
Length: 2 days
CEUs: 1.4
Price: $1,205 ISA Member/Group; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

Maintaining Pneumatic Components in Measurement and Control

This course covers correct technology, operation, and maintenance of pneumatic instruments employed in modern process facilities. The course emphasis is on valves, valve positioners, controllers, and transmitters.

You Will Be Able To:
- Describe the operation of various pneumatic devices including bellows, diaphragm, Bourdon tube, flapper/nozzle mechanism, and pressure transmitters
- Describe the specific tools used for pneumatic maintenance in a contemporary plant environment
- Calibrate a differential pressure (D/P) transmitter for a dip tube application
- Discuss the function of a control valve and actuator in a typical loop
- Bench check and operate a pneumatic valve actuator—performing a five-point calibration check on the positioner
- And more...

You Will Cover:
- Review of Fundamental Concepts
- Pneumatic Device Operation
- Instrument Calibration
- D/P Level Applications
- Maintenance
- And more...

Classroom/Laboratory Exercises:
- Pneumatic gage and D/P transmitter calibration
- D/P liquid level measurement with Bubbler System
- And more...

Course Details:
Course No.: TI06
Length: 2 days
CEUs: 1.4
Price: $1,410 ISA Member; $1,585 Affiliate Member; $1,765 Community Member/List; $1,410 Multi-Registration Rate

Includes ISA Standard:
ISA-7.0.01-1996—*A $110 Value*

- **Learn more at www.isa.org/training/TI21**

- **Learn more at www.isa.org/training/TI06**

Improve and advance your technical skills with the

ISA Technician Guide Series

Expand your knowledge by adding these valuable resources to your library. The ISA Technician Guide Series currently includes five books covering the most common work functions for today's automation and control systems technician:

- *Calibration: A Technician's Guide*
- *Loop Checking: A Technician's Guide*
- *Project Management: A Technician's Guide*
- *Start-Up: A Technician's Guide, Second Edition*
- *Troubleshooting: A Technician's Guide, Second Edition*

Shop today at
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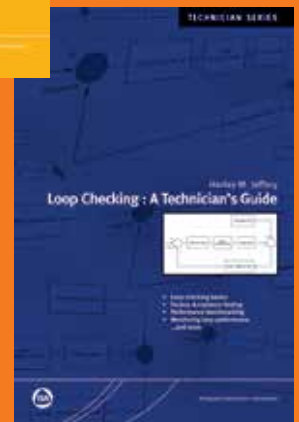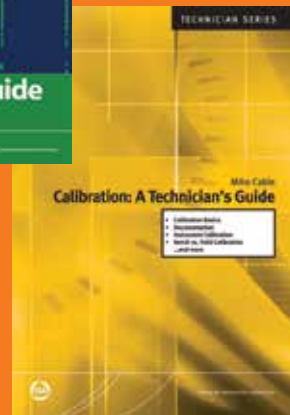
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*Discount taken before taxes, fees, and shipping
costs are added to the final cost.

Setting the Standard for Automation™

ISA

Take courses TC05 and TC10 and save!
Combo Price: $2,665 ISA Member; $2,995 Affiliate Member; $3,330 Community Member/List

Tuning Control Loops

This course is recommended for anyone who would like to gain a better understanding of how to tune control loops—whether you have tuned loops but would like to become more proficient or you have never tuned a loop before. Registrants are expected to have a basic understanding of instrumentation and controls (either by working experience or taking fundamental courses such as ISA's course FG07: Introduction to Industrial Automation and Control) as this course does not cover that material.

You Will Be Able To:
- Identify the requirements for open-loop and closed-loop stability
- Use three methods to tune a control system for stated quality control
- Tune a cascade control loop for optimum control
- Tune a feedforward control system for optimum control
- Tune ratio control systems
- And more...

You Will Cover:
- Review of Feedback Control Concepts and Components
- Control Modes
- Dynamic and Steady State Considerations
- Tuning Control Systems
- Safety Concerns and Procedures when Operating Control Systems
- And more...

Classroom/Laboratory Exercises:
- Demonstrate the operation of components required for closed- loop control
- Review start-up procedures for single- and multi-loop systems
- Tune cascade, ratio, and feedforward control systems
- Tune using a PC-based simulation software
- And more...

Course Details:
Course No.: TC05
Length: 3 days
CEUs: 2.1
Price: $1,410 ISA Member; $1,585 Affiliate Member; $1,765 Community Member/List; $1,410 Multi-Registration Rate

Recommended Resource:
Fundamentals of Process Control Theory, Third Edition
by P.W. Murrill
(See pages 54–55 for more information.)

Troubleshooting Instrumentation and Control Systems

This course presents a systematic approach to troubleshooting and start-up of single- and multi-loop control loops. You will learn how pressure, level, flow, and temperature loops operate to maintain good process control systems. Knowledge of instrumentation and control is assumed.

You Will Be Able To:
- Develop a systematic approach to troubleshooting
- Verify, locate, and identify performance problems and the causes of the problems
- Identify the common causes of sensor, transmitter, controller, and final control element problems
- Troubleshoot control systems
- Compare general troubleshooting procedures for conventional, FIELDBUS, and HART™ control systems
- And more...

You Will Cover:
- Approaches to Troubleshooting
- Logical Analysis Troubleshooting
- Review of ISA Standard Diagrams and Symbols
- Single-Loop Feedback Control Troubleshooting
- Multi-Loop Control Systems Troubleshooting
- And more...

Classroom/Laboratory Exercises:
- Diagnose and solve problems with single-loop control loops
- Diagnose and solve problems with ratio, cascade, and three-element control loop systems
- Diagnose problems using distributed control system (DCS) displays for information
- Troubleshoot several single control loop problems

Course Details:
Course No.: TC10
Length: 2 days
CEUs: 1.4
Price: $1,410 ISA Member; $1,585 Affiliate Member; $1,765 Community Member/List; $1,410 Multi-Registration Rate

Recommended Resource:
Troubleshooting: A Technician's Guide, Second Edition
by William L. Mostia, Jr., P.E.
(See pages 54–55 for more information.)

> **"TC05 and TC10's practical hands-on approach develops skills that can be immediately applied by the student in their job. The interactive presentations and labs reinforce the basic concepts."**
> —Don Lovell, ISA Instructor

- **Learn more at www.isa.org/training/TC05**

- **Learn more at www.isa.org/training/TC10**

Highly Intensive, Hands-On
Basic to Advanced

TECHNIC

Choose the ISA Technic

ISA offers a comprehensive set of in-depth, hands-on technician training courses—led by our world-class industry experts—that allows you to select the right level and type of technical training to meet your or your employees' specific needs.

ISA TECHNICIAN BOOT CAMP SERIES

- ISA Process Automation Boot Camp For Non-Maintenance Personnel (PABC)
- ISA Technician Training Boot Camp (TTBC)
- ISA Tactics for Advanced Troubleshooting Boot Camp (TATC)

ISA Process Automation Boot Camp For Non-Maintenance Personnel (PABC)

—New for 2014!

This course—specifically developed for non-maintenance personnel with little or no background in the field of process measurement and control— focuses on the physical measurement technologies, the communication signals, and the various applications of instrument equipment to achieve common process measurements and control.

Who should attend?

- Operations personnel
- Automation engineers
- Process control engineers
- Process control equipment sales staff
- Managers responsible for overseeing operations or maintenance

Schedule
ISA Headquarters,
Research Triangle Park, NC, USA
31 March – 4 April 2014
18–22 August 2014

ISA Technician Training Boot Camp (TTBC)

Starting with basic instrumentation fundamentals and ending with the advanced and ultimate in smart technology, this course focuses on the knowledge required by a control systems technician with five years' experience in performing maintenance, calibration, and troubleshooting tasks typical of a plant floor environment.

Who should attend?

- Technicians with instrument maintenance responsibilities
- Instrument supervisors
- Maintenance and reliability engineers
- Contract instrument maintenance personnel
- Maintenance managers

Schedule
ISA Headquarters,
Research Triangle Park, NC, USA
7–11 April 2014
22-26 September 2014

**Part of ISA's 2014
Technical Training Camp**
3–7 March 2014 (Colorado, USA)
2–6 June 2014 (Houston, TX, USA)
8–12 September 2014
(Houston, TX, USA)
13–17 October 2014 (Carson, CA, USA)

ISA Tactics for Advanced Troubleshooting Boot Camp (TATC)

—New for 2014!

This class details the techniques required to troubleshoot today's instrument loops and equipment. From understanding loop fundamentals to employing built-in equipment diagnostics, this class will give the student an advantage in problem identification via the latest in test equipment and communicators used in the process control industry.

Who should attend?

- Instrument technicians with maintenance responsibilities
- Maintenance and reliability engineers
- Process control engineers
- Automation engineers
- Supervisors needing general knowledge of troubleshooting techniques

Schedule
ISA Headquarters,
Research Triangle Park, NC, USA
12–16 May 2014
20–24 October 2014

Learn more and enroll yourself, your co-workers, and/or your employees at: **www.isa.org/TechBootCamps**

ISA's Automation Professional Skills Training Courses

ISA's extensive collection of automation professional skills training courses is primarily designed for automation professionals, control systems engineers, and engineering managers.

The courses in ISA's Automation Professional Skills collection span a broad range of technical topics including:

■ Asset Management and Enterprise Integration

■ Building Automation Systems

■ Communications

■ Control Systems

■ Cybersecurity

■ Measurement and Control

■ Plant Maintenance

■ Safety

Intended to be taken as needed to expand knowledge and proficiency in specific areas, these courses are built around the competencies tested on ISA's Certified Automation Professional® (CAP®) certification examination.

Implementing Business to MES Integration Using the ANSI/ISA95 Standard

Many manufacturing firms have made significant investments in flexible shop-floor execution systems and in sophisticated enterprise planning (ERP) systems. Those investments, however, cannot yield their full potential until each has access to the information and capabilities of the other. The ANSI/ISA95 standard addresses that coordination problem by providing a sound, robust definition of business activities and of the information that must flow between those two realms. This course also teaches the terminology used in Information Technology (IT) departments so that manufacturing and IT personnel can effectively work together on integration projects.

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
- Explain the business drivers involved in integration
- Discuss the roles of UML, XML, and B2MML in vertical integration
- Apply the ISA95 object models
- And more…

You Will Cover:
- Standards and Models
- Business Processes
- Production Processes
- Information Model

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

Course Details:
Course No.: IC55
Length: 2 days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

Includes ISA Standard:
ANSI/ISA-95.00.01-2010, ANSI/ISA95.00.02-2010, and ANSI/ISA-95.00.03-2005**—A $870 Value!**

Project Management for Automation and Control

This course deals with the project management functions and responsibilities from the viewpoint of an instrumentation and controls supplier. The roles and requirements are discussed along with the techniques and tools needed to work with the project manager of the engineering organization. This course includes project initiation, definition, execution, and close out, along with the phases involved for each. A particular emphasis is placed on the functional needs of providing what the customer needs in a project execution environment.

You Will Be Able To:
- Identify project types and overall goals and objectives
- Define the roles and responsibilities of project managers
- Communicate with the engineering organization project manager in a meaningful manner
- Explain the four important objectives critical to projects vs. the three objectives typical of other projects
- Execute projects in the phases unique to an automation and control endeavor
- And more

You Will Cover:
- Introduction
- Project Manager Qualification
- Project Development
- Initiation Phase
- Project
  - Planning
  - Executing
  - Controlling
  - Closing
  - And more

Classroom/Laboratory Exercises:
- Evaluate project manager skills in strategic planning
- Practice project scheduling techniques
- Demonstrate risk review and analysis

Course Details:
Course No.: MT07
Length: 3 days
CEUs: 2.1
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

Advanced Project Management for Team Leaders

This course teaches you advanced management techniques and tools for project leaders/project managers. This course builds on general project management techniques of project planning, project scope, and project scheduling. The course focus is on best practices for a leader in regard to development and implementation of the project communications plan, management of team relationships, resources procurement, risk management, cost control, and performance measurements during the automation project lifecycle.

