Replacing a skilled employee costs 150% of their salary. Training increases employee retention and eliminates cost.
Our learning services integrate best practices and new learning technologies to deliver real business value

Siemens Technical Learning Services provides students with the critical knowledge they need to know for their job directly from the equipment manufacturer. Our training solutions build the competence required to confidently make informed decisions in the daily operation of your plant’s automation and drives systems. Employees will achieve increased productivity (studies say up to 230%), while staying up to date with new technologies and best practices. We understand your people, processes and technology to offer complete learning solutions and competency management programs.

Professional instructors, engineers, and highly qualified field service personnel, who have in-depth understanding of your equipment, processes and systems, conduct scheduled classes using simulation workstations at our world-class facilities, online, or on-site.

Our practice-based learning approach with associated exercises makes it possible to gain theoretical knowledge reinforced with hands-on experience. Students simulate real-world situations to learn programming troubleshooting techniques that will help them commission, maintain, and operate your equipment with greater efficiency and an enhanced focus on safety.

SITRAIN curriculum families
• Automation
• Machine Tool
• Drives & Motion
• Electrical Maintenance & Safety
• Power Systems & SIMOCODE
• Process Analyzers
• Process Control
• Process Instrumentation

Siemens offers Continuing Education Credits (CEUs) for almost all of our courses. Find out more at www.usa.siemens.com/ceu.

Skills Gap Issue?
What does 3 Million job openings tell us about the skills gap?
—Maureen Conway, Aspen Institute

Easy registration options!
Online – over 500 self-paced courses available 24/7/365. Visit www.usa.siemens.com/sitrain
By phone – 1-800-333-7421
Visit one of our nine regional training centers (see page vi).

Visit our website www.usa.siemens.com/sitrain or call us 1-800-333-7421 today! SITRAIN 2015
The right training for everyone – flexible course options that produce results

In today’s competitive market, a highly skilled workforce is vital for success. However, understanding how to deploy an effective training strategy is a challenge. This is where Siemens can help. Rather than offering a “one-size-fits-all” solution, our SITRAIN training programs feature a variety of delivery methods designed to meet every training need.

Classroom courses
Presented in a Siemens classroom with proven materials and quality systems-level workstations for the most effective training possible.

On-site courses
Course material and learning paced to match the needs of your team; delivered at your location, saving travel and overtime costs.

Custom courses
Audience targeted training designed for special projects, applications, or groups; custom tailored to meet your time and budget constraints.

Online courses
Web-based courses delivered in a live, instructor-led training format; or self-paced learning paths for students who need the flexibility to set their own schedule and study pace for completion.

Video refreshers
On-demand, high-impact videos designed to retrain or refresh critical skills needed for performing specific tasks.

Simulator workstations
Engineered to provide real-world, hands-on experience, Siemens simulators are available in formats ranging from simple PLCSIM to fully functional motion control systems.

Safety training series
Focused on protecting your people and equipment, while minimizing risk; courses address OSHA and NFPA compliance, risk assessment, arc flash, and electrical safety.

Certification programs
Service technician and programmer training provide specialized knowledge and skills to meet the requirements of DIN EN ISO 9001.

The process to building expertise across a diverse workforce

Foundation Industrial Knowledge
Preparation Skill Builders
Core Skill Building
Task Based Reinforcement
Expert & Best Practices
Build a more efficient, effective, and highly motivated team – with Siemens training

Any language, any location, any depth of knowledge – the Siemens team delivers targeted practical training and skills development, building on a variety of technologies and platforms that include:

**Drive Technology**
- SINAMICS, SIMODRIVE, MASTERDRIVES, and MICROMASTER
- ROBICON Perfect Harmony

**Industrial Automation Systems**
- SIMATIC
  - SIMATIC STEP 7 / TIA PORTAL
  - PC-based automation / embedded automation

**Operator Control and Monitoring**
- SIMATIC HMI
  - SIMATIC WinCC Flexible
  - SIMATIC WinCC SCADA

**Motion Control System**
- SIMOTION
  - SIMOTION

**CNC-Automation System**
- SINUMERIK
  - SINUMERIK automation systems
    - Power Line
    - Solution Line

**Industrial Communication**
- SIMATIC NET
  - SIMATIC NET communication systems:
    - Industrial Ethernet, PROFINET, Industrial Wireless Communication, OPC, PROFIBUS, AS-Interface

**Process Control Systems**
- SIMATIC PCS 7
  - SIMATIC PCS 7:
    - AS Engineering, OS Engineering, Process Safety,
    - Advanced Process Library (APL), Advanced Process Control (APC)

**Safety Engineering – Safety Integrated**
- Standards
- Drive Technology (AC-converter)
- Industrial Automation Systems
  - SIMATIC S7 H/F Safety Integrated
- SIMATIC PCS 7 Process Safety
- SINUMERIK Safety

**SITRAIN learning programs** provide your employees with the opportunity to achieve personal goals, while at the same time, positively impacting your operating and financial goals.

**Benefits:**
- Increased productivity and efficiency
- Reduced employee turnover
- Decreased downtime and faster error resolution
- Improved safety and risk management
- Flexibility to adopt new technologies/methods
- Enhanced company image and talent recruiting

Visit our website www.usa.siemens.com/sitrain or call us 1-800-333-7421 today!

SITRAIN 2015 | v
Professional instructors, proven materials, and quality workstations combine for the most effective classroom training possible

Using a blended approach to learning, our classroom courses include instructor-led lectures along with hands-on learning using our custom-designed simulator training devices.

Studies indicate that when students practice what they have learned in a classroom setting they will retain 75% of the lesson, as compared with lecture-only settings where they retain just 20% of the lesson. Designed to mimic real-world environments, Siemens simulator workstations provide a safe and risk-free platform for job training, project testing, design engineering, and troubleshooting.

We combine technology and industry experience to deliver a highly effective, customized learning programs

- Job targeted courses
- Hands-on learning and skill building
- System-level training approach
- Extensive schedule of classes
- Various media and course length options
- On-site and custom courses
- Multiple training center locations
- Packaged services and products

Our learning content is reviewed and approved by Siemens technical and operational experts to ensure compliance with the highest industry, health, safety, and environmental standards.

Siemens U.S.-based training is offered at our headquarters in Atlanta, Georgia, as well as regional locations across the country. Each facility provides students with access to a full-time instructor and offers an advanced learning environment featuring our training simulator systems.

Need help finding the right training class?
World-class simulation systems available for training or purchase

Engineered to provide a real-world experience, Siemens simulators are fully functional, ready-to-use systems available in formats ranging from simple PLCsim to fully integrated motion control systems. System-level design makes the simulators an invaluable tool for program testing and debugging; reinforcing training; shop floor troubleshooting; and more. With portable construction and hard-shell cases, they can be easily transported. Custom-built systems are also available.

“Knowledge has become the key economic resource and the dominant—and perhaps even the only—source of competitive advantage.”
—Peter Drucker
Online instructor-led training – classroom lectures delivered in the convenience of your home or office

Siemens online instructor-led training courses offer students a live, classroom experience with the convenience and cost savings of online training. These courses provide hands-on instruction and live interaction, delivered anywhere with an Internet connection, including the student’s home or office.

Scheduled courses are typically 10-hour agendas presented Monday through Friday, in two-hour sessions. These training sessions provide students with lecture, demonstration, lab exercises, and Q&A sessions – all presented by Siemens professional instructors. For the full course duration, students can complete assignments and reinforce classroom instruction using a virtual cloud-based application that provides 24/7 access to fully functional Siemens software such as SIMATIC STEP7 and PLCSIM.

Online instructor-led courses include:
- Scheduled lectures and demonstrations
- Live group and individual Q&A sessions
- 24/7 access to fully functional Siemens application software (ex., SIMATIC STEP7)
- Working automation projects using Siemens PLCSIM simulation tools
- Lab exercises and solution reviews
- Full student and instructor desktop sharing
- Access to recorded lectures

To review our current online instructor-led course offering and schedule, please visit: www.usa.siemens.com/sitrainonline

Online Self-paced technology and safety library
Online Instructor-led courses build foundation knowledge with flexibility
Online Video Rapid Refreshers offer task based 1-5 videos
Online self-paced training – programs with maximum flexibility so that students can more easily fit courses into their busy schedule

With Siemens online self-paced training, students select the learning topics and set their own pace for completing their chosen courses. All course material can be accessed online. Instruction starts upon completing the purchase of a subscription.

Students can choose from over 500 courses consisting of high-quality graphics, on-screen text, supporting voice-over narration, and interactive exercises. Features include printable course content for reference and underlined key vocabulary terms with definitions displayed with a simple mouse-over action.

Depending on the subscription purchased, you can choose to provide students with access to any 10, 25, or 50 courses or select the entire online self-paced course catalog. These courses are offered 24/7/365, so that students can begin their subscription at any time. From the date of registration, students are given one year to complete their course selections.

To see if a self-paced online course is for you, and to find information about our online course interface system requirements, please visit: www.usa.siemens.com/sitrainonline

Self-paced Technology Catalog Classes:

- Additive Manufacturing
- Assembly-Final Stage Processes: Adhesives
- Assembly-Final Stage Processes: Coatings
- Assembly-Final Stage Processes: Fasteners
- Assembly-Final Stage Processes: Soldering
- Automation: Siemens
- Foundational: Inspection
- Foundational: Materials
- Foundational: Quality
- Foundational: Rigging
- Foundational: Safety
- Foundational: Shop Essentials
- Foundational: Supervisor Essentials
- Machining: Abrasives
- Machining: CNC
- Machining: Manual Machining
- Machining: Metal Cutting
- Machining: Siemens CNC
- Machining: Workholding
- Maintenance: Electrical Systems
- Maintenance: Hydraulics and Pneumatics
- Maintenance: Mechanical Systems
- Maintenance: Motor Controls
- Maintenance: PLCs
- Maintenance: Robotics
- Maintenance: Siemens PLCs
- Stamping-Forming-Fabricating: Press Brake
- Stamping-Forming-Fabricating: Stamping
- Welding

50% of the average worker’s skills will be outdated in 3 to 5 years. Keep current with online training.
NEW! Health & Safety Catalog with over 100 new course titles!

“Studies have shown a $4 to $6 return for every dollar invested in safety and health.”

—www.osha.gov

Teamed with Underwriters Laboratories (UL), Siemens Online Self-Paced training now offers 150+ new courses focused on subjects including Crane Safety, Electrical Safety, Hazardous Materials, OSHA Essentials, Fire Safety, Personal Protection Equipment and many more! This addition to the SITRAIN Online-Self Paced library brings the total catalog to over 450 courses including Industrial Technologies and Health & Safety.

When discussing training plans with your customers or for your own staff training needs, consider adding a selection of SITRAIN Online Self-Paced courses. Courses can be purchased in bundles of 10, 25, 50 or unlimited access for as little as $250 per user. Online Self-paced training delivers focused, flexible learning at an exceptional value.

Self-paced safety classes at www.sitrain-lms.com/OSPT.aspx?tab=1

- Crane Safety
- Electrical Safety
- Environmental
- Fire Safety/Combustibles
- Hazard Communication
- Hazardous Material Transportation
- Hazardous Materials
- HAZWOPER
- Health and Wellness
- Injury Prevention
- OSHA Essentials/General Safety
- Personal Protective Equipment
- Powered Industrial Trucks
- Respiratory Protection
Online Video Rapid Refreshers – quick, affordable, task-based learning options for a broad range of automation topics

This extensive library of short videos was created by our instructional experts to meet the real-world needs of industry, with all levels of experience in mind. By providing on-demand, how-to instruction in easy-to-understand bites, the Video Rapid Refreshers help maintain the critical industrial and manufacturing knowledge and skills developed during instructor-led training courses. Videos are typically three-minutes long and conveniently available via any computer or mobile device with Internet access.

Learning begins once you’ve completed registration
• Start your subscription at any time – videos are available 24/7/365
• Purchase one, three, six or 12 month subscriptions
• Take advantage of our most-flexible option – ultimate access with a full, one-year subscription

Want to learn more?
Browse our complete library of Online Video Rapid Refreshers at: www.usa.siemens.com/sitrainonline

More than 40% of mostly small and medium-size companies report difficulty finding skilled craftsmen to replace those retiring or leaving the industry. “It’s what worries these CEOs most about their futures,”

—Barry Bluestone, the Northeastern University
How can Siemens training solutions help you get your workforce up to speed and stay current?

1. **Program Readiness Assessment**
   - Learning and continuous improvement commitment
   - Site Learning Management System (LMS) infrastructure
   - Definition of KPIs and performance measures
   - Deployed technologies inventory

2. **Specification of Job Roles and Competencies**
   - Job role and responsibility definition
   - Job task definition and validation
   - Analytics and prioritization of key processes and problem areas

3. **Employee Skills Assessment and Gap Analysis**
   - Baseline skills self-assessment and validation
   - Skills-gap analysis

4. **C & P Improvement Trajectory Plan**
   - Learning plan development
   - Resource and schedule development
   - Knowledge testing and skills validation plan
   - Definition of refresher and reinforcement plan

5. **Pre- and Post-Course Testing**
   - Validations of knowledge transfer
   - Skills and behavior modification confirmations
   - Course and program continuous improvement feedback

6. **Confirmation of Program Completion**
   - Detailed reporting of progress and results
   - Scheduled program reviews and milestones

7. **Validation of Business Outcomes**
   - Measure, monitor and report impact to KPIs
   - 6 and 12 month reassessment
   - Focus group direct feedback for improvements
   - Management reviews and reporting
Siemens Cooperates with Education – a comprehensive support for schools interested in engaging with leading edge industrial technologies.

Through the Siemens Cooperates with Education (SCE) initiative, universities, K-12 schools, community colleges and other nonprofit training centers are afforded the opportunity to partner with Siemens on leading edge industrial technologies in their classrooms, research projects and workforce development programs. We provide support through equipment, software, instructor training and technical guidance.

SEC program offers curriculums and automation training based on Massive Open Online Course (MOOC) and blended learning concepts for conveying know-how on Industry 4.0. Educational institutions benefit from special conditions, support and partnerships.

For more information, see Siemens Cooperates with Education  www.usa.siemens.com/sce

By teaching Siemens, our students are much more attractive in the job market. Companies come from far away to recruit at our school (a small rural community college). We now have a German company recruiting student to take to Germany and train there for 2 years and then come back to work in the US for them.

—Accountines Smith, Tri-County Technical College
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**Key to graphic symbols**

- **Duration of course**:
  - 3 days
  - 10 hours

- **Register**
  - Click to register online

- **More information**
  - Click for more information

- **Additional requirements**
  - Previous class required before registering
  - Core Classes (darkest shade of color)
  - Online Instructor-Led Classes (medium shade of color)
  - Optional Courses (lightest shade of color)

Visit our website www.usa.siemens.com/sitrain or call us 1-800-333-7421 today!  SITRAIN 2015 | 2
Automation – S7-300 / S7-400 / STEP 7 V5.X

Learning Map

Foundation and Pre-requisite training courses are available for beginners in the form of our online, self-paced courses. Our Technology catalog offers general and Siemens-specific titles including Intro to PLC’s, Siemens PLC Programming concepts, and Function Block for Siemens PLC’s. Visit www.usa.siemens.com/ospt for a complete list of course offerings.

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<td>4 days</td>
</tr>
<tr>
<td>SIMATIC Technology Controller</td>
<td>SCT-S7ST7P1A</td>
<td>4 days</td>
</tr>
</tbody>
</table>

Online refresher courses:

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Need help finding the right training class?
Automation – SIMATIC S7 with STEP 7 v5
AB to S7 Fast Track
Course code: SCT-S7ABFP1A
Target audience
Experienced AB programmers interested in an advanced familiarization with Siemens SIMATIC S7 PLC family and STEP7 engineering software.
Prerequisites
• Allen Bradley PLC Programming skills.
Course Profile
This course is a “Fast-Track” agenda acknowledging the automation experience of the students and delivers must-know advanced topics to highly experienced engineers interested in SIMATIC STEP7. This course moves engineers/programmers quickly into the power of STEP7. Multiple S7 program editors are presented demonstrating the flexibility and fully integrated features of STEP7.
This course concentrates on STEP7 software, program structures, System Functions, advanced block libraries and custom block design. STEP7 engineering tools and programming instructions are demonstrated to guide the student through the development of a realistic applications. Analog processing and alarming are detailed through theory and program examples.
Objectives
Upon completion of this course, the student shall be able to:
• Utilize STEP7 engineering tools.
• Program using the multiple address types.
• Use symbolic addressing.
• Test and troubleshoot an application program.
• Create custom code blocks.
• Create reusable program blocks.
• Use data access functions.
• Program to process analog values.
• Monitor data blocks.
Topics
• SIMATIC S7 verses AB Overview
• Memory Allocation and Symbolic Addressing
• Hardware Assignments
• Program Editors / Instruction Set
• Debug, Test and Documentation

Automation – SIMATIC S7 with STEP 7 v5
Migration Engineering
Course code: SCT-S7AB7P1A
Target audience
This course is for experienced AB engineers and maintenance staff who are migrating systems to Siemens SIMATIC S7 PLC family and STEP7 engineering software.
Prerequisites
• Users should have Allen-Bradley PLC5 with RSLine or RSLogix expertise.
Course Profile
This course agenda acknowledges the automation experience of the students and delivers must-know information for systems migration to S7. Taught by an applications engineer experienced with A-B products, software and applications, this course moves engineers or high level maintenance staff quickly into the power of STEP7. A variety of real world solutions and key AB functionality is compared, contrasted and demonstrated in this course. Multiple S7 program editors are presented demonstrating the flexibility and fully integrated features of STEP7.
Objectives
Upon completion of this course, the student shall be able to:
• Use the engineering tools of STEP7
• Program using the multiple address types.
• Use symbolic addressing.
• Create, document, test and troubleshoot an application program.
• Create custom code blocks
• Structure a program that can use a program block multiple times.
• Use the data access functions.
• Program using the processed analog values.
• Generate data blocks.
Topics
• SIMATIC S7 verses AB Overview
• Memory Allocation and Symbolic Addressing
• Hardware Assignments
• Structured Programming
• Timers and Counters
• Analog Handling
• PID Loops and Advanced Instructions
• Debug, Test and Documentation
• Project Integration

Automation – SIMATIC S7 with STEP 7 v5
S7 Programming 1
Course code: SCT-S7T1AP1B
Target audience
This course is for SIMATIC S7-300/400 PLC users who are involved with developing or sustaining automation systems and their application programs.
Prerequisites
• MS Windows Expertise.
Course Profile
This course is the first in a three part series which builds basic programming skills with Siemens STEP7 software. Students will learn S7 project management, program design and application development. This is an aggressively paced curriculum covering the S7 programming editor with Ladder, Function Block Diagram, and Statement List programming languages, and key software tools. This course takes a systems approach to the S7300/400 PLCs, plus basic connectivity and functionality of an HMI and PROFINET remote I/O.
Objectives
Upon completion of this course, the student shall be able to:
• Complete a system hardware configuration.
• Build, document, test and troubleshoot a structured STEP7 program.
• Program using the multiple address types.
• Use symbolic addressing.
• Use core application instructions, functions and blocks.
• Program using the processed analog values.
• Generate data blocks.
• Establish connections to an HMI system.
Topics
• STEP 7 Family Overview
• Introduction to SIMATIC Manager
• Hardware Configuration Tool
• Monitor/Modify Tool
• Programming with STEP 7
• Assigning symbol names to Objects
• HMI for process control
• Software catalog elements
• System diagnostics
• Analog value processing
• Backing up the project

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Automation – SIMATIC S7 with STEP 7 v5
S7 Programming 2
Course code: SCT-S7TIAP2B
Target audience
This course is for SIMATIC S7-300/400 PLC users with basic engineering experience in the design and sustaining of SIMATIC automation systems and their application programs.
Prerequisites
• S7 TIA Programming 1
Course Profile
This course is the second in a three part series which increases skills with Siemens STEP7 Totally Integrated Automation. Students will learn to leverage the power of SIMATIC software with advanced structured programming techniques. A systems approach to the integration of efficiently programming the S7-300/400 PLCs, plus connectivity and functionality of an HMI and Micro Master Drive are the central focus of this course. Emphasis on Statement List (STL) programming for both direct and indirect addressing is an integral part of the course.
Objectives
Upon completion of this course, the student shall be able to:
• Leverage the power of Block and Function libraries.
• Use STL for advanced program development.
• Employ indirect addressing in a program.
• Incorporate System Functions (SFC) in a program.
• Integrate an HMI and Drive system with the PLC.
• Use Instance and Multi-Instance data blocks.
• Use interrupt-driven and error processing program execution blocks.
• Leverage STEP7 advanced diagnostics.
Topics
• Programming review
• Data Blocks and complex variables
• HMI event and alarm messages
• Introduction to Micro Master 4 Drives
• Program control
• Organization Blocks
• Parameter Passing with FC, FB, SFB, SFC
• Indirect Addressing
• Troubleshooting the automation system

Automation – SIMATIC S7 with STEP 7 v5
S7 Programming 3
Course code: SCT-S7TIAP3B
Target audience
This course is for advanced SIMATIC S7300/400 users who are involved with developing or maintaining automation systems and their control applications.
Prerequisites
• S7 TIA Programming 2
Course Profile
This course builds advanced skills in control system programming in a control systems environment. Workstations will include the S7 PLC, Touch Panel HMI, Drive system and both PROFIBUS and Ethernet networks. Students will be challenged with a number of advanced programming techniques including data management routines, advanced system functions, new program efficiency tools and error handling. Advanced level blocks, functions, tools and libraries are discussed and demonstrated.
Objectives
Upon completion of this course, the student shall be able to:
• Efficiently apply Data Blocks.
• Efficiently use the various Data Types.
• Manage program errors.
• Build and manage Recipes.
• Understand the advantages of each networking type.
• Set up a basic Ethernet network.
• Understand the optional program editors and their advantages.
Topics
• Training Units and Addressing
• Block calls and Multi Instance Model
• Complex Data Type Applications
• Indirect Addressing & Registers
• Block Calls & Parameters
• Error Handling
• Recipes
• S7 Communications
• S7 Ethernet
• S7 Engineering Tools Overview

Automation – SIMATIC S7 with STEP 7 v5
S7 Programming with S7 Graph
Course code: SCT-S7GPHP1A
Target audience
This course is for SIMATIC S7-300/400 PLC users involved in developing or sustaining automation systems that use of S7Graph.
Prerequisites
• S7 TIA Programming 1
Objectives
Upon completion of this course, the student shall be able to:
• Structure and process a program using the program elements of S7 GRAPH
• Create, document, test and troubleshoot an application program.
• Identify the components and performance characteristics of an S7 GRAPH structure.
• Structure and process a program using the program elements of S7 GRAPH
• Create, document, test and troubleshoot an application program.
Topics
• S7 GRAPH Programming Elements
  – S7 GRAPH Block
  – Program Editor Screen
  – Using the Help and Tutorial files
  – Using the Menus and Toolbars
  – S7 GRAPH Property Settings
• Principles of S7 GRAPH Programming
  – Calling the Graph Program
  – Monitoring the operation of a Sequencer
  – Program execution and scan
  – Running an Example Program
• S7 GRAPH Program Structures
  – Alternative and Simultaneous Branching
  – Terminations and Jumps
  – Interlocks and Supervisions
  – Event Dependent Actions
  – Permanent Operations
• Interaction with Other Program Modules
  – Operating Modes
  – Handling System Faults
  – Initializing the Sequencer
  – Manual control of the Sequencer
• Documentations and Storage
  – Documenting program blocks and networks
  – Creating cross-reference lists
  – Printing programs with documentation
  – Archiving projects and programs
  – Symbolic programming

Need help finding the right training class?

Register Here
Automation – SIMATIC S7 with STEP 7 v5
S7 Programming with SCL

Course code: SCT-57SCLP1A

Target audience
This course is for engineering and maintenance personnel, who create, diagnose and troubleshoot SIMATIC STEP7 applications with Structured Control Language (SCL) content.

Prerequisites
• S7 TIA Programming 1

Course Profile
This course provides an in depth look at STEP7 programming and program troubleshooting with a focus on the Structured Control Language (SCL) – a PASCAL-similar high level text language for programming mathematical algorithms, data management and organization tasks for Siemens automation systems.

Students should have a solid working knowledge of STEP7, SIMATIC Manager and the basic diagnostics and editor tools. This is a hands-on course filled with programming exercises in SCL. Students will use advanced software tools of STEP7 including PLC-SIM to complete system integration programming, troubleshooting, and functional testing of applications.

Objectives
Upon completion of this course, the student shall be able to:
• Efficiently use the SIMATIC Manager program editor tools.
• Use the STEP7 program monitor, diagnostics and troubleshooting tools.
• Build or modify SCL programs.
• Package an SCL program into a custom library block and use within a STEP7 project.
• Explore the SCL syntax requirements and the system debug functions.
• Use PLC-SIM to software

Topics
• The SIMATIC Manager
• SCL Overview, Program Structure and Syntax
• SCL Data Types and Declarations
• SCL Control Instructions

Upon completion of this course, the student shall be able to:
• Develop SCL programs for PLCs
• Use STEP7 for process control
• Apply SCL concepts to real-world applications

3.5 DAYS
REGISTER HERE SCHEDULE MORE INFO

Automation – SIMATIC S7 with STEP 7 v5
S7 Programming with STL

Course code: SCT-57STLP2A

Target audience
This course is intended for SIMATIC S7-300/400 PLC users with basic engineering experience in designing and sustaining SIMATIC automation systems and associated application programs.

Prerequisites
• S7 TIA Programming 2

Course Profile
The Advanced Statement List course is designed to provide participants with STL programming skills using hands-on tasks. These tasks increase Siemens STEP7 Totally Integrated Automation (TIA) skills through the creation of a Siemens TIA project.

The central focus of this course is through a systems integration approach – from efficiently programming S7300/400 PLCs using Statement List (STL) programming to connecting to an HMI and MICROMASTER drive. Students will gain knowledge in advanced Statement List (STL) instructions and instantiation.

A majority of this course is hands-on, practical exercises with approximately 10% theory. The goals are to aggressively guide the participant through a basic system project design, creation, and implementation.

Objectives
Upon completion of this course, the student shall be able to:
• Apply concepts of structured program creation.
• Use and create Block and Function libraries.
• Use STL for advanced program development.
• Employ indirect addressing in a program.

Topics
• Hardware review and configuration setup
• Key Topics from S7 TIA Programming
• Data Blocks and complex variables
• HMI integration
• Introduction to MICROMASTER 4x drives
• Organization Blocks
• Parameter passing with FC, FB, SFB, SFC
• Indirect Addressing
• Troubleshooting the automation system

3 DAYS
REGISTER HERE SCHEDULE MORE INFO

Automation – SIMATIC S7 with STEP 7 v5
S7 System Tools & Troubleshooting 1

Course code: SCT-57300S1B

Target audience
This course is designed for “first responders” to industry operations utilizing Siemens S7 automated control systems. Maintenance technicians, electricians, supervisors and others who need an understanding of their Siemens control system should attend this course to maximize line uptime.

PLEASE NOTE: If S7 PLC programming is required, please consider the S7 Programming courses.

Prerequisites
• MS Windows Expertise

Course Profile
This Tools and Troubleshooting course teaches basic S7 system concept, hardware configuration and parameterization, S7 software (SIMATIC Manager) basics, and an overview of programming fundamentals. Human Machine Interface (HMI) and PROFIBUS DP basics are also included.

Numerous hands-on exercises using a Totally Integrated Automation (TIA) plant model reinforce practical experience and theoretical knowledge.

Objectives
Upon completion of this course, the student shall be able to:
• Perform basic hardware assembly, cabling, wiring and testing.
• Establish PLC communication
• Use standard STEP7 tools and methods for testing and diagnosing hardware & software problems in a running program.
• Retrieve, Archive, and Download S7 programs.
• Perform startup procedures
• Configure and parameterize S7-300 Hardware utilizing S7 Software tools
• Configure and parameterize PROFIBUS DP

Topics
• PLC Hardware, Cabling and Configuration
• STEP7 and the SIMATIC Manager
• The STEP 7 Program Editor
• Binary and Digital Operations

3 DAYS
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Automation – SIMATIC S7 with STEP 7 v5
S7 System Tools & Troubleshooting 2

Course code: SCT-S7300S2B

Target audience
This course is for SIMATIC S7-300-400 PLC users with basic SIMATIC control system knowledge who install or maintain automation systems and their application programs.

Prequisites
• S7 System Tools & Troubleshooting 1

Course Profile
This course continues skill development in troubleshooting and modifying a control system. Participants will use STEP7 software tools to build new features, diagnostics and communications into the application project. Program development using organization blocks, system functions and instruction libraries build software troubleshooting efficiency. Analog signal processing and alarming are included in this application. Configuration and integration of an HMI and drive system into the student’s application project builds experience managing a complete automated control system.

