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SCE Guide Learning/Training Document

Siemens Automation Cooperates with Education (SCE) | 07/2020

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Offer
SCE Learning & Training Documents

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More than **100 didactic SCE Learning and Training Documents**

- → **Designed for use in** classes and lectures; **individual adaptation** possible
- → Suitable for **self-study**
- → For **implementation** of the **SCE Digitalization Concept**
- → Available **free-of-charge online** in up to **8 languages**

Didactically adapted documents impart practice-based, effective and structured learning content

↗ Learning &Training Documents

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Getting Started using SCE Learning & Training Documents

SCE Module and Concept Description (1) Overview

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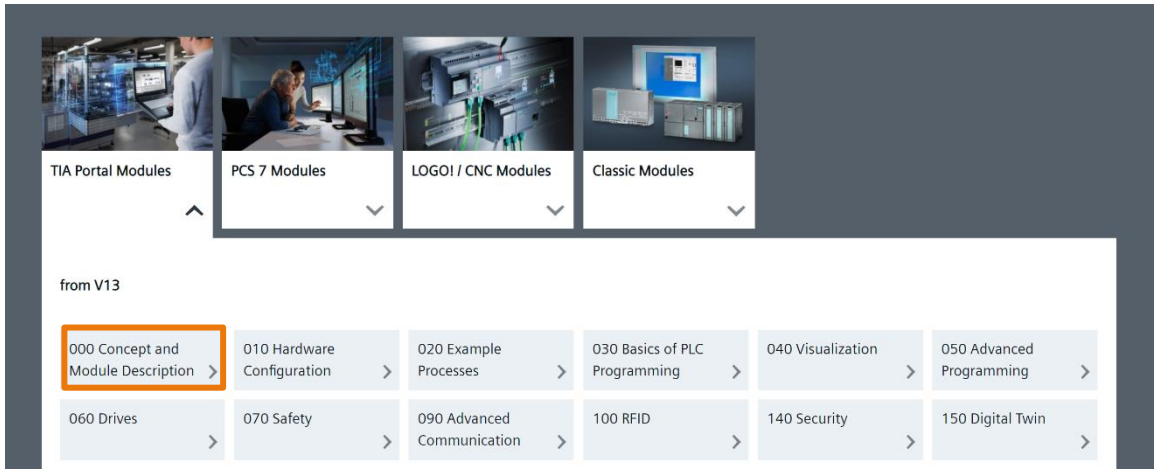
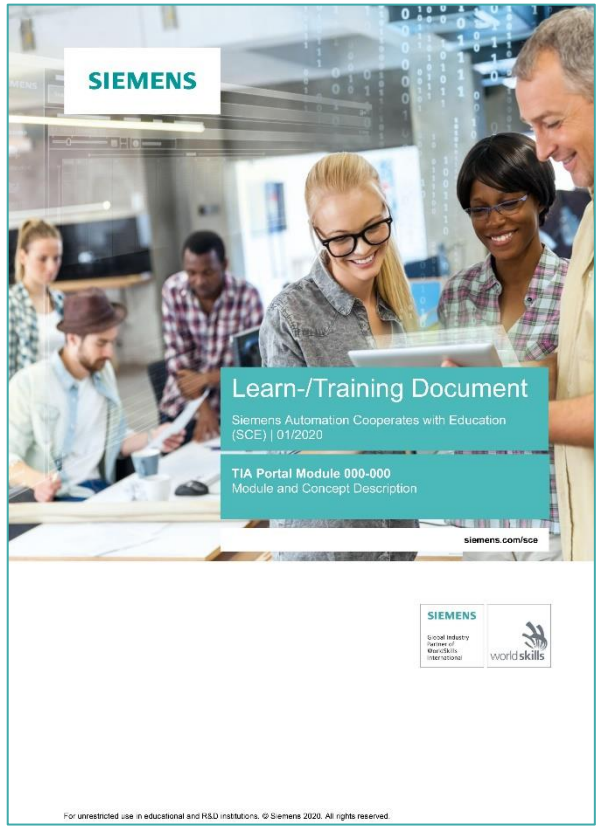
The module description offers you a **complete overview of the modules**, **explains the structure of the SCE learning & training documents** and **supports you in selecting relevant, interesting and technically suitable contents.**