You Will Be Able To:
- Properly scope the project and identify project definitions and customer expectations
- Select resources, outsource work effectively, and coordinate the project team properly by applying management and teambuilding skills to projects
- Improve your interpersonal skills
- Establish a communications plan and improve relationships among vendors, industrial organizations, and engineering organizations
- Identify risks and perform risk management
- And more...

You Will Cover:
- Project Management Knowledge Areas
- Project Processes
- Customer Satisfaction
- Skills
  - Leadership
  - Communication
  - People
- Management
  - Resource
  - Cost
  - Risk
- And more...

> **"This course gave me a broad use of project management, mostly from a controls and instrumentation point-of-view."**
> —Jeffrey Cerny, Director of Plant Engineering and Maintenance

Classroom/Laboratory Exercises:
- Resource balancing
- Project schedule and cost assessment

Course Details:
Course No.: MT10
Length: 2 days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

Introduction to Building Automation Systems

This real-world-based course will give you a broad introductory understanding of the specific issues involved with Building Automation Systems (BAS). You will explore the processes that occur at every level in the air conditioning industry including digital controls. Learn about sensing and measurement, actuation, analog output devices, and relays. Computer interfaces are discussed, including web interfaces. Your survey of the world of BAS includes: Future of BAS, Digital Direct Control (DDC) Basics, Field Devices, The Human Machine Interface (HMI), BAS Design and Specification, Energy Conservation Control Strategies, and System Maintenance.

You Will Be Able To:
- Identify and describe the major components in a BAS
- Identify and describe the basic mechanical components and controls in an HVAC control system
- Reference codes and standards applicable to BAS
- Explain energy conservation strategies
- Justify control components for project work
- And more...

You Will Cover:
- Building Automation Overview
- BAS Applications
- BAS System Solutions
- BAS System Delivery
- The Human Machine Interface (HMI) Applications
- And more...

Course Details:
Course No.: EA15
Length: 3 days
CEUs: 2.1
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

> **"Great job! In my 40 years in the building automation industry, never in one place have I seen a course so complete with the connection to the major interacting systems. The understanding of these systems is crucial to being able to control them."**
> —Ken Sinclair, Editor/Owner, AutomatedBuildings.com

Database Management for Industrial Automation and Control Systems

Learn the ways in which information is stored, managed, and protected in a modern Industrial Automation and Control System (IACS), including how to access and manipulate that information and what steps can be taken to safeguard and ensure the availability of that information. This course provides a specific introduction to relational database technologies and techniques. This course also provides a basic explanation of the technologies and terminology of information storage, manipulation, and exchange, making it especially beneficial to personnel responsible for the support and administration of an IACS and for integrating such systems into the plant and corporate business systems.

You Will Be Able To:
- Identify how information is represented and stored in an industrial automation and control computer system, including how bulk storage is organized into files and directories
- Design a basic set of relational database tables and a scheme that describes them
- Create basic relational and "flat" database tables using commercial software tools
- Use the Standard Query Language (SQL) to create, populate, and query a relational database of your own design and creation
- Evaluate the security and reliability of critical IACS databases and explain both architectural and cybersecurity mechanisms for improving both
- And more...

You Will Cover:
- **Data:** Representations • Relationships • Storage and Retrieval • Documentation • Security and Availability
- **Database:** Structures • Types • Tables • Operations • Software • Maintenance
- Relational Databases
- Basics of Database Design
- Special Requirements of Real Time Databases
- And more...

Classroom/Laboratory Exercises:
- Create and manipulate data in "flat" tables
- Create a Microsoft Access Database
- Use mySQL to create and populate a relational database
- Use SQL to query and manipulate a relational database

Course Details:
Course No.: EA05
Length: 2 days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

- **Learn more at www.isa.org/training/EA15**

- **Learn more at www.isa.org/training/EA05**

Industrial Data Communications Systems

Starting from the basics, this course gives you the tools to design and maintain industrial communications systems on your plant floor. You'll learn the underlying principles behind today's industrial communications systems, including Modbus, Data Highway Plus, Ethernet, and TCP/IP. Real-life examples and case histories provide insight into the facts behind control networks and how to effectively apply and maintain them in your plant.

You Will Be Able To:
- Apply serial standards, such as EIA-232, 422, 423, and 485, in plant floor settings
- Compare media access techniques such as CSMA/CD, token passing, and master/slave
- List options for Ethernet hardware to avoid instant obsolescence and being locked in the past
- Select and apply fiber optic technology
- Differentiate between different wireless and Industrial Ethernet alternatives
- And more...

You Will Cover:
- What is Data Communications?
- Serial Communications
- Industrial Protocols
- LAN Technologies
- Fiber Optics
- And more...

Classroom/Laboratory Exercises:
- Solve EIA-232 cabling problems
- Use protocol analyzers to capture serial and network traffic
- Use oscilloscopes to analyze network signals
- Use cable analyzers to diagnose cable/fiber optic problems
- And more...

Course Details:
Course No.: TS06
Length: 5 days
CEUs: 3.5
Price: $2,590 ISA Member; $2,915 Affiliate Member; $3,240 Community Member/List; $2,590 Multi-Registration Rate

Recommended Resource:
Industrial Data Communications, Fourth Edition
by Lawrence M. Thompson
(See pages 54–55 for more information.)

> **"TS06 and TS12 are courses anyone aspiring to successfully navigate the electrical/instrument/automation career ladder should attend. The course objectives should be a career-long training goal."** —Larry Thompson, Instructor

IT Survival Basics for I&C Personnel   *NEW!*

This course will provide an explanation of IT concepts and technology including Ethernet networking, switches, routers, servers, PCs, and firewalls. In addition, you will learn about wireless Ethernet networks and TCP/IP communications and how cybersecurity is applied to protect them. Students will gain a familiarity with basic IT concepts and technology, enabling them to effectively collaborate and communicate with IT personnel and to perform basic IT functions essential in a modern plant and with modern control system technology.

You Will Be Able To:
- Configure a switch for VLANs and Quality of Service
- Configure a basic firewall rule set
- Select the appropriate settings for "hardening" a PC
- Configure the security settings for Wireless Ethernet
- Configure IP and Ethernet addresses and subnet masks
- And more…

You Will Cover:
- Ethernet Communications
- Setting up VLAN and QoS Configurations
- ARP and DHCP Protocols that make ethernet LANs work
- IPv4 Addressing and Subnet Configuration
- Network Intrusion Detection Technology for the Plant
- And more…

Classroom/Laboratory Exercises:
- Use Wireshark to "sniff" and analyze Ethernet traffic
- Configure a DHCP server
- Configure a VLAN using switches
- Set up a wireless router with security
- Configure a network monitor
- And more…

Recommended Course Prerequisites
- General knowledge of data communications
- General familiarity with PCs and Windows OS
- Basic DC electronic/electrical circuit knowledge
- ISA Course TS06: *Industrial Data Communication Systems*
- ISA Course TS12: *Industrial Networking and Security*

Course Details:
Course No.: TS14
Length: 5 days
CEUs: 3.5
Price: $2,590 ISA Member; $2,915 Affiliate Member; $3,240 Community Member/List; $2,590 Multi-Registration Rate

PLC/PAC Automation: Basic Structure, Programming, Installation, and Maintenance

This course defines Programmable Logic Controller (PLC) and Programmable Automation Controller (PAC) architecture, configuration, installation, maintenance, and programming. The course content covers today's various PLC vendors.

You Will Be Able To:
- Identify the basic components of PLC/PAC systems and where they are utilized
- Identify the basic IEC 611313 programming languages: Relay Ladder Diagram (RLD), Structured Text (ST), Function Block Diagrams (SBD), and Instruction List (IL)
- Wire a complete PLC system utilizing digital and analog I/O simulators
- Install and tune a PID
- Troubleshoot and maintain PLC/PAC systems
- And more…

Over 80% of the class is hands-on laboratory exercises!

You Will Cover:
- Basic Components of a PLC/PAC System
- Input/Output (I/O) Systems: Discrete, Analog, DC, and AC Input/Output Modules
- CPU Operation and PLC Memory Organization
- PLC/PAC Relay Ladder Diagram Programming
- Motor Control Connection to PLC
- And more…

Classroom/Laboratory Exercises:
- Wire discrete and analog devices to PLC
- Enter, download, and test a ladder program
- Program permissive logic, timer and counter, data manipulation, and basic arithmetic operations
- Develop and program from a selection of real-world applications

Recommended Course Prerequisite:
- Basic AC and DC Electric Theory (e.g. Ohm's Law, etc.)

Course Details:
Course No.: TC30P
Length: 5 days
CEUs: 3.5
Price: $2,590 ISA Member; $2,915 Affiliate Member;
$3,240 Community Member/List; $2,590 Multi-Registration Rate

Recommended Resource:
Programmable Controllers, Fourth Edition by Thomas A. Hughes
(See pages 54–55 for more information.)

Advanced System Programming Languages (IEC 611313) Utilized By PLC/PAC Systems

Today's PLC/PAC systems are powerful computers that can be programmed in five different languages, which can co-exist on the same operating platform. All five languages conform to the IEC 611313 specification. This course was developed for the individuals responsible for selecting the proper language(s) for an application. The course will explain the constructs and operation of the various instructions in the repertoires. For the course project selected, students will program an application in all five languages, testing through simulation.

You Will Be Able To:
- Identify the basic components of PLC/PAC systems and where they are utilized
- Identify the IEC 611313 programming languages
- Develop, write, and test "real-world applications" utilizing the various types of the IEC 611313 languages

You Will Cover:
- Basic Components of a PLC/PAC System
- Language Definitions and Programs Using:
  – Relay Ladder Diagram (RLD)
  – Structured Text (ST)
  – Function Block Diagrams (SBD)
  – Instruction List (IL)
  – Sequential Function Chart (SFC)

Classroom/Laboratory Exercises:
- Write programs in RLD, ST, SBD, IL, and SFC languages

Recommended Course Prerequisites:
- ISA Course: PLC/PAC Automation: Basic Structure, Programming, Installation, Maintenance (TC30P)
- A basic understanding of PLC systems

This is a programming course with 90% hands-on labs!

Course Details:
Course No.: TC36P
Length: 5 days
CEUs: 3.5
Price: $2,590 ISA Member; $2,915 Affiliate Member;
$3,240 Community Member/List; $2,590 Multi-Registration Rate

- **Learn more at www.isa.org/training/TC30P**

- **Learn more at www.isa.org/training/TC36P**

PLC/PAC System Integration

NEW!

What type of PLC/PAC system do I choose? The PLC/PACs system provides three major subsections: (1) PLC/PAC hardware and software, (2) graphics, and (3) communications. This course will explore all three of these areas and a variety of options. During the course, you will learn how to develop possible system requirement questions for various PLC/PAC vendors prior to the implementation project. You will also learn how to choose the proper programming language(s) to fit your system (RLD, ST, FBD, IL, and/or SFC). How personal computers (PC) are being used as PAC front ends and how I/O is being connected will also be covered.