Objectives
Upon completion of this course, the student shall be able to:
• Be familiar with ways you can use different block types (FC, FB, OB, and OB).
• Become familiar with the principles
• of analog value processing.
• Eliminate software errors that lead to a CPU stop.
• Eliminate logical software errors, such as multiple assignments.
• Save and document program changes that have been made.
• Use the data block access functions.
• Access and use the processed analog values.

Topics
• Hardware and Software Commissioning Review
• Data Storage in Blocks, Function blocks
• Analog processing and programming
• Troubleshooting
• MPI Network Commissioning
• Tags and HMI Messages
• Drive System Commissioning

Automation – SIMATIC S7 with STEP 7 v5
S7-200 Advanced Programming

Course code: SCT-S7200P2A

Target audience
This course is for advanced SIMATIC S7-200 PLC users involved in developing or sustaining automation systems and their application programs.

Prequisites
• S7-200 Programming & Maintenance

Course Profile
This course presents topics and applications dealing with S7-200 networking. Included are discussions on the standard Point-to-Point Interface (PPI), the TD 200 Operator Interface and the Actuator/ Sensor Interface (ASI) communications. The course concentrates on the High-Speed features of the S7-200 product line plus Analog signal processing. Hands-on exercises are used to reinforce lecture subjects.

Objectives
Upon completion of this course, the student shall be able to:
• Understand the various types of S7-200 networking options.
• Understand the High-Speed operations of the S7-200 product line.
• Program and use the TD 200 Operator Interface.
• Program and make use of the S7-200 Analog module.

Topics
• Networking
  – PPI
  – PROFIBUS
  – ASI (Actuator, Sensor Interface)
• High-Speed Features
  – HSC (High-Speed Counters)
  – PTO and PWM (PulseTrain Output and Pulse Width Modulation)
  – Transmit and Receive Instructions
• TD 200 Operator Interface
  – TD 200 Wizard Setup
  – Programming for TD 200 Operation
• Analog
  – Analog Addressing
  – Math
  – Programming for Analog Data in conjunction

Automation – SIMATIC S7 with STEP 7 v5
S7-200 Programming & Maintenance

Course code: SCT-S7200B1B

Target audience
This course is for SIMATIC S7-200 PLC users involved in developing or sustaining automation systems and their application programs.

Prequisites
• MS Windows Expertise

Course Profile
This course begins with an introduction to the S7 product family followed by a detailed SIMATIC S7-200 system review. This discussion includes hardware and software components plus system configuration issues.

The course concentrates on the STEP 7 MicroWIN software, program structuring and the instruction set. STEP 7 software tools and programming instructions are introduced to guide the student through the development of a realistic application. The use of test, debug and diagnostic tools complete the program.

Objectives
Upon completion of this course, the student shall be able to:
• Understand basic PLC theory including primary elements, signal processing, scan time and throughput.
• Identify the components and performance characteristics of the SIMATIC S7-200 PLC.
• Use binary operations, timers, counters, comparators, and arithmetic operations.
• Create, document, test and troubleshoot a simple application program.
• Use the key features of the S7-200 including the analog pots, communications, interrupts, high-speed counters and pulse output, the memory cartridge and TD200 display.

Topics
• PLC Basics
• SIMATIC S7 System Family Overview
• STEP 7 MicroWIN Programming Software
• Principles of STEP 7 Programming
• Using the S7-200 Instruction Set
• S7-200 Special Features
• Program Documentation and Storage
• Debug and Test Tools
• What’s new? Future Product & Features

Need help finding the right training class?
Automation – SIMATIC S7 with STEP 7 v5
S7-300F Distributed Safety Engineering
Course code: SCT-S75FTE1A

Target audience
This course is for engineers and personnel responsible for implementing SIMATIC Distributed Safety systems, including:
- Selecting the appropriate architecture
- Selecting the components and understanding their specific purposes and limitations
- Specifying the module and system wiring
- Developing the safety PLC program
- Starting up and supporting the system.

Prerequisites
- MS Windows Expertise
- AB-S7 Fastrack OR S7 System Tools & Troubleshooting 1 or S7 TIA Programming 1

Course Profile
This course introduces the student to a Siemens Distributed Safety PLC application. Participants receive knowledge on applying the system per relevant standards, Failsafe Hardware Module details and parameterization, Safety Program structure and implementation, Safety Communications, System Diagnostics and introduction to Drive Safety.

Objectives
Upon completion of this course, the student shall be able to:
- Locate and understand the applicability of the detailed documentation and development resources
- Select and configure the Failsafe Hardware Components, and understand their application restrictions.
- Properly implement a Safety program in the PLC.
- Document, test, and troubleshoot the system.

Topics
- Introduction to Distributed Safety
- Standards discussion
- Hardware introduction and safety wiring
- STEP7 quick tour
- STEP7 Distributed Safety overview and labs
- Reintegration
- Safety Logic
- System Communication overview
- Diagnostics
- Throughput Calculations

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Automation – SIMATIC S7 with STEP 7 v5
Siemens Certified Programmer – Test

Course code: SCT-S7TIAAC3A

Target audience
This course is intended for experienced STEP 7 programmers who have met the prerequisites below.

Prerequisites
• Advanced Programming Experience
• S7 TIA Programming 1
• S7 TIA Programming 2
• S7 TIA Programming 3

Course Profile
This is a comprehensive performance test designed to assess the skills of a PLC programmer applicant for Siemens PLC systems. This is a practical, skills-based certification test covering topics taught during TIA Programming 1, 2, and 3. It is recommended that the student attend the “Siemens Certified Programmer Refresher” in preparation for the test (course code SCT-S7TIA3A).

Topics
• Skills and abilities of a Siemens Certified Programmer
  – Parameterization of the CPU
  – Configuration of the distributed I/O
  – Configuration of a drive
  – Programming of an HMI device
  – Structuring of a program using a structogram
  – Implementation of the program taking account of the aspect of reusability through the use of:
    – Functions, function blocks
    – and multi-instances
  – Complex data structures
  – Library functions for integrated error handling
• Passing the test entitles the participant to be awarded “Siemens Certified Programmer” status recognized globally by Siemens, distributors, partners and other companies.
• At minimum, prerequisites must be met in order to take the test.
• Taking the recommended Siemens “Certified Programmer Refresher” provides a quality hands-on review of all needed skills prior to taking the certification test. The test is included as part of the review course.

Automation – SIMATIC S7 with STEP 7 v5
Siemens Certified Programmer Refresher

Course code: SCT- S7TIAAR3A

Target audience
This course is intended for experienced STEP 7 programmers seeking a Siemens Certification which is recognized globally. This refresher course will help prepare the participant for the Siemens Certified Programmer Certification Test.

Prerequisites
• S7 TIA Programming 1
• S7 TIA Programming 2
• S7 TIA Programming 3

Course Profile
This is a hands-on, instructor led course provides a focused review and skills refresher of topics taught in TIA Programming 1, 2, and 3 courses. This refresher is intended to prepare the student for the Siemens Certified Programmer Test (course code SCT-S7TIAAC3A) held at the conclusion of the course.

Objectives
Upon completion of this course, the student shall be able to:
Successfully Complete the Siemens Certified Programmer Test.

Topics
• Course Overview
• Hardware
• Tag (Symbol) Table
• Program principles
• Troubleshooting Program errors
• HMI
• MICROMASTER Drive
• Independent Project

Automation – SIMATIC S7 with STEP 7 v5
Siemens Certified Technician Level 1 Test

Course code: SCT- S7300C2A

Target audience
This Siemens Service Technician Level 1 Certification Test intended for experienced STEP 7 service and maintenance technicians. Siemens certification is recognized globally.

Prerequisites
• S7 System Tools & Troubleshooting 1
• S7 System Tools & Troubleshooting 2

Course Profile
This is a comprehensive performance test designed to assess the skills of a level 1 Technician applicant for Siemens PLC Service and Maintenance of S7 systems

This is a practical, skills-based certification test covering topics from the S7 System Tools and Troubleshooting 1- and 2-course curriculum. It is recommended the student attend the “Siemens Certified Technician Level 1 Refresher” in preparation for the test (course code SCT-S7300R2A).

Objectives
Upon completion of this course, the student shall be able to:
Successfully Complete the Siemens Certified Service Technician Level 1 Test.

Topics
• Course Overview
• Hardware
• Troubleshooting Hardware stations
• Tag (Symbol) Table
• Program principles
• Troubleshooting Program errors
• HMI
• MICROMASTER Drive
• Independent Project
### Automation – SIMATIC S7 with STEP 7 v5

#### Siemens Certified Technician Level 1 Refresher

**Course code:** SCT-S7300R2A

**Target audience**
This is a refresher course to prepare the applicant for the Siemens Service Technician Level 1 Certification Test. This course is intended for experienced STEP 7 service and maintenance technicians. Siemens certification is recognized globally.

**Prerequisites**
- 57 System Tools & Troubleshooting 1
- 57 System Tools & Troubleshooting 2

**Course Profile**
This is a hands-on, instructor led course providing careful review and skills refresher of topics taught in S7 System Tools and Troubleshooting 1 and 2 courses. This refresher is intended to prepare the student for the Siemens Certified Technician 1 Test (course code SCT-S7300C2A) held at the conclusion of the course.

**Objectives**
Upon completion of this course, the student shall be able to:
- Successfully Complete the Siemens Certified Service Technician Level 1 Test.

**Topics**
- Course Overview
- Hardware
- Troubleshooting Hardware stations
- Tag (Symbol) Table
- Program principles
- Troubleshooting Program errors
- HMI
- MICROMASTER Drive
- Independent Project

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### Automation – SIMATIC S7 with STEP 7 v5

#### SIMATIC Technology Controller

**Course code:** SCT-S7317P1A

**Target audience**
This course is for SIMATIC S7-Technology CPU (S7-3xx-T CPU) users who are involved with developing or maintaining automation system and motion control application

**Prerequisites**
- S7 TIA Programming 1

**Course Profile**
This course is focused on the Siemens S7 Technology CPU Motion Control system. Students should have a solid working knowledge of STEP7 and at least a basic understanding of the principles of motion control. This training focuses on the application of the S7 317-T. Students will review the basic set up and configuration issues of the system and apply these skills to build various motion control applications.

**Objectives**
Upon completion of this course, the student shall be able to:
- Set up and configure the S7-3xx-T CPU
- Identify the key motion applications of the S7-3xx-T
- Build a functioning motion control project
- Use the system Technological Objects and Functions.
- Use the Motion Configuration software
- Set up and communicate to a multi axis drive system
- Build an application for Gears and CAMs
- Use the system diagnostics and documentation
- Use the system measurement and control tools

**Topics**
- System Overview
- Drives and Axis configuration
- Basic Motion Application
- Gearing, CAMS
- Output CAM, Measuring Input

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### Automation – SIMATIC S7 with STEP 7 v5

#### Introduction to SIMATIC PLC Languages

**Course code:** SCT-S701LPLCP1A

**Target audience**
This course is for engineers and maintenance personnel who are new to PLC programming – who will be creating, modifying or troubleshooting S7 PLC systems with SIMATIC STEP 7 software.

**Prerequisites**
- Basic industrial technology skills
- Introduction to SIMATIC PLCs

**Course Profile**
This course is designed to build core SIMATIC STEP 7 programming skills. For students new to Siemens PLC programming, this course is an ideal preparation to the S7 Programming 1 or S7 Tools and Troubleshooting 1 courses. This is a live instructor led on-line course delivered in 2 hour learning modules through the web. Access to fully functional STEP 7 software will be provided to the student through a cloud based application. Students are encouraged to complete assigned lab exercises and reinforce the learning modules throughout the week.

**Objectives**
Upon completion of this course, the student shall be able to:
- Build simple S7 PLC programs using the Relay Ladder Logic (LAD) editor
- Navigate the SIMATIC Manager and use the key program development and diagnostics tools
- Build simple S7 PLC programs using the Function Block Diagram (FBD) editor
- Manage program data through proper data storage and retrieval
- Build a simple function using the Statement List program editor

**Topics**
- Basic Ladder Logic Programming
- Introduction to SIMATIC Manager
- SIMATIC Manager Development and Troubleshooting Tools/Monitor/Modify Tool
- Basic Function Block Diagram
- Introduction to SIMATIC Data Storage
- Basic Statement List Programming

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Automation – Online Instructor Led

**Introduction to SIMATIC PLCs**

Course code: **SCT-S701LPCL1A**

**Target audience**

This course is for engineers and maintenance personnel who are new to PLC programming – who will be creating, modifying or troubleshooting S7 PLC systems with SIMATIC STEP 7 software.

**Course Profile**

This course is designed to provide the student with core SIMATIC PLC program fundamentals. For students new to PLC applications, this course is an ideal preparation to the S7 Programming 1 or S7 Tools and Troubleshooting 1 courses. This is a live, instructor led, on-line course delivered in 2 hour learning modules through an innovative web application. Access to fully functional STEP 7 software will be provided to the student through a cloud based application. Students are encouraged to complete assigned lab exercises during and after each session to reinforce the learning modules throughout the week.

**Objectives**

*Upon completion of this course, the student shall be able to:*

- Apply and convert various numbering system concepts within a typical PLC application
- Identify the IEC language set and perform essential program analysis and organization
- Build a fundamental program flow chart and structogram for efficient program development
- Navigate the SIMATIC Manager tools for efficient program development, documentation and testing
- Configure various input and output (I/O) addressing, Data Block and internal memory allocations

**Topics**

- Binary, Hexadecimal, and BCD (Binary Coded Decimal) Number Systems
- Introduction to IEC 61131-3 PLC Programming Standards
- Introduction to Discrete and Analog I/O
- Introduction to the SIMATIC Manager
- SIMATIC I/O Addressing Principles

**Online Instructor-led Training**

**STEP 7 v5 Programming with SCL**

Course code: **SCT-S701LSCLP1A**

**Target audience**

This course is for engineering and maintenance personnel, who create, diagnose and troubleshoot SIMATIC STEP7 applications with Structured Control Language (SCL) content.

**Prerequisites**

- S7 Programming 1

**Course Profile**

This course provides an in depth look at STEP7 programming and program troubleshooting with a focus on the Structured Control Language (SCL) – a PASCAL similar high level text language for programming mathematical algorithms, data management and organization tasks for Siemens automation systems.

Students should have a solid working knowledge of STEP7, SIMATIC Manager and the basic diagnostics and editor tools. This is a hands-on course filled with programming exercises in SCL. Students will use advanced software tools of STEP7 including PLC-SIM to complete system integration programming, troubleshooting, and functional testing of applications.

**Objectives**

*Upon completion of this course, the student shall be able to:*

- Efficiently use the SIMATIC Manager program editor tools.
- Use the STEP7 program monitor, diagnostics and troubleshooting tools.
- Build and modify SCL programs.
- Package an SCL program into a custom library block and use within a STEP7 project.
- Explore the SCL syntax requirements and the system debug functions.
- Use PLC-SIM software to simulate PLC hardware and test user defined SCL program code.

**Topics**

- The SIMATIC Manager
- SCL Overview
- SCL Program Structure
- SCL Syntax
- SCL Data Types
- SCL Declarations
- SCL Control Instructions
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- Methods to go Online with STEP7 Projects
- Set PG/PC IP Address in Windows 7
- 32 Bit Pointers - Area Internal and Area Crossing
- Add Boolean Elements to Existing LADDER Code
- Add ET200S Station to PROFIBUS Network
- Address Overview in Hardware Configuration Editor
- Arrange Hardware Stations & Networks in HW Config View
- Bit Shifting Logic in Statement List
- SIMATIC Help for Programming with STL
- STL Code & Monitoring for Combination AND/OR Networks
- STL Commands That Affect RLO
- Troubleshoot a PROFIBUS Station Failure
- Troubleshooting a Power Module Failure on the ET200S Station
- Troubleshooting a PROFINET Station Down

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Learning Map

Foundation and Pre-requisite training courses are available for beginners in the form of our online, self-paced courses. Our Technology catalog offers general and Siemens-specific titles including Intro to PLC’s, Siemens PLC Programming concepts, and Function Block for Siemens PLC’s. Visit www.usa.siemens.com/ospt for a complete list of course offerings.

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S7-1200 Maintenance & Engineering

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Need help finding the right training class?
Automation – SIMATIC S7 with TIA Portal
AB to S7 Fast Track with TIA Portal

Course code: SCT-PTABFP1A

Target audience
This 3 day, fast-paced course is for experienced AB programmers interested in an advanced training on Siemens SIMATIC S7 PLC family and STEP7 engineering software.

Prerequisites
• Allen Bradley PLC Programming skills.

Course Profile
This course is a “Fast-Track” agenda acknowledging the automation experience of the students and delivers must-know, advanced topics to experienced engineers interested in Siemens SIMATIC STEP 7 TIA Portal software. This course moves engineers programmers quickly into the power of the STEP 7 TIA Portal engineering tool. Multiple STEP 7 program editors are presented demonstrating the flexibility and fully integrated features of STEP 7.

Objectives
Upon completion of this course, the student shall be able to:
• Utilize STEP 7 TIA Portal engineering tools
• Insert an HMI device into a project
• Locate Tags using Cross-Reference tool
• Utilize System Diagnostic Functions to test and troubleshoot an application program.
• Create custom code blocks
• Create reusable program code (FB, DB, FC, etc.) and insert in Library
• Assign tags in STEP 7 TIA Portal
• Create, Store, and Retrieve Library Objects

Topics
• System Overview
• AB-STEP 7 TIA Portal Navigation
• AB-STEP 7 TIA Portal Communication
• Hardware
• Memory Allocation and Usage
• Tag Handling
• Program Instructions in STEP 7 TIA Portal
• Programming Blocks
• HMI
• Reference Data
• System Diagnostics
• Simulation
• Library Options

---

Automation – SIMATIC S7 with TIA Portal
S7-1200 TIA System

Course code: SCT-S712TP1A

Target audience
This system course is for SIMATIC S7-1200 PLC users who are involved with developing or sustaining automation systems and their application programs. This course is for users needing advanced programming and configuration skills and who may use the extended system functions.

Prerequisites
• MS Windows Expertise

Course Profile
Additional Prerequisite: Solid industrial technology skills.

The goal of this course is to help the student build skills utilizing in programming and extended system functionality of the S7-1200 system, STEP7 engineering tool and WinCC Basic, Human Machine Interface (HMI).

This course begins with a brief review of the SIMATIC S7-1200 system, its components and the HMI Basic Panels.

Objectives
Upon completion of this course, the student shall be able to:
• Identify the components and features of the S7-1200 system.
• Navigate the STEP7 Portal software and identify the basic tool set.
• Complete a system hardware configuration including basic PC - PLC communications.
• Use the STEP7 tools to monitor and troubleshoot the system.
• Build, document, test and troubleshoot a structured STEP7 Basic program using the multiple address types and data blocks.
• Build a basic HMI project and integrate into the STEP7 program.
• Use core application instructions, functions and blocks to build and test a basic control program.
• Efficiently used the diagnostics tools of STEP7.

Topics
• SIMATIC S7-1200 family overview
• Introduction to STEP7 Basic
• Device and Networks Portal with monitoring

---

Automation – SIMATIC S7 with TIA Portal
TIA Portal Programming 1

Course code: SCT-PTT1AP1A

Target audience
This course is for SIMATIC S7-300/400 PLC users who are involved with developing or sustaining automation systems and their application programs.

Prerequisites
• MS Windows Expertise

Course Profile
This course is the first in a three part series which builds basic programming skills with Siemens STEP7 software. Students will learn S7 project management, program design and application development. This is an aggressively paced curriculum covering the S7 programming editor with Ladder, Function Block Diagram, and Statement List, and SCL programming languages, and key software tools. This course takes a systems approach to the S7300/400 PLCs, plus basic connectivity and functionality of an HMI, Drive, and PROFINET I/O.

Objectives
Upon completion of this course, the student shall be able to:
• Complete a system hardware configuration.
• Build, document, test and troubleshoot a structured STEP7 program.
• Program using the multiple address types.
• Use symbolic addressing.
• Use core application instructions, functions and blocks.
• Program using the processed analog values.
• Generate data blocks.
• Establish connections to an HMI system.

Topics
• System Overview
• Introduction: Engineering Software “TIA Portal”
• Devices and Networks
• Symbol Table
• Program Blocks
• Binary Operations
• Digital Operations
• Introduction to Distributed I/O
• Introduction to HMI
• FCs and FBs
• Troubleshooting
• Introduction to the MICROMASTER Drive
**Automation – SIMATIC S7 with TIA Portal**

### TIA Portal Programming 2

**Course code:** SCT-PTTIA2P

**Target audience**
This course is for SIMATIC S7-300/400 PLC users with basic engineering experience in the design and sustaining of SIMATIC automation systems and their application programs.

**Prerequisites**
- TIA Portal Programming 1

**Course Profile**
This course is the second in a three part series which increases skills with Siemens SIMATIC TIA Portal. Students will learn to leverage the power of TIA Portal software with advanced structured programming techniques. A systems approach to the integration of efficiently programming the S7300/400 PLC, connectivity using PROFINET IO, functionality of an HMI, and integration of Micro Master Drive are the central focus of this course.

**Objectives**
> Upon completion of this course, the student shall be able to:

1. Leverage the power of Block and Function libraries.
2. Use STL and SCL for advanced program development.
3. Employ indirect addressing in a program.
4. Incorporate System Functions (SFC) in a program.
5. Integrate an HMI and Drive system with the PLC.
6. Use Instance and Multi-Instance data Blocks.

**Topics**
- Analog value processing
- Functions, function blocks, and multi-instances using the IEC-compliant timer/counter
- Jump commands and battery operations
- Indirect addressing
- Integration of a Micromaster drive (420) using PROFIBUS DP
- Monitoring and control of drive with “Starter” software
- Classical software error handling and evaluation with error organization blocks (OBs)
- Troubleshooting and alarms with an HMI device (Touch Panel 277B)

### TIA Portal Service 1

**Course code:** SCT-PTTIA51A

**Target audience**
This course is designed for "first responders" to industry operations utilizing Siemens S7 automated control systems. Maintenance technicians, electricians, supervisors and others, who need an understanding of their Siemens control system, should attend this course to maximize line uptime. PLEASE NOTE: If training in S7 PLC programming is required, please consider the SIMATIC TIA Portal Programming 1 course.

**Prerequisites**
- MS Windows Expertise

**Course Profile**
This first level service course teaches the basic S7 system concept, hardware configuration and parameterization, S7 software (SIMATIC TIA Portal) basics, and an overview of programming fundamentals. Human Machine Interface (HMI) and PROFINET IO basics are also included.

**Objectives**
> Upon completion of this course, the student shall be able to:

1. Use standard STEP 7 tools and methods for Testing, Diagnosing, and Correcting hardware & software problems in a running program.
2. Operate, Monitor, & Maintain components of a typical SIMATIC TIA system.
3. Perform basic hardware assembly, cabling, wiring and testing.
4. Establish PLC communication with multiple technologies.
5. Retrieve, Archive, and Download S7 programs.

**Topics**
- System Overview
- Introduction: Engineering Software “TIA Portal”
- PLC Installation & Maintenance
- Device and Network
- Symbol Table
- Hardware Commissioning
- Program Blocks
- Binary Operations
- Introduction to Distributed I/O
- Introduction to HMI
- Introduction to the MicroMaster Drive

### TIA Portal Service 2

**Course code:** SCT-PTTIA52A

**Target audience**
This course is designed for SIMATIC S7-300-400 PLC users with basic SIMATIC control system knowledge who install or maintain automation systems and their application programs.

**Prerequisites**
- TIA Portal Service 1

**Course Profile**
This course continues skill development in troubleshooting and modifying a control system. Participants will use SIMATIC TIA Portal software tools to build new features, diagnostics and communications into the application project. Program development using organization blocks, system functions and instruction libraries build software troubleshooting efficiency. Analog signal processing and alarming are included in this application. Configuration and integration of an HMI and Drive system into the student’s application builds experience managing a Totally Integrated Automation (TIA) project.

**Objectives**
> Upon completion of this course, the student shall be able to:

1. Use advanced STEP 7 tools and methods for Testing, Diagnosing, and Correcting hardware & software problems in a running program.
2. Utilize the different block types (FC, FB, OB, and DB).
3. Eliminate logical software errors, such as multiple assignments.
4. Utilize principles of analog value processing.
5. Use the data block access functions.
6. Access and use the processed analog values utilizing Step7 GRAPH.
7. Backup and document executed program changes

**Topics**
- Hardware and Software Review
- Data Blocks and Organization Blocks (OBs)
- Analog Processing
- Troubleshooting
- HMI
- Drive System
Automation - SIMATIC S7 with TIA Portal S7 v5 to TIA Portal Fast Track
Course code: SCT-PTT1FP1A

Target audience
This course is for experienced STEP 7 Version 5x users who are, or will be, involved in developing or sustaining SIMATIC S7 with TIA PORTAL projects. The course is designed for both Engineering and Maintenance personnel already familiar with the V5.x STEP 7 environment, programming tools, and troubleshooting techniques.

Prerequisites
• S7 Programming 1 OR
• S7 System Tools and Troubleshooting 1

Course Profile
The goal of this course is to provide experienced users, familiar with the Ver. 5.x STEP 7 environment, programming tools, and troubleshooting techniques the “Level 1” TIA Portal System knowledge and skills.

Objectives
Upon completion of this course, the student shall be able to:
• Configure the components and feature functions of the S7-1500 system.
• Navigate the STEP7 Portal software and utilize the basic and advanced tool set.
• Configure system hardware including basic networking communications, HMI, & Drive.
• Build, document, test and troubleshoot a structured STEP7 Basic program.
• Build a basic HMI project and integrate into the STEP7 program.
• Use core application instructions, functions and blocks to build and test a basic control program.
• Efficiently employ the diagnostics tools of STEP7.
• Utilize StartDrive.
• Setup and Configure Devices and Networks.
• Utilize SCL Editor to program and test blocks.

Topics
• SIMATIC S7 TIA Portal overview
• Range & Depth of Engineering Framework
• Devices and Networks
• PLC Tags
• Program Blocks and Program Editor
• Connection with HMI
• Advanced Programming Topics
• Troubleshooting
• Structured Control Language (SCL)
• Startdrive: Integrating & Commissioning a Drive

Automation - SIMATIC S7 with TIA Portal S7 TIA Portal Distributed Safety Engineering
Course code: SCT-PTSFT1A

Target audience
This course is for engineers and personnel responsible for implementing and maintaining SIMATIC S7 TIA Portal Distributed Safety systems.

Prerequisites
• TIA Portal Programming 1 OR
• TIA Portal Service 1

Course Profile
This course introduces the student to a Siemens Distributed Safety PLC application. Participants receive knowledge on applying the system per relevant standards, Failsafe Hardware Module details and parameterization, Safety Program structure and implementation, Safety Communications, System Diagnostics and introduction to Drive Safety. The course format is a combination of instruction and hands-on exercises. A realistic model is used for demonstrations and student exercises. Exercises allow students to practice tasks such as configuration, programming, and code debugging.

Objectives
Upon completion of this course, the student shall be able to:
• Locate and understand the applicability of the detailed documentation and development resources
• Select and configure the Failsafe Hardware components, and understand their application restrictions.
• Properly implement a Safety program in the PLC.
• Document, test, and troubleshoot the system.

Topics
• Introduction to Distributed Safety
• Standards discussion
• ET 200SP distributed I/O system
• Hardware Configuration
• Safety Advanced: Programming
• Fail-safe Communication
• F-system Response Times

Online Instructor-led Training S7 TIA Portal Programming with SCL
Course code: SCT-PTOILSCLP3A

Target audience
This course is for engineering and maintenance personnel, who create, diagnose and troubleshoot SIMATIC TIA Portal applications with Structured Control Language (SCL) content.

Prerequisites
• TIA Portal Programming 1

Course Profile
This course provides an in-depth look at STEP7 programming and program troubleshooting with a focus on the Structured Control Language (SCL) – a PASCAL similar high level text language for programming mathematical algorithms, data management and organization tasks for Siemens automation systems. Students should have a solid working knowledge of STEP7, TIA Portal and the basic diagnostics and editor tools. This is a hands-on course filled with programming exercises in SCL. Students will use advanced software tools of TIA Portal including PLC SIM to complete system integration programming, troubleshooting, and functional testing of applications.

Objectives
Upon completion of this course, the student shall be able to:
• Efficiently use the TIA Portal program editor tools.
• Use the TIA Portal program monitor, diagnostics and troubleshooting tools.
• Build and modify SCL programs.
• Package an SCL program into a custom library block and use within a TIA Portal project.
• Explore the SCL syntax requirements and the system debug functions.
• Use PLC SIM software to simulate PLC hardware and test user defined SCL program code.