TIA Portal modules / from V13



↗ To document



Obtain a quick overview of module offers and structure

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SCE Module and Concept Description (2)
Module overview & detailed overview of basic/advanced modules

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000-000
General Module Overview of SCE Learn-/Training Documents

Basic modules

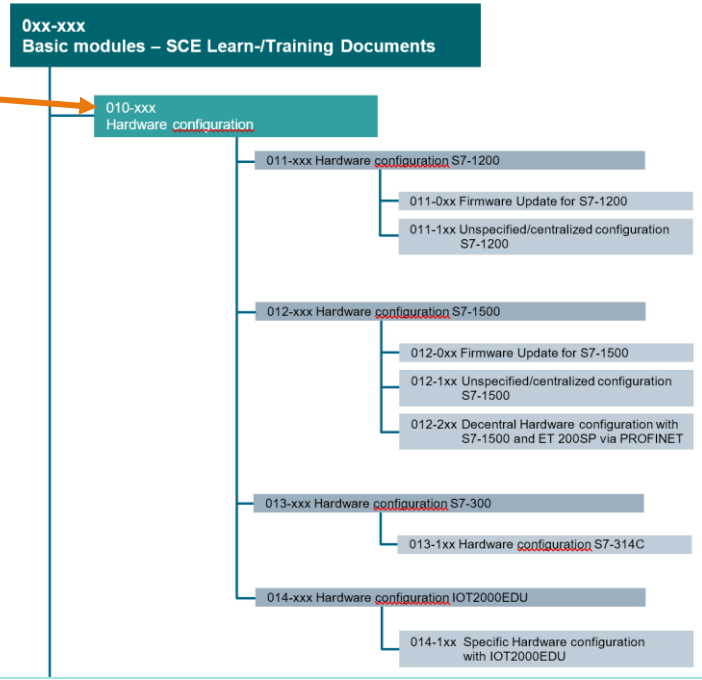
- 010-xxx Hardware configuration
- 020-xxx Example process
- 030-xxx Basics of PLC programming

Advanced modules

- 040-xxx Visualization
- 050-xxx Advanced programming
- 060-xxx Drives
- 070-xxx Safety
- 080-xxx Energy efficiency *
- 090-xxx Advanced communication
- 100-xxx RFID
- 110-xxx Vision *
- 120-xxx Siwarex *
- 130-xxx Web server *
- 140-xxx Security
- 150-xxx Digital Twin

1.2 Basic modules

The basic modules include the following topics: "Hardware Configuration", "Example Processes" and "Basics of PLC Programming", see Figure 2. The structure of these modules is explained in the following.



Basic and advanced modules are presented in detail.

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Guide to learning/training documents according to product technologies

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TIA Portal modules

- IOT2000EDU
- S7-1500/1200/300
- ET 200SP
- WinCC Advanced with TP700 Comfort
- WinCC Basic with KTP700 Basic
- SCALANCE XC208/S615
- G120
- RF210R IO-Link
- PID controller
- SCL
- Graph
- SIMIT
- STEP 7
- TIA Portal from V13
- TIA Portal with PLCSIM Advanced, NX MCD

PCS 7 modules

PCS 7

- V9.0
- V8.1
- V8.0
- V7.0

LOGO! / CNC modules

LOGO!