You Will Be Able To:
- Explain the differences between a PLC (programmable logic controller) and a PAC (programmable automatic controller)
- Decide when to use a DCS, PLC, or PAC system and their economic justifications
- Define various industrial communication protocols, including Ethernet
- Utilize basic graphics and their applications
- Discuss system configuration of digital and analog I/O
- Choose which of the IEC 611313 languages works for your project

You Will Cover:
- Basic components of a PLC/PAC system
- Basics of Various Communication Protocols and Where to Use Them
- The IEC 611313 Specification for Programming Different Languages Used in PLC/PAC Systems
  - Structured Text (ST)
  - Relay Ladder Diagram (RLD)
  - Function Block Design (FBD)
  - Instruction List (IL)
  - Sequential Function Chart (SFC)
- System Installation Guidelines
- System Wiring Checkout
- And more…

Classroom/Laboratory Exercises:
- Wire a complete digital and analog I/O PLC system to a simulator and do a complete system checkout
- Configure a digital/analog I/O hardware and CPU from a system specification
- Program, download to PLC, and simulate a RLD
- Draw and tag basic graphic symbols
- Set up communications between eight application programs

Course Details:
Course No.: TC39P
Length: 5 days
CEUs: 3.5
Price: $2,590 ISA Member; $2,915 Affiliate Member; $3,240 Community Member/List; $2,590 Multi-Registration Rate

- **Learn more at www.isa.org/training/TC39P**

Designing and Tuning Feedback and Advanced Regulatory Control Strategies

The required field of knowledge of a process control engineer has expanded significantly in recent years. This course will provide the foundation which will allow a process control engineering to make appropriate use of all technologies available.

For those who select or design process control strategies, this course also provides a thorough background in feedback control, plus a working knowledge of the application of advanced regulatory control strategies such as ratio, cascade, feed forward, override and decoupling. The course emphasizes the benefits of advanced regulatory control for improving the economics of process operations.

You Will Be Able To:
- Determine process characteristics that are relevant to the design and/or troubleshooting of a control loop
- Apply a variety of feedback controller tuning techniques and know the strengths and weaknesses of each
- Select an appropriate control strategy for a given application
- Provide the engineering design for control strategies using a DCS or other platform available at your plant
- And more…

You Will Cover:
- Process Control Loop Characteristics
- Feedback Control
- Controller Tuning
- Advanced Control Strategies
- And more…

Classroom/Laboratory Exercises
- Use a control loop simulation program for hands-on practice of several feedback controller tuning techniques
- Observe the effect of each topic, such as the behavior of cascade and feedforward control, through a simulation program demonstration

Recommended Prerequisites:
- Familiarity with fundamental process measurement techniques, signal transmission technologies used in the process industries, and some type of process operator (control room) work station
- Mathematical competency equivalent to high school Algebra

  (Note: A brief review of mathematical concepts used in class will be provided at the beginning of the course.)

Course Details:
Course No.: EC05
Length: 3 Days
CEUs: 2.1
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

Recommended Resource:
Basic and Advanced Regulatory Control: System Design and Application, Third Edition by Harold L. Wade
(See pages 54–55 for more information.)

- **Learn more at www.isa.org/training/EC05**

Designing and Applying Model-Based Control Strategies

This course will cover designing and applying Model-Based Control (MBC) strategies, including the basic structure of all MBCs, the basic technology of Model Predictive Control (MPC), and how to successfully build and monitor controllers.

You Will Be Able To:
- Identify real-world control problems as the basis of need for advanced control
- Explain the basic technology of MPC
- Define how model errors are used to improve control
- Build and simulate MPC controllers
- Monitor performance of installed controllers
- And more...

You Will Cover:
- Model Based Control (MBC)
- Model Predictive Control (MPC)
- Model Errors
- Build Controllers
- Performance Monitoring
- And more...

Classroom/Laboratory Exercises:
- Build a controller with 1 MV and 1 CV, simulate, and tune
- Build a controller with 1 MV, 1 CV, and 1 CNST; simulate; and tune
- Build a controller with 2 MVs and 1 CV, simulate, and tune for optimum use of MVs
- Connect OPC to server and browse tags

Course Details:
Course No.: EC60
Length: 3 Days
CEUs: 2.1
Price: $1,205 ISA Member; $1,360 Affiliate Member;
$1,510 Community Member/List; $1,205 Multi-Registration Rate

Batch Control Using the ANSI/ISA88 Standards

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
- 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
- Identify the alternative architectures for programmable logic controllers (PLCs), distributed control systems (DCSs), and PC-based control systems
- And more...

You Will Cover:
- ANSI/ISA88 Standards
- Physical Model
- Procedural Control Mode
- Batch Tracking
- Control Activity Model
- And more...

> **"A good overview of ISA88. Course met objectives."**
> —Jason Packard, Senior Research Scientist

Classroom/Laboratory Exercises:
- Develop procedural elements using the ANSI/ISA88 procedural control model and test those procedural elements against the equipment entities
- Develop recipes using the ANSI/ISA88 recipe model and the ANSI/ISA88 recipe representation
- Develop phase logic that runs in the equipment entities and links to the procedural elements
- Apply the modes and various states defined in ANSI/ISA88

Course Details:
Course No.: IC40
Length: 3 days
CEUs: 2.1
Price: $1,310 ISA Member; $1,475 Affiliate Member;
$1,640 Community Member/List; $1,310 Multi-Registration Rate

Includes ISA Standards:
ANSI/ISA-88.00.01-2010, ANSI/ISA-88.00.02-2001, and ANSI/ISA-88.00.03-2003—*A $490 Value!*

Using the ANSI/ISA-62443 Standards to Secure Your Control System

NEWLY REVISED!

The move to using open standards such as Ethernet, TCP/IP, and web technologies in supervisory control and data acquisition (SCADA) and process control networks has begun to expose these systems to the same cyber attacks that have wreaked so much havoc on corporate information systems. This course provides a detailed look at how the ANSI/ISA-62443 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.

You Will Be Able To:
- Discuss the principles behind creating an effective long-term program security
- Interpret the ANSI/ISA-62443 industrial security guidelines and apply them to your operation
- Explain the concepts of defense in depth and zone/conduit models of security
- Analyze the current trends in industrial security incidents and methods hackers use to attack a system
- Define the principles behind the key risk mitigation techniques, including anti-virus and patch management, firewalls, and virtual private networks
- And more…

You Will Cover:
- How Cyberattacks Happen
- Creating A Security Program
- Risk Analysis
- Addressing Risk with:
  - Security Policy, Organization, and Awareness
  - Selected Security Counter Measures
  - Implementation Measures
- And more…

Classroom/Laboratory Exercises:
- Develop a business case for industrial security
- Conduct security threat analysis
- Investigate scanning and protocol analysis tools
- Apply basic security analysis tools software

Course Details:
Course No.: IC32
Length: 2 Days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

Includes ISA Standards:
ANSI/ISA-62443-1-1(99.01.01)-2007, ANSI/ISA-62443-3-3 (99.03.03)-2013, and ANSI/ISA-62443-2-1(99.02.01)-2009 **—A $630 Value!**

- **Learn more at www.isa.org/training/IC32**
- **Online, instructor-assisted course option also available.** See page 48.
- **Check out the Control Security and ANSI/ISA99 Webinar Series.** See page 49.

Be one of the first to earn the ISA99/IEC 62443 Cybersecurity Fundamentals Specialist designation!

Announcing the NEW ISA99/IEC 62443 Cybersecurity Fundamentals Specialist Certificate Program

ISA has developed a knowledge-based certificate recognition program designed for professionals involved in IT and control system security roles that need to develop a command of industrial cybersecurity terminology and an understanding of the material embedded in the ANSI/ISA-62443 standards: **ISA99/IEC 62443 Cybersecurity Fundamentals Specialist Certificate Program.**

Program Requirements
ISA99/IEC 62443 Cybersecurity Fundamentals Specialist designations and certificates will be awarded to individuals who meet the following program requirements:
- Successfully complete an intensive two-day, classroom training course from ISA: Using the ANSI/ISA-62443 Standards to Secure Your Industrial Control System (IC32)—course information listed to the left. (Online version available. See page 48.)
- Earn a passing score on the 75-question multiple-choice exam.

Program Pre-Requisites
- There are no required prerequisites for this program; however, it is highly recommended that applicants have:
- Three to five years of experience in the IT cybersecurity field with some experience in an industrial setting—with at least two years specifically in a process control engineering setting
- Some level of knowledge or exposure to the ANSI/ISA-62443 standards

Exam Areas Covered
- Understanding the Current Industrial Security Environment
- How Cyber Attacks Happen
- Creating a Security Program
- Risk Analysis
- Addressing Risk with Security Policy, Organization, and Awareness
- Addressing Risk with Selected Security Counter Measures
- Addressing Risk with Implementation Measures
- Monitoring and Improving the CSMS
- Designing/Validating Secure Systems

Renewal
Because these are certificates and not certifications, they do not have to be "renewed"; however, a certificate will only be considered current for three years. In order to extend the current status of a certificate, you will be required to score 70% or above on a 20-question **ISA999/IEC 62443 Certificate Knowledge Review Exam.**

Learn more about this NEW certificate program, eligibility criteria, renewal, and upcoming courses at **www.isa.org/ISA99Certificate.**

Industrial Networking and Security

You will learn about the latest developments in networking, including practical tips on designing, implementing, and testing TCP/IP-based networks and how to apply them securely and reliably in an industrial environment. You will discuss the functions and purposes of the elements used to create and protect an industrial network, including switches, routers, firewalls, and intrusion detection/prevention systems. This course will expand your practical knowledge of LAN, WAN, and Web technologies. This course illustrates what is safe and practical for today's plant floor, including Internet technologies such as web servers, TCP/IP, and fiber optics. Special focus will be placed on the questions of security in the industrial setting drawing on the work of the ISA99 standards committee and the National Institute of Standards and Technology (NIST). More...

You Will Be Able To:
- Identify standards for analog dial-up connections and modems
- Apply TCP/IP protocols, addressing, and troubleshooting
- Estimate where web technologies can safely be used for process control
- Identify security technologies such as firewalls, proxy servers, virus scanning, and intrusion protection
- Perform basic security scanning on your networks and perform "hardening" of your computers
- And more...

You Will Cover:
- TCP/IP Networking
- Secure Architectures
- Understanding Packets and Protocols
- Building a Plant Floor Web Server
- Network Security Issues
- And more...

Classroom/Laboratory Exercises:
- Use TCP/IP diagnostic tools in Windows-2000/XP
- Use network analyzers to troubleshoot
- Perform a basic security scan on a target system
- And more...

Course Details:
Course No.: TS12
Length: 5 days
CEUs: 3.5
Price: $2,590 ISA Member; $2,915 Affiliate Member; $3,240 Community Member/List; $2,590 Multi-Registration Rate

Industrial Automation Cybersecurity: Principles and Application

This advanced course will expand your practical knowledge of cybersecurity technologies as applied to an industrial setting. The course will familiarize you with the latest developments in cybersecurity, including practical guides to design, implementation, and testing industrial networks and applications to ensure their security and reliability in an industrial production environment. Course topics include the use of Internet technologies, web servers, TCP/IPV6, fiber optics, intrusion protection systems (IPS), virtual private networks (VPNs), and cryptography. More...

Note: *This is an advanced course with a minimum satisfactory completion of ISA courses TS06 and TS12 (or equivalent in experience/training) as a mandatory prerequisite for successful completion of this course.*

You Will Be Able To:
- Apply the TCP/IPV6 protocols, addressing, and troubleshooting
- Locate web technologies where they can be used securely for process control
- Develop network security architectures and explain how to use layering and segmentation to improve security
- Use security technologies such as firewalls, VPNs, virtualization, virus scanning, and intrusion protection from a security perspective
- Industrially harden and secure your networks and perform "team red" testing of your systems
- And more...

You Will Cover:
- TCP/IPV6 Networking
- Making Networks Secure
- Secure Architectures
- Building a Secure Plant Floor Web Server
- Security Management
- Practical Cybersecurity Applications
- And more...

Classroom/Laboratory Exercises:
- Configure industrial network security parameters and settings
- Use network analyzers/sniffers/scanners to troubleshoot
- Use web technology to securely display plant data
- Configure a managed switch/router/firewall/VPN for the plant floor
- And more...