Topics
• The TIA Portal
• SCL Overview
• SCL Program Structure
• SCL Syntax
• SCL Data Types
• SCL Declarations
• SCL Mathematical and Logical Operations
• SCL Control Instructions

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### Automation – SIMATIC HMI / SIMATIC HMI with TIA Portal

#### Learning Map

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| Online instructor-led courses | Optional courses |

Need help finding the right training class?
Automation – SIMATIC HMI
SIMATIC HMI Panel with WinCC Flexible
Course code: SCT-S7WFXC1A

Target audience
This course is for automated control engineers or maintenance staff who will be designing, configuring or maintaining a control system application configured with Siemens WinCC Flexible software.

Course Profile
This course provides a comprehensive review of the features and capabilities of Siemens WinCC Flexible software. Students will perform a complete system configuration including project configuration, graphics design and system integration. Students will also build skills with the user management tools including security, access, alarms and messaging. Advanced functionality such as recipe creation and scripting are briefly introduced through scenario applications. The course concludes with Siemens unique Sm@rt services for plant wide web and system access. Throughout this course lecture materials are complimented with hands-on exercises which build a working WinCC Flexible application.

Objectives
Upon completion of this course, the student shall be able to:
- Create and manage a WinCC Flex project.
- Integrate components between WinCC Flex and STEP 7.
- Create tags from the STEP7 symbol table.
- Design graphic screens and tools.
- Configure internal and external tags.
- Define & administer user security.
- Set and test the Alarms and Messages.
- Configure, archive and display trends.
- Understand basic recipe building.
- Understand basic scripting services.
- Understand Sm@rt Services.

Topics
- WinCC Flexible System Overview
- Basic Graphics Design
- Advanced Graphics Design
- User Management
- Process Value Archiving
- Recipe Management
- Run-Time Scripting
- Sm@rt Access and Service

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Course Profile
Upon completion of this course, the student shall be able to:
• Create and manage WinCC Projects.
• Integrate components between WinCC and TIA Portal.
• Create WinCC tags in STEP 7 symbol table.
• Establish communications with the PLC.
• Design a complex graphic.
• Configure internal and external tags.
• Define & Administer User Security.
• Set and test the WinCC Alarms and Messages.

Topics
• System overview TIA Portal,
• SIMATIC WinCC (SCADA)
• Creating a SIMATIC WinCC Professional project and user administration
• Configuring the connection to the SIMATIC S7 automation system
• Structuring the operator interface.
• Fundamentals of creating graphics displays for human machine interfaces.
• Navigating through the plant displays
• Message representation, message logging, message configuring
• Variable logging, trend configuring and plotting

Target audience
This course is for automation control engineers or maintenance staff designing, configuring or maintaining a control system application configured with SIMATIC TIA Portal WinCC Advanced software. *NOTE: This TIA Portal course is for configuring Panels and/or Machine mounted HMI.

Prerequisites
• Basic knowledge of automation technology.

Objectives
Upon completion of this course, the student shall be able to:
• Create and manage a WinCC Advanced project.
• Integrate components between WinCC Flex and STEP 7.
• Create tags from the STEP7 symbol table.
• Design graphic screens and tools.
• Configure internal and external tags.
• Define & administer user security.
• Set and test the Alarms and Messages.
• Configure, archive and display trends.
• Configure a basic recipe.

Topics
• WinCC Advanced System Overview
• Creating and transferring a Project
• Basic Graphics Design
• Advanced Configuration Functions
• User Management
• The Message System
• Tag Logging (Archiving), Trends, and Trend Configuration
• Recipe Management

Target audience
This course is for PLC users with engineering or maintenance experience who will be designing and configuring automation systems and their application programs using Siemens TIA Portal Windows Control Center (WinCC) Professional SCADA (Supervisory Control and Data Acquisition). *NOTE: This TIA Portal course is for configuring WinCC.

Prerequisites
• Basic knowledge of automation technology.

Course Profile
Using a model application, this course provides a system overview of WinCC Professional with emphasis on its capabilities and special features. Detailed configuration procedures will be studied in an order compatible with the typical development of an industrial application.

Objectives
Upon completion of this course, the student shall be able to:
• Explore the basic tools of SIMATIC TIA Portal WinCC Professional (SCADA).
• Integrate components between WinCC SCADA and STEP 7.
• Create tags from the TIA Portal symbol table.
• Configure internal and external tags.
• Migrate WinCC project to SIMATIC TIA Portal WinCC Professional project.
• Commission a SIMATIC TIA Portal WinCC Professional project.

Topics
• System Overview
• Creating a SIMATIC TIA Portal WinCC Professional project
• Configuring the connection to the SIMATIC S7 automation system
• Basic Graphics Design Overview
• The Message System
• User Management
• Project Migration Tools
• Project Commissioning

Target audience
This course is for automation control engineers or, maintenance staff possessing solid working skills with Siemens WinCC configuration software and, moving to Siemens SIMATIC TIA Portal WinCC Professional software.

Prerequisites
• SIMATIC WinCC SCADA Configuration

Course Profile
This course provides fast-track training of the tools, features and capabilities of Siemens SIMATIC TIA Portal WinCC Professional software. Students must have previous Siemens WinCC software experience to attend this class. The key configuration and integration issues unique to SIMATIC TIA Portal WinCC Professional will be covered in this course.

Objectives
Upon completion of this course, the student shall be able to:
• Explore the basic tools of SIMATIC TIA Portal WinCC Professional (SCADA).
• Integrate components between WinCC SCADA and STEP 7.
• Create tags from the TIA Portal symbol table.
• Configure internal and external tags.
• Migrate WinCC project to SIMATIC TIA Portal WinCC Professional project.
• Commission a SIMATIC TIA Portal WinCC Professional project.
Online Instructor-led Training

Introduction to WinCC Flexible

Course code: SCT-S701LWFXC1A

Target audience
This course is for automation control engineers or maintenance staff who will be designing, configuring or maintaining a control system application configured with Siemens WinCC Flexible software.

Course Profile
This course provides a rich introduction to the features and capabilities of Siemens WinCC Flexible software. Students will perform a system configuration including project configuration, graphics design and system integration. Throughout this course lecture materials are complimented with hands-on exercises which build a working WinCC Flexible application. This is a hands-on course filled with configuration exercises in WinCC Flexible. Students will use advanced software tools of STEP7 including PLC SIM to complete system configuration, troubleshooting, and functional testing of applications. Messaging, alarms, security, and archiving will not be covered in this introduction.

Objectives
Upon completion of this course, the student shall be able to:
• Create and manage a WinCC Flex project.
• Integrate components between WinCC Flex and STEP 7.
• Create tags from the STEP7 symbol table.
• Design graphic screens and tools.
• Configure internal and external tags.
• Use PLC SIM software to simulate PLC hardware and test user defined WinCC Flexible project.

Topics
• WinCC Flexible System Overview
• The Project
• Basic Graphics Design
• Advanced Graphics Design

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Learning Map

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Maintenance
- SIMATIC NET PROFIBUS, Ethernet, PROFINET
  - SCT-S7NETS1A

Engineering Core
- SIMATIC NET PROFIBUS, Ethernet, PROFINET
  - SCT-S7NETS1A
  - PROFINET
    - SCT-S7PNTP1B
Automation – SIMATIC NET

PROFINET

Course code: SCT-S7PNTP1B

Target audience
This course is for maintenance personnel involved with sustaining or commissioning S7 industrial Ethernet / PROFINET network.

Prerequisites
• S7 TIA Programming 1 OR
• S7 System Tools & Troubleshooting 1 AND
• S7 System Tools & Troubleshooting 2

Course Profile
This course provides a working knowledge of Industrial Ethernet and PROFINET networks within an S7 PLC automation system. Students will build skills with the basics of network installations, configuration and troubleshooting.

Objectives
Upon completion of this course, the student shall be able to:
• Describe and view Industrial Network architecture and components.
• Install and configure a simple PROFINET network including, PC connection, interface modules, couplers, software and cables
• Configure and troubleshoot SEND/RECEIVE
• Perform network diagnostics using the NCM and SIMATIC Net tools
• Install and address various network connections and components.

Topics
• Introduction to Industrial Ethernet
• PROFINET I/O
• PROFINET Topology
• Network Troubleshooting
• I-Shared Devices
• Web Server Overview
• Exercises

Automation – SIMATIC NET

SIMATIC NET PROFIBUS, Ethernet, PROFINET

Course code: SCT-S7NETS1A

Target audience
This course is for engineering and maintenance personnel involved with the sustaining or commissioning of S7 industrial networks.

Prerequisites
• S7 TIA Programming 1 OR
• S7 System Tools & Troubleshooting 1

Course Profile
This course provides a working knowledge of Industrial Ethernet, PROFIBUS and Actuator-Sensor Interface (AS-i) networks within an S7 PLC automation system. Students will build skills with the basics of network installations, configuration and troubleshooting. This course covers sensor, field and enterprise level networks including hardware and software requirements, topologies and installation rules.

Objectives
Upon completion of this course, the student shall be able to:
• Describe the various Industrial Networking options and terminology in the S7 environment.
• Install and configure simple networks including, interface modules, software and cables
• Configure and troubleshoot SEND/RECEIVE connections
• Use the OSI and IP protocols.
• Install and address various sensor and field devices including 3rd party devices.

Topics
• Introduction to SIMATIC NET
• Network components and installation guidelines
• ISO Transport Protocol (IE and FDL )
• TCP/IP Protocol
• Communication Processor (CPs) Options
• NCM software overview
• S7 Communication functions
• SIMATIC Manager network projects
• Network Configurations
• Error tracing diagnostics for PROFIBUS DP
• Network performance
• AS-i Network Overview
• Introduction to OPC Server

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Automation – SIMATIC S5

S5 Maintenance & Programming 1

Course code: SCT-S5SP5G1A

Target audience
This course is for maintenance technicians and controls engineers who are responsible for sustaining and upgrading SIMATIC S5 systems and their programs.

Prerequisites
• Computer Expertise

Course Profile
This course provides the basic skills necessary to troubleshoot S5 hardware and modify programs using STEPS software. Students will build skills with a typical S5 hardware sustaining ranging from module wiring and configuration to parameterization and addressing.

Objectives
Upon completion of this course, the student shall be able to:
• Build a basic S5 hardware configuration
• Troubleshoot the system hardware using status indicators and STEPS software tools
• Program discrete logic operations (AND, OR, etc.)
• Create and edit documentation
• Program timers and counters (time, count events, etc.)
• Program comparison operations
• Program integer math operations
• Troubleshoot common software errors

Topics
• Fundamental control concepts
• Programming basics
• Hardware overview
• Digital operations
• Counters, compares, and arithmetic
• Timer operations
• Introduction to Data and Function blocks
• Troubleshooting

4.5 DAYS

REGISTER HERE

SCHEDULE MORE INFO

S5 Maintenance & Programming 2

Course code: SCT-S5SP5G2A

Target audience
This course is for maintenance technicians and controls engineers who are responsible for advanced troubleshooting and program modifications for the SIMATIC S5 system.

Prerequisites
• S5 Maintenance & Programming 1

Course Profile
This course provides advanced level skills in system troubleshooting and program modifications. Students will concentrate on the Supplemental Operation Set and the creation and diagnostics of system function blocks. Students will also gain experience with Statement List instructions (STL).

Advanced hardware, communications and diagnostics will be reinforced in this course. Students will build skills in analog signal processing and troubleshooting. Students will also modify or develop programs that will be loaded into a SIMATIC S5 controller with field simulation using a PG740 programming unit (or equivalent) to test its operation.

Objectives
Upon completion of this course, the student shall be able to:
• Utilize STEP 5 instructions from the supplemental operations set.
• Write or modify programs for analog I/O.
• Create user defined function blocks without formal operands. 
• Create user created function blocks with formal operands.
• Utilize indirect addressing techniques.
• Create and use basic STL program code.
• Perform advanced hardware configuration and troubleshooting tasks.

Topics
• Program structure
• Function Blocks (FBs)
• Programming user-defined function blocks
• Organization Blocks (OBs)
• Analog input and output

4.5 DAYS

REGISTER HERE

SCHEDULE MORE INFO
Automation – SIMATIC TI

505 Advanced Programming

Course code: SCT-TITSFP2A

Target audience
This is an engineering level course for personnel involved in process control applications that require a programming language using a more sophisticated control level than Relay Ladder Logic (RLL).

Prerequisites
• 505 Maintenance & Programming

Course Profile
This course addresses the Special Function statements, Analog alarms, and PID Loop programming features of the SIMATIC S45/ S55/ S65 and S75 controllers. The programming environment is both TISOFT and SOFTSHOP.

This course covers Special Function programming which includes the structures statements which are specifically designed for process control and advanced machine control applications. All Special Function statements are explained in class, with hands-on exercises to reinforce programming procedures.

Objectives
On completion of this course, the student shall be able to:
• Develop programs using Special Function statements.
• Troubleshoot programs with Special Function Statements.
• Program analog alarms and interpret the results.
• Understand the PID Loop menus.

Topics
• SIMATIC 505 System Overview
• Introduction to Special Function Programming
• Special Function Statements
• Analog Alarms
• 555 Power Math
• PID Loop Menus

Automation – SIMATIC TI

505 Maintenance and Programming

Course code: SCT-TITSFG1A

Target audience
This course is for both engineering and maintenance personnel responsible for designing, commissioning, installing or maintaining the SIMATIC 505 family Programmable Logic Controller (PLC).

Prerequisites
• MS Windows Expertise

Course Profile
This entry-level course covers the tasks necessary to support the design, modification, start-up and maintenance of a typical SIMATIC 505 PLC system. Students work with their choice of TISOFT or SOFTSHOP software throughout the course.

Hands-on lab exercises challenge the student to use the programming and diagnostic tools available in SIMATIC 505 systems.

Objectives
On completion of this course, the student shall be able to:
• Properly install and configure a 505 PLC system.
• Identify and configure PROFINET-I/O.
• Troubleshoot and identify problems in the PLC hardware and software and take the appropriate action to solve these problems.
• Build or modify an RLL program using the appropriate editing procedures and tools.
• Efficiently manage a PLC program including archival, loading, documentation, status and editing tools.
• Use the software diagnostic tools for system troubleshooting and program debug.

Topics
• PLC Fundamental Concepts and Terminology
• Hardware Overview
• Program Management
• Discrete Program Elements
• Word Program Elements
• Analog Program Elements
• Documentation
• PLC Diagnostics

Automation – SIMATIC TI

APT Programming

Course code: SCT-TIAPTP1B

Target audience
This is an entry-level course on APT programming for personnel who are involved in developing or sustaining application programs in a process control environment.

Course Profile
This course is structured to teach an APT program design procedure and how to write correct APT language syntax. The course topics are presented in the order that an individual would follow in developing an APT solution within the PCS environment. The course format is a combination of instruction and hands-on exercises.

Objectives
Upon completion of this course, the student shall be able to:
• Traverse the APT levels that are used to generate a structured program.
• Divide a process into APT units by applying general rules for program structuring.
• Write proper language syntax in both sequential and continuous function charts.
• Develop a basic APT program following proven design strategies and techniques.
• Explore the power of APT within the system framework of the Process Control System.

Topics
• General Introduction of APT
  – ICONS
  – Program Content level
  – Unit content level CFCs and SFCs
  – APT Tables
• APT Hierarchy and Terminology
• APT Program Design procedure
• APT Devices and Device extensions
• Using the APT Debug Functions
• Programming in Math Language
• Programming Continuous Function Charts
• Programming PID Loops and Analog Alarms
• Programming Sequential Function Charts
• Programming Recipes
• PCS Tag Translation procedure
Need help finding the right training class?

## Machine Tool – Power Line / HMI Advanced

### Learning Map

Foundation and Pre-requisite training courses are available for beginners in the form of our online, self-paced courses. Our Technology catalog offers general and Siemens-specific titles including Intro to PLC’s, Siemens PLC Programming concepts, and Function Block for Siemens PLC’s. Visit www.usa.siemens.com/ospt for a complete list of course offerings.

### Core courses

<table>
<thead>
<tr>
<th>Course Name</th>
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<th>Duration</th>
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<tr>
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<td>4.5 days</td>
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<tr>
<td>D Series Operations &amp; Programming 2 w/ HMI Advanced</td>
<td>SCT-SN84DP2B</td>
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<tr>
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<td>SCT-SN84DM1A</td>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>840Dpl Maintenance 2 w/ HMI Advanced</td>
<td>SCT-SN84DM2A</td>
<td>4.5 days</td>
</tr>
</tbody>
</table>

### Online instructor-led courses

- **SCT-SD61UM1A**
  - 611U Maintenance
  - 4 days

### Optional courses

- **SCT-SN84DM1A**
  - 840Dpl Maintenance 1 w/ HMI Advanced
  - 4.5 days

- **SCT-SN84DM2A**
  - 840Dpl Maintenance 2 w/ HMI Advanced
  - 4.5 days

- **SCT-SNSSIM2A**
  - 840Dpl Safety Integrated Maintenance
  - 4.5 days
CNC – SINUMERIK Power Line

611U Maintenance

Course code: SCT-SD61UM1A

Target audience
This course is for shop level maintenance technicians who are expected to troubleshoot to module level.

Course Profile
This course provides the skills and knowledge that maintenance electricians require for installing, sustaining, and troubleshooting the SIMODRIVE 611U. The goal of the class is to teach students to identify the cause of various types of problems associated with the drive and to implement the appropriate solution.

Objectives
Upon completion of this course, the student shall be able to:
• Identify various types of problems associated with SIMODRIVE 611U
• Tune the drive using SIMOCOM-U software
• Control the drive using PROFIBUS and/or hardwired interfaces.
• Troubleshoot the drive unit
• Perform maintenance tasks on the drive unit

Topics
• Types of the servomotors
• Principles of pulse width modulation (PWM)
• Installation and use of SIMOCOM-U software
• Working with assemblies and subassemblies
• Connecting Interfaces for the Infeed/Regenerative (E/R) and/or Unregulated Infeed (UIE) modules
• Starting up the Infeed/Regenerative (E/R) and/or UIE modules
• Troubleshooting the Infeed/Regenerative (E/R) and UIE module
• Connecting interfaces for the 611U module
• Diagnostic features of the feed module
• Start-up of the 611U module
• Matching the motor to a feed module inverter
• Tuning the motor using SIMOCOM-U software

CNC – SINUMERIK Power Line

840Dpl Maintenance 1 w/ HMI Advanced

Course code: SCT-SN84DM1A

Target audience
This course is for maintenance personnel of CNC machines that utilize the SINUMERIK 840D/840D F control, with the MMC-103 or PCU-50 Operator Interfaces. Personnel using the MMC-100.2 or HT-6 Operator Interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

Prerequisites
• Microsoft Windows XP Expertise

Course Profile
This course emphasizes the maintenance aspects of the control. A complete overview of the softkey menus of the SINUMERIK 840D/840D F control, with the MMC-103 or PCU-50 Operator Interfaces. Demonstrations are given on how to competently manage maintenance functions and how to backup and restore the PLC program and control data. Class format is predominately hands-on exercises.

Objectives
Upon completion of this course, the student shall be able to:
• Explain the function of the drive in a closed loop application
• Identify the major components of the drive system
• Identify the external interface signal connections
• Commission the drive for speed/torque setpoint mode
• Commission the drive for position mode
• Install start up software (SIMOCOM_U) and/or Unregulated Infeed (UIE) modules
• Control the drive using PROFIBUS and/or hardwired interfaces.
• Troubleshoot the drive unit
• Perform maintenance tasks on the drive unit

Topics
• TYPES OF THE SERVOMOTORS
• PRINCIPLES OF PULSE WIDTH MODULATION (PWM)
• INSTALLATION AND USE OF SIMOCOM-U SOFTWARE
• WORKING WITH ASSEMBLIES AND SUBASSEMBLIES
• CONNECTING INTERFACES FOR THE INFED/REGEN (F/R) AND/OR UNREGULATED INFED (UIE) MODULES
• STARTING UP THE INFED/REGEN (F/R) AND/OR UIE MODULES
• TROUBLESHOOTING THE INFED/REGEN (F/R) AND UIE MODULE
• CONNECTING INTERFACES FOR THE 611U MODULE
• DIAGNOSTIC FEATURES OF THE FEED MODULE
• START-UP OF THE 611U MODULE
• MATCHING THE MOTOR TO A FEED MODULE INVERTER
• TUNING THE MOTOR USING SIMOCOM-U SOFTWARE

CNC – SINUMERIK Power Line

840Dpl Maintenance 2 w/ HMI Advanced

Course code: SCT-SN84DM2A

Target audience
This course is for maintenance personnel of CNC machines that utilize the SINUMERIK 840D/840D F control, with the MMC-103 or PCU-50 Operator Interfaces. Personnel using the MMC-100.2 or HT-6 Operator Interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

Prerequisites
• 840Dpl Maintenance 1 w/HMI Advanced

Course Profile
This course provides a complete overview of the system hardware, software and configuration of the SINUMERIK 840D CNC, and the maintenance and troubleshooting procedures for the 611D Digital Servo drive system. The course includes information regarding the hardware, configuration, and commissioning procedures for utilization of the SIMODRIVE 611D. Class format is predominately hands-on exercises.

Objectives
Upon completion of this course, the student shall be able to:
• Explain the function of the drive in a closed loop application
• Identify the major components of the drive system
• Identify the external interface signal connections
• Commission the drive for speed/torque setpoint mode
• Commission the drive for position mode
• Install start up software (SIMOCOM_U) and/or Unregulated Infeed (UIE) modules
• Control the drive using PROFIBUS and/or hardwired interfaces.
• Troubleshoot the drive unit
• Perform maintenance tasks on the drive unit

Topics
• TYPES OF THE SERVOMOTORS
• PRINCIPLES OF PULSE WIDTH MODULATION (PWM)
• INSTALLATION AND USE OF SIMOCOM-U SOFTWARE
• WORKING WITH ASSEMBLIES AND SUBASSEMBLIES
• CONNECTING INTERFACES FOR THE INFED/REGEN (F/R) AND/OR UNREGULATED INFED (UIE) MODULES
• STARTING UP THE INFED/REGEN (F/R) AND/OR UIE MODULES
• TROUBLESHOOTING THE INFED/REGEN (F/R) AND UIE MODULE
• CONNECTING INTERFACES FOR THE 611U MODULE
• DIAGNOSTIC FEATURES OF THE FEED MODULE
• START-UP OF THE 611U MODULE
• MATCHING THE MOTOR TO A FEED MODULE INVERTER
• TUNING THE MOTOR USING SIMOCOM-U SOFTWARE
CNC – SINUMERIK Power Line
840Dpl Safety Integrated Maintenance

Course code: SCT-SN5SIM2A

Target audience
This advanced course is designed for controls engineers and service specialists who use the SINUMERIK 840D and Safety Integrated (SI) functions in machine tool applications.

Prerequisites
• 840Dpl Maintenance 2 w/ HMI Advanced

Course Profile
This course provides the knowledge and skills that controls engineers and/or maintenance technicians require for familiarization and the operation of an automated machine tool, equipped with a SINUMERIK 840D CNC which uses the optional Safety Integrated System.

Objectives
Upon completion of this course, the student shall be able to:
• Understand the concepts of safety technology and the system requirements for Safety Integrated.
• Have a working knowledge of safety-oriented inputs and outputs for DMP Modules.
• Have a working knowledge of safety-oriented inputs and outputs for Profi Safe Modules.
• Understand the principles related to safe communication.
• Identify, understand, and use Machine Data and interface signals related to Safety Integrated applications.
• Perform error detection procedures related to Safety Integrated applications.
• Evaluate diagnostics and alarm displays
• Understand and perform Test Stop procedures.
• Understand Safety Integrated systems with SAFE SPL and without SAFE SPL.

Topics
• Safety-oriented inputs and outputs
• Safe Standstill
• Safe operational stop
• Securely reduced speed
• Safe software limit switches
• Safe stopping process
• Safe programmable logic
• Safety related Machine Data
• Understand OEM safety related alarms
• Understand checksums

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CNC – SINUMERIK Power Line
D Series Operations & Programming 1 w/ HMI Advanced

Course code: SCT-SN84DP1B

Target audience
This course is for Operator/Programmers of CNC machines that utilize the SINUMERIK 840D / 810D / 840Di controls, with MMC-103 or PCU-50 Operator Interfaces. Personnel who are using the MMC-100.2 or HT-6 Operator Interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

Prerequisites
• MS Windows Expertise

Course Profile
This course provides a complete overview of the softkey menus of the SINUMERIK D-series CNC and describes the basic principles of operating the control. Demonstrations are given on how to manage part programs, define offsets, and restore programs and control data. Class format is predominately hands-on exercises. Students use SINUMERIK 840D CNC simulators to build proficiency in moving through various menus and in managing part programs.

Objectives
Upon completion of this course, the student shall be able to:
• Edit and store part programs in editing mode, using Siemens-installed editors.
• Back-up and restore workpieces, part programs, and control data to/from internal hard drive.
• Back-up and restore workpieces, part programs, and control data to/from an external data medium.

Topics
• Program management
• Program and subprogram directories
• The Workpiece directory
• Editing subprograms and part programs
• Saving programs to the hard disk
• Saving workpieces and programs to an external data medium

---

CNC – SINUMERIK Power Line
D Series Operations & Programming 2 w/ HMI Advanced

Course code: SCT-SN84DP2B

Target audience
This course is for Programmers/Engineers who need an advanced understanding of the programming dialect used in the SINUMERIK 840D controls, with a PCU-50/70 Operating Interface.

Prerequisites
• D Series Operations & Programming 1 w/ HMI Advanced

Course Profile
The programming language of the control still retains G-codes, and in fact, can be programmed exclusively using the traditional G-code functions. However, the D-series controls (840D, 840Di; 810D) offer many additional preparatory commands and functions which are currently unique. The course format is a combination of instruction and hands-on exercises. SINUMERIK 840D CNC simulators are set up in the classroom, and configured to simulate an application. Students are assigned practice programs to complete and are encouraged to present machine specific program applications for review within the classroom environment.

Objectives
Upon completion of this course, the student shall be able to:
• Write simple programs for standard machining operations.
• Explain the use of machining (canned) cycles.
• Describe how predefined subroutines and preparatory functions are used.
• Define essential terms
• Describe some of the more sophisticated programming functions

Topics
• Program definitions: Axis coordinating systems, machining cycles and transformations
• File management
• Contour definitions: Interpolation commands, tool compensation/frames, and transition commands
• Variables and arguments
• Advanced functions including NC/PLC Synchronized actions

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Learning Map

**Foundation and Pre-requisite training courses** are available for beginners in the form of our online, self-paced courses. Our Technology catalog offers general and Siemens-specific titles including Intro to PLC’s, Siemens PLC Programming concepts, and Function Block for Siemens PLC’s. Visit www.usa.siemens.com/ospt for a complete list of course offerings.

### 840D Solution Line

#### HMI Advanced Maintenance

- **S7 Programming 1**
  - Course code: SCT-S7TIAP1B
  - Duration: 4.5 days

- **840Dsl Maintenance 1** w/ HMI Advanced
  - Course code: SCT-SN84SM1A
  - Duration: 4.5 days

- **840Dsl Maintenance 2** w/ HMI Advanced
  - Course code: SCT-SN84SM2A
  - Duration: 4.5 days

#### HMI Operate Maintenance

- **S7 Programming 1**
  - Course code: SCT-S7TIAP1B
  - Duration: 4.5 days

- **840Dsl Maintenance 1** w/ Operate
  - Course code: SCT-SNSLM1A-OP
  - Duration: 4.5 days

- **840Dsl Maintenance 2** w/ Operate
  - Course code: SCT-SNSLM2A-OP
  - Duration: 4.5 days

#### HMI Advanced Operator

- **D Series Operations & Programming 1** w/ HMI Advanced
  - Course code: SCT-SN84DP1B
  - Duration: 4.5 days

- **D Series Operations & Programming 2** w/ HMI Advanced
  - Course code: SCT-SN84DP2B
  - Duration: 4.5 days

- **840Dsl Maintenance 2** w/ HMI Advanced
  - Course code: SCT-SN84SM2A
  - Duration: 4.5 days

### 840D Safety Integrated Maintenance

- **S7 Programming 1**
  - Course code: SCT-S7TIAP1B
  - Duration: 4.5 days

- **840Dsl Maintenance 1** w/ Operate
  - Course code: SCT-SNSLM1A-OP
  - Duration: 4.5 days

- **840Dsl Maintenance 2** w/ Operate
  - Course code: SCT-SNSLM2A-OP
  - Duration: 4.5 days

### Optional and specialty courses:

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<td>2 days</td>
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</table>
CNC – SINUMERIK Solution Line
840Dsl Maintenance 1
w/ HMI Advanced
Course code: SCT-SN84SM1A

Target audience
This course is designed for electrical/electronic end-user maintenance personnel for machine tools using the new SINUMERIK 840Dsl (Solution Line) controls. The course presumes the customer is using the PCU 50.3, Windows XP-based HMI Advanced software. Personnel using the PCU 20 / HTB / or HMI TCU (Thin Client Unit) interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

Prerequisites
• Microsoft Windows XP Expertise

Course Profile
This course emphasizes the maintenance aspects of this new version of the SINUMERIK 840D. An overview of the softkey menus of the control is provided, including the basic principles of operating the control. Demonstrations are given on how to competently manage maintenance functions, and for back-up/restore functions of the NC and PLC series start-up.