- LOGO! logic modules 0BA0 - 0BA8
- LOGO!Soft Comfort V8.0

CNC

- SinuTrain Operate V4.5
- SinuTrain V6.3

Classic modules

Previous products up to 2010

↗ See Guide

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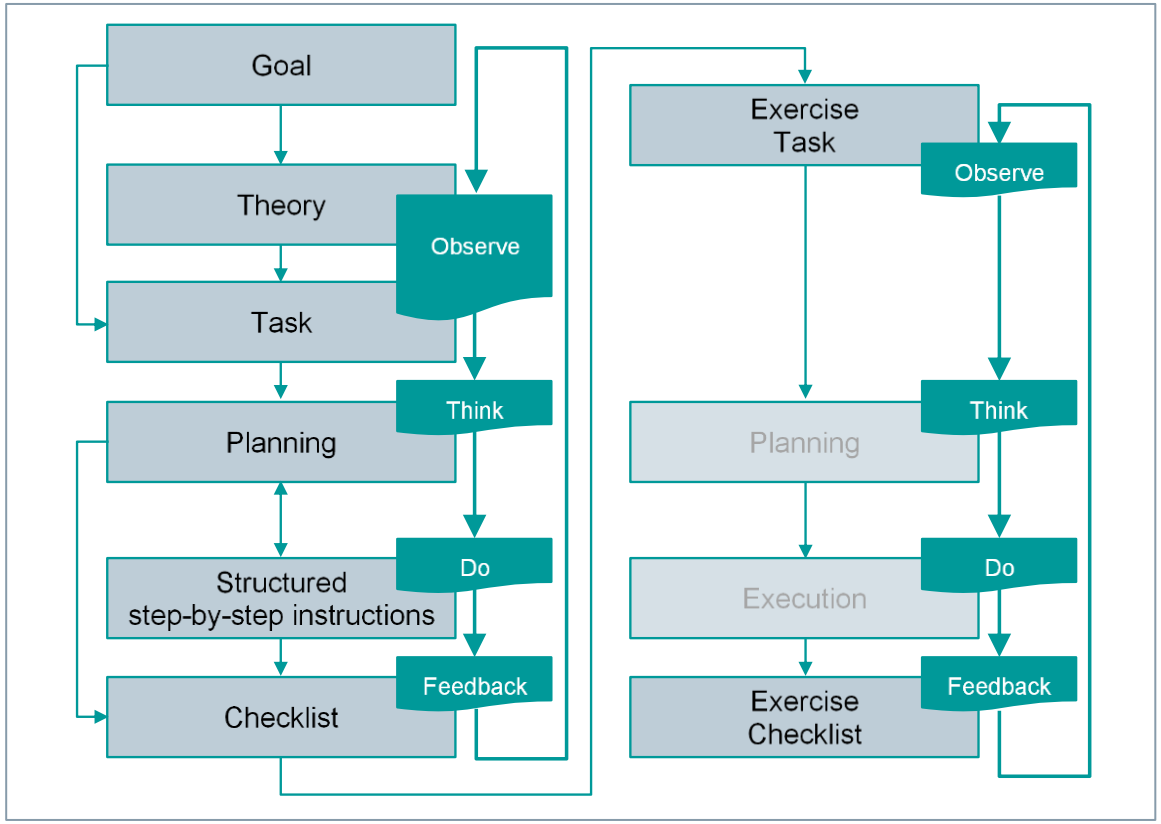
Didactical structure of the SCE learning/training documents



For details, see the SCE Module & Concept Description
Page 12

↗ To document

Didactical structure to consolidate learning success and provide helpful feedback.

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What's new

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Company > Sustainability > Education > SCE > Learning & Training Documents

Learning & Training Documents

Time-tested, curriculum-based and adaptable learning materials

Specifically designed for educational institutions (research, development and non-commercial institutions that provide initial training) in the fields of automation and drive technology, we offer more than 100 didactically prepared learning and training documents – including projects – for download free of charge. Our learn- & training documents are perfectly matched to curricula and syllabuses and are optimally suited for use with our SCE trainer packages. They also take into account all aspects of a modern industrial solution: installation, configuration, programming, and commissioning. They are based on Massive Open Online Course (MOOC) and blended learning concepts for conveying know-how on Industry 4.0. Pedagogics 3.0 concepts and learning as a service contribute to the high quality of our learn-/training documents. All documents can be individually matched to your requirements. Take advantage of our industrial know-how for the practice-oriented, efficient design of your courses.