Course Details:
Course No.: TS13
Length: 4.5 days
CEUs: 3.2
Price: $2,590 ISA Member; $2,915 Affiliate Member; $3,240 Community Member/List; $2,590 Multi-Registration Rate

Includes ISA Standard:
ANSI/ISA-99.02.01-2009—*A $180 Value!*

Transducer/Transmitter Installation for Nuclear Safety Applications Using ANSI/ISA-67.01.01

This course will cover the ANSI/ISA-67.01.01 standard relating to the installation of transducers for nuclear safety-related applications. The course emphasis will be a review of established requirements and recommendations for the installation of transducers and auxiliary equipment for nuclear applications outside of the main reactor vessel.

You Will Be Able To:
- Describe limitations between local and remote mounting of transducers
- Determine proper local and remote transmitter installation requirements
- Identify requirements for small pipe and tubing installations
- Implement updates to drawings for plant transducer changes

You Will Cover:
- Discussion and Implementation of Elements Relating to ANSI/ISA-67.01.01
- Terminology for Transducer Mounting and Installation
- Determination of Transducer Installation Methods for Various Applications
- Vendor Specifications and the Impact on Installation
- Analysis and Utilization of Tools Provided to Install In-Plant Transducers

Course Details:
Course No.: IC67
Length: 2 days
CEUs: 1.4
Price: $1,410 ISA Member; $1,585 Affiliate Member;
$1,765 Community Member/List; $1,410 Multi-Registration Rate

ANSI/ISA-67.04-2006: Setpoints for Nuclear Safety-Related Instrumentation

The ANSI/ISA-67.04-2006 standard is intended for use in establishing procedures for determining setpoints, setpoint margins, and test routines in safety-related instrument channels. The 2006 version of the standard is consistent with the current Nuclear Regulatory Commission (NRC)'s guidance and will provide the information necessary to comply with this guidance.

This course will discuss the terminology and the appropriate use of the latest version of the ANSI/ISA67 standard and the steps necessary for the development of safety-related setpoint analysis. ANSI/ISA-67.04.01 has been used as the basis for many plant-specific setpoint programs and setpoint calculations. The changes to this standard should be reflected in all programs where compliance to NRC requirements is necessary. More…

You Will Be Able To:
- Define what constitutes a setpoint methodology
- Determine setpoint calculations, including errors associated with measuring the process, the primary element, and the instruments
- Methods of error combination and when each is proper
- State why ISA-RP67.04.02 was developed
- Identify the requirements for implementing a utility- or plant-specific methodology
- And more…

You Will Cover:
- History of Setpoint Requirements
- Terminology
- Error Relationships
- The Calculation Process
- And more...

Classroom/Laboratory Exercises:
- Develop a ladder diagram of error relationships
- Evaluate the error associated with density changes in a level measurement channel
- Evaluate the impact of environmental changes on a pressure measurement channel
- Develop setpoint calculations from given conditions and components
- And more…

Course Details:
Course No.: IC68P
Length: 3 days
CEUs: 2.1
Price: $1,410 ISA Member; $1,585 Affiliate Member;
$1,765 Community Member/List; $1,410 Multi-Registration Rate

Includes ISA Standard:
ANSI/ISA-67.04.01-2006 (R2011) **—A $45 Value**

- **Learn more at www.isa.org/training/IC67**

- **Learn more at www.isa.org/training/IC68P**

Take courses EI05 and EI10 and save!
Combo Price: $2,255 ISA Member; $2,535 Affiliate Member; $2,820 Community Member/List

Industrial Pressure, Level, and Density Measurement Engineering

This course presents the principles and applications of modern pressure, level, and density measurement systems. Emphasis is placed on instrument design technologies; system performance and design; and specification, selection, installation, and maintenances requirements.

You Will Be Able To:
- 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 for-process and installation conditions
- Select and apply devices and systems for industrial pressure and level measurement
- Specify and use smart transmitters in level and pressure measurement processes
- And more...

You Will Cover:
- Review of Measurement Principles
- Pressure Transducers
- Smart Transmitters
- Level Measurement Methods, Technologies, and Applications
- Density Measurement Devices and Applications
- And more...

Classroom/Laboratory Exercises:
- Evaluate pressure/level instrument performance vs. published specifications
- Evaluate level instrument performance and accuracy
- Specify pressure and level instruments for a variety of specific application requirements
- Calculate effects of fluid property changes on pressure, level, and density measurement
- And more...

Course Details:
Course No.: EI05
Length: 2 Days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

Includes ISA Standards and Technical Reports:
ISA-20-1981 and ISA-TR20.00.01-2007**—A $280 Value!**

Recommended Resource:
Industrial Flow Measurement, Third Edition by David W. Spitzer
(See pages 54–55 for more information.)

Industrial Flow Measurement Engineering

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

You Will Be Able To:
- Design a system to make practical and precise industrial flow measurements
- Specify and select the appropriate flowmeters for different applications
- Create installation detail drawings to obtain flowmeter accuracy and performance
- Solve typical flow measurement problems
- Plan maintenance activities required by different flowmeter technologies
- And more...

You Will Cover:
- Introduction
- Flowmeters:
  - Differential Pressure
  - Magnetic
  - Mass
  - Oscillatory
  - Correlation
  - Positive Displacement
  - Thermal
  - Turbine
  - Ultrasonic
  - Insertion
- Open Channel Flow Measurement
- Flowmeter Selection

Classroom/Laboratory Exercises:
- Determine upstream and downstream piping considerations
- Perform sizing calculations for different types of flowmeters and different process applications
- Specify installation and calibration requirements for different types of flowmeters and applications
- Complete specification sheets for a variety of flowmeters and flow elements
- And more...

Course Details:
Course No.: EI10
Length: 3 Days
CEUs: 2.1
Price: $1,410 ISA Member; $1,585 Affiliate Member; $1,765 Community Member/List; $1,410 Multi-Registration Rate

Includes ISA Standards and Technical Reports:
ISA-20-1981 and ISA-TR20.00.01-2007**—A $280 Value!**

Includes ISA Text:
Industrial Flow Measurement, Third Edition by David W. Spitzer
—A $99 Value!

- **Learn more at www.isa.org/training/EI05**
- **Online, instructor-assisted course option also available.** See page 48.

- **Learn more at www.isa.org/training/EI10**
- **Online, instructor-assisted course option also available.** See page 48.

System Checkout, Testing, and Startup

This course provides the information necessary in the checkout, system test, and startup of process control systems. The learning experience is enhanced through exercises for each of the necessary stages from risk analysis through site acceptance testing.

You Will Be Able To:
- Determine the adequacy of a documentation package when given a specified start-up scenario
- Select the hardware approach that would meet the given criteria including cost effectiveness, efficacy, and reliability
- Select the best risk containment policy/procedure for given conditions
- Select which identifiable sections of software coding require what degree of testing to develop a matrix for testing procedures
- Develop a plan for alarm and interlock testing that will simulate both correct and out-of-bounds conditions that will meet all given conditions
- And more...

You Will Cover:
- First Look—Prerequisites
- Instrument Commissioning
- Loop Testing
- Software Testing
- Alarm/Interlock Testing
- And more...

Classroom/Laboratory Exercises:
- Risk Analysis Exercise
- Installation Verification Exercise
- Loop Testing Exercise
- Software Testing Exercise
- Alarm/Interlock Exercise
- Live Test Exercise
- Comprehensive Exercise

Course Details:
Course No.: EA10
Length: 3 days
CEUs: 2.1
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

Sizing, Selecting, and Applying Process Control Valves

This course provides a practical explanation of control valves, actuators, and positioner designs and their applications. This course also covers methods that can be used to identify specific valve problems and acceptable solutions within engineering tolerance.

You Will Be Able To:
- Differentiate between various types of valves and the benefits of each
- Analyze a control system to determine control valve needs
- Size valves for any flow condition likely to be found in a process plant
- Specify appropriate auxiliaries including positioners and I/P transducers
- Design control valve installations that are safe and trouble-free
- And more...

You Will Cover:
- Basic Valve Types
- Valve Performance
- Installation
- Specification and Selection
- Smart Valves
- And more...

Classroom/Laboratory Exercises:
- Test valves to evaluate performance factors
- Size valves manually and with software
- Evaluate operation of valves with pneumatic actuators and positioners
- Demonstrate smart valve/positioner operation
- And more...

Course Details:
Course No.: EI30
Length: 3 Days
CEUs: 2.1
Price: $1,410 ISA Member; $1,585 Affiliate Member; $1,765 Community Member/List; $1,410 Multi-Registration Rate

Recommended Resource:
Control Valve Primer: A User's Guide by Hans D. Baumann
(See pages 54–55 for more information.)

> **"The extensive course materials provided contained useful information about values/sizing and selection, both theoretical and practical."**
>
> —Mike Jones, Electrical Supervisor

- **Learn more at www.isa.org/training/EA10**

- **Learn more at www.isa.org/training/EI30**

Applying Motor Controls and Drives

This course gives you a broad perspective of DC motors, AC motors (single and three-phase), and Variable Speed Drives (for AC Induction Motors and DC Motors). Industrial applications of Variable Speed Drives for constant torque, constant horsepower, and variable torque/variable horsepower are included. Also covered are Motor Starter Circuits and Reduced Voltage Starting techniques. Stepper Motors and Servo Motors are discussed along with their advantages and applications.

You Will Be Able To:
- Calculate volts per hertz ratio as related to Variable Frequency Drives
- Specify, select, and implement motors for variable torque and horsepower
- Interpret motor performance curves
- Discuss stepper and servo motor systems for industrial applications
- Explain the differences in various motion control feedback devices
- And more…

You Will Cover:
- DC Motors Theory and Construction
- Single-Phase and Three-Phase AC
- Motor Theory and Construction
- Motor Specifications
- Motor Control Circuits
- Motor Applications
- And more...

Classroom/Laboratory Exercises:
- Motor-to-Load calculation
- Torque-to-Load calculation
- Variable Speed Drive operation/measurement

> **"[This course provided] a good practical approach to understanding how the drives and motors interact."**
> —Paul Nozal, Senior Instrument Consultant

Course Details:
Course No.: SP15
Length: 3 Days
CEUs: 2.1
Price: $1,310 ISA Member; $1,475 Affiliate Member; $1,640 Community Member/List; $1,310 Multi-Registration Rate

Includes ISA Text:
Motors and Drives: A Practical Technology Guide by David Polka

Introduction to Safety Instrumented Systems for the Process Industry

NEW!

This short course will serve as a quick overview (ideal for technicians and operators) of the principles governing the use of Safety Instrumented Systems (SIS). You will learn basic definitions and concepts, the different types of applicable standards, and the role of personnel in the Safety Lifecycle of these systems.

This course also serves as an introductory course to the more comprehensive ISA multi-day course: *Safety Instrumented Systems—Design, Analysis, and Justification* (EC50) and its related certificate programs.

From the Course Developer:
"After attending this course, students should recognize 1) the cost-effective system solution implemented by engineers, 2) the role of technical staff on the safety team, 3) the need for a lifecycle in functional safety, and 4) the importance of maintenance in the operational phase. Most importantly, students should leave with an appreciation for the phrase: 'Safety is everyone's business!' More than just a legal and industry requirement, safety is a primary need."