Objectives
Upon completion of this course, the student shall be able to:
• Identify the major SINAMICS S120 hardware and indicators in an 840Dsl application.
• Access and utilize the major operating areas of the control.
• Edit and store machine data.
• Back-up and restore NC data to the internal hard drive.
• Back-up and restore PLC program data to the internal hard drive.
• Back-up and restore PROFIBUS drive data to the internal hard drive.
• Back-up and restore NC data to an external data medium.
• Back-up and restore PLC program data to an external data medium.
• Back-up and restore PROFIBUS drive data to an external data medium.

Topics
• Data back-up and restoration
• Diagnostic functions
• Hardware Overview

CNC – SINUMERIK Solution Line
840Dsl Maintenance 1
w/ Operate
Course code: SCT-SN84SM1A-OP

Target audience
This course is designed for electrical/electronic end-user maintenance personnel for machine tools using the new SINUMERIK 840Dsl (Solution Line) controls. This course presumes the customer is using the PCU 50 or an HMI TCU (Thin Client Unit), with the SINUMERIK Operate system platform.

Prerequisites
• MS Windows Expertise

Course Profile
This course emphasizes the maintenance aspects of this new version of the SINUMERIK 840D. An overview of the softkey menus of the control is provided, including the basic principles of operating the control. Demonstrations are given on how to competently manage maintenance functions, and for back-up/restore functions of the NC, PLC and PROFIBUS Drive series start-up archive files.

Objectives
Upon completion of this course, the student shall be able to:
• Identify the major SINAMICS S120 hardware and indicators in an 840Dsl application.
• Access and utilize the major operating areas.
• Edit and store machine data.
• Back-up and restore NC data, PLC program and PROFIBUS drive data to the internal hard drive or System CF Card.
• Back-up and restore NC data, PLC program and PROFIBUS drive data to an external data medium.
• Diagnose problems using SIEMENS generated alarm displays.
• Use on-screen help functions to help diagnose alarm related problems.
• Perform file management functions using System Data Management.

Topics
• Data back-up and restoration
• Diagnostic functions
• Hardware Overview
• PLC communications and basic diagnostic functions.

CNC – SINUMERIK Solution Line
840Dsl Maintenance 2
w/ HMI Advanced
Course code: SCT-SN84SM2A

Target audience
This course is for maintenance personnel of CNC machines that utilize the SINUMERIK 840D / 810D controls, using the MMC-103 or PCU-50 Operator Interfaces. Personnel using the MMC-100.2 or HT-6 Operator Interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

Prerequisites
• 8400pl Maintenance 1 w/HMI Advanced

Course Profile
This course provides a complete overview of the system hardware, software and configuration of the SINUMERIK 840D CNC, and its integrated SIMODRIVE 611D Digital Servo drive system. The course includes information regarding the hardware, configuration, and commissioning procedures for utilization of the SIMODRIVE 611D.

Objectives
Upon completion of this course, the student shall be able to:
• Back-up and restore all data to the MMC-103 / PCU-50, using Symantec GHOST software.
• Access and interpret the control's status displays for troubleshooting purposes.
• Analyze system messages, alarm messages, and LED indicators to identify failures.
• Set and/or adjust specific machine data in the control.
• Optimize a closed loop position control system.

Topics
• Initialization of the control
• Initialization of the digital servo system
• System data back-up and restoration
• PLC User program back-up
• Interface signals and status display function
• Axis position control
• Spindle control
• Identifying OEM generated alarms and operator messages
• NC Auxiliary functions
• Identification and setting of 611-D module and motor data in the 840D
• Diagnosis of servo problems in the 840D
CNC – SINUMERIK Solution Line

840Dsl Maintenance 2 w/ Operate

Course code: SCT-SNSSL2A-OP

Target audience
This advanced/maintenance course is designed for electrical/electronic end user maintenance personnel, and supporting manufacturing/production engineers who wish to know more about the new SINUMERIK 840Dsl (Solution Line) CNC Controls.

Prerequisites
• MS Windows XP Expertise
• 840Dsl Maintenance 1 w/ Operate

Course Profile
This course includes information regarding system hardware, system software, configuration, and commissioning procedures related to both the 840Dsl and its integrated SINAMICS S-120 servo/spindle drive system. Course format is a mixture of lecture and hands-on exercises. SINUMERIK 840Dsl simulators are utilized to allow the student to build proficiency with the hardware and software systems.

Objectives
Upon completion of this course, the student shall be able to:
• Back-up and restore all NC data to the control
• Back-up and restore all PLC data
• Back-up and restore all PROFIBUS drive data
• Access and interpret control status displays for troubleshooting purposes
• Analyze system messages, alarm messages, and LED indications to identify failures
• Set and/or adjust machine data
• Optimize a closed loop position control system
• Perform practical start-up and servicing.

Topics
• Drive configuration and fundamentals of optimization
• Adaptation of control functions
• Start-up of compensations, synchronous actions, and axial coupling
• PLC Interface
• Axis position control
• Spindle control
• NC Auxiliary functions

CNC – SINUMERIK Solution Line

840Dsl Operations & Programming 1 w/HMI Operate

Course code: SCT-SNSSLP1A-OP

Target audience
This course is for Operator/Programmers of CNC machines that utilize the new SINUMERIK 840Dsl (Solution Line) controls. This course presumes the customer is using the PCU 50.3 or an HMI TCU (Thin Client Unit), with the SINUMERIK Operate system platform.

Prerequisites
• MS Windows Expertise

Course Profile
This course provides a complete overview of the soft key menus of the SINUMERIK 840Dsl (Solution Line) controls, and describes the basic principles of operating the control. Demonstrations are given on how to manage part programs, define offsets, save and restore programs and control data.

Objectives
Upon completion of this course, the student shall be able to:
• Edit and store part programs in editing mode, using Siemens-installed editors.
• Back-up and restore work pieces, part programs, and control data to/from internal hard drive or the system CF Card.
• Back-up and restore work pieces, part programs, and control data to/from an external data medium.
• Use all Manual Mode operations.
• Use all MDI Mode operations.
• Use all Automatic Mode operations.
• Set and edit work offsets.
• Set and edit tool offsets.

Topics
• Program and subprogram directories.
• The Work piece directory.
• Editing subprograms and part programs.
• Saving programs to the hard disk.
• Saving work pieces and programs to an external data medium.
• Manual Mode operations.
• MDI Mode operations
• Automatic Mode operations.
• Parameter editing operations.

CNC – SINUMERIK Solution Line

840Dsl Safety Integrated Acceptance Test Workshop

Course code: SCT-AUSATW1A

Target audience
This workshop is designed for controls engineers who are responsible for sign off authorization on the SINUMERIK 840Dsl Safety Integrated Acceptance Test documentation.

Course Profile
This course identifies standard safety integrated functions and the Acceptance Test procedures needed to document the results. The goal of the workshop is to provide the knowledge needed to identify the differences between OEM documentation procedures and the necessary documentation that is required by the automotive industry to accept the OEM Safety Acceptance Test documentation. Note: This workshop is not intended to give the student the extensive SI knowledge required to determine if the results of the Safety Acceptance Test are satisfactory.

Objectives
Upon completion of this course, the student shall be able to:
• Understand the concepts of safety technology and the system requirements for Safety Integrated.
• Understand the concepts of standard safety integrated functions.
• Understand the concepts and requirements of checksums.
• Participate in a Safety Integrated Acceptance Test procedure.
• Compare acceptable and unacceptable test results.

Topics
• Safety Integrated concepts
• System requirements
• Standard safety integrated functions
• Safe programmable logic
• Checksums
• Safety Integrated Acceptance Test
• Documentation results

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Need help finding the right training class?
CNC – SINUMERIK Solution Line
840Dsl Safety Integrated for OEMs

Course code: SCT-SNDSL11A

**Target audience**
German Course Code equivalent: NC-845LSIW. This advanced course is designed for controls engineers and service specialists who configure and commission the SINUMERIK 840Dsl Safety Integrated (Si) functions in machine tool applications.

**Prerequisites**
- 840Dsl Maintenance 1 w/HMI Advanced
- 840Dsl Maintenance 2 w/HMI Advanced
- 57 TIA Programming 1 OR
- 840Dsl Maintenance 1 w/Operate
- 840Dsl Maintenance 2 w/Operate
- 57 TIA Programming 1

**Course Profile**
During this course, the student will learn about configuring and commissioning the function Safety Integrated using the SINUMERIK 840Dsl.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Understand the concepts of safety technology and the system requirements for Safety Integrated.
- Have a working knowledge of safety-oriented inputs and outputs for PROFISafe Modules.
- Understand the principles related to safe communication over PROFINET and PROFIBUS.
- Commission, understand, and use SAFE Machine Data and interface signals related to Safety Integrated Inputs and Outputs.
- Commission Safety Integrated systems with SAFE SPL (Safe Programmable Logic)
- Commission Safe Operational Stop, Safe Standstill, Safe Velocity, and Safe Cams.
- Commission SAFE limits and understand the User Agreement and its implications.

**Topics**
- General information on safety technology; new standards
- Description of the safe basic functions
- Procedure during startup and troubleshooting
- Description of the machine data and interface signals

---

CNC – SINUMERIK Solution Line
840Dsl Safety Integrated Maintenance

Course code: SCT-SNLSLM1A

**Target audience**
This advanced course is designed for controls engineers and service specialists who use the SINUMERIK 840Dsl and Safety Integrated (Si) functions in machine tool applications.

**Prerequisites**
- 840Dsl Maintenance 2 w/HMI Advanced AND
- 57 TIA Programming 1 OR
- 840Dsl Maintenance 2 w/Operate

**Course Profile**
This course provides the knowledge and skills that controls engineers and/or maintenance technicians require for familiarization and the operation of an automated machine tool, equipped with a SINUMERIK 840Dsl CNC which uses the optional Safety Integrated System. The goal of the class is to teach the students to identify the various types of applications associated with the Safety Integrated System, to achieve working knowledge of the concepts, and to identify and diagnose Safety Integrated related problems.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Understand the concepts of safety technology and the system requirements for Safety Integrated.
- Have a working knowledge of safety-oriented inputs and outputs for PROFISafe Modules.
- Understand the principles related to safe communication.
- Identify, understand, and use Machine Data and interface signals related to Safety Integrated applications.
- Perform error detection procedures
- Evaluate diagnostics and alarm displays

**Topics**
- Safety-oriented inputs and outputs
- Safe operational stop
- Securely reduced speed
- Safe software limit switches
- Safe programmable logic

---

CNC – SINUMERIK Solution Line
D Series Operations 1 w/ HMI Advanced

Course code: SCT-SN84DP1B

**Target audience**
This course is for Operator/Programmers of CNC machines that utilize the SINUMERIK 840D/810D/840Di controls, with MMC-103 or PCU-50 Operator Interfaces. Personnel who are using the MMC-100.2 or HT-6 Operator Interfaces are urged to contact Siemens Customer Training prior to enrolling in this class.

**Prerequisites**
- MS Windows Expertise

**Course Profile**
This course provides a complete overview of the softkey menus of the SINUMERIK D-series CNC and describes the basic principles of operating the control. Demonstrations are given on how to manage part programs, define offsets, and restore programs and control data.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Edit and store part programs in editing mode, using Siemens-installed editors.
- Back-up and restore workpieces, part programs, and control data to/from internal hard drive.
- Back-up and restore workpieces, part programs, and control data to/from an external data medium.

**Topics**
- Program management
- Program and subprogram directories
- The Workpiece directory
- Editing subprograms and part programs
- Saving programs to the hard disk
- Saving workpieces and programs to an external data medium

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CNC – SINUMERIK Solution Line
D Series Operations & Programming 2 w/ HMI Advanced

Course code: SCT-SN84DP2B

Target audience
This course is for Programmers/Engineers who need an advanced understanding of the programming dialect used in the SINUMERIK 840D controls, with a PCU-50/70 Operating Interface.

Prerequisites
• D Series Operations & Programming 1 w/ HMI Advanced

Course Profile
The programming language of the control still retains G-codes, and in fact, can be programmed exclusively using the traditional G-code functions. However, the D-series controls (840D, 840Dy, 810D) offer many additional preparatory commands and functions which are currently unique.

Objectives
Upon completion of this course, the student shall be able to:
• Write simple programs for standard machining operations.
• Explain the use of machining (canned) cycles.
• Describe how predefined subroutines and preparatory functions are used.
• Define essential terms
• Describe some of the more sophisticated programming functions

Topics
• Program definitions
• File management
• Contour definitions
• Variables and arguments
• Advanced functions

Online Instructor-led Training
840DsI Operations & Programming 1 w/HMI Operate

Course code: SCT-SNOILSN5LP1A-OP

Target audience
This course is for Operator/Programmers of CNC machines that utilize the new SINUMERIK 840DsI (Solution Line) controls. This course presumes the customer is using the PCU 50.3 or an HMI TCU (Thin Client Unit), with the SINUMERIK Operate system platform.

Prerequisites
• MS Windows Expertise

Course Profile
This course provides a complete overview of the soft key menus of the SINUMERIK 840DsI (Solution Line) controls, and describes the basic principles of operating the control. Demonstrations are given on how to manage part programs, define offsets, save and restore programs and control data. Class format is predominately hands-on exercises. Students use SINUMERIK 840DsI CNC SinuTrain for SINUMERIK Operate simulator software to build proficiency in moving through various menus, managing part programs and setting and editing work and tool offsets.

Objectives
Upon completion of this course, the student shall be able to:
• Edit and store part programs in editing mode, using Siemens-installed editors.
• Back-up and restore work pieces, part programs, and control data to/from internal hard drive or the system CF Card.
• Back-up and restore work pieces, part programs, and control data to/from an external data medium.
• Use all Manual Mode operations.
• Use SINUMERIK 840DsI CNC SinuTrain for SINUMERIK Operate simulator software.
• Use all MDI Mode operations.
• Use all Automatic Mode operations.
• Set and edit work offsets.
• Set and edit tool offsets.

Topics
• Control operation management
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Learning Map

Foundation and Pre-requisite training courses are available for beginners in the form of our online, self-paced courses. Our Technology catalog offers general and Siemens-specific titles including Intro to PLC’s, Siemens PLC Programming concepts, and Function Block for Siemens PLC’s. Visit www.usa.siemens.com/ospt for a complete list of course offerings.

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Prerequisites
- Completion of the following quickSTEP online course: Basics of AC Drives

Course Profile
This course provides training on the advantages of the motion control and apos - s innovative technology for easy installation, troubleshooting and diagnostics.

Objectives
- Upon completion of this course, the student shall be able to:
  - Configure logic and set-up the drive for proper operation.
  - Identify the use of the available programmable analog & binary Inputs/Outputs.
  - Develop a logical and concise method of effectively troubleshooting indicated drive FAULTS and WARNINGS.
  - Configure and operate the CUMC using “Simolink.”
  - State the basic function and/or use of the CUMC option boards.
  - Identify hardware configurations and verify required connections.
  - Use motor and drive data for proper initialization of the CUMC.

Topics
- Introduction to CUMC Drive Hardware
- Parameter settings
- Motor data & related drive settings
- Initial setup requirements
- Overview of MPU board logic diagrams
- Analog & Binary I/O configuration
- Overview of the CUMC communication capabilities
- Overview of the CUMC OPTIONS
Drives - SIMOTION, MASTERDRIVE, ROBICON

Drives - SIMOTION, MASTERDRIVE, ROBICON

ROBICON W-Series

Setup & Maintenance

Course code: SCT-DVSNWM1A

Target audience
This course is for engineering and maintenance personnel responsible for installing, maintaining, and troubleshooting drive systems that utilize the SIMAMICS ROBICON W-Series Drives.

Prerequisites
- IPPO Online Courses, 20 AC Motor Basics, 24 AC Drive Basics

Course Profile
This course is intended to provide knowledge and skills related to the ROBICON W-series drives as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises aimed at developing job-related knowledge and skills.

Objectives
Upon completion of this course, the student shall be able to:
- Locate modules, terminals, options, and features of the SIMAMICS W Series Drives
- Commission the Drive with AOP30 and SIMAMICS STARTER
- Perform all required Drive optimizations
- Take local control of a drive using the AOP30 and the STARTER Control Panel
- Upload, back-up, and download projects to the Drive system
- Firmware Upgrade/Downgrade
- Compare and analyze parameter files
- Configure Analog, Digital, and Comm. I/O
- Configure, Trace, and Evaluate BICO connections in the drive control logic
- Configure common Drive Functions
- Evaluate drive system performance using the trace function
- Evaluate operating states, alarms and fault codes

Topics
- Drive construction, options, and features
- SIMAMICS STARTER
- Commissioning
- Drive Functions
- Diagnostics and Troubleshooting
- Maintenance and Repair
- Integration into an Automation System

4.5 DAYS

Motion Control - SIMOTION

SIMOTION System Course

Course code: SCT-DVSMOM1A

Target audience
This course is for SIMOTION system developers and users who are responsible for creating, commissioning, or maintaining SIMOTION based motion control systems.

Prerequisites
- SIMAMICS S Set up and Maintenance highly recommended

Course Profile
This course is intended to provide knowledge and skills related to SIMOTION systems as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises. This course will utilize the D425-2 DP/PN motion control module and the SIMAMICS servo drive controller for all exercises. The skills acquired will be portable to SIMOTION C-based and P-based controllers.

Objectives
Upon completion of this course, the student shall be able to:
- Locate modules, terminals, options, and features of the SIMOTION Controller and the SIMAMICS S120 Drive
- Commission the SIMAMICS servo controller for use with SIMOTION.
- Upload, back-up, and download projects to SIMOTION and SIMAMICS
- Create, document, test, and troubleshoot a SIMOTION program.
- Create and monitor system variables.
- Interpret diagnostic codes and messages.

Topics
- SIMOTION and SIMAMICS construction, options, and features
- Commissioning SIMAMICS and SIMOTION
- SIMOTION Execution System
- Configuring axes - Drive optimization and SCOUT configuration
- Programming in MCC, Ladder, Structured Text
- Monitoring and Troubleshooting User Programs
- Communications and HMI
- Diagnostics and Troubleshooting
- Monitoring the system with IT DIAG

4.5 DAYS

Motion Control - SIMOTION

SIMOTION System Maintenance

Course code: SCT-DVMSYM1A

Target audience
This course is for Maintenance Technicians and Site Engineers who are responsible for maintaining systems with Siemens motion based control systems including SIMOTION and SIMAMICS S.

Prerequisites
- Siemens Online Self-paced Training, Automation: Siemens, 20 AC Motor Basics, 24 AC Drive Basics

Course Profile
This course is intended to provide knowledge and skills related to SIMOTION systems as it pertains to operation, maintenance, diagnostics, troubleshooting and repair. It is formatted as a combination of instruction and carefully structured, hands-on exercises. This course will utilize the D425-2 DP/PN motion control module and the SIMAMICS servo drive controller for all exercises. The skills acquired will be portable to SIMOTION C-based and P-based controllers.

Objectives
Upon completion of this course, the student shall be able to:
- Locate modules, terminals, options, and features of the SIMOTION Controller and the SIMAMICS S120 Drive
- Commission the SIMAMICS servo controller for use with SIMOTION.
- Upload, back-up, and download projects to SIMOTION and SIMAMICS
- Create, document, test, and troubleshoot a SIMOTION program.
- Create and monitor system variables.
- Interpret diagnostic codes and messages.

Topics
- SIMOTION and SIMAMICS construction, options, and features
- Commissioning SIMAMICS and SIMOTION
- SIMOTION Execution System
- Configuring axes - Drive optimization and SCOUT configuration
- Programming in MCC, Ladder, Structured Text
- Monitoring and Troubleshooting User Programs
- Communications and HMI
- Diagnostics and Troubleshooting
- Monitoring the system with IT DIAG

4.5 DAYS
Motion Control - SIMOTION

SIMOTION System Programming

Course code: SCT-DVSMOP1A

Target audience
This course is for SIMOTION system developers and users who are responsible for creating, commissioning, or maintaining SIMOTION based motion control systems.

Prerequisites
• SIMOTION System Course

Course Profile
This course enables the participant to structure, generate and put in operation complex SIMOTION control program using MCC-charts and Structured Text. Examples of different applications user programs will be generated and ways of structuring programs will be shown. The focus lies on programming with Structured Text, Ladder and MCC.

Objectives
Upon completion of this course, the student shall be able to:
• Create programs in Structured Text, Ladder, and MCC
• Use commands for motion control within the user program
• Assign programs to execution system
• Create structures and subprograms (FC and FB)
• Use function blocks of certain libraries
• Use variables and data structures
• Use tools for testing and diagnosis of the program

Topics
• System Design Functionality
• Programming
• Structured Text
• POS Axis Output CAM
• Gear CAM
• Libraries

---

Drives - SINAMICS, MASTERDRIVE, ROBICON

SINAMIC S 6RA80 DCM Setup & Maintenance

Course code: SCT-DVDCMM1A

Target audience
This course is for engineering and maintenance personnel responsible for installing, maintaining, and troubleshooting drive systems that utilize the 6RA80 SINAMICS DC MASTER or DCM Control Module.

Course Profile
This course is intended to provide knowledge and skills related to the 6RA80 SINAMICS DC MASTER or DCM Control Module as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises aimed at developing job-related knowledge and skills.

Objectives
Upon completion of this course, the student shall be able to:
• Locate modules, terminals, options, and features of the SINAMICS DC MASTER Converter
• Perform commissioning using the BOP20 and AOP30 operator panels and SINAMICS STARTER
• Perform all required Drive optimizations
• Upload, back-up, and download projects to the Drive system
• Firmware Upgrade/Downgrade
• Compare and analyze parameter files
• Configure Analog, Digital, and Comm. I/O
• Configure, Trace, and Evaluate BICO connections in the drive control logic
• Configure common Drive Functions
• Evaluate drive system performance using the trace function
• Evaluate operating states, alarms and fault codes

Topics
• DCM Drive construction, options, and features
• SINAMICS STARTER
• Commissioning
• DCM Drive Functions
• Diagnostics and Troubleshooting
• Maintenance and Repair
• Integration into an Automation System
• Peer to Peer Interfaces
• Drive Control Chart (DCC)

---

Drives - SINAMICS, MASTERDRIVE, ROBICON

SINAMICS G130/G150 Setup & Maintenance

Course code: SCT-DVSGM1A

Target audience
This course is for engineering and maintenance personnel responsible for installing, maintaining, and troubleshooting drive systems that utilize the SINAMICS G130/G150 Drive.

Prerequisites
• IPOV Online Courses, 20 AC Motor Basics, 24 AC Drive Basics

Course Profile
This course is intended to provide knowledge and skills related to the SINAMICS G130/ G150 drive as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises aimed at developing job-related knowledge and skills.

Objectives
Upon completion of this course, the student shall be able to:
• Locate modules, terminals, options, and features of the SINAMICS G130/G150.
• Commission the Drive with AOP30 and SINAMICS STARTER
• Perform all required Drive optimizations
• Take local control of a drive using the AOP30 and the STARTER Control Panel
• Upload, back-up, and download projects to the Drive system
• Firmware Upgrade/Downgrade
• Compare and analyze parameter files
• Configure Analog, Digital, and Comm. I/O
• Configure, Trace, and Evaluate BICO connections in the drive control logic
• Configure common Drive Functions
• Evaluate drive system performance using the trace function
• Evaluate operating states, alarms and fault codes

Topics
• Drive construction, options, and features
• SINAMICS STARTER
• Commissioning
• Drive Functions
• Diagnostics and Troubleshooting
• Maintenance and Repair
• Integration into an Automation System

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Drives - SINAMICS / MASTERDRIVE / ROBICON

**SINAMICS G120 Basic Maintenance**

Course code: SCT-DVG12M1A

**Target audience**
This course is intended for personnel responsible for the long term maintenance and diagnostics of the Siemens Drive.

**Prerequisites**
- Completion of the following quickSTEP online course: Basics of AC Drives

**Objectives**
Upon completion of this course, the student shall be able to:
- Trace voltage waveform from Input rectifier to Motor output.
- Utilize G120 Architecture to troubleshoot Hardware Modules
- Troubleshoot the Power Electronics
- Operate the Drive via IOP Keys
- Perform Basic Commissioning and Set Up via IOP
- Backup and Restore the Operating Program via Memory Card and IOP
- Establish communication with STARTER
- Upload, Archive, and Restore G120 Configuration via STARTER
- Control Drive via STARTER Control Panel
- Trace Signals within the G120 configuration utilizing BICO technology
- Troubleshoot Drive failure to respond to a Command Source and Setpoint Channel Source
- Use the Diagnostic Fault and Warning Buffer to troubleshoot the system
- Troubleshoot Regulation (speed or torque) problems
- Install or Replace a Motor, Power Module and Control Unit
- Replace a Cooling Fan
- Obtain technical support online or via hotline

**Topics**
- Safety, PPE, and ESD
- Perform Hardware Module Diagnostics
- Set up and Operate the G120 via Intelligent Operator Panel (IOP)
- Back-up and restore operating program via IOP and Memory Card
- Utilize STARTER software to Upload, Archive and Restore G120 Project
- Troubleshoot a SINAMICS drive system using STARTER application diagnostics
- Evaluate Drive System Performance
- Replace Defective Hardware

---

**SINAMICS S120 Basic Maintenance**

Course code: SCT-DVS12M1A

**Target audience**
This course is intended for personnel responsible for the long term maintenance and diagnostics of the Siemens Drive.

**Prerequisites**
- Completion of the following quickSTEP online course: Basics of AC Drives

**Objectives**
Upon completion of this course, the student shall be able to:
- Trace voltage waveform from Input rectifier to Motor output.
- Utilize S120 Architecture to troubleshoot Hardware Modules
- Troubleshoot the Power Electronics
- Operate the Drive via AOP30
- Perform Basic Commissioning and Set Up with AOP30
- Save the Operating Program to Memory Card
- Establish communication with STARTER
- Upload, Archive, and Restore S120 Configuration via STARTER
- Control Drive via STARTER Control Panel
- Trace Signals within the S120 configuration utilizing BICO technology
- Troubleshoot Drive failure to respond to a Command Source and Setpoint Channel Source
- Use the Diagnostic Fault and Warning Buffer to troubleshoot the system
- Troubleshoot Regulation (speed or torque) problems
- Install or Replace a Motor, Power Module, and Control Unit
- Replace a Cooling Fan
- Obtain technical support online or via hotline

**Topics**
- Safety, PPE, and ESD
- Perform Hardware Module Diagnostics
- Set up and Operate the S120 via AOP30
- Save operating program to Memory Card via AOP30
- Utilize STARTER software to Upload, Archive and Restore S120 Project
- Troubleshoot a SINAMICS drive system using STARTER application diagnostics
- Evaluate Drive System Performance
- Replace Defective Hardware
- Obtain technical support

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**SINAMICS S Setup & Maintenance**

Course code: SCT-DVS1M1A

**Target audience**
This course is for engineering and maintenance personnel responsible for installing, maintaining and troubleshooting drive systems that use the SINAMICS S (S110, S120, S150) drive systems.

**Prerequisites**
- Siemens Online Self-paced Training, Automation: Siemens, 20 AC Motor Basics, 24 AC Drive Basics

**Course Profile**
This course is intended to provide knowledge and skills related to the SINAMICS S drive as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises aimed at developing job-related knowledge and skills.

**Objectives**
Upon completion of this course, the student shall be able to:
- Locate modules, terminals, options, and features on the SINAMICS S series drives.
- Commission the Drive with SINAMICS STARTER
- Perform all required Drive optimizations
- Take local control of a drive using the STARTER Control Panel
- Upload, back-up, and download projects to the Drive system
- Firmware Upgrade/Downgrade
- Configure Analog, Digital, and Comm. I/O
- Configure, Trace, and Evaluate BICO connections in the drive control logic
- Configure common Drive Functions
- Evaluate drive system performance using the trace function
- Evaluate operating states, alarms and fault codes

**Topics**
- Drive construction, options, and features
- SINAMICS STARTER
- Commissioning
- Drive Functions
- Diagnostics and Troubleshooting
- Maintenance and Repair
- Integration into an Automation System
- Drive Control Chart (DCC)
- Technology Functions

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Drives & Motion – MASTERDRIVE / ROBICON / SIMOTION / SINAMICS

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Drives - SINAMICS, MASTERDRIVE, ROBICON

SINAMICS G120
Setup & Maintenance

Course code: SCT-DV120M1A

Target audience
This course is for engineering and maintenance personnel responsible for installing, maintaining and troubleshooting drive systems that use the SINAMICS G120 series AC drives.

