

## S7 TIA Portal Programming with SCL-Virtual

### General Information

Course Code: SCT-PTOILSCLP3A  
Length: 10 Hours

### 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

### Profile

1.9 CEUs (Continuing Education Credits)

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 PLCSIM to complete system integration programming, troubleshooting, and functional testing of applications.

This is a live, instructor led, on-line course delivered in 2 hour learning modules through an innovative web application. Access to fully functional TIA Portal 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. 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:*

- 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 PLCSIM software to simulate PLC hardware and test user defined SCL program code.

### Topics

1. The TIA Portal
  - a. The Project Structure
  - b. Offline/Online Views
  - c. TIA Portal Help System
  - d. Creating a Watch Table
2. SCL Overview
  - a. SCL Defined
  - b. Supported Block Types
  - c. SCL Editor
  - d. Compile, Debug and Troubleshooting SCL code
  - e. Download and Program Test
3. SCL Program Structure
  - a. Block call order
  - b. Local Instances of FBs
  - c. Global Data Blocks
  - d. Instance Data Blocks
  - e. Adding Code comments
4. SCL Syntax
  - a. Keywords and Identifiers
  - b. Assignment Statements
  - c. Conditional Statements
  - d. Control Statements
  - e. OK Flag
5. SCL Data Types
  - a. Elementary Data Types
  - b. Complex Data Types
  - c. User Defined Data Types
  - d. Data Types for Parameters
  - e. Constants and Jump Labels
6. SCL Declarations
  - a. INPUT Parameters
  - b. OUTPUT Parameters
  - c. IN\_OUT Parameters
  - d. STATIC and TEMP Variables
  - e. CONSTANTS
7. SCL Mathematical and Logical Operations
  - a. Arithmetic Operations
  - b. Comparison Operators
  - c. Logical Operators
  - d. Standard Functions
  - e. Conversion Functions
  - f. Numerical Functions
8. SCL Control Instructions
  - a. IF, Then, Instructions
  - b. CASE Instruction
  - c. FOR Instruction
  - d. WHILE Instruction
  - e. REPEAT Instruction
  - f. CONTINUE Instruction
  - g. EXIT, RETURN, and GOTO Instructions