You Will Be Able To:
- Define a Safety Instrumented System (SIS) and its function
- Identify the principles behind the ANSI/ISA- 84.00.01 standard
- Evaluate the four basic characteristics of a SIS and their implications in the standards
- Determine what risk is and how it can be managed
- Define
  - Layer of Protection
  - PFD
  - PFS
  - RRF
  - Availability
  - Reliability
  - Architectures and Architectural Limitations
  - Safety Integrity Levels (SILs)
  - Demand Modes
- Discuss the difference between various industry-applicable standards

You Will Cover:
- Introduction: Scary Stories
- Definition of SIS and its Functions
- Components
- Layers of Protection
- Hazard and Risk Management
- Failure Rates and Modes
- Systems
- Safety Standards and Certifications

Course Details:
Course No.: EC50CT
Length: 1 day
CEUs: 0.7
Price: $535 ISA Member; $615 Affiliate Member; $685 Community Member/List; $535 Multi-Registration Rate

Safety Instrumented Systems— Design, Analysis, and Justification*

This course focuses on the engineering requirements for the specification, design, analysis, and justification of safety instrumented systems (SIS) for the process industries. You 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:

- Implement the ISA84 standard
- Calculate SILs using a variety of techniques
- Analyze the performance of various sensor, logic, and final element configurations, as well as the impact of diagnostics, test intervals, common cause, system size, and more
- Calculate optimum system test intervals
- Apply the documentation requirements for process safety management, regulations, and industry standards
- And more...

You Will Cover:

- Guidelines and Standards
- General SIS Design Considerations
- Hazard and Risk Assessment
- System Technologies
- Operations and Maintenance
- And more...

> "Simply reading a book or the standard on SIS design is no guarantee of understanding. This ISA training course is a useful way for someone to show their qualifications in SIS."
>
> —Paul Gruhn, P.E., ISA Instructor

Classroom/Laboratory Exercises:

- Calculate device failure rates and determine safe vs. dangerous performance
- Model the impact of field devices, automatic diagnostics, manual test intervals, common cause, and more
- Determine the SIL of a sample process and design a SIS to meet the performance requirements

Course Details:

Course No.: EC50
Length: 4 days
CEUs: 2.8
Price: $2,000 ISA Member; $2,255 Affiliate Member;
$2,505 Community Member/List; $2,000 Multi-Registration Rate
ISA84 Certificate 1 Program Price: $185 + Course Registration Rate

Includes ISA Standards:

ANSI/ISA-84.00.01-2004 Parts 1–3 and ANSI/ISA-84.91.01-2012
—A $910 Value

Includes ISA Text:

Safety Instrumented Systems: Design, Analysis, and Justification, Second Edition by Paul Gruhn, P.E., ISA84 SIS Expert and Larry Cheddie, P.E., CFSE
—A $99 Value

- **Learn more at www.isa.org/training/EC50**
- **Online, instructor-assisted course option also available.** See page 48.

Advanced Safety Integrity Level (SIL) Selection*

This course focuses on hands-on examples of safety integrity level (SIL) selection using a variety of different techniques and providing more insight into the factors that determine risk reduction requirements. Students will be better able to save their companies time and money through the optimization of system performance requirements.

You Will Be Able To:

- Develop and implement different SIL selection techniques within your organization
  - Risk matrix
  - Risk graph
  - Layer Of Protection Analysis (LOPA)
- Determine the appropriate level of performance needed of your safety systems
- Help prevent over- or under-designing the system requirements to save your organization time and money

You Will Cover:

- Determination of the Appropriate Level of Performance Needed for Your Safety Systems
- Prevention of System Requirements Over- or Under-Design
- SIL Selection Hands-on Examples

Classroom/Laboratory Exercises:

- Multiple application exercises of SIL selection
- Students are encouraged to bring their own examples to cover in class

Course Details:

Course No.: EC52
Length: 2 days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member;
$1,510 Community Member/List; $1,205 Multi-Registration Rate
ISA84 Certificate 2 Program Price: $185 + Course Registration Rate

Includes ISA Standard:

ANSI/ISA-84.00.01-2004 Parts 1–3**—An $850 Value**

Recommended Resource:

Safety Integrity Level Selection—Systematic Methods Including Layer of Protection Analysis by Edward M. Marszal, P.E. and Dr. Eric W. Scharpf, MIPENZ
(See pages 54–55 for more information.)

- **Learn more at www.isa.org/training/EC52**

Advanced Design and SIL Verification*

This course focuses on more detailed design issues and further hands-on examples of system analysis/modeling.
You will be better able to perform system design and analysis, thus saving your company time and money in optimizing system designs.

You Will Be Able To:
- Analyze any system technology and configuration to see if it will meet the required safety integrity level (SIL)
- Determine if existing systems are safe enough (or whether they need to be upgraded) and whether proposed systems will meet the performance requirements
- Determine the optimum manual test interval for any system, saving your company time and money by not over- or under-testing systems

You Will Cover:
- System Modeling/Analysis Hands-On Advanced Examples
- Detailed Design Topics

Classroom/Laboratory Exercises:
- Multiple application exercises of system modeling/analysis

Course Details:
Course No.: EC54
Length: 2 days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member;
$1,510 Community Member/List; $1,205 Multi-Registration Rate
ISA84 Certificate 2 Program Price: $185 + Course Registration Rate

Includes ISA Standard:
ANSI/ISA-84.00.01-2004 Parts 1–2—*A $600 Value*

Recommended Resource:
Safety Instrumented Systems Verification—Practical Probabalistic Calculations by William M. Goble and Harry Cheddie
(See pages 54–55 for more information.)

The ISA84 Standard is important to you because...
- It can help your organization systematically and continuously identify, reduce, and mange its process safety risks
- The ANSI/ISA-84.00.01-2004 (IEC61511) standard is considered to be a generally accepted and recognized good engineering practice under OSHA's process safety management standard's performance-based requirements
- Safety is everyone's concern

- **Learn more at www.isa.org/training/EC54**

certificate program

*These courses are part of the ISA84 Safety Instrumented Systems Certificate Programs

ISA and the Automation Standards Compliance Institute (ASCI) offer three certificate programs that will increase knowledge and awareness of the ISA84 standard.

Each certificate program includes specialized training on ISA84 and an exam that is offered through the Prometric testing centers. Those who register for the training course and the certificate program and pass the exam will be issued an ISA certificate specifying that they have successfully completed that certificate program.

Certificate 1:
ISA84 SIS Fundamentals Specialist
This certificate requires the completion of the four-day instructor-led ISA training course **EC50** with exam (or the online, instructor-assisted version, EC50E, with exam). This Certificate is required to apply for Certificate 2 and Certificate 3. No application required.

Certificate 2:
ISA84 SIL Selection Specialist
This certificate requires the completion of the two-day instructor-led ISA training course **EC52** with exam. Certificate 1 is a prerequisite. Application required.

Certificate 3:
ISA84 SIL Verification Specialist
This certificate requires the completion of the two-day instructor-led ISA training course **EC54** with exam. Certificate 1 is a prerequisite. Application required.

ISA84 SIS Expert
Individuals who achieve Certificates 1, 2, and 3 are designated as ISA84 Safety Instrumented Systems (SIS) Experts.

Renewal
Because these are certificates and not certifications, they do not have to be "renewed"; however, a certificate will only be considered current for three years. In order to extend the current status of a certificate, you will be required to score 70% or above on a 20-question **ISA84 Certificate Knowledge Review Exam**.

Learn more about these certificate programs, eligibility criteria, renewal, and upcoming courses at **www.isa.org/ISA84Certificate**.

Fire and Gas System Engineering— Performance Based Methods for Process Facilities

NEW!

Fire and gas detection and suppression system design techniques that are currently in use are often considered to be unsatisfactory due to their nature of being rule-of-thumb and experience-oriented without any real ability to quantify risk. This has resulted in systems that are either over- or under-designed. The development of ISA-TR-84.00.07 resulted in a comprehensive framework for performance-based fire and gas design. This course describes the techniques recommended in this technical report, along with hands-on use of the techniques and associated software tools. **This course is designed for all audiences from high-level decision makers and users of FGS.**

You Will Be Able To:
- Explain the scope of fire and gas engineering for process facilities and the myriad of related standards, regulations, and requirements
- Identify the fire and gas system design methods and guidelines that are currently available including their strengths and limitations
- Explain the Safety Lifecycle (per IEC 61511 / ISA84 and ISA-TR84.00.07) and how they can provide a framework for functional safety of Fire and Gas Systems
- Identify and define the fire and gas zones along with the hazards contained in those zones
- Apply statistical analysis, industry databases, and data integration techniques to assess the likelihood of Fire and Gas System relevant events
- Assess the tolerability of the risk posed by a process facility before and after application of fire and gas detection and suppression systems using risk integration techniques
- And more…

You Will Cover:
- Introduction: Overview and Definitions
- Fire and Gas Hazards
- Zone Definition
- Detector Coverage Assessment

Classroom/Laboratory Exercises:
- Case study employing software to develop a complete performance-based design for a sample oil and gas production facility
- Performance requirement selection using both fully quantitative and semi-quantitative approaches

Course Details:
Course No.: EC56P
Length: 3 days
CEUs: 2.1
Price: $1,310 ISA Member; $1,475 Affiliate Member;
$1,640 Community Member/List; $1,310 Multi-Registration Rate

- **Learn more at www.isa.org/training/EC56P**

Applying Instrumentation in Hazardous (Classified) Locations

This course provides a detailed, 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:
- Interpret appropriate industry standards including those for NFPA, NEMA, IEC, API, and ISA
- Apply explosion-proof seals and enclosures
- Specify lightning protection for hazardous locations
- Assess the danger from spills of flammable liquids
- Select the proper NEMA/IEC enclosures for different location classifications
- And more...

You Will Cover:
- Classification
  - Hazardous Area
  - Dust
  - Enclosure
  - Class II Division
  - Class III Division
- Intrinsic Safety
- Purging and Pressurization
- Grounding Considerations
- Protection Techniques Standards
- And more...

Classroom/Laboratory Exercises:
- Develop classification drawings
- Evaluate intrinsic safety systems using entity concept and circuit characteristics
- Analyze protective techniques for specified applications

Course Details:
Course No.: ES10
Length: 2 days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member;
$1,510 Community Member/List; $1,205 Multi-Registration Rate

Includes ISA Standards and Technical Reports:
ANSI/ISA-12.01.01-2009, ANSI/ISA-RP12.06.01-2003, ANSI/ISA-12.12.01-2012, and ISA-TR12.24.01-1998 (IEC 60079-10 Mod)
—A $415 Value!

- **Learn more at www.isa.org/training/ES10**
- **Online, instructor-assisted course is coming soon!**

Boiler Control Systems Engineering

This course covers boiler components and their purpose. Additionally, the course explains the ISA symbols used in boiler control, how to identify the engineering and control of boilers using these symbols, and a method of presenting the engineering. This course covers topics including defining the control and ratio control fundamentals, feed forward control, feed forward plus feed back control, cascade control, ratio control, and how all of these are implemented in boiler control. Also reviewed are proportional control, proportional plus reset control, proportional plus reset plus derivative control, what all of these are, and how they are used. Flame detection methods, including the advantages of each method, are also covered.

You Will Be Able To:
- Identify the benefits of improved boiler process control and savings from improved efficiency
- Develop proper control systems documentation
- Apply principles and methods for flow and level measurements to improve boiler operations
- Apply control concepts such as cascade, ratio, and feedforward control for boiler control
- Evaluate process requirements for writing instrumentation specifications
- And more...

You Will Cover:
- Basic Control Loops
- Combustion of Fuels
- Steam Supply and Firing Rate Demand
- Feedwater Control Systems
- Improving Operations with Computers and Analyzers
- And more...

Classroom/Laboratory Exercises:
- Develop piping and instrumentation diagrams (P&IDs) for gas, oil, and pulverized coal
- Review methods of efficiency calculations
- Use PC software to simulate boiler start-up and drum level control
- Tune a boiler control system for maximum efficiency
- And more...

Course Details:
Course No.: ES15
Length: 3 days
CEUs: 2.1
Price: $1,310 ISA Member; $1,475 Affiliate Member; $1,640 Community Member/List; $1,310 Multi-Registration Rate

Recommended Resource:
Boiler Control Systems Engineering, Second Edition
by G.F. (Jerry) Gilman
(See pages 54–55 for more information.)