Prerequisites
• Siemens Online Self-paced Training, Automation: Siemens, 20 AC Motor Basics, 24 AC Drive Basics

Course Profile
This course is intended to provide knowledge and skills related to the SINAMICS G120 as it pertains to commissioning, operation, configuration, maintenance, diagnostics, and troubleshooting. It is formatted as a combination of instruction and carefully structured, hands-on exercises aimed at developing job-related knowledge and skills.

Objectives
Upon completion of this course, the student shall be able to:
• Locate modules, terminals, options, and features of the SINAMICS G120 series drives.
• Commission the Drive with Operator Panels (IOP, BOP-2) and SINAMICS STARTER
• Perform all required Drive optimizations
• Take local control of a drive using Operator Panels and the STARTER Control Panel
• Upload, back-up, and download projects to the Drive system
• Configure Analog, Digital, and Comm. I/O
• Configure, Trace, and Evaluate BICO connections in the drive control logic
• Configure common Drive Functions
• Evaluate drive system performance using the trace function
• Evaluate operating states, alarms and fault codes

Topics
• Drive construction, options, and features
• SINAMICS STARTER
• Commissioning
• Drive Functions
• Diagnostics and Troubleshooting
• Maintenance and Repair
• Integration into an Automation System
• Technology Functions

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Learning Map

**Foundation and Pre-requisite training courses** are available for beginners in the form of our online, self-paced courses. Our Technology catalog offers general and Siemens-specific titles including Intro to PLC’s, Siemens PLC Programming concepts, and Function Block for Siemens PLC’s. Visit www.usa.siemens.com/ospt for a complete list of course offerings.

### Perfect Harmony

- **Next Generation Control Air Cooled**
  - SCT-DVSNAM1A

- **Next Generation Control Liquid-Cooled WCII**
  - LDA-LDNGLS1B

### Legacy

- **Legacy Control Air/Liquid-Cooled**
  - LDA-LDLALS1A

- **Legacy Control Liquid-Cooled WCII**
  - LDA-LDNGLS1C

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### Optional and specialty courses:

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<td>1 day</td>
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<tr>
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<td>LDA-LDNGAOT1</td>
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<tr>
<td>Next Generation Control Liquid Cooled – Operator Training</td>
<td>LDA-LDNGLOT1</td>
<td>0.5 days</td>
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<tr>
<td>Next Generation Control Liquid Cooled High Voltage</td>
<td>LDA-LDHVGE1A</td>
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<tr>
<td>SOP – System Operational Program</td>
<td>LDA-LDSOPE1A</td>
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### Online refresher courses:

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<td>LDA-LDNGAS1B-RA1</td>
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<tr>
<td>Operation, Maintenance and Repair (Gen3, Gen3E, Gen4), Refresher-B</td>
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<tr>
<td>Operation, Maintenance and Repair (Gen3, Gen3E, Gen4), Refresher-C</td>
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<tr>
<td>SINAMICS S Setup and Maintenance, Refresher-A</td>
<td>SCT-DVSNAM1A-RA1</td>
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<tr>
<td>SINAMICS S Setup and Maintenance, Refresher-C</td>
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</table>
Drives - Perfect Harmony

Legacy Control Air/Liquid-Cooled

Course code: LDA-LDLALS1A

Target audience
This course is intended for maintenance and electrical personnel, as well as, electrical engineers using Siemens Perfect Harmony Legacy Control drives (both Air and Liquid-Cooled designs).

Prerequisites
- Strong fundamental electrical background

Course Profile
This training session includes Theory of Operation, details of components, troubleshooting, interface and hands-on sessions.

Objectives
Upon completion of this course, the student shall be able to:
- Understand how the Perfect Harmony functions and correct implementation at your facility.
- Learn how to work with personal protective equipment while working safely on the VFD.
- Identify full components per assembly and schematics.
- Check power semiconductors with an analog meter
- Utilize the keypad for monitoring and programming.
- Use a laptop to extract valuable information which can be utilized for troubleshooting, and backing up the original files. Parameters, EEPROM, SOP, historic, and fault logger.

Topics
- Introduction to Air and Liquid Cooled Drives Systems
- Introduction to the Perfect Harmony Legacy Control
- Specifications
- Fundamental Terminology used with VFD’s
- Motor Theory
- Safety on medium voltage drives
- Power Devices
- Harmony Topology (operation, layout, theory)
- Drive Hardware Identification
- Theory of operation on the various control boards (Legacy Control Boards)
- Review schematics and assembly drawings
- Operation of the Harmony Drive
- Review drawings and requirements for plumbing systems and blower assemblies.

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Drives - Perfect Harmony

Next Generation Control Air Cooled – Operator Training

Course code: LDA-LDNGAOT1

Target audience
This is a 4 hour training session to allow your personnel to obtain an understanding of how the drive operates, and monitoring capabilities. The Equipment Safety issues will be covered. This course is intended for Operations personnel or site personnel to gain an understanding of the operations of the VFD. This session will be on the Siemens Perfect Harmony Air Cooled Next Generation control drives.

Prerequisites
- Understanding Safety requirements of your facility.

Course Profile
This training session includes general Theory of how the VFD works, Safety with regards to the VFD, and operation of the VFD in manual and automatic control. Also covered will be the Keypad for monitoring of dynamics of the VFD operation and Alarms and Faults.

Objectives
Upon completion of this course, the student shall be able to:
- Have a general understanding on how the Perfect Harmony functions
- Understand the Safety concerns when working around the VFD.
- How to utilize the keypad for basic programming. (accel/decel rates, min/max speed) and monitoring (speed demand, speed feedback, motor voltage and motor current)
- Identify customers permissive ½s required for the VFD to operate.

Topics
- Introduction to the Perfect Harmony Air Cooled drive
- Safety on medium voltage drives - Personnel Protective equipment, correct procedure for applying and shutting power off the VFD.
- Control Door options -for operation - Switches and pushbuttons and functionality
- Operation of the Harmony Drive in the Automatic and Manual mode
- Utilization of the Keypad for programming key parameters and viewing Alarm/Fault Logger

Drives - Perfect Harmony

Next Generation Control Air Cooled – Drive Orientation

Course code: LDA-LDNGAD01

Target audience
This is a one day drive orientation allowing personnel to obtain an understanding of what the drive is and how it works. All power connections and safety issues will be covered.

Prerequisites
- Operation fundamentals of non VFD equipment and your process, as well as, electrical operation and safety.

Course Profile
This course will cover the following topics, Theory of Operation, Safety variables related to the VFD, Hardware Identification, Power Supply sources required to run the VFD, Operation of the VFD, General review of the Keypad, Alarms and Faults, Spare Parts, and the Cooling System ½ Air Cooled

Objectives
Upon completion of this course, the student shall be able to:
- Have a good understanding on how the Perfect Harmony functions
- Understand the Safety concerns when working around the VFD.
- Identify each cabinet and power components with in each cabinet.
- Identify each power sources required for the VFD to operate via customer drawings
- Identify all customers permissives required for the VFD to operate.
- Navigate through customer schematics -power and control connections.
- Operate the VFD in the Automatic or Manual mode of operation.

Topics
- Introduction to Air Cooled System
- Introduction to the Perfect Harmony Legacy Control
- Specifications of the VFD
- Safety on medium voltage drives
- Drive Hardware Identification
- Control Door controls
- Operation of the Harmony Drive in the Automatic and Manual mode
- Using the Keypad
- Key parameters
- Review Alarm/Fault Logger
- Tool Suite Demonstration only
Drives - Perfect Harmony

Next Generation Control
Liquid Cooled – Drive Orientation

Course code: LDA-LDNGLD01

Target audience
This is a one day drive orientation allowing personnel to obtain an understanding of what the drive is and how it works. All power connections and safety issues will be covered. This course is intended for maintenance and electrical personnel, as well as, electrical engineers using Siemens Perfect Harmony Liquid Cooled Next Generation control drives.

Prerequisites
• Operation fundamentals of non VFD equipment and your process, as well as, electrical operation and safety.

Course Profile
This course will cover the following topics, Theory of Operation, Safety variables related to the VFD, Hardware Identification, Power Supply sources required to run the VFD, Operation of the VFD, General review of the Keypad, Alarms and Faults, Spare Parts, and the Cooling System ½ Liquid Cooled

Objectives
Upon completion of this course, the student shall be able to:
• Understand the Safety concerns when working around the VFD.
• Identify each cabinet and power components within each cabinet.
• Identify each power sources required for the VFD to operate via customer drawings
• Identify all customers permissives required for the VFD to operate.
• Navigate through customer schematics -power and control connections.
• Operate the VFD in the Automatic or Manual mode of operation.

Topics
• Introduction to Liquid Cooled System
• Introduction to the Perfect Harmony Legacy Control
• Specifications
• Safety on medium voltage drives
• Drive Hardware Identification
• Control Door Controls
• Operation of the Harmony Drive in the Automatic and Manual mode

Drives - Perfect Harmony

Next Generation Control
Liquid Cooled – Operator Training

Course code: LDA-LDNGLOT1

Target audience
This is a 4 hour training session to allow your personnel to obtain an understanding of how the drive operates, and monitoring capabilities. Equipment Safety issues will be covered.

Course Profile
This training session includes general Theory of how the VFD works, Safety with regards to the VFD, and operation of the VFD in manual and automatic control. Also covered will be the Keypad for monitoring of dynamics of the VFD operation and Alarms and Faults. The Cooling system monitoring capabilities will be discussed which consist of the pump and key sensing devices.

Objectives
Upon completion of this course, the student shall be able to:
• Understand the Safety concerns when working around the VFD.
• How to utilize the keypad for basic programming. (accel/decel rates, min/max speed) and monitoring (speed demand, speed feedback, motor voltage and motor current)
• Identify customers permissive ½ required for the VFD to operate.
• Operating the VFD in the Automatic and Manual mode of operation.
• Understanding the Cooling Cabinet and recognize when additional water is required, and when the conductivity is high and replacing the deionizer tank

Topics
• Introduction to the Perfect Harmony Liquid Cooled drive
• Safety on medium voltage drives - Personnel Protective equipment, correct procedure for applying and shutting power off the VFD.
• Control Door options -for operation .
• Switches and pushbuttons and functionality
• Operation of the Harmony Drive in the Automatic and Manual mode
• Utilization of the Keypad and key parameters
• Reviewing Alarm/Fault Logger
• Cooling cabinet monitoring capabilities and operation

Drives - Perfect Harmony

Next Generation Control
Liquid Cooled – High Voltage

Course code: LDA-LDHVGE1A

Target audience
This course is intended for maintenance and electrical personnel, as well as, electrical engineers using Siemens Perfect Harmony Legacy Control drives (both Air and Liquid-Cooled designs).

Prerequisites
• Strong fundamental electrical background

Course Profile
This training session includes Theory of Operation, details of components, troubleshooting, interface and hands-on sessions. This is an advanced session which covers each aspect of the VFD (variable frequency drive) in detail, as well as, advanced troubleshooting procedures

Objectives
Upon completion of this course, the student shall be able to:
• Understand how the Perfect Harmony functions and correct implementation at the facility.
• Learn how to work with personal protective equipment while working safely on the VFD.
• Identify full components per assembly and schematics.
• Understand how each control board functions
• Understand how a power cell functions (High Voltage).

Topics
• Introduction to Liquid Cooled Drive System
• Introduction to Perfect Harmony Next Generation drives
• Specifications
• Fundamental Terminology used with VFD’s
• Motor Theory
• Safety on medium/High voltage drives
• Power Devices
• Harmony Topology (operation, layout, theory)
• Drive Hardware Identification
• Theory of operation on the various control boards (NXG1A, NXG1B, NXG2)
• Review schematics and assembly drawings
• Operation of the Harmony Drive
• Review drawings and requirements for plumbing systems
• Presentation of Siemens software, Utilization of Tool Suite software package
• Maintenance, Troubleshooting, Installation, and Setup
Drives - Perfect Harmony

Next Generation Control Liquid-Cooled WC3

Course code: LDA-LDNGLS1C

Target audience
This course is intended for maintenance and electrical personnel, as well as, electrical engineers using Siemens Perfect Harmony Legacy Control drives (both Air and Liquid-Cooled designs).

Prerequisites
• Strong fundamental electrical background

Course Profile
This training session includes Theory of Operation, details of components, troubleshooting, interface and hands-on sessions. This is an advanced session which covers each aspect of the VFD (variable frequency drive) in detail, as well as, advanced troubleshooting procedures.

Objectives
Upon completion of this course, the student shall be able to:
• Understand how the Perfect Harmony functions and correct implementation at your facility.
• Learn how to work with personal protective equipment while working safely on the VFD.
• Identify full components per assembly and schematics.
• Understand how each control board functions.
• Understand how a power cell functions.
• Check power semiconductors with an analog meter.
• Utilize the keypad for monitoring and programming.

Topics
• Introduction to Liquid Cooled Drive System
• Introduction to Perfect Harmony Next Generation drives
• Fundamental Terminology used with VFD’s
• Motor Theory
• Safety on medium/High voltage drives
• Power Devices
• Harmony Topology (operation, layout, theory)
• Drive Hardware Identification
• Theory of operation on the various control boards (NXG1A, NXG1B, NXG2)
• Review schematics and assembly drawings
• Operation of the Harmony Drive
• Review drawings and requirements for plumbing systems
• Presentation of Siemens software, Utilization of Tool Suite software package

Drives - Perfect Harmony

Next Generation Control Liquid-Cooled WCII

Course code: LDA-LDNGLS1B

Target audience
This course is intended for maintenance and electrical personnel, as well as, electrical engineers using Siemens Perfect Harmony Legacy Control drives (both Air and Liquid-Cooled designs).

Prerequisites
• Strong fundamental electrical background

Course Profile
This training session includes Theory of Operation, details of components, troubleshooting, interface and hands-on sessions. This is an advanced session which covers each aspect of the VFD (variable frequency drive) in detail, as well as, advanced troubleshooting procedures.

Objectives
Upon completion of this course, the student shall be able to:
• Understand how the Perfect Harmony functions and correct implementation at your facility.
• Learn how to work with personal protective equipment while working safely on the VFD.
• Identify full components per assembly and schematics.
• Understand how each control board functions.
• Understand how a power cell functions.
• Check power semiconductors with an analog meter.
• Utilize the keypad for monitoring and programming.
• Use a laptop to communicate to the VFD to perform programming and viewing parameters; viewing status of VFD; power cells, digital and analog I/O; graphical display of key variables; uploading parameters, event, historic, and fault logger.

Topics
• Introduction to Liquid Cooled Drive Systems
• Introduction to Perfect Harmony Next Generation drives
• Specifications
• Fundamental Terminology used with VFD’s
• Motor Theory
• Safety on medium voltage drives
• Power Devices
• Harmony Topology (operation, layout, theory)
• Drive Hardware Identification
• Theory of operation on the various control boards (NXG1A, NXG1B)

Drives - Perfect Harmony

SOP – System Operational Program

Course code: LDA-LDSOPE1A

Target audience
This session is for personnel to obtain an understanding of all functions that control the Variable Frequency Drive (VFD), as well as, feedbacks from the VFD. The course is a two day session covering the System Operational Program (SOP) - the program which controls all functions of the VFD. The Tool Suite Software will be provided. This includes Drives Host and the Debug Tool.

Course Profile
This course provides the knowledge and skills necessary to review and evaluate the System Operational Program (SOP). By understanding the SOP the learner will understand which permissives are required for the drive to run in the automatic or manual control - where the speed commands come from and how they are directed. The student will also understand the assignments of the digital inputs and outputs - as well as, the assignments of all analog inputs. Additional logic within the SOP will also be addressed.

Objectives
Upon completion of this course, the student shall be able to:
• Read the entire System Operational Program.
• Understand how the jobsite SOP functions with relationship to the jobsite drawings.
• Understand system flags utilized in the SOP (see Topics).
• Modify the SOP to meet specific customer requirements.

Topics
• Introduction to the Perfect Harmony Drive System
• Customer schematics
• Drive flowcharts
• Symbol definitions
• Breakdown of flags utilized in SOP
• Drive flags - initialization flags
• Counters
• Menu timers
• SOP timers
• Digital Inputs to Wago or Breakout Board
• Digital Outputs from Wago or Breakout Board
• Drive Faults
• User Alarms/Faults
• Start/Stop logic
Drives - Perfect Harmony

Large Drives & Motor Training Course and Demonstration

Course code: LDA-LDVFD1A

Target audience
This is a task-based session intended for maintenance and electrical engineering personnel using Siemens (PH) Perfect Harmony Next Generation (VFD) variable frequency drives. This session covers the fundamentals of the PH air cooled VFD building confidence in personnel who want to operate, analyze and troubleshoot the VFD safely.

Prerequisites
• PC with administrative rights required.
• Strong fundamental electrical background

Course Profile
This course is intended to provide knowledge and skills which include Theory of Operation, details of components, troubleshooting, interface and hands-on tasks. It is formatted to provide both instructional and hands on tasks used in maintaining, analyzing and troubleshooting the VFD.

Objectives
Upon completion of this course, the student shall be able to:
• Understand Perfect Harmony VFD theory including the transformer, power cells, and controls.
• Understand Safety elements interfacing with the VFD.
• Identify the components and performance characteristics of the Perfect Harmony Drive.
• Use Laptop to upload, download, evaluate and troubleshoot VFD system

Topics
• Course overview and objectives
• Introduction to Perfect Harmony Next Generation drives
• Air Cooled System Level interface
• Motor Theory and Operation
• Safety on medium voltage drives
• VFD
• Perfect Harmony Topology (operation, layout, theory)
• Control Hardware Identification and operation
• Laptop to VFD Communications

Drives - Perfect Harmony

Operation, Maintenance and Repair (Gen3, Gen3E, Gen4)

Course code: LDA-LDNA5A1B

Target audience
This is a task-based course intended for maintenance and electrical personnel, as well as electrical engineers using Siemens Perfect Harmony Next Generation Control drives. The course builds confidence in personnel who want to understand how the drive works and how to operate the drive safely.

Prerequisites
• PC with administrative rights required.
• Strong fundamental electrical background

Course Profile
This course is intended to provide knowledge and skills which include Theory of Operation, details of components, troubleshooting, interface and hands-on tasks. It is formatted to provide both instructional and hands on tasks utilized in maintaining, analyzing and troubleshooting the VFD.

This course is an advanced session covering each aspect of the VFD (variable frequency drive) in detail, as well as, advanced troubleshooting procedures. The format is a combination of 25% instruction and 75% hands-on learning aimed at developing job-related knowledge and skills. Hands on is with an actual Perfect Harmony VFD, simulators, and power cells.

Topics
• Course overview and expectations
• Introduction to Perfect Harmony Next Generation drives Air Cooled
• Basics of VFD’s and Motors
• Specifications
• Safety on medium voltage drives
• Power Electronics
• Drive Hardware Identification
• Perfect Harmony Topology (theory, layout, operation)
• Key Parameters utilized in the VFD
• Tool Suite software - install, navigate, program
• Configuration software

Drives - Perfect Harmony

Cell Repair Certification

Course code: LDA-CRCE1A

Target audience
Siemens Repair Depot centers

Prerequisites
• Siemens Employee

Course Profile
This is a certification session on the repair of Air Cooled power cells. This course is intended to provide knowledge and skills which include theory of operation, details of components, troubleshooting, interface and hands-on tasks to repair Air Cooled power cells.

It is formatted to provide both instructional and hands on tasks utilized in evaluating, analyzing, repairing and testing the Air Cooled Cells – Gen 3, Gen 3E, Gen 4.

Objectives
Upon completion of this course, the student shall be able to:
• Obtain understanding of Siemens repair procedures
• Analyze each style of power cell for defects and update enhancements
• Interpret power cell drawings (assembly and schematics)
• Dis-assemble each power cell effectively and efficiently
• Replace components per Siemens guidelines
• Assemble each power cell effectively and efficiently
• Test power cells with new power cell station

Topics
• Course overview and expectations
• Requirements of repair depot center
• Introduction to power cell certification program
• Basics of Perfect Harmony drive and power cells
• Power cell power electronics
• Power cells (operation, layout, theory of operation)
• Safety and PPE
• Power cell assembly and schematics drawings
• Procedure for Power Cells (tools, dis-assembly, replacement, assembly, testing)
• Certification exam
### Drives - Perfect Harmony

#### Perfect Harmony Drive Certification

**Course code:** LDA-LDPHAC1A

**Target audience**
This course is intended for Siemens field service personnel. This course is a certification on Siemens Perfect Harmony Next Generation and Legacy control Air and Liquid cooled VFD’s.

**Prerequisites**
- Siemens Field Service Representative

**Course Profile**
This comprehensive certification training session includes Theory of Operation, details of components, troubleshooting, interface and hands-on sessions. This is a four week session which covers various Harmony VFD’s (variable frequency drives) in detail, as well as, advanced troubleshooting procedures. Various software packages will be provided to the associate’s to load on their computers.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Understand how the Perfect Harmony functions and correct implementation at customer’s facilities.
- Learn how to work with personal protective equipment while working safely on the VFD.
- Identify full components per assembly and schematics.
- Check power semiconductors with an analog meter
- Utilize the keypad for monitoring and programming.
- Use a laptop to communicate to the VFD to perform programming and viewing parameters; viewing status of VFD; power cells, digital and analog I/O; graphical display of key variables; uploading parameters, event, historic, and fault logger.
- Interpret customer on-site drawings of the VFD system (assembly and schematics)
- Recommend and correctly install spare parts.
- Understand the Liquid cooled cabinet, components and function ability
- HMI interface on the control cabinet
- HMI -Unitronics monitoring of the cooling sensors

#### NXGPro

**Course code:** LDA-NXPROE1A

**Target audience**
Siemens employee

**Prerequisites**
- Knowledge of Perfect Harmony NXG 2 Controls
- Siemens Employee

**Course Profile**
This course is intended to provide knowledge and skills which include details of all new hardware components, interfacing options, variances from NXG 2 controller. It is formatted to provide instructional and hands on tasks to allow Siemens employees the capabilities to install, interface and test the NXGPro controls.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Comprehend all hardware
- Read and utilize Siemens assembly and schematics
- Replace components per Siemens guidelines
- Programmability of new parameters
- Utilize NXGPro Control manual

**Topics**
- Course overview
- NXGPro DCR
- Power supply options
- System Interface Board
- User I/O Board
- Test Board
- Options
- Wiring options
- Exam

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### Drives - Perfect Harmony

#### Next Generation Control Liquid-Cooled WC3

**Course code:** LDA-LDNGLS1C

**Target audience**
This course is intended for maintenance and electrical personnel, as well as, electrical engineers using Siemens Perfect Harmony Legacy Control drives (both Air and Liquid-Cooled designs).

**Prerequisites**
- Strong fundamental electrical background

**Course Profile**
This training session includes Theory of Operation, details of components, troubleshooting, interface and hands-on sessions. This is an advanced session which covers each aspect of the VFD (variable frequency drive) in detail, as well as, advanced troubleshooting procedures. The Drive Tools Software package is included and loaded by the associate on their laptop.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Understand how the Perfect Harmony functions and correct implementation at your facility.
- Learn how to work with personal protective equipment while working safely on the VFD.
- Identify full components per assembly and schematics.
- Understand control boards and power cells
- Check power semiconductors with an analog meter.
- Utilize the keypad for monitoring and programming.
- Use a laptop to communicate to the VFD
- Interpret on-site drawings of your VFD system
- Recommend and correctly install spare parts.

**Topics**
- Introduction and Specifications
- Fundamental Terminology and Theory
- Safety on medium/High voltage drives
- Harmony Topology (operation, layout, theory)
- Maintenance, Troubleshooting, Installation, and Setup
- Waveforms on control boards via oscilloscope
- Bypass Operation of the VFD
- Transformer feedback - Advanced Monitoring
- Siemens Master and Backup PLC / all control interfaces/ Redundancy in the cooling cabinet

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### Electrical Maintenance & Safety

**Learning Map**

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#### Health and Safety Catalog
Siemens now offers an entire online self-paced catalog of courses dedicated to safety. Partnered with Underwriters Laboratory, over 150 interactive titles are available along with our 400 unique technology courses. [www.usa.siemens.com/ospt](http://www.usa.siemens.com/ospt).

#### Electrical Maintenance

- **Electrical Maintenance**
  - Course: SCT-EMEMTM1A
  - Days: 4

- **Evaluating Electrical Tests**
  - Course: SCT-EMEETM1A
  - Days: 4

#### Electrical Safety

- **PCS7 System Operator** (Online instructor-led)
  - Course: SCT-EMOILESOM1A
  - Days: 8

- **Electrical Safety: NFPA 70E Arc Flash Training**
  - Course: SCT-ERISESAT
  - Days: 0.5

- **OSHA Electrical Safety & Arc Flash**
  - Course: SCT-EMESOM1A
  - Days: 2

- **Risk Assessment Management**
  - Course: SCT-MSRAMG1A
  - Days: 1.5

#### Switchgear & Breakers

- **Industrial Switchgear Maintenance**
  - Course: SCT-EMISGM1A
  - Days: 5

- **RL Switchgear Maintenance**
  - Course: SCT-EMRLSM1A
  - Days: 4

- **WL Switchgear Maintenance**
  - Course: SCT-EMWLBM1A
  - Days: 2

- **GM Switchgear Maintenance**
  - Course: SCT-EMGMSM1A
  - Days: 4

#### Optional and specialty courses:

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<td>840Dpl Safety Integrated Maintenance</td>
<td>SCT-SN5SIM2A</td>
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<tr>
<td>840Dsl Safety Integrated for OEMs</td>
<td>SCT-SN5SL1A</td>
<td>4.5 days</td>
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<tr>
<td>840Dsl Safety Integrated Maintenance</td>
<td>SCT-SN5LSM1A</td>
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<td>Electrical Safety: Non Qualified Workers</td>
<td>SCT-ERISAXEC</td>
<td>0.5 days</td>
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<tr>
<td>Electrical Safety: Qualified Workers</td>
<td>SCT-ERISESQW</td>
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<tr>
<td>Lockout Tagout: Take Control</td>
<td>SCT-CLLOTMPG</td>
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<td>S7-300F Distributed Safety Engineering</td>
<td>SCT-S7SFTET1A</td>
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<td>S7-300F Distributed Safety Sustaining</td>
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<tr>
<td>Transformer Maintenance</td>
<td>SCT-EMXFMM1A</td>
<td>3 days</td>
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</table>
Maintenance & Safety
840Dsl Safety Integrated Maintenance
Course code: SCT-SNSSIM2A

Target audience
This advanced course is designed for controls engineers and service specialists who use the SINUMERIK 840D and Safety Integrated (SI) functions in machine tool applications.

Prerequisites
• 840Dsl Maintenance 2 w/HMI Advanced

Course Profile
This course provides the knowledge and skills that controls engineers and/or maintenance technicians require for familiarization and the operation of an automated machine tool, equipped with a SINUMERIK 840D CNC which uses the optional Safety Integrated System.

Objectives
Upon completion of this course, the student shall be able to:
• Understand the concepts of safety technology and the system requirements for Safety Integrated.
• Have a working knowledge of safety-oriented inputs and outputs for DMP Modules.
• Have a working knowledge of safety-oriented inputs and outputs for PROFIsafe Modules.
• Understand the principles related to safe communication.
• Identify, understand, and use Machine Data and interface signals related to Safety Integrated applications.
• Perform error detection procedures related to Safety Integrated applications.
• Evaluate diagnostics and alarm displays
• Understand and perform Test Stop procedures.
• Understand Safety Integrated systems with SAFE SPL and without SAFE SPL.

Topics
• Safety-oriented inputs and outputs
• Safe Standstill
• Safe operational stop
• Securely reduced speed
• Safe software limit switches
• Safe stopping process
• Safe programmable logic
• Safety related Machine Data
• Understand OEM safety related alarms
• Understand checksums

Maintenance & Safety
840Dsl Safety Integrated for OEMs
Course code: SCT-SNSDSL1A

Target audience
German Course Code equivalent: NC-84SLSIW. This advanced course is designed for controls engineers and service specialists who configure and commission the SINUMERIK 840Dsl Safety Integrated (SI) functions in machine tool applications.

Prerequisites
• 840Dsl Maintenance 1 w/HMI Advanced
• 840Dsl Maintenance 2 w/HMI Advanced
• S7 TIA Programming 1 OR
• 840Dsl Maintenance 1 w/Operate
• 840Dsl Maintenance 2 w/Operate

Course Profile
During this course, the student will learn about configuring and commissioning the function Safety Integrated using the SINUMERIK 840Dsl.

Objectives
Upon completion of this course, the student shall be able to:
• Understand the concepts of safety technology and the system requirements for Safety Integrated.
• Have a working knowledge of safety-oriented inputs and outputs for PROFIsafe Modules.
• Understand the principles related to safe communication over PROFINET and PROFINBUS.
• Commission, understand, and use SAFE Machine Data and interface signals.
• Commission Safety Integrated systems with SAFE SPL (Safe Programmable Logic)
• Commission Safe Operational Stop, Safe Standstill, Safe Velocity, and Safe Cams.
• Commission SAFE limits and understand the User Agreement and its implications.