Burner Management Systems Engineering Using NFPA Code 85 and ANSI/ISA77 Standards

This course covers the safe start-up, monitoring, and shut-down of multiple burner boiler furnaces. This course also discusses causes of furnace explosions and the relationship between burner management systems (BMS) and boiler control systems.

Prior attendance at ISA course ES15: Boiler Control Systems Engineering or an understanding of boilers and boiler control is assumed.

You Will Be Able To:
- Identify the primary cause of furnace explosions
- Apply NFPA 85 Code
- Implement flame failure protection for specific systems
- Design alarms, interlocks, and emergency shutdown systems
- Describe the function and use of the burner front, operator interfaces, and logic systems
- And more...

You Will Cover:
- Burner Management Systems (BMS)
- NFPA 85 Code
- Boiler Components
- Programmable Controllers
- Logic Methods
- And more...

Classroom/Laboratory Exercises:
- Design piping and instrumentation diagrams (P&IDs) for gas, oil, and pulverized coal furnace systems
- Develop logic diagrams for igniter and switch settings
- Develop shut-down and permissive lists for single and multiple burners

Course Details:
Course No.: ES16
Length: 2 days
CEUs: 1.4
Price: $1,205 ISA Member; $1,360 Affiliate Member; $1,510 Community Member/List; $1,205 Multi-Registration Rate

> **"[This course provided] good knowledge of what NFPA 85 requires for BMS."**
>
> —Brian Rychener, Electrical Engineer

- **Learn more at www.isa.org/training/ES15**
- **Check out the Boiler/Burner Management Webinar Series.** See page 49.

- **Learn more at www.isa.org/training/ES16**
- **Check out the Boiler/Burner Management Webinar Series.** See page 49.

ISA Automation Engineering

SURVIVAL TRAINING SERIES

Boot Camps for Automation Engineers and System Integrators

Do you have what it takes to survive in the world of process automation and/or system integration?

Sharpen your process automation know-how with these intensive courses featuring expert-led lecture and hands-on exercises covering practical, real-world automation and system integrator survival skills.

Calling all new and seasoned automation engineering professionals and system integrators:

ISA Automation Engineering Survival Training Series

Do you need a comprehensive program designed to hone your process automation or system integrator knowledge and skills? Then, enroll now in one of these intensive, hands-on, expert-developed, technical training boot camps:

ISA Survival Training Course Special Features:

- Real-world plant tours
- ISA textbook
- CEUs and PDHs

ISA Automation Engineering Survival Training (AEST)

Are you new to the automation engineering profession? Do you support a daily plant operation? Do you want to broaden or hone your skills as an automation engineer? ISA Automation Engineering Survival Training (AEST), now with more hands-on labs, focuses on concepts important to automation engineers in the plant environment.

WHO SHOULD ATTEND?

- New automation, control system, or process control engineers
- Recent process engineering and other engineering graduates
- Seasoned engineers looking to refresh their process automation knowledge and skills
- Individuals wanting to learn more about process automation

SCHEDULE:

Part of ISA's 2014 Technical Training Camps
10–14 March 2014
Colorado, USA
9–13 June 2014 and **15–19 September 2014**
Houston, TX, USA
6–10 October 2014
Carson, CA, USA

ISA Automation Engineering Survival Training: Integrator Version (AESTIV)—New for 2014!

Do you work for a system integrator? Do you support client projects? Do you need to expand your skills in working in a project design or commissioning environment? ISA's new Automation Engineering Survival Training: Integrator Version (AESTIV), designed specifically for system integrators, focuses on concepts important to automation engineers in a project design and commissioning role.

WHO SHOULD ATTEND?

- New automation, control system, or process control engineers working for system integrators
- Seasoned system integration engineers looking to refresh their process automation skills
- Automation engineers wishing to move into a career as a system integrator

SCHEDULE:

31 March – 4 April 2014 and **4–8 August 2014**
ISA Headquarters, Research Triangle Park, NC, USA
5–9 May 2014
MAVERICK Technologies, Columbia, IL, USA

Enroll Now! www.isa.org/SurvivalSeries

Check us out on YouTube: **www.isa.org/AESTVideo**.

Certification and Licensure Preparation

More automation and control professionals are seeking certification and licensure to distinguish themselves and advance their careers in a highly competitive marketplace. ISA offers highly valuable review courses and other instructional resources to help prepare applicants for certification and licensure exams.

ISA's review courses can help you prepare for the following examinations:

■ Certified Automation Professional® (CAP®)

■ Certified Maintenance and Reliability Technician (CMRT)

■ Control Systems Engineering (CSE) PE

■ Certified Control Systems Technician® (CCST®) Level I

■ Certified Control Systems Technician® (CCST®) Level III

These courses are designed to assist the exam applicant with preparing for the exam and identifying areas or topics where additional preparation may be needed. Each course provides references and sample questions to further aid preparation efforts.

Certified Automation Professional® (CAP®) Exam Review Course

This course reviews the knowledge and skills areas included on the ISA Certified Automation Professional® (CAP®) 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
- Discuss how the various types of control technologies are used in industrial automation, including process control from basic to advanced control, 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
- Apply the critical areas of automation opportunity identification and project justification
- And more...

You Will Cover:
- Field Devices
- Control and Simulation
- Operator Interface and Alarm Management
- Safety, Reliability, and Electrical
- Workflow and Project Leadership
- And more...

Classroom/Laboratory Exercises:
- Practice taking CAP exam-style questions

Course Details:
Course No.: EC00
Length: 3 days
CEUs: 2.1
Price: $1,410 ISA Member; $1,585 Affiliate Member; $1,765 Community Member/List; $1,410 Multi-Registration Rate

Includes ISA Resource:
Certified Automation Professional® (CAP®) Study Guide
—A $39 Value!

Special Savings Bonus!
Take this review course and sit for the CAP electronic exam for FREE! You must submit a CAP application and course registration six (6) weeks prior to your course date **and** meet CAP eligibility criteria to be qualified for the free exam. You will be able to schedule an electronic exam date once your application has been approved. For more details, visit **www.isa.org/CAP**.

Certified Maintenance and Reliability Technician (CMRT) Exam Review Course

This course is designed as a fast paced review for the experienced maintenance mechanic. It provides a thorough overview of the knowledge and mechanical skills required in today's industrial maintenance environment. It is designed specifically for industrial maintenance mechanics preparing for the CMRT exam. An explanation of the examination process and practice certification-type exams are provided.

You Will Be Able To:
- Properly employ safety, health, and environmental skills and knowledge that will enable you to take responsibility and corrective action to prevent incidents that would otherwise result in injury or death to yourself and or your co-workers
- Perform preventive and or predictive maintenance according to the work plan to maximize mean time between failures
- Research and collect information relating to a maintenance request by reviewing the work order and interviewing the necessary personnel to determine the general nature of the problem
- Verify troubleshooting analysis by disassembly and inspection of components using established procedures in accordance with applicable standards and guidelines

You Will Cover:
- Maintenance Practices (Safety)
- Preventive and Predictive Maintenance
- Troubleshooting and Analysis
- Corrective Maintenance

Classroom/Laboratory Exercises:
- Equipment identification exercises using diagrams of the most commonly found components in manufacturing facilities

Course Details:
Course No.: TM00
Length: 3 Days
CEUs: 2.1
Price: $1,410 ISA Member; $1,585 Affiliate Member; $1,765 Community Member/List; $1,410 Multi-Registration Rate

Includes ISA Resource:
Certified Maintenance Reliability Technician (CMRT) Study Guide
—A $39 Value!

Visit www.SMRP.org to learn more about CMRT Certification.

Control Systems Engineering (CSE) PE Exam Review Course

This 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 licensure 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 PE exam
- Apply recognized standards for symbols and documents
- Recognize the basic calculation techniques for measurement devices
- Apply process variable measurements and sensor selection
- Explain basic process control loops:
  - Configuration
  - Operation
  - Performance
- And more...

You Will Cover:
- Sensors Technologies Applicable to Various Measurements (Process Variables)
- Signal Types and Transmission Methods
- Signal Circuit Design
- Control System Analysis and Implementation
- Codes, Standards, and Regulations
- And more...

Classroom/Laboratory Exercises:
- Practice taking CSE exam-related questions

Course Details:
Course No.: EN00
Length: 3 days
CEUs: 2.1
Price: $1,410 ISA Member; $1,585 Affiliate Member; $1,765 Community Member/List; $1,410 Multi-Registration Rate

Includes ISA Resource:
Control Systems Engineering Study Guide, Fifth Edition
—A $39 Value!

"A good general overview of what to expect on [CSE PE] exam. Good info on how to go about taking the test (strategy). Pointed out to me what areas I needed to work on."
—Brian Keene, Plant Engineer

Certified Control Systems Technician® (CCST®) Level I Exam Review Course

This 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 CCST Level I exam. An explanation of the examination process and practice certification-type exams are provided.

You Will Be Able To:
- Cite principles and theories that explain measurement and control instrument functions
- Describe procedures required to properly maintain the function of measurement and control instrumentation
- Perform calculations and other analysis 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
- Identify any need for further study or training in specific knowledge areas
- And more...

You Will Cover:
- Concepts of Process Control
- **Domain 1:** Calibration—Maintenance, Repair, Troubleshooting
- **Domain 2:** Project Start-Up, Commissioning, Loop Checking, Project Organization, Planning
- **Domain 3:** Documentation
- And more…

Classroom/Laboratory Exercises:
- Unit conversion calculations
- Calibration documentation and analysis
- Trouble recognition and analysis
- ISA CCST Level I practice exams

Course Details:
Course No.: TS00
Length: 4 days
CEUs: 2.8
Price: $2,000 ISA Member; $2,255 Affiliate Member; $2,505 Community Member/List; $2,000 Multi-Registration Rate

Includes ISA Resource:
CCST® Study Guide Level I—**A $39 Value!**

> **Special Savings Bonus!**
> **Take this review course and sit for the CCST Level I electronic exam for FREE!** You must submit a CCST application and course registration six (6) weeks prior to your course date **and** meet CCST Level I eligibility criteria to be qualified for the free exam. You will be able to schedule an electronic exam date once your application has been approved. For more details, visit **www.isa.org/CCST**.

NEW!

Certified Control System Technician® (CCST®) Level III Exam Review Course

This course reviews the knowledge and skills areas included on the Certified Control Systems Technician® (CCST®) Level III certification exam. The intent is to prepare practicing technicians who meet 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 CCST Level III certification exam.

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, discrete, batch, motor, and motion control
- Determine the requirement for tuning and discuss tuning procedures
- Interpret the best practice methodology for troubleshooting automation projects
- And more…

You Will Cover:
- Field Devices
- Control and Simulation
- Operator Interface and Alarm Management
- Safety, Reliability, and Electrical
- Maintenance Management
- Workflow and Project Leadership

Classroom/Laboratory Exercises:
- Practice CCST exam-style questions

Course Details:
Course No.: TS03
Length: 4.5 Days
CEUs: 2.8
Price: $2,000 ISA Member; $2,255 Affiliate Member; $2,505 Community Member/List; $2,000 Multi-Registration Rate

Includes ISA Resource:
CCST® Study Guide Level III—**A $39 Value!**

> **Special Savings Bonus!**
> **Take this review course and sit for the CCST Level III electronic exam for FREE!** You must submit a CCST application and course registration six (6) weeks prior to your course date **and** meet CCST Level III eligibility criteria to be qualified for the free exam. You will be able to schedule an electronic exam date once your application has been approved. For more details, visit **www.isa.org/CCST**.

- **Learn more at www.isa.org/training/TS00**
- **Online, instructor-assisted course option available.** See page 48.

- **Learn more at www.isa.org/training/TS03**
- **Online, instructor-assisted course option available.** See page 48.