Topics
• System requirements
• General information on safety technology
• Description of the safe basic functions
• Procedure during startup and troubleshooting
• Description of the machine data and interface signals

Maintenance & Safety
840Dsl Safety Integrated Maintenance
Course code: SCT-SNSLSTM1A

Target audience
This advanced course is designed for controls engineers and service specialists who use the SINUMERIK 840Dsl and Safety Integrated (SI) functions in machine tool applications.

Prerequisites
• 840Dsl Maintenance 2 w/HMI Advanced
• S7 TIA Programming 1 OR
• 840Dsl Maintenance 2 w/Operate

Course Profile
This course provides the knowledge and skills that controls engineers and/or maintenance technicians require for familiarization and the operation of an automated machine tool, equipped with a SINUMERIK 840Dsl CNC which uses the optional Safety Integrated System. The goal of the class is to teach the students to identify the various types of applications associated with the Safety Integrated System, to achieve a working knowledge of the concepts, and to identify and diagnose Safety Integrated related problems.

Objectives
Upon completion of this course, the student shall be able to:
• Understand the concepts of safety technology and the system requirements for Safety Integrated.
• Have a working knowledge of safety-oriented inputs and outputs for PROFIsafe Modules.
• Understand the principles related to safe communication.
• Identify, understand, and use Machine Data and interface signals related to Safety Integrated applications.
• Perform error detection procedures
• Evaluate diagnostics and alarm displays

Topics
• Safety-oriented inputs and outputs
• Safe Standstill
• Securely reduced speed
• Safe software limit switches
• Safe stopping process

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Electrical Maintenance & Safety

Maintenance & Safety
Electrical Maintenance

Course code: SCT-EMEMTM1

Target audience
This course is for Maintenance electricians and technicians, supervisors and people in the process of cross training from non-electrical trades.

Course Profile
This course is designed to increase knowledge in the areas of basic electrical theory and the preventive maintenance of many types of electrical equipment. The typical voltage range of equipment covered is 480V to 15kV.

Objectives
Upon completion of this course, the student shall be able to:
• Identify Various Power Distribution System Arrangements.
• Explain Techniques for Evaluating Insulation Tests.
• Solve Electrical Maintenance Problems Using Basic Mathematics.
• Determine preventive Maintenance Procedures for Many Types of Electrical Equipment.
• Identify Governmental Safety Regulations
• Describe Safe Work Practices

Topics
• Power System Fundamentals
• and Documentation
• Electrical Tests
• Fundamental Principles of Power System Equipment
• Equipment Maintenance
• Fundamentals of Power System Analysis
• Electrical Safety

Maintenance & Safety
Electrical Safety: NFPA 70E Arc Flash Training

Course code: SCT-ERISESAT

Target audience
Anyone whose job requires them to work on or near high voltage energized electrical parts.

Course Profile
This course presents a true story of an electrical worker who received 2nd and 3rd degree burns over 40 percent of his body and was nearly killed when he was engulfed in an arc blast. Learners see the mistakes made and learn the lifesaving lessons from this incident. 14 interactions actively involve the learner to stress the importance of understanding all hazards of a job task and taking the necessary precautions to protect yourself from them.

Objectives
Upon completion of this course, the student shall be able to:
• Be committed to your own personal safety.
• List causes of Mark’s accident and injuries.
• Agree that following safe work practices is your own responsibility.
• Dress safely when working with electricity.
• List unsafe items to wear when working with electricity.
• Agree that flame-resistant clothing is a regulation and requirement for anyone working with electricity.
• Conduct an arc flash hazard analysis.
• Explain ways to determine the Incident Energy Level.
• Define the Arc Flash Boundary.
• Differentiate between the four Hazard Categories.
• Select the approved Personal Protective Equipment for each Hazard Category.

Topics
• Personal Responsibility
• Avoiding Injury
• Flame Resistant clothing (FR)
• Arc Flash Hazard Analysis
• Incident Energy Level
• Arc Flash Protection Boundary
• Hazard Risk Categories
• Hazard Risk Category Zero
• Hazard Risk Category One
• Hazard Risk Category Two
• Hazard Risk Categories Three and Four

Maintenance & Safety
Electrical Safety: Non Qualified Workers

Course code: SCT-SMAXELEC

Target audience
All persons who work with machinery and equipment either on or off the job.

Course Profile
Employees need to know how electricity works, and what they should do to protect themselves from its hazards. This course provides the information employees need to work safely around electricity. The Course also satisfies the OSHA training requirements under 29 CFR Part 1910.331 for non-qualified workers.

Objectives
Upon completion of this course, the student shall be able to:
• Describe how electricity works.
• Distinguish between volts and amps.
• Describe how the flow of electricity works.
• Describe the function of circuit breakers and fuses.
• Describe the function of a fuse.
• Describe the function of a circuit breaker.
• State how fuses and circuit breakers are rated.
• Describe function of ground wires and GFCIs.
• Define GFCI.
• Define ground wire.
• Describe the function of a ground wire.
• Define a grounded outlet.
• Use safe work practices when working with electricity.
• State the dangers most commonly associated with electricity.
• Identify unsafe work practices that should be avoided.
• Describe the function of double-insulated tools.
• Work safely with electrical equipment.

Topics
• How Electricity Works
• Fuses and Circuit Breakers
• Grounding and GFCIs
• Safe Work Practices
• Working With Electrical Equipment
• Dangerous Work Environments
• Electrical Emergencies

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Maintenance & Safety

**Electrical Safety: Qualified Workers**

*Course code: SCT-ERISESQW*

**Target audience**

Anyone whose job requires them to work on or near energized electrical parts.

**Course Profile**

This course presents the training requirements and safe work practices for qualified workers as outlined in OSHA 1910 Subpart (S). The training features several incidents involving electricity in which unsafe acts by employees have resulted in serious injury or death. Topics include qualified worker status, electrical arcing and arc blasts, protective clothing requirements for qualified workers, limited approach and prohibited approach boundaries, use of voltage-rated gloves and other PPE, performing live work and de-energizing equipment.

**Objectives**

*Upon completion of this course, the student shall be able to:*

- Recognize someone qualified to work on or near live parts.
- Agree that a worker may be qualified for some electrical work and not qualified for other electrical work.
- Differentiate between a qualified and non-qualified worker.
- List the two types of hazards associated with electricity.
- Avoid injury when working with electricity.
- Agree that a minimum safe distance for unqualified workers varies depending on voltage level and circuits.
- Define minimum safe distance.
- Explain how minimum safe distance is determined.
- Protect yourself against electric hazards.
- List the two main types of electric hazards.
- Explain an arc blast.
- Describe ways to protect yourself against burns.
- Always use the required protective clothing and equipment.

**Topics**

- The Qualified Worker
- Avoiding Injury
- Hazards
- Protective Equipment
- Additional Safety Measures

**Maintenance & Safety**

**Evaluating Electrical Tests**

*Course code: SCT-EMEETM1A*

**Target audience**

This course is recommended for technicians, maintenance engineers and maintenance planners who have the responsibility to evaluate the electrical tests of motors, generators, transformers, switchgear and power cables of an industrial plant or a commercial building. This course is valuable whether you perform tests yourself or evaluate the test data that is supplied by a testing contractor.

**Course Profile**

The Evaluating Electrical Tests Seminar explains the interpretation of those electrical tests that are most frequently performed on power system apparatus. Emphasis is on the evaluation of test data. The techniques for performing tests are briefly explained to provide background information.

The opportunity to work through classroom exercises that are based on actual-case scenarios in a “teamwork” setting sharpens the evaluation skills of every participant.

**Objectives**

*Upon completion of this course, the student shall be able to:*

- Describe Various Methods of Electrical Testing
- Interpret Electrical Test Results
- Predict Expected Operational Equipment Life More Accurately
- Apply Fundamental Concepts of Electrical Testing to Actual Equipment
- Select Recommended Testing Procedures for New Equipment
- Practice Safe Work Practices and Procedures When Performing Electrical Testing

**Topics**

- Fundamentals of Electrical Measurements
- Evaluating Insulation Tests
- Evaluating Applied-Potential Tests
- Evaluating Circuit Resistance Tests
- Evaluating Overcurrent Tests
- Fundamentals of Cable Fault Localization

**Maintenance & Safety**

**Industrial Switchgear Maintenance**

*Course code: SCT-EMISGM1A*

**Target audience**

Personnel responsible for the daily operation and maintenance of Medium and Low Voltage Switchgear and Motor Control.

**Course Profile**

The Industrial Switchgear and Motor Control course provides the basic skills required to safely operate and maintain Medium Voltage switchgear, Low Voltage Switchgear, Medium Voltage Control and Low Voltage Motor Control Centers. Classroom instruction, video tapes, and demonstrations on typical equipment are employed. Sample circuit breakers are used for troubleshooting and replacement of typical parts.

**Objectives**

*Upon completion of this course, the student shall be able to:*

- Perform proper safety procedures
- Identify MV & LV switchgear and its ratings
- Identify MV & LV motor control and its ratings
- Identify Insulated case circuit breaker ratings
- Identify Molded case circuit breaker ratings
- Proper and safe racking procedure
- Perform Rack out - Lock out - Tag out procedure
- Verify operation of protective interlocks
- Perform Mechanical and Electrical operation
- Locate and replace close and trip coils and motor
- Interpret Siemens schematics and wiring diagrams

**Topics**

- Safety procedures around Electrical Equipment
- Introduction to Switchgear Ratings
- Handling, storage and assembly
- Circuit breaker and Motor control ratings
- Cable and control wiring connections
- PT and CPT units
- Current Transformer safety
- Circuit breaker racking procedures
- Rack out, Lock out, tag out procedures
- Explanation of Vacuum Interruption
- Disassembly for maintenance
- Replacing Trip coil, closing coil, and charging motor
- Lubrication
- Insulation testing (Megger)
- Dielectric testing (High Potential)
**Electrical Maintenance & Safety**

**Maintenance & Safety**

**Lockout Tagout: Take Control**

Course code: SCT-CLLOTMPG

**Target audience**
All workers.

**Course Profile**
This course teaches your workers proper lockout/tagout procedures, why the procedures are important, how and when to use them, and how to safely restart the equipment or machinery. Twenty-four interactions help bring the course content to life and reliably assess your workers understanding of the material.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Explain the elements of a lockout tagout program.
- State the purpose of Lockout Tagout.
- Explain why locks are used.
- List the information contained on tags.
- Differentiate between authorized and affected employees.
- Agree that both authorized and affected employees are involved in the lockout tagout program.
- Recognize hazardous energy sources.
- List forms of hazardous energy.
- Recognize possible results of uncontrolled energy.
- Control hazardous energy.
- Select examples of energy-isolating devices.
- Agree to adhere to one lock and key per employee.
- Agree to never share or exchange locks and keys.
- Explain the purpose of tags.
- Explain why tags should be difficult to remove.
- Perform effective lockout tagout procedures.
- Assemble the proper order of all lockout tagout steps.
- Agree that only trained, authorized employees should perform lockout tagout.
- Identify questions to ask before starting work on equipment.

**Topics**
- The Lockout/Tagout Program
- Hazardous Energy
- Lockout/Tagout Procedures
- Start-Up Procedures

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**Maintenance & Safety**

**OSHA Electrical Safety & Arc Flash**

Course code: SCT-EMESOM1A

**Target audience**
This course is designed for anyone specifically cited in paragraph 1910.332 of CFR 29. Included are supervisors of personnel, engineers, technicians, electricians and others facing a higher than normal risk of electrical accidents.

**Course Profile**
The Electrical Safety and OSHA Requirements Seminar reviews the principles, governmental regulations, work practices and specialized equipment relating to electrical safety. Demonstrations of lockout/tagout and personal protective equipment are provided. CFR 1910 Subpart S Electrical, CFR 1910 Subpart R Electrical Power Generation, Transmission and Distribution and NFPA 70E Standard for Electrical Safety 2009 Edition, Personal and other Protective Equipment are incorporated into this program.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Review the Required Procedures for Locking, Tagging and Grounding of Electrical Equipment.
- Define elements of an Approved Safety Program.
- Determine the Flash Protection Boundary.
- Assess the applicable Hazard/Risk category and select proper Personal Protective Equipment.

**Topics**
- Electrical Safety Practices
- Working Safely in Electrical Switchgear
- Working Safely with Power Transformers
- Arc Flash Hazards

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**Maintenance & Safety**

**S7-300F Distributed Safety Engineering**

Course code: SCT-S7FTE1A

**Target audience**
This course is for engineers and personnel responsible for implementing SIMATIC Distributed Safety systems, including:
- Selecting the appropriate architecture
- Selecting the components and understanding their specific purposes and limitations
- Specifying the module and system wiring
- Developing the safety PLC program
- Starting up and supporting the system.

**Prerequisites**
- MS Windows Expertise
- AB-S7 Fastrack OR S7 System Tools & Troubleshooting 1 OR S7 TIA Programming 1

**Course Profile**
This course introduces the student to a Siemens Distributed Safety PLC application. Participants receive knowledge on applying the system per relevant standards, FailSafe Hardware Module details and parameterization, Safety Program structure and implementation, Safety Communications, System Diagnostics and introduction to Drive Safety.

**Objectives**
*Upon completion of this course, the student shall be able to:*
- Locate and understand the applicability of the detailed documentation and development resources
- Select and configure the FailSafe Hardware components, and understand their application restrictions.
- Properly implement a Safety program in the PLC.
- Document, test, and troubleshoot the system.

**Topics**
- Introduction to Distributed Safety
- Standards discussion
- Hardware introduction and safety wiring
- STEP7 quick tour
- STEP7 Distributed Safety overview and labs
- Reintegration
- Safety Logic
- System Communication overview
- Diagnostics
- Throughput Calculations
**Maintenance & Safety**

**S7-300F Distributed Safety Sustaining**

Course code: SCT-S7FSTS1A

Target audience

This course is for SIMATIC S7 300F PLC users who install or maintain automation safety systems and their application programs.

Prerequisites

- MS Windows Expertise
- S7 TIA Programming 1 OR
- S7 System Tools & Troubleshooting 1

Course Profile

This course introduces the student to a Siemens Distributed Safety PLC application. Participants will build skills on commissioning, troubleshooting and upgrading an automation safety system. FailSafe Hardware Module details and parameterization, Safety Program structure and implementation, and System Diagnostics are covered.

Objectives

Upon completion of this course, the student shall be able to:

- Understand the concept of the Siemens S7 safety integrated system.
- Identify S7 safety components.
- Know how to remove and replace S7-300 and ET200S safety components.
- Identify the wiring diagrams of the S7-300 and ET200S safety components.
- Understand the hardware configuration of the S7-300 safety components.
- Identify the LED diagnostics for the S7-300 safety components.
- Identify the addressing of the S7-300 safety components.
- Troubleshooting using the Hardware Configuration diagnostics to identify system faults.

Topics

- Safety Systems Overview
- Introduction to Standard & Safety Block Structure
- S7 Safety CPU and ET200S Hardware
- Safety PLC Hardware Configuration
- Safety Project Overview
- Safety Program Code
- Testing and Diagnostics

**Maintenance & Safety**

**Transformer Maintenance**

Course code: SCT-EMXFMM1A

Target audience

This program is recommended for maintenance electricians, supervisors and others who are involved with the maintenance and troubleshooting of transformers. Personnel involved in the purchasing of maintenance services also would benefit from an improved understanding of one of their facility and app — the most essential pieces of electrical equipment, the power transformer.

Objectives

Upon completion of this course, the student shall be able to:

- Understand Fundamental Principles of Transformers
- Explain Design & Application Variables
- Correctly Identify the Terminal Markings & Connection
- Determine Volt-Amp Relationships & Transformer Ratings
- Explain the Different Types of Transformer Construction
- Describe the Maintenance Activities for Liquid Filled and Dry-Type Transformers

Topics

- Overview
- Planned Maintenance Requirements of Transformers
- Maintenance Testing

**Maintenance & Safety**

**WL Low Voltage Switchgear Maintenance**

Course code: SCT-EMWLBM1A

Target audience

For personnel involved in installation, operation, maintenance or testing of Siemens Type WL low voltage switchgear with Electronic Trip Units (ETU).

Course Profile

Proper methods for installing the equipment to assure satisfactory service and typical operations such as racking, charging, closing and tripping are explained as well as how to respond should the breaker trip. Typical maintenance and parts replacement are covered.

Features and benefits of the electronic trip units and expansion modules are explained and methods for setting the trip units using front panel controls or by connection to a PC are covered.

Objectives

Upon completion of this course, the student shall be able to:

- Identify Siemens WL low voltage switchgear
- Understand the installation requirements for satisfactory service
- Properly rack, charge, close and trip the WL circuit breaker
- Determine the appropriate response to a breaker trip condition
- Perform typical maintenance
- Read and adjust settings on the Electronic Trip Unit using front panel or electronic means
- Recognize the safety features of the lockouts provided and how to use them
- Replace an electronic trip unit, charging motor, closing coil or trip coil
- Perform field testing of the circuit breaker
- Interpret Siemens drawings related to the WL switchgear line

Topics

- Introduction to Type WL Low Voltage Switchgear
- Cubicle Structure and Components
- Circuit Breaker Components
- Cubicle and Circuit Breaker as a Unit
- ETU Protective Device
- Maintenance
- Parts Replacement
Electrical Maintenance & Safety

Online Instructor-led Training
OSHA Electrical Safety and Arc Flash

Course code: SCT-EMOILESOM1A

Target audience
This course is designed for anyone specifically cited in paragraph 1910.332 of CFR 29. Included are supervisors of personnel, engineers, technicians, electricians and others facing a higher than normal risk of electrical accidents.

Course Profile
The Electrical Safety and OSHA Requirements Seminar reviews the principles, governmental regulations, work practices and specialized equipment relating to electrical safety. Demonstrations of lockout/tagout and personal protective equipment are provided.


Objectives
Upon completion of this course, the student shall be able to:
- Review the Required Procedures for Locking, Tagging and Grounding of Electrical Equipment.
- Define elements of an Approved Safety Program.
- Determine the Flash Protection Boundary.
- Assess the applicable Hazard/Risk category and select proper Personal Protective Equipment.

Topics
- Electrical Safety Practices
- Working Safely in Electrical Switchgear
- Working Safely with Power Transformers
- Arc Flash Hazards

Maintenance & Safety
Risk Assessment Management

Course code: SCT-MSRAMG1A

Target audience
This course is for users who are involved with developing or sustaining machine safety automation systems and their application programs.

Prerequisites
- Basic knowledge of machine safety standards
- MS Windows Expertise

Course Profile
The objective of this course is to methodically, transparently and comprehensively present the process of risk assessment as a necessary step in analyzing hazards before risk mitigation. Participants will be introduced to the risk evaluation method outlined in ANSI B11.0 2010 with the aid of pre-completed templates and a real example. Throughout this course students will work on identifying different hazards, defining machine limits, assessment of the original risk, risk reduction techniques, documentation requirements and exercises based on practical examples.

Objectives
Upon completion of this course, the student shall be able to:
- Understanding the Risk Assessment process.
- Identify different hazards during the Risk Assessment process.
- Understand ways of creating customized Risk Assessment templates
- Do a practical implementation of Risk Assessment
- Understand the documentation requirements for Risk assessment.
- Look into conducting a standard-compliant Risk assessment implementation.

Topics
- Introduction to Machine Safety
- Overview of Machine Safety Standards
- What is a Risk Assessment
- Differences - Risk Assessment
- Understanding the Risk Assessment Process
- Types of Risk Reduction
- Benefits of Risk assessment
- Instructor led Risk Assessment
- Exercise based on practical example
- Discussion
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Learning Map

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Power & Controls
ACCESS/WinPM.net

Course code: SCT-PSACCE1A

Target audience
This course is intended for individuals who require a detailed introduction to and understanding of how to use and administer ACCESS intelligent devices and the WinPM. Net software package. It is expected that the students of this course have some experience with Siemens ACCESS Power Meters and the WinPM.Net software package.

Course Profile
The Siemens SITRAIN Training Center offers a variety of courses taught by a dedicated team of Siemens training professionals in an environment that promotes quick, efficient learning and encourages active class participation. Our US ACCESS headquarters is located in Norcross, GA., a suburb of Atlanta. Our courses provide an interactive "hands-on" learning environment demonstrating real world scenarios. Each student is provided a personal workstation to use connected through an Ethernet LAN to a range of Siemens ACCESS advanced digital devices. This 3-day course provides hands-on, introductory training for our ACCESS power meters and for the WinPM. Net software system.

Objectives
Upon completion of this course, the student shall be able to:
- Identify the primary applications, features, and advantages of the entire Siemens meter product range.
- Configure meters using their front panel interfaces and through WinPM.Net software.
- Understand the features and functions of the various WinPM.Net software components.
- Enable security features, manage user accounts and assign control privileges.
- Use and configure the analog and/or digital inputs and outputs of Siemens ACCESS meters.
- Install WinPM.Net software for each type of workstation configuration.
- Establish communication to Siemens ACCESS meters using a variety of communication options.
- Generate reports

Power & Controls
Industrial Switchgear Maintenance

Course code: SCT-EMISGM1A

Target audience
Personnel responsible for the daily operation and maintenance of Medium and Low Voltage Switchgear and Motor Control.

Course Profile
The Industrial Switchgear and Motor Control course provides the basic skills required to safely operate and maintain Medium Voltage switchgear, Low Voltage Switchgear, Medium Voltage Control and Low Voltage Motor Control Centers. Classroom instruction, video tapes, and demonstrations on typical equipment are employed. Sample circuit breakers are used for troubleshooting and replacement of typical parts.

Objectives
Upon completion of this course, the student shall be able to:
- Perform proper safety procedures
- Identify MV & LV switchgear and its ratings
- Identify MV & LV motor control and its ratings
- Identify Insulated case circuit breaker ratings
- Identify Molded case circuit breaker ratings
- Proper and safe racking procedure
- Perform Rack out - Lock out - Tag out procedure
- Verify operation of protective interlocks
- Perform Mechanical and Electrical operation
- Locate and replace close and trip coils
- Interpret Siemens schematics and wiring diagrams

Topics
- Safety procedures around Electrical Equipment
- Introduction to Switchgear Ratings
- Handling, storage and assembly
- Circuit breaker and Motor control ratings
- Cable and control wiring connections
- PT and CPT units
- Current Transformer safety
- Circuit breaker racking procedures
- Rack out, Lock out, tag out procedures
- Explanation of Vacuum Interruption
- Disassembly for maintenance
- Replacing Trip coil, closing coil, and charging motor
- Lubrication
- Insulation testing (Megger)
- Dielectric testing (High Potential)

Power & Controls
SIMOCODE Pro Motor Management System

Course code: SCT-SCSIMG1A

Target audience
This course is intended for SIMOCODE Pro Motor Management System users who are involved with implementation, start-up, operation or maintenance of systems containing the SIMOCODE Pro.

Course Profile
This course introduces the SIMOCODE Pro Motor Management System and its components. Using representative hardware, the student will configure and operate the system. Unit controls allow the student to experience the reaction of the SIMOCODE Pro to over-current, undervoltage or over temperature. SIMOCODE ES software is used to configure the system for operation of a reversing motor and modification of the controls to adapt to user and apos - s requirements.

Objectives
Upon completion of this course, the student shall be able to:
- Configure the SIMOCODE Pro for use as any particular motor starter.
- Set the SIMOCODE Pro to match the motor parameters.
- Modify the SIMOCODE program as required.
- Wire the Inputs, Outputs and Control Power.
- Recognize fault indications and how to reset them.
- Upload/Download the SIMOCODE program.
- Use Diagnostic functions in SIMOCODE ES.
- Replace a SIMOCODE device.
- Install SIMOCODE program.
- Set the SIMOCODE communication address using the addressing plug.
- Integrate SIMOCODE ES into the Step 7 environment.

Topics
- Response to Fault Conditions
- Device Configuration
- Protection
- Monitoring Functions
- Inputs/Outputs
- Additional Function Blocks
- Diagnostics
- Communications

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Power & Controls

WL Low Voltage

Switchgear Maintenance

Course code: SCT-EMWLBM1A

Target audience
For personnel involved in installation, operation, maintenance or testing of Siemens Type WL low voltage switchgear with Electronic Trip Units (ETU).

Course Profile
Proper methods for installing the equipment to assure satisfactory service and typical operations such as racking, charging, closing and tripping are explained as well as how to respond should the breaker trip. Typical maintenance and parts replacement are covered.

Features and benefits of the electronic trip units and expansion modules are explained and methods for setting the trip units using front panel controls or by connection to a PC are covered.

Objectives
Upon completion of this course, the student shall be able to:
- Identify Siemens WL low voltage switchgear
- Understand the installation requirements for satisfactory service
- Properly rack, charge, close and trip the WL circuit breaker
- Determine the appropriate response to a breaker trip condition
- Perform typical maintenance
- Read and adjust settings on the Electronic Trip Unit using front panel or electronic means
- Recognize the safety features of the lockouts provided and how to use them
- Replace an electronic trip unit, charging motor, closing coil or trip coil
- Perform field testing of the circuit breaker
- Interpret Siemens drawings related to the WL switchgear line

Topics
- Introduction to Type WL Low Voltage Switchgear
- Cubicle Structure and Components
- Circuit Breaker Components
- Cubicle and Circuit Breaker as a Unit
- ETU Protective Device
- Maintenance
- Parts Replacement

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Process Analyzers

Learning Map

Foundation and Pre-requisite training courses are available for beginners in the form of our online, self-paced courses. Our Technology catalog offers general and Siemens-specific titles including Intro to PLC’s, Siemens PLC Programming concepts, and Function Block for Siemens PLC’s. Visit www.usa.siemens.com/ospt for a complete list of course offerings.

Maxum Application Courses
- Maxum HRVOC Operations & Maintenance
  - Course code: PIA-PAMAXHR3

Maxum HRVOC Operations & Maintenance
- Course code: PIA-PAMAXHRV

Maxum Operations with GC Portal Level 1
- Course code: PIA-PAMAXGCP1

Maxum Operations with GC Portal Level 2
- Course code: PIA-PAMAXGCP2

Maxum Analyzer Networks
- Course code: PIA-PAMAXUM5

Optichrom

- Optichrom Operation & Maintenance
  - Course code: PIA-PAOPTIA2

- MicroSAM Maintenance
  - Course code: PIA-PAMSAMS1

- Maxum MaxBasic Software Development
  - Course code: PIA-PAMAXUM3

- Maxum Gas Chromatograph Portal Workshop
  - Course code: PIA-PAMAXGCPWS

Optichrom Operation & Maintenance
- Course code: PIA-PAOPTIA1

Introduction to Process Gas Chromatography (Online instructor-led)
- Course code: PIA-PAOILOPTIA1

Total Sulfur Application Vapor Samples (Online instructor-led)
- Course code: PIA-PAOILMAXTSA

ULTRAMAT
- ULTRAMAT 6 Service & Repair
  - Course code: PIA-PACONAC2

- ULTRAMAT 23 Service & Repair
  - Course code: PIA-PACGAC23

NOXMAT
- NOXMAT 6 Service & Repair
  - Course code: PIA-PACONAC5

- NOXMAT 6 Service & Repair
  - Course code: PIA-PACONAC4

OXYMAT
- OXYMAT 6 Service & Repair
  - Course code: PIA-PACONAC3

CEMS
- CEMS System Overview
  - Course code: PIA-PACONAC1

CEMS includes Ultramat 6, Oxymat 6 and Noxmat 6

Continuous Gas Analyzer Courses

Online refresher courses:

<table>
<thead>
<tr>
<th>Course name</th>
<th>Course code</th>
<th>Duration</th>
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<tr>
<td>Maxum Operation with GCP Level 1, Refresher</td>
<td>PIA-PAMAXGCP1-RA1</td>
<td>2 hours</td>
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Need help finding the right training class?
Process Analyzers
CEMS System Overview
Course code: PIA-PACONAC1

Target audience
This overview course is intended for individuals responsible for the operation and calibration of Siemens Continuous Analyzers as well as CEMS systems.

Course Profile
This course covers maintenance and calibration of the Siemens Continuous Monitoring Analyzers Systems. This course covers hardware and software associated with each analyzer - Ultramat 6, Oxymat 6 and Noxmat 6. This course also covers sample systems associated with each analyzer and sample system with continuous emissions monitoring. Siemens Monitors and generic data collection systems are covered.

Objectives
Upon completion of this course, the student shall be able to:
- Calibrate Ultramat 6, Oxymat 6 and Noxmat 6 analyzers
- Replace the primary modules in these analyzers and the CEMS sample system.
- Perform a bench alignment on the Ultramat 6
- Set parameters in the 6 series analyzers thru the HMI.
- Clean the detector cells

Topics
- Sample Systems
  - Disassembly & Assembly
  - Speed Loops
  - Gas sample probe
- Sample gas cooler
  - Condensation Outlet
  - Operation & Adjustments
- Liquid membrane separator
- Condensation monitors
  - Balston coalescing filters
- ULTRAMAT
  - Cell Cleaning and Maintenance
  - Pneumatic Pump
  - Electronic Board Identification
  - Infrared Analysis
- OXYMAT
  - Bench Disassembly
  - Analyzer Bench Identification
- NOXMAT
- Data Acquisition Systems

Process Analyzers
FIDAMAT 6
Service & Repair
Course code: PIA-PACONAC4

Target audience
This hardware course is intended for individuals responsible for the maintenance and operation of Siemens Fidamat 6 Continuous Gas Analyzer.

Course Profile
In this course students will setup, calibrate and perform basic maintenance functions on the Siemens Fidamat 6 Flame Ionization Continuous Gas Analyzer. This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
- Calibrate the Fidamat 6 analyzer using zero and span gasses.
- Replace the primary modules in Fidamat 6
- Light and adjust the FID
- Set parameters in the 6 series analyzers thru the HMI.
- Clean the detector cells

Topics
- Principle of FIDAMAT Operation
  - Electronic Board Identification
  - Analyzer Bench Identification
  - Flame Ionization
- FIDAMAT Maintenance
  - Calibration
  - Cell Cleaning
  - Bench Disassembly
  - Panel Operation
  - Software
- Labs
  - Calibration
  - Hardware Assembly
  - Hardware Disassembly
  - Software and Communications
  - Familiarization and Identification of Hardware and Parts

Process Analyzers
LDS-6 LASER 6
Operations and Maintenance
Course code: PIA-PACGLDS6

Target audience
This overview course is intended for individuals responsible for the maintenance and operation of Siemens LDS-6.

Course Profile
This course covers maintenance and calibration of the Siemens Laser LDS-6 Analyzer including hardware and software. This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
- Calibrate the LDS-6 analyzers
- Replace the primary modules in the controller, transmitter and receiver.
- Set parameters thru the HMI and in the LDS Com PC software.
- Perform an alignment between the transmitter and Detector.

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Process Analyzers

Maxum Analyzer Networks

Course code: PIA-PAMAXUM5

Target audience
This course is intended for individuals responsible for maintaining the Maxum Process Gas Chromatograph (PGC). Engineers and technicians who will design and maintain the communication network connecting the Maxum PGC, maintenance workstations and the plant Distributed Control Systems (DCS).

Course Profile
This course gives the students hands-on experience with the Maxum Gas Chromatograph Network systems. Students will learn skills they can use to install, and maintain Maxum Ethernet networks, Advance Data Hiway systems, Gateway units, Modbus tables, and OPC servers.

Objectives
Upon completion of this course, the student shall be able to:
• Design a Maxum Ethernet network
• Configure a Maxum to communicate on a Maxum Ethernet network.
• Setup ADH to Ethernet Gateway.
• Configure a Maxum to communicate via Modbus or OPC with a DCS interface.
• Edit a Maxum Modbus Map.
• Install and configure a typical Maxum OPC server.

Topics
• Network Overview
• Advance Data Highway (ADH)
  – Design Advance Data Hiway Networks
  – Conduct 9V Battery Loop Test
  – Gateway ADH to Ethernet Configuration
  – Convert ADH Network to Maxum Ethernet
• Ethernet
  – Design Ethernet Networks for Maxum PGC systems with Switches and Fiber Optic Cables
  – Configure Subnets and Gateways
  – Configure Maxum Database for Ethernet
• Modbus
  – Develop Modbus Maps using Excel
  – Troubleshoot communications
  – Simulate DCS communications
• Maxum OPC Server
  – Configure Maxum Tables for OPC
  – Setup Maxum OPC Server
  – Setup COM/DCOM to Client software

Maxum Gas Chromatograph Portal Workshop

Course code: PIA-PAMAXGCPWS

Target audience
This course is designed for users experienced with Maxum System Manager / EZChrom workstation software who want to learn how to use Siemens Gas Chromatograph Portal (GC Portal) workstation software to perform maintenance on the Maxum Gas Chromatograph.

Prerequisites
• Maxum Operation Level 1
• Maxum Operation Level 2

Course Profile
In this course users will get an overview of the Maxum GC Portal workstation software and complete the same exercises done in Maxum Operation Level 1 and Level 2 using GC Portal.

Topics
• Maxum GC Portal Overview
• Maxum GC Portal Network View
• Backup and Restore Database
• View Chromatograms
• Setup Method
• Analyzer Calibration
• Modify Validation Sequence
• Adding hardware
• Adding user specified alarms
• Add Auto Validation
• Editing a Method
• Formula Editor
• DB Converter
• Upgrading the analyzer

Maxum HRVOC Operations & Maintenance

Course code: PIA-PAMAXHRV

Target audience
This hardware course is intended for individuals responsible for maintaining the HRVOC Maxum Gas Chromatograph. This class is for users who need to perform routine maintenance and calibration of the Maxum Gas Chromatograph used in HRVOC Flare and Cooling Tower Applications.

Prerequisites
• Basic Chromatography skills
• Process Gas Chromatography Technology

Course Profile
The course covers operation, maintenance, and calibration of the Maxum Gas Chromatograph. It also covers the hardware and related programming as well as covering the operation of the Maxum Workstation, which includes Table Editor and EZChrom. Maxum II Gas Chromatographs with HRVOC Cooling Tower and Flare Gas applications and sample systems are used in this class for the labs and lectures.

Objectives
Upon completion of this course, the student shall be able to:
• Perform basic maintenance on the Maxum Hardware modules.
• Balance the carrier gas flows.
• Setup the analyzer valve and EPC times
• Configure an EZChrom Instrument
• Adjust peak times using EZChrom
• Calibrate the analyzer with EZChrom
• Backup and Restore the analyzer database

Topics
• Maxum HRVOC Hardware Overview
• HRVOC Regulations Overview
  – Siemens Cooling Tower HRVOC Solution
  – Siemens Flare HRVOC Solution
• Maxum Applet Maintenance
  – Setting Flows at Pressure
  – Plumbing Configurations
• Maxum Detectors Maintenance
• Maxum Chromatograph
• Alarms
• Advance EZChrom Software
• Sample Systems
Process Analyzers
Maxum HRVOC
Operations & Maintenance Short

Target audience
This hardware course is intended for individuals responsible for maintaining the HRVOC Maxum Gas Chromatograph. This class is for users who need to perform routine maintenance and calibration of the Maxum Gas Chromatograph used in HRVOC Flare and Cooling Tower Applications.

Prerequisites
• Maxum Operation Skills
• Maxum Operation Level 1 OR Maxum Operations with GC Portal Level 1

Course Profile
The course covers operation, maintenance, and calibration of the Maxum Gas Chromatograph HRVOC Application. Maxum II Gas Chromatographs with HRVOC Cooling Tower and Flare Gas applications and sample systems are used in this class for the labs and lectures.

Objectives
Upon completion of this course, the student shall be able to:
• Perform basic maintenance on the Maxum Hardware modules.
• Balance the carrier gas flows.
• Setup the analyzer valve and EPC times
• Configure an EZChrom Instrument
• Adjust peak times using EZChrom
• Calibrate the analyzer with EZChrom
• Backup and Restore the analyzer database

Topics
• HRVOC Regulations Overview
  – Siemens Flare HRVOC Solution
  – Siemens Cooling Tower HRVOC Solution
• Maxum Applet Maintenance
  – Plumbing Configurations
  – Setting Flows at Pressure
• Maxum Detectors Maintenance
  – Flare Sample System
  – Cooling Tower Sample System
• Sample Systems
• Labs
  – Set Flows per Plumbing Diagram
  – Set Valve Switching Cooling Tower Application

Process Analyzers
Maxum MaxBasic
Software Development

Course code: PIA-PAMAX0M3

Target audience
This software course is intended for individuals responsible for programming of the Maxum Gas Chromatograph and for users who need to perform routine software changes.

Prerequisites
• Maxum Operation Level 1

Course Profile
This course gives the students hands-on with the Workstation MaxBasic language editor for the Maxum Gas Chromatograph. The course covers operation of the software modules that come with the Maxum Workstation as well as options that can be added to the system. A fully functional copy of the MaxBasic Language Editor CD is included with the course at no additional charge.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Modify a MaxBasic programs
• Compile and save the program to the Maxum database.
• Create SQL statements to read and write to the Maxum database.
• Use parameter table entries and IARGs for variables in programs
• Create simple MaxBasic programs

Topics
• MaxBasic Overview
  – Making a Program Basics
  – Coding Standards
  – Online Reference
• Maxum Basic
  – If Then commands
  – Structure, Variables
  – Arithmetic Operators
  – Arrays and Sub Procedures
• Maxum Database
  – Foreign and Primary Keys
• Standard Query Language (SQL)
• Writing and Using Programs

Process Analyzers
Maxum Operation Level 1

Course code: PIA-PAMAX0M1

Target audience
This course uses Siemens Maxum System Manager and EZChrom workstation software. Users wanting training using GC Portal, the current workstation software, should enroll in the Maxum Operation with GC Portal Level 1 Course. This course is intended for individuals responsible for maintaining the Maxum Gas Chromatograph and for users who need to perform routine maintenance and calibration.

Prerequisites
• Basic Chromatography skills
• Process Gas Chromatography Technology

Course Profile
This course covers operations, setup, and calibration of the Maxum Gas Chromatograph, an overview of the Maxum System Manager, and an introduction to Advance EZChrom.

Objectives
Upon completion of this course, the student shall be able to:
• Perform basic maintenance on the Maxum Hardware modules.
• Balance the carrier gas flows.
• Setup the analyzer valve and EPC times
• Configure an EZChrom Instrument
• Adjust peak times using EZChrom
• Calibrate the analyzer with EZChrom
• Backup and Restore the analyzer database

Topics
• Maxum System Overview
• Maxum System Manager Overview
• Maxum Hardware Overview
• Maxum Valve Maintenance
  – Model 50, Model 11, Liquid Inject
• Maxum Detectors Maintenance
  – Flame Photometric and Ionization
• System Addressing
  – IP Addressing
  – CAN Addresses and adding a CAN Card
• Maxum Chromatograph
• Parallel Chromatography
  – Applets
  – Hardware Timing
  – Flow Settings
• Human Machine Interface
  – Menus, Navigation, and Alarms
**Process Analyzers**

**Maxum Operations with GC Portal Level 1**

Course code: PIA-PAMAXGC1

**Target audience**
This course uses Siemens Gas Chromatograph Portal (GC Portal) workstation software. Users wanting training using EZChrom, the legacy workstation software, should enroll in the Maxum Operation Level 1 Course. This course is intended for individuals responsible for maintaining the Maxum Gas Chromatograph and for users who need to perform routine maintenance and calibration.

**Prerequisites**
- Basic Chromatography skills
- Process Gas Chromatography Technology

**Course Profile**
This course covers operations, setup, and calibration of the Maxum Gas Chromatograph, an overview of the Maxum GC Portal workstation software. (GC Portal replaces both System Manager and EZChrom).

This course can be taught at the customer's site and customized to meet the customer's needs. With advance notice, customer specific applications can be taught.

**Objectives**
Upon completion of this course, the student shall be able to:
- Perform basic maintenance on the Maxum hardware modules
- Balance the carrier gas flows.
- Setup the analyzer valve and EPC timing
- Access Maxums using GC Portal
- Adjust peak times with the GC Portal workstation software.
- Calibrate the analyzer with GC Portal
- Backup and Restore the analyzer database

**Topics**
- Maxum System Overview
- Maxum GC Portal Overview
- Maxum Hardware Overview
- Maxum Valve Maintenance
- Maxum Detectors Maintenance
- Maxum Chromatograph
- Parallel Chromatography
- GC Portal Method Software
- Color Touch Screen CIM

**Maxum Operations with GC Portal Level 2**

Course code: PIA-PAMAXGCP2

**Target audience**
This course uses Siemens Gas Chromatograph Portal (GC Portal) workstation software. Users wanting training using EZChrom, the legacy workstation software, should enroll in the Maxum Operation Level 2 Course. This course is intended for individuals who have completed the Maxum Operation with GC Portal Level 1 or the Maxum Operation with EZChrom Level 1 course and are responsible for maintaining the Maxum Gas Chromatograph.

**Prerequisites**
- Maxum Operations with GC Portal Level 1 OR Maxum Operation Level 1

**Course Profile**
This course provides the students with more hands-on training with the Maxum GC Portal workstation software. (GC Portal replaces both System Manager and EZChrom). This course continues reviewing the software table structure and how it can be modified to add functionality to the Maxum Gas Chromatograph. Students learn how to create methods and sequences from scratch, as opposed to modifying an existing method or sequence.

**Objectives**
Upon completion of this course, the student shall be able to:
- Setup and calibrate using the Color Touch Screen Control Interface Module (CIM).
- Run multiple level calibrations in GC Portal.
- Add Methods and Sequences in GC Portal
- Perform Analyzer software upgrades
- Setup Chromatogram and Data Logging
- Add User Specific Alarms
- Add peaks, valves and programs by creating a Method in GC Portal.
- Create STATMON files

**Topics**
- Advance Maxum System Overview
- GC Portal Overview
- Maxum Chromatograph
- GC Portal Methods Software
- Advance Utilities
- GC Portal Analyzer
- Integrated Control Environment

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**Maxum Operation Level 2**

Course code: PIA-PAMAXUM2

**Target audience**
This course is intended for individuals who have completed the Maxum Operation Level 1 course.

**Prerequisites**
- Maxum Operation Level 1

**Course Profile**
This course provides the students with more hands-on training with the Workstation Table Editor and Advance EZChrom. This course continues reviewing the software table structure and how it can be modified to add functionality to the Maxum Gas Chromatograph. Students learn how to create methods and sequences from scratch, as opposed to modifying an existing method or sequence.

This course can be taught at the customer's site and customized to meet the customer's needs.

**Objectives**
Upon completion of this course, the student shall be able to:
- Setup and calibrate the Maxum Using the Human Machine.
- Run multiple level calibrations in EZChrom.
- Add Methods and Sequences in EZChrom
- Perform Analyzer software upgrades
- Setup Chromatogram and Data Logging
- Add User Specific Alarms
- Add peaks, valves and programs by creating a Method in GC Portal.
- Create STATMON files

**Topics**
- Advance Maxum System Overview
- Workstation Overview
- Maxum Chromatograph Software
- Advance Utilities
- System Manager Table Editor
- Integrated Control Environment

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**Maxum Operations**

**Maxum Operations with GC Portal Level 1**

Course code: PIA-PAMAXGC1

**Target audience**
This course uses Siemens Gas Chromatograph Portal (GC Portal) workstation software. Users wanting training using EZChrom, the legacy workstation software, should enroll in the Maxum Operation Level 1 Course. This course is intended for individuals responsible for maintaining the Maxum Gas Chromatograph and for users who need to perform routine maintenance and calibration.

**Prerequisites**
- Basic Chromatography skills
- Process Gas Chromatography Technology

**Course Profile**
This course covers operations, setup, and calibration of the Maxum Gas Chromatograph, an overview of the Maxum GC Portal workstation software. (GC Portal replaces both System Manager and EZChrom).

This course can be taught at the customer's site and customized to meet the customer's needs. With advance notice, customer specific applications can be taught.

**Objectives**
Upon completion of this course, the student shall be able to:
- Perform basic maintenance on the Maxum hardware modules
- Balance the carrier gas flows.
- Setup the analyzer valve and EPC timing
- Access Maxums using GC Portal
- Adjust peak times with the GC Portal workstation software.
- Calibrate the analyzer with GC Portal
- Backup and Restore the analyzer database

**Topics**
- Maxum System Overview
- Maxum GC Portal Overview
- Maxum Hardware Overview
- Maxum Valve Maintenance
- Maxum Detectors Maintenance
- Maxum Chromatograph
- Parallel Chromatography
- GC Portal Method Software
- Color Touch Screen CIM

**Maxum Operations with GC Portal Level 2**

Course code: PIA-PAMAXGCP2

**Target audience**
This course uses Siemens Gas Chromatograph Portal (GC Portal) workstation software. Users wanting training using EZChrom, the legacy workstation software, should enroll in the Maxum Operation Level 2 Course. This course is intended for individuals who have completed the Maxum Operation with GC Portal Level 1 or the Maxum Operation with EZChrom Level 1 course and are responsible for maintaining the Maxum Gas Chromatograph.

**Prerequisites**
- Maxum Operations with GC Portal Level 1 OR Maxum Operation Level 1

**Course Profile**
This course provides the students with more hands-on training with the Maxum GC Portal workstation software. (GC Portal replaces both System Manager and EZChrom). This course continues reviewing the software table structure and how it can be modified to add functionality to the Maxum Gas Chromatograph. Students learn how to create methods and sequences from scratch, as opposed to modifying an existing method or sequence.

**Objectives**
Upon completion of this course, the student shall be able to:
- Setup and calibrate using the Color Touch Screen Control Interface Module (CIM).
- Run multiple level calibrations in GC Portal.
- Add Methods and Sequences in GC Portal
- Perform Analyzer software upgrades
- Setup Chromatogram and Data Logging
- Add User Specific Alarms
- Add peaks, valves and programs by creating a Method in GC Portal.
- Create STATMON files

**Topics**
- Advance Maxum System Overview
- GC Portal Overview
- Maxum Chromatograph
- GC Portal Methods Software
- Advance Utilities
- GC Portal Analyzer
- Integrated Control Environment

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Need help finding the right training class?
Process Analyzers
Maxum
Simulated Distillation
Course code: PIA-PAMAXUM8

Target audience
This software course is intended for individuals responsible for the maintenance and operation of the Maxum Gas Chromatograph with the Simulated Distillation or Motor Gasoline Application.

Prerequisites
• Maxum Operation Level 1

Course Profile
This course covers setup and calibration of the Maxum Gas Chromatograph with a Simulated Distillation Application. This course covers the specific hardware and software associated with this application.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Calibrate a Simulated Distillation Maxum
• Configure Simulated Distillation functions
• Evaluate Motor Gasoline Application specific alarms
• Setup Temperature Ramp parameters

Topics
• Simulated Distillation Overview
  – Calibration
  – ASTM 2887
  – Sample Calibration
  – K Factor Select
  – Null
• Motor Gasoline Application
  – Basic Principle
  – Functional Description
  – Theory of Operation
  – Baseline Correction Options
  – Factor Select
  – MOGAS Alarms
  – Boiling Point Table
  – Calibration Standards

Process Analyzers
MicroSAM Maintenance
Course code: PIA-PAMSAMS1

Target audience
This software course is intended for individuals responsible for maintaining the MicroSAM Gas Chromatograph. This class is for users who need to perform routine maintenance and calibration of the MicroSAM Gas Chromatograph.

Prerequisites
• Maxum Operation Level 1

Course Profile
The course covers operation, maintenance, and calibration of the MicroSAM Gas Chromatograph. It also covers the hardware and related programming as well as covering the operation of the Maxum Workstation, which includes Table Editor and EZChrom.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Perform basic maintenance on the MicroSAM Hardware modules.
• Balance the carrier gas flows.
• Setup the analyzer valve times and EPC pressures
• Configure an EZChrom Instrument
• Adjust peak times using EZChrom
• Calibrate the MicroSAM with EZChrom.
• Backup and restore the analyzer database to a PC

Topics
• Hardware Overview
• Chromatograph
• Workstation
• Advance EZChrom Software
• Table Editor
• Labs

Process Analyzers
NOXMAT 6
Service & Repair
Course code: PIA-PACONACS

Target audience
This hardware course is intended for individuals responsible for the maintenance and operation of Siemens Continuous Analyzer.

Course Profile
This course covers maintenance and calibration of the Siemens Noxmat 6 Paramagnetic Continuous Gas Analyzer hardware and software.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
• Calibrate the Noxmat 6 analyzer using zero and span gasses.
• Replace the primary modules in Noxmat 6
• Set parameters in the Noxmat 6 analyzers thru the HMI.

Topics
• Principle of NOXMAT Operation
  – Electronic Board Identification
  – Analyzer Bench Identification
  – Infrared Analysis
• Noxmat Maintenance
  – Calibration
  – Cell Cleaning
  – Condensate Trap
  – Bench Disassembly
  – Panel Operation
  – Software
• Labs
  – Calibration
  – Hardware Assembly
  – Hardware Disassembly
  – Software and Communications
  – Familiarization and Identification of Hardware and Parts

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Process Analyzers

Optichrom
Operation & Maintenance
Course code: PIA-PAOPTIA2

Target audience
This course is intended for individuals responsible for routine maintenance and calibration of the Advance Optichrom Gas Chromatograph.

Prerequisites
- Basic Chromatography skills
- Process Gas Chromatography Technology

Course Profile
This course covers operation, setup, and calibration of the Advance Optichrom Gas Chromatograph and includes a complete review of the Optichrom hardware and software table structure. This course also gives the students an introduction to Advance basic language and the Advance Optichrom Application Personal Computer (APC) software.

This course can be taught at the customer’s site and customized to meet the customer’s needs.

Objectives
Upon completion of this course, the student shall be able to:
- Perform basic maintenance on the Optichrom Hardware modules.
- Balance the carrier gas flows.
- Set up the analyzer valve times.
- Adjust peak times using the control panel.
- Calibrate the analyzer.
- Backup and Restore the analyzer database with APC.

Topics
- Advance Hardware Overview
- Valve Maintenance
  - Plunger, Rotor, Quill
- Detectors Maintenance
  - Flame Photometric and Ionization
  - Thermal Conductivity
- Installation and Maintenance of the Advance Data Hiway
  - Configurations
  - Operation
- Advance Chromatograph
  - Troubleshooting
  - Maintenance
- Application Personal Computer Overview
- Advance Programming

Process Analyzers

OXYMAT 6
Service & Repair
Course code: PIA-PACONAC3

Target audience
This hardware course is intended for individuals responsible for the maintenance and operation of Siemens OXYMAT 6 Continuous Gas Analyzer.

Course Profile
In this course students will setup, calibrate and perform basic maintenance functions on the Siemens Oxymat 6 Paramagnetic Continuous Gas Analyzer.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
- Calibrate the Oxymat 6 analyzer using zero and span gases.
- Replace the primary modules in Oxymat 6.
- Set parameters in the 6 series analyzers thru the HMI.
- Clean the detector cells.

Topics
- Principle of OXYMAT Operation
  - Electronic Board Identification
  - Analyzer Bench Identification
  - Paramagnetic Oxygen
- OXYMAT Maintenance
  - Calibration
  - Cell Cleaning
  - Bench Disassembly
  - Panel Operation
  - Software
- Labs
  - Calibration
  - Hardware Assembly
  - Hardware Disassembly
  - Software and Communications
  - Familiarization and Identification of Hardware and Parts

Process Analyzers

Process Gas
Chromatography
Technology
Course code: PIA-PAOPTIA1

Target audience
This class is intended for individuals who need a basic understanding of process gas chromatography. The course will provide the student with the practical knowledge in process gas chromatography necessary for the operation of Siemens Process Gas Chromatographs, taught in later courses.

Course Profile
This course introduces the student to chromato-graphic technology and theory as well as to the hardware associated with process gas chromatography.

This course can be taught at the customer site and customized to meet the customers’ needs. With advance notice, customer specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
- Identify the modules in a Process Gas Chromatograph
- Repair a Model 11 and Model 50 valve
- Troubleshoot general problems in a Process Gas Chromatograph
- Adjust a column valve time based on a chromatograms and even plumbing diagrams.
- Adjust peak windows to integrate the correct peaks.
- Setup a Sample System using the custom documentation for a given system.

Topics
- Chromatographic Principles
- Chromatograph Column Theory
- Sample injection and Column switching Valves; Plunger, rotor, quill
- Detectors; TCD, FID, FPD
- Component attenuation, integration and calibration
- Analytical Techniques; Backflush, Parallel, Trap / Bypass, Reverse Column Step, and Heartcut
- Sample Systems

Need help finding the right training class?
In this course, students will setup, calibrate and perform basic maintenance functions on the Siemens Ultramat 6 Infrared Continuous Gas Analyzer System including hardware and software.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer-specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
- Calibrate the Ultramat 6 analyzer using zero and span gases.
- Replace the primary modules in Ultramat 6
- Replace and align the detector bench
- Set parameters in the Ultramat 6 thru the HMI.
- Clean the detector cell

Topics
- Principles of Ultramat Operation
  - Electronic Board Identification
  - Analyzer Bench Identification
  - Infrared Analysis
- Ultramat Maintenance
  - Calibration
  - Cell Cleaning
  - Condensate Trap
  - Pneumatic Pump
  - Bench Disassembly
  - Panel Operation
  - Software
- Labs
  - Calibration
  - Hardware Assembly
  - Hardware Disassembly
  - Software and Communications
  - Familiarization and Identification of Hardware and Parts

Process Analyzers
ULTRAMAT 6
Service & Repair
Course code: PIA-PACONAC2

Target audience
This course is intended for individuals responsible for the maintenance and operation of Siemens Continuous Analyzer.

Course Profile
In this course, students will setup, calibrate and perform basic maintenance functions on the Siemens Ultramat 6 Infrared Continuous Gas Analyzer System including hardware and software.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer-specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
- Calibrate the Ultramat 6 analyzer using zero and span gases.
- Replace the primary modules in Ultramat 6
- Replace and align the detector bench
- Set parameters in the Ultramat 6 thru the HMI.
- Clean the detector cell

Topics
- Principles of Ultramat Operation
  - Electronic Board Identification
  - Analyzer Bench Identification
  - Infrared Analysis
- Ultramat Maintenance
  - Calibration
  - Cell Cleaning
  - Condensate Trap
  - Pneumatic Pump
  - Bench Disassembly
  - Panel Operation
  - Software
- Labs
  - Calibration
  - Hardware Assembly
  - Hardware Disassembly
  - Software and Communications
  - Familiarization and Identification of Hardware and Parts

Process Analyzers
ULTRAMAT 23
Service & Repair
Course code: PIA-PACGAC23

Target audience
This course is intended for individuals responsible for the maintenance and operation of Siemens Ultramat 23 Continuous Gas Analyzer.

Course Profile
In this course, students will setup, calibrate and perform basic maintenance functions on the Siemens Ultramat 23 Infrared Continuous Gas Analyzer System including hardware and software.

This course can be taught at the customer’s site and customized to meet the customer’s needs. With advance notice, customer-specific applications can be taught.

Objectives
Upon completion of this course, the student shall be able to:
- Calibrate the Ultramat 23 analyzer using zero and span gases.
- Replace the primary modules in Ultramat 23
- Replace and align the detector bench
- Set parameters in the Ultramat 23 thru the HMI.
- Clean the detector cell

Topics
- Principles of Ultramat 23 Operation
  - Infrared Analysis
  - Analyzer Bench Identification
  - Electronic Board Identification
- Ultramat 23 Maintenance
  - Software
  - Panel Operation
  - Bench Disassembly
  - Pneumatic Pump
  - Condensate Trap
  - Cell Cleaning
  - Calibration
- Labs
  - Familiarization and Identification of Hardware and Parts
  - Software and Communications
  - Hardware Disassembly
  - Hardware Assembly
  - Calibration

Online Instructor-led Training
Introduction to Process Gas Chromatography
Course code: PIA-PAOILOPTIA1

Target audience
This course is intended for individuals seeking to gain a conceptual understanding of process gas chromatography and associated hardware. The course will provide the student with the fundamental principles of chromatographic parts and their inter-relationships. The operation and maintenance of Siemens Process Gas Chromatographs are taught in later courses.

Course Profile
This course introduces the student to process gas chromatography theory and technology. This is a live, instructor-led, on-line course delivered in 2 hour learning modules through an innovative web application. Students are encouraged to complete assigned lab exercises during and after each session to reinforce the learning modules throughout the week. A professional Siemens instructor will also be available to answer student questions outside of scheduled class times.

Objectives
Upon completion of this course, the student shall be able to:
- Identify the various hardware components used in a Process Gas Chromatograph and know their general functions.
- Conceptually setup a Sample System using the custom documentation.
- Conceptually adjust column-valve times based on chromatograms and oven plumbing diagrams.
- Conceptually adjust peak times and integration windows to measure the correct peaks.
- Conceptually troubleshoot general problems in a Process Gas Chromatograph.

Topics
- Chromatographic Principles
- Sample Systems
- Chromatograph Column Theory
- Valve Operation and Maintenance
- Detector Operation and Maintenance
- Temperature Control
- Component Integration
- Analytical Techniques
Process Automation – APACS+ / PCS7 / TDC

Learning Map

Foundation and Pre-requisite training courses are available for beginners in the form of our online, self-paced courses. Our Technology catalog offers general and Siemens-specific titles including Intro to PLC’s, Siemens PLC Programming concepts, and Function Block for Siemens PLC’s. Visit www.usa.siemens.com/ospt for a complete list of course offerings.