Maximize Your Training ROI with an ISA Needs Assessment

The International Society of Automation (ISA) is your one-stop shop for turn-key professional development solutions. ISA is recognized worldwide as a leader in non-biased education and training programs for automation professionals—from experienced engineers and practicing technicians to newcomers to the industry.

ISA offers unbiased employee skills and training needs assessments to help companies and individuals identify their professional development goals and the specific training they need to accomplish those goals.

How does ISA maximize your training return on investment (ROI)? By helping your company identify and implement measurable, unbiased, and rapid solutions for your professional development needs. We eliminate the training you don't need so your employees can receive the right training at the right place and time. Our solutions-development process consists of three elements:

NEEDS ASSESSMENT

PROGRAM

TRAINING

TESTING

Each element of our process feeds into the next part enabling us to show you opportunities for improvement and growth, while achieving your short-term and long-term training goals.

Knowing Your Goals Helps Us Better Serve You

The first and most important step in our Needs Assessment process is to learn about your company's goals: **What does success look like to you?**

The next step involves interviews with and questionnaires for your employees—the people who need to be trained—administered by one of our Subject Matter Experts.

After we gain a deeper understanding of your goals and employees' current skills levels, we identify the gaps that exist between the two. Then, we partner with you to develop a master plan, or road-map, to help eliminate these gaps.

Benefits of an ISA Needs Assessment

An ISA Needs Assessment allows you to:
- Use your training budget strategically by investing only in the training you need
- Identify strengths and weaknesses as well as areas where training could enhance job performance to successfully meet identified performance requirements
- Document the knowledge and skills of your employees for clients, regulatory agencies, and other key stakeholders
- Reduce employee time-off work for training
- Demonstrate commitment to your employees' professional development—this in turn can lead to increased employee retention
- Invest in your greatest asset— your employees

The ISA Needs Assessment documentation is useful when undergoing ISO, FDA, or OSHA audits.

Elements of the ISA Needs Assessment

Knowledge Assessment Survey and Analysis— 100–125 multiple choice questions that relate directly to identified knowledge requirements

Task Performance Assessment Survey and Analysis— "Self-assessment" for each employee of his or her ability to complete specific tasks related to his or her job

General Performance Interviews— Interviews conducted by ISA's Subject Matter Expert with each employee and his or her direct supervisor to clarify and enhance the information collected by the surveys

Individual Training Needs Report— Comprehensive Training Needs Report that includes an overall group assessment and individual reports for each employee

Types of ISA Needs Assessments

- Standard to Achieve ISA's Certified Control Systems Technician® (CCST®) Certification
- Standard to Achieve ISA's Certified Automation Professional® (CAP®) Certification
- Custom

Schedule Your ISA Needs Assessment Today!

Learn more about the ISA Needs Assessment and schedule one for your employees today by contacting ISA's Senior Learning Consultants at:
- **+1 919-549-8411**
- **info@isa.org**

An ISA Needs Assessment can help you identify which courses in ISA's Training Paths your employees really need and which ones they don't.

ISA Online, Instructor-Assisted Training Courses

Created for the Busy Automation Professional!

ISA online, instructor-assisted training courses are flexible, multi-week courses of study that allow you, the busy automation professional, to complete an ISA course any time, any place.

As a CyberU student, you will acquire skills and expertise that are in high demand in today's marketplace as you learn from ISA experts and network with professional classmates who share similar technical issues.

Online, Instructor-Assisted Course Features:

Course Materials
All course notesets and supporting materials will be sent to course registrants prior to the course start date.

Online Pre-recorded Course Modules
Your instructor has pre-recorded each course module so that you can access the course presentations when it is convenient for your schedule. Each module is a web/audio session that takes approximately 60 minutes.

Ask the Expert
Interact with your expert instructor via email throughout the course and through scheduled live phone Q&A sessions. You can expect a reply to your email within 24 hours. This email address is active for the course duration. The Q&A sessions provide an opportunity for you and your classmates to speak one-on-one with the instructor. You will have an opportunity to ask any questions you may have about the course material and to interact with your fellow classmates.

Class Discussions
You will be invited to subscribe to a course listserve for course participants. You can use this listserve to post questions and share experiences relevant to the course with other class members.

Course Assignments and Exams
Take the course pre-test before you begin studying the course material to get a better understanding of areas that you will want to focus on more during the course.

Homework assignments for all modules will be indicated on the syllabus. The homework assignments are designed to help expand your understanding of the course material.

The final exam will be taken and scored online.

CEUs and PDHs
You must receive at least 80% on the course final exam to receive Continuing Education Units (CEUs) and Professional Development Hours (PDHs) credit and your Certificate of Completion.

2014 Schedule

SAFETY
Safety Instrumented Systems—Design, Analysis, and Justification (EC50E)
- 31 March – 23 May
- 26 May – 18 July
- 28 July – 19 September
- 29 September – 21 November

Sistemas Instrumentados de Seguridad—Diseño, análisis y justificatión (EC50SPE)
- 3 de febrero a 28 de marzo
- 31 de marzo a 23 de mayo
- 26 de mayo a 18 de julio
- 28 de julio a 19 de septiembre
- 29 de septiembre a 21 de noviembre

SECURITY
Using the ANSI/ISA-62443 Standards to Secure Your Control System (IC32E)
- 24 March – 16 May
- 21 July – 12 September
- 22 September – 14 November

WIRELESS
Implementing Wireless Industrial Automation Systems (IC85E)
- 2 June – 25 July

PROCESS CONTROL
Introduction to Industrial Pressure, Level, and Density Measurement Technologies (EI05E)
- 7 April – 23 May

Overview of Industrial Flow Measurement Engineering (EI10E)
- 9 June – 15 August

CERTIFICATION PREPARATION
Certified Automation Professional® (CAP®) Online Exam Review Course (EC00E)—Newly Revised!
- 28 April – 25 July
- 2 June – 29 August
- 7 July – 3 October
- 8 September – 5 December
- 6 October – 31 December

Control Systems Engineering (CSE) PE Online Exam Review Course (EN00E)—NEW!
- 5 May – 25 July
- 11 August – 10 October

Certified Control Systems Technician® (CCST®) Level I Online Exam Review Course (TS00E)
- 17 February – 2 May
- 12 May – 25 July
- 4 August – 17 October
- 6 October – 19 December

Certified Control Systems Technician® (CCST®) Level III Online Exam Review Course (TS03E)
- 24 February – 6 June
- 23 June – 3 October
- 25 August – 5 December

For a description of each scheduled course and to register, visit **www.isa.org/Distance/OnlineAssisted**.

With online, instructor-assisted courses, you can download assignments, read and contribute to class discussions, review instructor feedback, and more—all at your convenience!

Live Webinars

ISA webinars are interactive presentations, conducted via the Internet and your telephone, covering the hottest topics in industry today.

You can provide these quality webinars at your location for an unlimited number of participants for one low fee. Individual (single location) event pricing (per site): **$235 ISA Member; $265 Affiliate Member; $295 Community Member/List.**

Pre-Recorded Webinars
ISA offers a recorded version of these webinars following the live event. Visit **www.isa.org/websem** for more information, or to see other currently available topics.

For a description of each webinar and to register, visit **www.isa.org/websem.**

2014 Webinar Schedule

Introduction to Measurement and Control Series
Series Pricing (per site): $880 ISA Member; $995 Affiliate Member; $1,105 Community Member/List

Introduction to Process Control .... 29 October
Introduction to Temperature Measurement ....5 November
Introduction to Level Measurement................................... 12 November
Introduction to Flow Measurement .... 19 November
Introduction to Pressure Measurement............................... 3 December

Advanced Process Control Series
Series Pricing (per site): $880 ISA Member; $995 Affiliate Member; $1,105 Community Member/List

pH Control Solutions ....12 February
Temperature Control Solutions ....19 February
Overview of Enhanced EDDL...26 February
Designing and Applying Model Predictive Control Strategies ....5 March
System Identification for Control .... 12 March

Control Systems Security and ANSI/ISA99 Series
Series Pricing (per site): $525 ISA Member; $595 Affiliate Member; $665 Community Member/List

Cybersecurity Risk Assessment for Automation Systems . 19 March & 18 June
Firewall and Security Zones on the Plant Floor ... 26 March & 25 June
A Tour of the ANSI/ISA99 Security Standards............. 2 April & 9 July

Enterprise-Control Integration and ANSI/ISA95 Series
Series Pricing (per site): $705 ISA Member; $795 Affiliate Member; $885 Community Member/List

Applying Manufacturing Execution Systems .... 16 April
Applying ISA95 for Specification of MES
User Requirements.. 23 April
The ISA95 Object Models for Enterprise-Control
System Integration Part 1: Introduction .... 30 April
The ISA95 Object Models for Enterprise-Control
System Integration Part 2: Application....................................8 May

Electrical Safety Series
Series Pricing (per site): $350 ISA Member; $395 Affiliate Member; $440 Community Member/List

Grounding in Instrumentation Systems................................... 7 May
Noise Reduction in Signal and Power Circuits .... 14 May

Wireless Technology and ANSI/ISA100 Series
Series Pricing (per site): $525 ISA Member; $595 Affiliate Member; $665 Community Member/List

Introduction to ANSI/ISA100 Series of Standards
for Wireless Industrial Automation .... 21 May
Introduction to ANSI/ISA-100.11a—The First of the ISA100 Series of
Standards for Wireless Industrial Automation .... 28 May
Deployment of ANSI/ISA-100.11a—The First of the ISA100 Series of
Standards for Wireless Industrial Automation .... 4 June

Boiler/Burner Management Series
Series Pricing (per site): $705 ISA Member; $795 Affiliate Member; $885 Community Member/List

Introduction to Boiler Control .... 30 July
Is a Burner Management System (BMS) a Safety
Instrumented System (SIS)? ....27 August
Is a Fire and Gas System a Safety
Instrumented System (SIS)? .... 3 September
Introduction to the IEC 61511 Changes .... 10 September

Fiber Optics, RFID, and Sensor Technology Series
Series Pricing (per site): $525 ISA Member; $595 Affiliate Member; $665 Community Member/List

Wireless Networking of Sensors and
Instrumentation: Applications and Techniques............ 17 September
Overview of Fiber Optic Sensing................................. 24 September
Radio Frequency Identification (RFID):
Overview and Applications... 1 October

Automation Project Management Series
Series Pricing (per site): $525 ISA Member; $595 Affiliate Member; $665 Community Member/List

Effective Project Team Building.. 8 October
Team Member Motivation .... 15 October
Successful SCRUM Applications .... 22 October

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SAVE! **Register for all the webinars in a series and get the** *discounted series rate—that's a 25% savings!* Contact ISA Customer Service for more information or to register at **+1 919-549-8411.** (Series pricing not available through online registration.)

Interactive Multimedia Online Courses

All of these interactive, multimedia courses cover fundamental principles for control systems and other automation professionals. They are helpful when preparing for ISA's Certified Control Systems Technician® (CCST®) certification.