- **Operators**
  - PCS7 System Operator
    - On-site Only
      - SCT-S7OILPLCI1A
    - Online instructor-led
      - PIA-PAIOLOPTIA1

- **Plant Engineers Maintenance**
  - PCS7 System Service 1
    - SCT-PCSVCS1A

- **Control Engineers / System Integrators**
  - PCS7 System Engineering 1
    - SCT-PCSYSE1C
  - PCS7 System Engineering 2
    - SCT-PCSYSE2C
  - PCS7 OS Advanced Engineering
    - SCT-PCOSCP2A

Optional and specialty courses:

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<td>SCT-AP200M1A</td>
<td>5 days</td>
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Need help finding the right training class?
Process Automation – APACS+
200 APACS+ Maintenance & Configuration
Course code: SCT-AP200M1A

Target audience
Technicians, Site Engineers and Integration Engineers using APACS+ 4mation to develop a process system solution.

Prerequisites
• Computer Expertise

Course Profile
This course is designed for controls technicians and engineers who are responsible for project design, development and commissioning an APACS+ system. This course covers system architecture, as well as capabilities of system hardware components. These include control modules, I/O modules, system network components, servers and clients. Additionally, the student will be prepared to make changes and additions to an existing APACS+ controller configuration. Finally, the student will learn to navigate and interpret a controller configuration, modify an existing configuration and add new elements such as I/O tags and control loops.

Objectives

Upon completion of this course, the student shall be able to:
• Describe the architecture and hardware
• Move and connect field I/O points.
• Perform preventive maintenance.
• Troubleshoot a problem and identify the system component that has failed.
• Shutdown and restart a system as required
• Select appropriate hardware elements
• Diagnose the system using system diagnostics
• Navigate and interpret a controller configuration
• Modify existing controller configuration
• Read and force real-time data values
• Prepare a controller configuration for use

Topics
• ProcessSuite System Architecture Overview
• Module Mounting and Power Distribution
• Introduction to 4-motion™
• APACS+® ProcessSuite Troubleshooting
• Introduction to Controller Configuration
• Configure I/O Tags And Variables
• Ladder Logic Diagrams
• Managing The Resource Blocks

Process Automation – APACS+
APACS+ to PCS7 OS Migration
Course code: SCT-PCAPSP1A

Target audience
Technicians, Site Engineers and Integration Engineers familiar with APACS+/ProcessSuite should attend this course.

Prerequisites
• Working knowledge of the APACS system and HMI.

Course Profile
This course is designed to help existing users of APACS+/ProcessSuite systems transition into PCS 7/APACS+ OS as their HMI platform. This course builds upon previous APACS+/ProcessSuite knowledge gained in the 101 APACS+ Maintenance course, 201 4-motion Configuration course and the 203 ProcessSuite Framework Configuration course. The student will learn to easily use PCS 7/APACS+ OS with a previously existing 4-motion configuration.

Objectives

Upon completion of this course, the student shall be able to:
• Compare APACS+/ProcessSuite, APS and PCS 7 / APACS+ Architecture
• Log on and off the runtime PCS 7 OS
• Operate a running APACS+/ PCS 7 OS including Navigation, Process symbols, Faceplates, Alarm Messages
• Review the Types of HMI Comments
• Configure a DBA project for migration
• Start the migrated OS project into runtime
• Add External Variables manually
• Add an Internal Variable for Text Reference
• Edit graphic object properties
• Edit Customized Objects
• Insert and configure Trend objects
• Create and configure online Trends.
• Modify APACS+ alarms
• Customize PCS 7 OS Alarm Logging
• Identify the requirements for creating custom Tags, Faceplates and symbols using DBA

Process Automation – PCS7
BRAUMAT Compact Workshop
Course code: SCT-PCBRCE1A

Target audience
The target audience for this workshop includes PCS7 planning and brewery engineering personnel, software project engineers, system integrators, service and maintenance personnel.

Prerequisites
• PCS7 System Engineering 1
• PCS7 System Engineering 2

Course Profile
PLEASE NOTE: Prerequisite PCS7 System Engineering 1 is mandatory. Prerequisite PCS7 System Engineering 2 is recommended. The BRAUMAT Compact workshop is designed to provide participants with an opportunity to apply their PCS 7 engineering skills to hands-on tasks associated with creating, configuring and modifying a Braumat Compact project. This workshop is more hands-on practical exercises than theory (theory approx. 10 - 20%). The goals of this workshop are to aggressively guide the participant through a basic system project design, creation, and implementation using the BRAUMAT Compact library.

Objectives

Upon completion of this course, the student shall be able to:
• Configure BRAUMAT Compact within the PCS7 programming area.
• Create a recipe based on single sequences for multiple units.
• Configure a BRAUMAT Compact project utilizing the basic components of BRAUMAT Compact such as tag generator, Phaseon Matrix, batch trending, and batch reporting.

Topics
• Installation of BRAUMAT Compact
• Creation of a BRAUMAT Compact project
• Create a system with three interdependent subsystems
• Reporting and trending
• Scheduler
• Extending the recipe with logical functions
• Creation of function blocks using the BRAUMAT Compact concept

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# Process Automation – APACS+ / PCS7 / TDC

## Process Automation – PCS7

### PCS 7 AS

**Advanced Engineering**

Course code: SCT-PCSASE1A

**Target audience**

This course is intended for PCS 7 users already proficient at engineering PCS 7 AS/OS projects.

**Prerequisites**

- PCS7 System Engineering 2

**Course Profile**

This is an advanced AS engineering course designed for experienced PCS 7 users, engineers and Solution Partners. The goals of this course are to enhance the student’s skill-set by exploring advanced AS configuration topics and solutions to common application problems.

**Objectives**

*Upon completion of this course, the student shall be able to:*

- Calculate memory, systems structure and architecture requirements
- Configure automatic archives/read-back jobs and a distributed Engineering Station
- Compare project versions and use access protection
- Engineer with Advanced ES tools
- Use advance features of SFCs, SFC types and alarm messaging
- Use advanced Process Control (APC) strategies

**Topics**

- Common simulation tools
- PCS 7 Documentation and Online Support
- Requirements and functional process description
- System design and component specification
- PCS7 Project handling
- Advanced ES
- SFC Advanced
- Advanced alarm engineering
- Advanced Process Control (APC)

### PCS 7 CEMAT

Course code: SCT-PCCMTP1A

**Target audience**

PCS 7 Planning engineers, Software project engineers, service and maintenance personnel, and system integrators should attend this course.

**Prerequisites**

- Basic knowledge of SIMATIC PCS7 V7.0

**Course Profile**

This course covers BRAUMAT compact within the PCS7 programming area. Students learn to create a recipe based on single sequences for multiple units. Additionally they gain knowledge of the basic components of BRAUMAT Compact like the Taggenerator, the Phasecon Matrix, Batch Trending and Batch reporting.

**Objectives**

*Upon completion of this course, the student shall be able to:*

- Move and connect field I/O points.
- Perform preventive maintenance
- Troubleshoot a problem and identify the system component that has failed.
- Shutdown and restart a system as required or after a power failure.
- Select appropriate hardware elements for system expansion
- Use the ProcessSuite Vision system diagnostics

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## Process Automation – PCS7

### PCS7 OS

**Advanced Engineering**

Course code: SCT-PCOSCP2A

**Target audience**

This course is intended for PCS 7 users proficient at engineering PCS 7 AS/OS projects.

**Prerequisites**

- PCS7 Experience Credentials
- PCS7 System Engineering 1

**Course Profile**

This is an advanced OS engineering course designed for experienced PCS 7 users, engineers and Solution Partners. The goals of this course are to enhance the student’s skill-set by exploring advanced OS configuration topics and solutions to common application problems. This course begins with an existing AS project and a brief but thorough introduction to it. Using this “base” project and advanced programming techniques, various OS architectures will be added. OS graphic development will include “best practice” methods as well as advanced topics such as C-script, VB script, Faceplate functionality and custom solutions. Various diagnostic aids and troubleshooting methods will be employed throughout the presentation of this course.

**Objectives**

*Upon completion of this course, the student shall be able to:*

- Perform a typical process system configuration
- Configure a fully functioning PCS7 OS project
- Customize existing block icons
- Create and configure custom graphics as well as custom faceplates
- Create and configure various PCS 7 architectures including Server/Client, Redundant Server, Web Server/Client, MS Server and Multi-project set up.
- Perform advanced level system administration

**Topics**

- PCS 7 Documentation and Online Support
- Basics of OS configuration
- The Client/Server Configuration
- The Server Redundancy
- Extended Configuration of Multi-user Projects
- OSI/Web Option
- Long-term Archiving
- The Graphic Configuration
- The Block Icon

---

Need help finding the right training class?
Process Automation – PCS7

PCS7 Process

Safety Sustaining

Course code: SCT-PCSFT51A

Target audience
This course is for site engineers and maintenance staff responsible for the sustaining and operation of a Siemens PCS7 based Safety Instrumented System (SIS).

Course Profile
This course builds skills for sustaining and operating a Siemens PCS7 Process Safety system. The course begins with an introduction to Process safety system concepts, purpose and typical process control architectures. The course then builds skills in hardware components, basic SIMATIC project management and system troubleshooting. A light review of system program elements and topics is included to support systems level troubleshooting. The Safety Matrix, a tool available for safety cause and effect configuration is also covered. The class will use a functioning safety demo project with minimal system programming.

Objectives
Upon completion of this course, the student shall be able to:
- Use the basic knowledge of a process safety control system to properly sustain an existing system.
- Configure the proper hardware of the CPU and signal modules to ensure appropriate system response.
- Navigate a safety project
- Configure the Safety Library blocks to manage a safety shutdown program.
- Configure using the Safety Matrix programming tool
- Operate, control and troubleshoot a safety system using the Safety Matrix tool.
- Troubleshoot the system using various software tools and status indicators.

Topics
- Process Safety Overview
- Siemens Process Safety
- Project Management
- Configuring Hardware (HW)
- Continuous Functions Charts (CFC)
- Safety Matrix
- System Troubleshooting

Process Automation – PCS7

PCS7 SIMATIC Batch

Course code: SCT-PCBATP1B

Target audience
This course is for PCS7 system design engineers, configuration engineers, programmers, commissioning personnel, and OEMs working with the SIMATIC Batch option.

Prerequisites
- PCS7 System Engineering 1
- PCS7 System Engineering 2 (Recommended)

Course Profile
This course is an introduction to Siemens SIMATIC Batch processing. Using the same project created during the prerequisite PCS 7 System Engineering training courses, students will review a typical batch process model to understand process elements and terminology. Students will then use the same sample batch process to learn batch tools, management and control skills. Security, system administration and batch control techniques topics are included. Recipe generation and planning considerations are also discussed.

Objectives
Upon completion of this course, the student shall be able to:
- Define the terms and procedural model according to the ISA 88.01
- Set up the hardware configuration; define SIMATIC Batch structure, a P-Cell, Unit, Functions in Plant View and CFC
- Properly compile and download a Batch project
- Navigate file structures on BATCH Server
- Utilize BATCH faceplates and other OS Batch controls in the OS
- Execute all configuration steps on the ES to start up a BATCH server successfully
- Create a new Pcell, handle materials, write/ edit/release master recipes
- Create new users and set up user rights
- Set up batches based on the quantity of the order and batch dependencies
- Access data of finished and archived batches
- Perform Online Structure Changes.

Topics
- PCS 7 Documentation and Support
- Functional Process Description
- Batch Systems Basics
- SIMATIC Batch in SIMATIC Manager and OS
- SIMATIC Batch offline and offline

Process Automation – PCS7

PCS7 System Engineering 1

Course code: SCT-PCSYSE1C

Target audience
Controls engineers using PCS7 to develop a process system solution.

Prerequisites
- Basic automated controls experience
- Industrial electronics experience
- Solid computer skills

Course Profile
This course is designed for controls engineers who are responsible for project design, development and commissioning a PCS7 system. The goals of this course are to aggressively help the student learn a basic system configuration and project design using standard system tools and libraries. This course begins with the definition of a typical project and planning the system architecture. The students will then actively build, test and debug a simple PCS7 process system exploring the Automation Station, Engineering Station and Operator Station engineering environments. Hands-on lab exercises are used to build experience with system engineering, process optimization and common troubleshooting.

Objectives
Upon completion of this course, the student shall be able to:
- Define the requirements and components of a PCS7 system solution
- Configure a multiproject complete with Component and Plant Hierarchy
- Configure basic Continuous Function Charts
- Configure basic Sequential Function Charts
- Configure a basic Operator Station configuration
- Configure and test basic communications
- Perform basic system administration and project management functions.

Topics
- PCS 7 Documentation and Support
- Requirements and Functional Process Description
- System Design and Component Specification
- Project setup
- Station and network configuration
- Connection to the process
- Basic Operating and Monitoring
Process Automation – APACS+ / PCS7 / TDC

Process Automation – PCS7

PCS7 System Engineering 2
Course code: SCT-PCSYSE2C

Target audience
Controls engineers who are using PCS7 to develop a process system solution and need an advanced level system configuration and integration skills.

Prerequisites
• PCS7 System Engineering 1

Course Profile
This is an advanced process control course for engineers. The goals of this course are to aggressively help the student learn advanced level system configuration and project engineering. This course begins with the project configured in the System Engineering-1 course and elevates the functionality through advanced Engineering Station programming, Operator Station graphics development and, Automation Station hardware integration. Students will use ½ best practice ½ project design and management techniques to configure a typical process application.

Objectives
Upon completion of this course, the student shall be able to:
• Perform a typical process system configuration.
• Build a fully functioning PCS7 project.
• Perform fast bulk engineering.
• Build custom blocks using SCL.
• Configure custom graphics.
• Set up user administration.
• Use models to replicate Plant Hierarchy.
• Create alarm and tag archives.
• Configure Ethernet communications.

Topics
• Customizing the OS
• Archiving System
• Locking functions and operating modes
• Mass data engineering
• Final steps of configuration
• User block - attributes and visualization
• Demonstration Server-Client System

Process Automation – PCS7

PCS7 System Operator
Course code: SCT-PCCPCSU1C

Target audience
This course targets PCS7 system operators, production supervisors, and administrative staff who require a working knowledge of the system. Additionally, anyone in need of building a basic, operational understanding of the PCS7 process control system. The Day 2 option is targeted for operators with basic technical diagnostic responsibilities and backgrounds.

Course Profile
This course provides the student with a working exposure to the PCS7 OS control system. This is a flexible agenda with a 1 day core agenda plus a “Day 2 option” with advanced system diagnostics. Using a prebuilt Siemens demo project, the students will learn PCS7 system operational functions and procedures in a safe and controlled environment. The Day 2 option is targeted for those operators with additional system diagnostics responsibilities. This course is a hands-on curriculum working with a typical simulated production process.

Objectives
Upon completion of this course, the student shall be able to:
• Understand the PCS7 control system architecture
• Navigate the system screen hierarchy
• Control and monitor a production process
• Use the system keysets and functions
• Use the Trending and Messaging systems
• Use the Reports and Archive systems
• Use the system Hardware Configuration and Diagnostics tools (Day 3 option)

Topics
• PCS7 Overview
• Demo Project Screen Review
• PCS7 OS Process Mode
• System Operator Inputs
• Graphic System Control
• Trend, Message and Reports Systems
• Archive System
• Maintenance Station (Day 2)
• PCS7 System Hardware Overview (Day 2)
• System Troubleshooting Basics (Day 2)

Process Automation – PCS7

PCS7 System Service 1
Course code: SCT-PCSVCSS1A

Target audience
Plant Engineers, Technicians and Users responsible for operating, optimizing and troubleshooting a PCS7 system should attend this course.

Prerequisites
• Computer Expertise
• Industrial electronics experience

Course Profile
This course is designed for individuals receiving an engineered PCS7 system and responsible for system sustaining and service. The goals of this course are to help the student learn to efficiently use, optimize and troubleshoot the processes through the PCS7 system. This course begins with the students learning the key system architecture and operational functions. Students will then perform system troubleshooting using the PCS7 tools using a fully functional class project. This hands-on course builds experience with system use, optimization, common troubleshooting and basic sustaining engineering tasks.

Objectives
Upon completion of this course, the student shall be able to:
• Navigate the PCS7 documentation
• Navigate a PCS7 OS runtime station including the built-in diagnostics screens
• Perform preventive and basic diagnostic maintenance
• Perform basic hardware changes and system reconfiguration.
• Configure and test basic network communications including MPI, Ethernet and PROFIBUS DP/PA.
• Perform basic OS graphics modifications.

Topics
• PCS7 System Documentation and Support
• System Design and Component Specification
• PCS 7 OS Runtime and Messaging System
• System Troubleshooting
• Simatic Manager and Network Topologies
Process Automation – TDC

SIMATIC TDC Engineering with D7 and CFC

Course code: SCT-PCTDCP2A

Target audience
Programmers, Commissioning engineers, configuring engineers and service personnel should attend this course.

Prerequisites
• S7 System Tools & Troubleshooting 1 OR S7 TIA Programming 1

Course Profile
This course is designed for service technicians and commissioning/configuration engineers who are responsible for project maintenance, design, development and commissioning a TDC system using CFCs. This course provides you with the knowledge for programming and commissioning the control system SIMATIC TDC. After the training you will be able to configure technological functions with CFC and establish the communication via PROFIBUS, Industrial Ethernet and GDM-connection.

Objectives
Upon completion of this course, the student shall be able to:
• Obtain help using the online documentation
• Configure rack hardware
• Copy, archive and restore a project
• Configure the PGI/PC interface
• Create and edit a program using CFC blocks
• Configure the processing sequence of CFC blocks
• Configure scan times and interrupts
• Create run-time groups
• Save, compile, and load the program to the memory module
• Monitor program and hardware operation using Test Mode
• Create and use reference data for a program
• Convert a task to a program (Chart in chart, chart as block)

Topics
• Working with the SIMATIC-Manager
• Hardware configuration for the system
• Preparation of CFC charts for this system
• Working with own blocks and chart in chart
• Communication-Hardware and its ranges
• Introduction to the communication
• Processor communication

Online Instructor-led Training

PCS7 System Operator

Course code: SCT-PC0ILPCSU1C

Target audience
This course targets PCS7 system operators, production supervisors, and administrative staff who require a working knowledge of the system. Additionally, anyone in need of building a basic, operational understanding of the PCS7 process control system.

Course Profile
This course provides the student with a working exposure to the PCS7 OS control system. Using a prebuilt Siemens demo project, the students will learn PCS7 system operational functions and procedures in a safe and controlled SIMULATED plant environment. All core operational tasks and system tools are discussed and practiced by the students. Typical operator system inputs, acknowledgments, control and monitoring tasks are included. This course is a hands-on curriculum working with a typical simulated production process.

This is a live, instructor led, on-line course delivered in two hour learning modules through an innovative web application. Access to fully functional PCS7 software will be provided to the student through a cloud based application.

Objectives
Upon completion of this course, the student shall be able to:
• Identify the PCS7 control system architecture
• Navigate the OS system screen hierarchy
• Control and monitor a production process
• Navigate the system keysets and functions
• Access the Trending and Messaging systems
• Create / access the Reports and Archive systems

Topics
• PCS7 Overview
• Demo Project Screen Review
• PCS7 OS Process Mode
• System Operator Inputs
• Graphic System Control
• Trend System
• Message System
• Functions and Outputs of the Report System
• Archive System
# Process Instrumentation

## Learning Map

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**Flow Technologies**

- **DAYS 4**
- **PIA-PRT3C1A**

**Level Technology**

- **DAYS 4**
- **PIA-PRT1C1A**

**SITRANS FUH1010**

- **DAYS 3**
- **PIA-PRFUHC1A**

**SITRANS FUS/FUE 1010 Clamp-On Products**

- **DAYS 3**
- **PIA-PRFUEC1A**

**SITRANS FUG1010 Clamp-On Products**

- **DAYS 3**
- **PIA-PRFUGC1A**

**Procidia/353 Controller Configuration**

- **DAYS 3**
- **PIA-PR353C1A**
**Process Instrumentation**

**Field Instrumentation**

Course code: PIA-PRT5C1A

**Target audience**
Service personnel and customers using process instruments.

**Course Profile**
Combining hands-on tutorials with theory sessions, this course teaches participants the principles of field instrumentation, including pressure and temperature measurement, and electro-pneumatic and ultrasonic technologies. Working with the PI product portfolio, students gain an understanding of common applications, troubleshooting, customer requirements, and how to select a suitable product.

**Topics**
- Pressure
  - Introduction to pressure principles and technology
  - Pressure terminology
  - Programming
  - Common applications
  - Maintenance and troubleshooting
- Temperature
  - Theory
  - Transmitter design
  - Programming temperature diagnostics
- Valve Positioners
  - Introduction to Valve positioners
  - Valve positioner technology
  - Programming and initialization
  - Applications

**Flow Technologies**

Course code: PIA-PRT3C1A

**Target audience**
This course is for service personnel and customers unfamiliar with flow meter technologies and the proper use of these process instruments.

**Course Profile**
Using hands-on tutorials and theory sessions, this course gives participants a comprehensive overview of several flow measurement technologies using the PI Coriolis mass flow, electromagnetic volume flow, Vortex flow measurement, and ultrasonic flow measurement technologies. Covering commonly used flow product lines and common applications, participants learn the principles of flow measurement, product features, product selection, understanding and meeting customer requirements, and basic troubleshooting of applications and installations.

**Objectives**
Participants will:
- Learn the principles of flow measurement.
- Review commonly used flow technologies and common applications.
- Explore product features and selection of flow technology based on application requirements.
- Learn basic troubleshooting of applications and installations.

**Topics**
- Introduction to flow measurement and why it is a critical process variable
- Theory, history, and terminology
- Flow markets and key applications
- Working principles, installation, commissioning, common errors, and unique selling points of:
  - Coriolis MASSFLO flow meters
  - Electromagnetic flow meters
  - Ultrasonic flow meters - Transit time and Doppler
  - Vortex flow meter
- Product selection by application
- Installation guidelines
- Hands-on exercises on each type of technology presented

**Level Technology**

Course code: PIA-PRT1C1A

**Target audience**
This course is intended for individuals responsible for basic set-up and calibration of the solids and liquid level measurement devices for Siemens PI.

**Course Profile**
Combining hands-on tutorials with theory sessions, this course teaches participants the principles of solids and liquid level measurement using the Siemens Process Instrumentation ultrasonic, radar, capacitance, guided wave radar and point level detection technologies. Covering product lines and common applications, participants learn the basics of point and continuous level measurement, product features, product selection, and troubleshooting.

**Objectives**
Participants will:
- Gain an understanding of the measuring principles for contacting and non-contacting level instrumentation.
- Obtain and understand the principle of operation, selection of sizing, and basic programming for ultrasonic, radar, guided wave radar, pressure, and capacitance.
- Acquire an understanding of when and how to apply each technology to a specific application in order to give the application the best chance of being successful.
- Acquire knowledge of industrial communication instruments and software to remotely monitor applications.

**Topics**

- Ultrasonics:
  - Theory of operation
  - Applications, programming and installation basics
  - Support Software
- Non-Contacting Microwave Radar:
  - Theory of operation
  - Pulse, FMCW, 2-wire
  - Power, Frequency, Cost
  - SIMATIC PDM
  - Applications and installation basics
- Guided Wave Radar:
  - Theory of operation
  - Applications and installation details
- Capacitance
  - Theory of operation and Applications

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Process Instrumentation

Procidia/353 Controller Configuration

Course code: PIA-PR353C1A

Target audience
Sales channel partners and service personnel, employees, and customers who will be configuring the Model 353 controller. Upon request, 352 Controller and Procidia HMI configuration may be covered during custom classes.

Course Profile
This course covers the operation and configuration of 353 controller. The course provides information on the capabilities of controllers, including input and output capacity and network communication options. The student will be introduced to the steps required to configure the controller using the faceplate and using a PC based Graphical Configuration Utility.

Objectives
Upon completion of this course, the student shall be able to:
- Describe the hardware components of each system
- Explain typical applications for each product
- Configure controllers from the operator display faceplate and the Iconfig® software program
- Upload and download configurations plus monitor working controllers
- Perform preventive maintenance
- Connect field wiring to the local I/O of each unit

Topics
- Controller overview and faceplate familiarization
- Installation and Maintenance
  - Configuration Overview
  - Input, Output, and Display configuration
  - Setpoint, Switching and Track & Hold function blocks
  - Controller and Dynamic function blocks
  - Factory configured options
- Graphical Configuration Utility
- Communicating using Ethernet
- In depth operating theory, application considerations, installation and maintenance of any of the following products
  - Overview of data mapping and the iWare HMI

Process Instrumentation

SITRANS FUG1010 Clamp-On Products

Course code: PIA-PRFUGC1A

Target audience
This is an advanced course intended for technical individuals responsible for maintenance and operation of SITRANS FUG010 Natural Gas clamp-on flowmeters.

Prerequisites
- Training Course PIA-PRFUEC1A
- Knowledge of Natural Gas Industry Terminology

Course Profile
Combining hands-on tutorials with theory sessions, this course teaches participants the configuration and application details of the SITRANS FUG1010 product line as it relates to the gas industry. This course is an advanced course with focus on the FUG product. Additionally, the course covers many of the applications for the products as well as installation and troubleshooting.

Objectives
Participants will learn:
- Principles of transit-time clamp-on flow meters for the gas industry.
- Programming fundamentals, requirements, and options.
- Installation requirements and procedures.
- Commissioning and verification.
- Troubleshooting and corrective action.
- Utilization of supporting diagnostic software and tools.
- Communication options.

Topics
- Model selection and part numbering
  - Fundamental theory and application considerations
- Programming techniques
- Installation methods and guidelines
- Hands-on installation exercises
- Construction and loading of AGA8 tables
- Basic troubleshooting
- Use of Si-Ware® serial data software

Process Instrumentation

SITRANS FUH1010

Course code: PIA-PRFUHC1A

Target audience
This is an advanced course intended for technical individuals responsible for maintenance and operation of SITRANS FUH Hydrocarbon clamp-on flowmeters and associated leak detection systems.

Prerequisites
- Training Course PIA-PRFUEC1A
- Knowledge of Hydrocarbon Industry terminology

Course Profile
Combining hands-on tutorials with theory sessions, this course teaches participants the configuration and application details of the SITRANS FUH1010 and Leak Detection product line as it relates to the Hydrocarbon Liquid industry. This course is an advanced course with focus on the FUH product and leak detection designs. Additionally, the course covers many of the applications for the products as well as installation and troubleshooting.

Objectives
Participants will learn:
- Principles of transit-time clamp-on flow meters for the Hydrocarbon industry.
- Programming fundamentals, requirements, and optimization.
- Installation requirements and procedures.
- Commissioning and verification.
- Troubleshooting and corrective action.
- Utilization of supporting diagnostic software and tools.
- Communication options.

Topics
- Theory and application considerations
  - Installation methods, requirements and guidelines
- Detailed analysis of diagnostic data
- Enhanced application troubleshooting
- Construction and Programming liquid tables
- Assessment and correction of operational issues and communications
- Use of Si-Ware® serial data software
Process Instrumentation
SITRANS FUS/FUE1010 Clamp-On Products

Course code: PIA-PRFUEC1A

Target audience
This course is intended for technical individuals responsible for routine maintenance and calibration of SITRANS FUS/FUE/FST clamp-on flowmeters. Additionally sales representatives responsible for selling and specifying these meters will benefit from this class.

Prerequisites
• Basic knowledge of pipes and piping system terminology

Course Profile
Combining hands-on tutorials with theory sessions, this course teaches participants the configuration details of the products in the FUS/FUE product line. Additionally, the course covers many of the applications for the products as well as installation and troubleshooting.

Objectives
Participants will learn:
• Principles of transit-time and Doppler clamp-on flow meters for liquids.
• Programming fundamentals, requirements, and options.
• Installation requirements and procedures.
• Commissioning and verification.
• Troubleshooting and corrective action.
• Utilization of supporting diagnostic software and tools.
• Communication options.

Topics
• Model selection and part numbering
• Fundamental theory and application considerations
• Programming techniques
• Installation methods and guidelines
• Hands-on installation exercises
• Basic troubleshooting
• Use of Si-Ware® serial data software

Process Instrumentation
SITRANS FUH1010

Course code: PIA-PRFUHC1A

Course Profile
Combining hands-on tutorials with theory sessions, this course teaches participants the configuration and application details of the SITRANS FUH1010 product line as it relates to the Liquid Hydrocarbon industry. This course is an advanced course with focus on the FUH product line. Additionally, the course covers many of the applications for the products as well as installation and troubleshooting.

Objectives
Participants will learn:
• Theory and application considerations
• Installation methods, requirements and guidelines
• Detailed analysis of diagnostic data
• Enhanced application trouble shooting
• Construction and Programming liquid tables
• Assessment and correction of operational issues and communications
• Use of Si-Ware® serial data software
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