Automation and Control Curriculum
- Basic Process Control Library (9 courses)
- Calibration and Test Equipment Library (6 courses)
- Continuous Process Control Library (4 courses)
- Control Valves and Actuators Library (4 courses)
- Distributed Control Systems (DCS) Library (5 courses)
- Electronic Maintenance Library (12 courses)
- Process Measurement Library (8 courses)
- Smart Digital Instrumentation (4 courses)

Electrical Maintenance Curriculum
- AC/DC Theory Library (14 courses)
- Applied DC Fundamentals Library (4 courses)
- Basic Electronic Components and Their Measurement Library (3 courses)
- DC Motors Library (2 courses)
- DC Motor Controllers Library (2 courses)
- Electronic Circuits Library (3 courses)
- Industrial Electricity and MEMS Library (7 courses)
- Mechanical Electrical Control Systems Library (7 courses)
- Motor Control Library (8 courses)
- Motor Drives Library (6 courses)
- Programmable Logic Controllers (PLC) Library (5 courses)
- Safety Skills Library (8 courses)
- Using RSLogix Library (3 courses)

Machine Technology Curriculum
- Machine Technology Library (10 courses)
- Engine Lathe Library (14 courses)

Maintenance Troubleshooting Curriculum
- Maintenance Troubleshooting Library (5 courses)

ISA's Online Training Can Help You
✔ **Save Money**
✔ **Enhance Your Skills**
✔ **Retain More Information**
Order online at:
www.isa.org/Distance/OnlineCourses

Mechanical Maintenance Curriculum
- Boiler Operation and Control Library (5 courses)
- Centrifugal Pumps Library (5 courses)
- Clutches and Brakes Library (2 courses)
- Gaging and Measurement Library (2 courses)
- HVAC&R Library (7 courses)
- Hydraulics Library (7 courses)
- Hydraulic Power Systems and Troubleshooting Library (2 courses)
- Industrial Bearings Library (3 courses)
- Industrial Drives Library (6 courses)
- Industrial Hydraulics Library (4 courses)
- Industrial Seals Library (3 courses)
- Machinery Lubrication Library (3 courses)
- Mechanical Print Reading Library (4 courses)
- Operator Inspection Library (9 courses)
- Pneumatics Library (8 courses)
- Rigging Library (2 courses)
- Steam Traps Library (3 courses)
- Valve Basics Library (4 courses)

Predictive Maintenance Curriculum
- Advanced Vibration: AC Induction Motors Library (2 courses)
- Machinery Oil Analysis Library (3 courses)
- Thermography Library (3 courses)
- Ultrasonics Library (3 courses)
- Vibration Analysis Library (6 courses)

Workplace Skills Curriculum
- Workplace Mathematics Library (4 courses)
- Workplace Reading Library (5 courses)

Now Available!
ISA has added over 300 NEW **online** and **DVD** courses in 20+ languages!

To meet the growing need for more self-paced technical training in a variety of languages, ISA now offers the following series:

Online Course Series

Bahasa
- Process Operator Series (3 courses)

Czech
- Process Safety Series (4 courses)

Danish
- Process Safety Series (4 courses)

Dutch
- Process Safety Series (4 courses)

English
- Chemical Handling Series (4 courses)
- Computer Numerical Control Series (15 courses)
- Confined Space Series (2 courses)
- Electrical Safety Series (2 courses)
- Environmental Series (3 courses)
- Ethics and Compliance Series (6 courses)
- Lockout/Tagout Series (3 courses)
- Maintenance and Safety Series (7 courses)
- Pipefitting Series (11 courses)
- Process Operator Series (13 courses)
- Smart Digital Instrumentation Series (4 courses)
- Welding Series (2 courses)

Canadian English
- Process Safety Series (5 courses)

UK English
- Process Safety Series (4 courses)

Finnish
- Process Safety Series (3 courses)

French
- Process Safety Series (4 courses)

French Canadian
- Process Safety Series (5 courses)

German
- Process Operator & Safety Series (15 courses)

Hindi
- Process Safety Series (7 course)

Hungarian
- Process Safety Series (4 courses)

Italian
- Process Safety Series (4 courses)

Mandarin
- Process Safety Series (4 courses)

Polish
- Process Safety Series (4 courses)

Portuguese
- Process Safety Series (9 courses)

Romanian
- Process Safety Series (4 courses)

Spanish
- Advanced Vibration Series (2 courses)
- Basic Engine Lathe Series (14 courses)
- Basic Machine Technology Series (10 courses)
- Centrifugal Pumps Series (2 courses)
- Electronic Maintenance Series (3 courses)
- HVAC Series (4 courses)
- Industrial Drives Series (3 courses)
- Industrial Electricity Series (2 courses)
- Industrial Hydraulics Series (9 courses)
- Mechanical Electrical Series (3 courses)
- Motor Controls Series (8 courses)
- Motor Drives Series (3 courses)
- Operator Inspection Series (5 courses)
- PLC Series (5 courses)

- Process Operator Inspection Series (4 courses)
- Process Safety Series (15 courses)
- Steam Traps Series (3 courses)
- Thermography Series (3 courses)
- Ultrasonics Series (3 courses)
- Valve Basics Series (3 courses)
- Vibration Analysis Series (3 courses)

Swedish
- Process Safety Series (4 courses)

Tamil
- Process Safety Series (5 courses)

Thai
- Process Safety Series (4 course)

Turkish
- Process Safety Series (4 courses)

New DVD Series (English only)
- HR and Industrial Compliance Series (5 courses)
- Electrical Safety Series (7 courses)
- Chemical Handling Safety Series (4 courses)
- Confined Space Entry Series (4 courses)
- Environmental Awareness Series (3 courses)
- Lockout/Tagout Series (2 courses)
- Machine Guarding Series (2 courses)
- Rigging Series (2 courses)
- Welding Safety Series (3 courses)
- Process Safety (Misc.) Series (3 courses)

Learn more at www.isa.org/Online/INTL.

ISA DVD Training

ISA's DVDs are an inexpensive, informative way to brush up on the technology you encounter on the job. These fast-paced lessons include live footage shot at manufacturing plants around the world. Browse our listing of almost 50 titles and order today! **www.isa.org/Distance/DVD**.

❶ Instrumentation Basics Series
DVD Series Order No.: ITT-P2ADVD
Complete Series: $1,200

Feedback Control
© 1991
DVD Order No.: IT21DVD

Process Control Modes
© 1991
DVD Order No.: IT22DVD

Process Characteristics
© 1991
DVD Order No.: IT23DVD

Process Variables
© 1991
DVD Order No.: IT24DVD

Instrumentation Symbols
© 1991
DVD Order No.: IT25DVD

Instrument Loop Diagrams
© 1991
DVD Order No.: IT26DVD

Process and Instrumentation Diagrams
© 1991
DVD Order No.: IT27DVD

Mechanical Connections
© 1991
DVD Order No.: IT28DVD

Electrical Connections
© 1991
DVD Order No.: IT29DVD

Primary Calibration Standards
© 1991
DVD Order No.: IT210DVD

Pneumatic Test Equipment
©1991
DVD Order No.: IT211DVD

Electronic Test Equipment
© 1991
DVD Order No.: IT212DVD

Oscilloscopes
© 1992
DVD Order No.: IT213DVD

Instrumentation Errors
© 1992
DVD Order No.: IT214DVD

Instrument Calibration
© 1992
DVD Order No.: IT215DVD

❷ Electronic Maintenance Series
DVD Series Order No.: ITTP2B-DVD
Complete Series: $950

Solid State Devices
© 1992
DVD Order No.: IT216DVD

Integrated Circuits and Op Amps
© 1992
DVD Order No.: IT217DVD

Sensor and Transducer Principles
© 1992
DVD Order No.: IT218DVD

Transmitters
© 1992
DVD Order No.: IT219DVD

Transducers
© 1992
DVD Order No.: IT220DVD

Controllers, Indicators, and Recorders
© 1992
DVD Order No.: IT221DVD

Tuning
© 1992
DVD Order No.: IT222DVD

Sampling Systems and Gas Chromatograph Valves
© 1992
DVD Order No.: IT223DVD

Gas Chromatograph Ovens and Controllers
© 1992
DVD Order No.: IT224DVD

Spectroscopic Analyzers
© 1992
DVD Order No.: IT225DVD

Electrochemical Analyzers
© 1992
DVD Order No.: IT226DVD

Instrument Loop Troubleshooting
© 1992
DVD Order No.: IT227DVD

Pricing:
- **All DVDs are just $99 each!**
- **Instructor Guide** ($20 ISA Member; $22.50 Affiliate Member; $25 Community Member/List)
  - **Student Workbooks** ($10 ISA Member; $13.50 Affiliate Member; $15 Community Member/List) are available for series 1 and 2.
  - **Manuals** ($10 ISA Member; $13.50 Affiliate Member; $15 Community Member/List) are available for series 3–7.

All DVDs are 30 minutes long, unless otherwise noted.

❸ Automatic Process Control Series
DVD Series Order No.: APCDVD
Complete Series: $250

Basic Automatic Process Control
© 1986
DVD Order No.: APC1DVD

Advanced Process Control
© 1986
DVD Order No.: APC2DVD

Digital Control Techniques
© 1986
DVD Order No.: APC3DVD

❹ Boiler Control Series
DVD Series Order No.: BOILRDVD
Complete Series: $450

Introduction to Boilers: An Overview
© 1988
DVD Order No.: BOILR1DVD

Boiler Design and Construction
© 1988
DVD Order No.: BOILR2DVD

Boiler Feedwater and Steam—Controlling for Safety and Efficiency
© 1988
DVD Order No.: BOILR3DVD

Boiler Fuel and Air—Controlling for Safety and Efficiency
© 1988
DVD Order No.: BOILR4DVD

Boiler Operations
© 1988
DVD Order No.: BOILR5DVD

❺ Control Valves and Actuators Series
DVD Series Order No.: CVADVD
Complete Series: $149
DVDs in this series are 60 minutes.

Introduction to Control Valves
© 1989
DVD Order No.: CVA1DVD

Selection and Sizing of Valves and Actuators
© 1989
DVD Order No.: CVA2DVD

❻ Industrial Measurement Basics Series
DVD Series Order No.: IMSDVD
Complete Series: $350
DVDs in this series are 60 minutes.

Temperature
© 1988
DVD Order No.: IMSTMPDVD

Pressure
© 1988
DVD Order No.: IMSPRDVD

Level
© 1988
DVD Order No.: IMSLVLDVD

Flow
© 1988
DVD Order No.: IMSFLDVD

❼ Instrument Calibration Series
DVD Series Order No.: ICSDVD
Complete Series: $250
DVDs in this series are 60 minutes.

Principles of Calibration
© 1989
DVD Order No.: ICS1-BDVD

Calibrating Pressure and Temperature Instruments
© 1989
DVD Order No.: ICS2-BDVD

Calibrating Flow and Level Instruments
© 1989
DVD Order No.: ICS3-BDVD

These DVDs are training aids that provide a useful introduction to or review of each technical topic area presented. They are not meant to be comprehensive, in-depth training courses. Though some viewers may consider the video footage dated, ISA's DVDs effectively demonstrate the fundamental concepts presented.

Registration: Frequently Asked Questions

Class/Registration Confirmation

How will I know I am registered for a course?
All registrants will receive a confirmation letter and special instructions upon processing of his or her registration for a course(s). If you do not receive a confirmation letter, please call +1 919-549-8411. Registration is on a first-come-first-served basis. If a course is full, you will be contacted by ISA to transfer your registration to another offering or to receive a refund.

What will I receive with my registration at the course?
- Course workbook to support lecture and lab exercises and refer to when back at work
- Textbooks and other appropriate reference materials
- Certificate of completion
- Credit for Continuing Education Units (CEUs) or Professional Development Hours (PDHs)

Does the confirmation letter provide details on course hours and location information?
Your confirmation letter will provide specific instructions for the time and location of your training course.

Students With Special Needs

What if I need special accommodations in order to attend a course?
If you require any special accommodations in order to attend an ISA training course at any location, please inform ISA and provide a letter explaining your needs.

Payment

When is payment due?
Full payment is due at the time of registration and must be received prior to the first day of the course. Credit card, company purchase order, and/or company checks are acceptable methods of payment. If payment is not received in advance, your seat is not guaranteed in the course. All course prices are subject to change without notice. Prices listed in this catalog are subject to change.

> **Money Back Guarantee**
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Batch Control Systems—Design, Application, and Implementation, Second Edition
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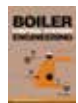*Preventive Maintenance, Third Edition*
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