Download

The SCE learning & training documents are subdivided into autonomous modules for the various topics, which can be customized according to the reader's knowledge. You can download selected modules below.

> What's new?

What's new?

The latest learning & training documents

2020-07	150-XXX Digital Twin: Modules 1 to 6	FR
2020-06	150-XXX Digital Twin: Modules 1 to 6	IT
2020-04	150-004 DigitalTwin: Creating a Static 3D Model Using the NX CAD System	DE EN ES ZH
	150-005 DigitalTwin: Creation of a Dynamic 3D Model Using the Mechatronics Concept Designer CAE System	DE EN ES
	150-006 DigitalTwin: Signal Creation for a Dynamic 3D Model in the Mechatronics Concept Designer CAE System	DE EN ES
2020-02	150-001 DigitalTwin: Virtual commissioning of a production plant using a dynamic 3D model	ES ZH
	150-002 DigitalTwin: Configuration of the Automation Program of a Dynamic 3D Model in the TIA Portal	ES ZH
	150-003 DigitalTwin: Enhancements and Optimizations of an Automation Program for a 3D Model	ES ZH
2020-01	500-XXX Process Automation (PA) – University Learn-/Training Documents V9.0	DE EN
	000-000 Concept and Module Description	DE EN ES FR IT KR PT ZH
2019-10	052-100 Sequencer Programming with GRAPH and SIMATIC S7	DE EN ES FR IT PT ZH
2019-09	020-120 SIMIT Process Simulation – Basics of simulation creation	DE EN
	062-101 Frequency Converter G120 on PROFINET with SIMATIC S7-1500	DE EN ES FR IT PT ZH
	142-100 Industrial Ethernet with SIMATIC S7-1500 and SCALANCE XC208	DE EN

You can always find the latest learning and training documents under What's new

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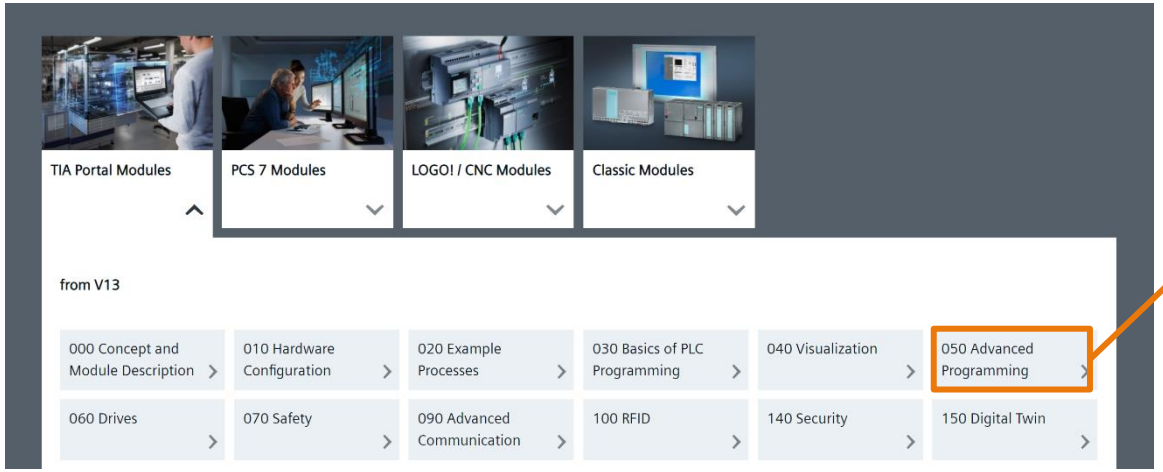
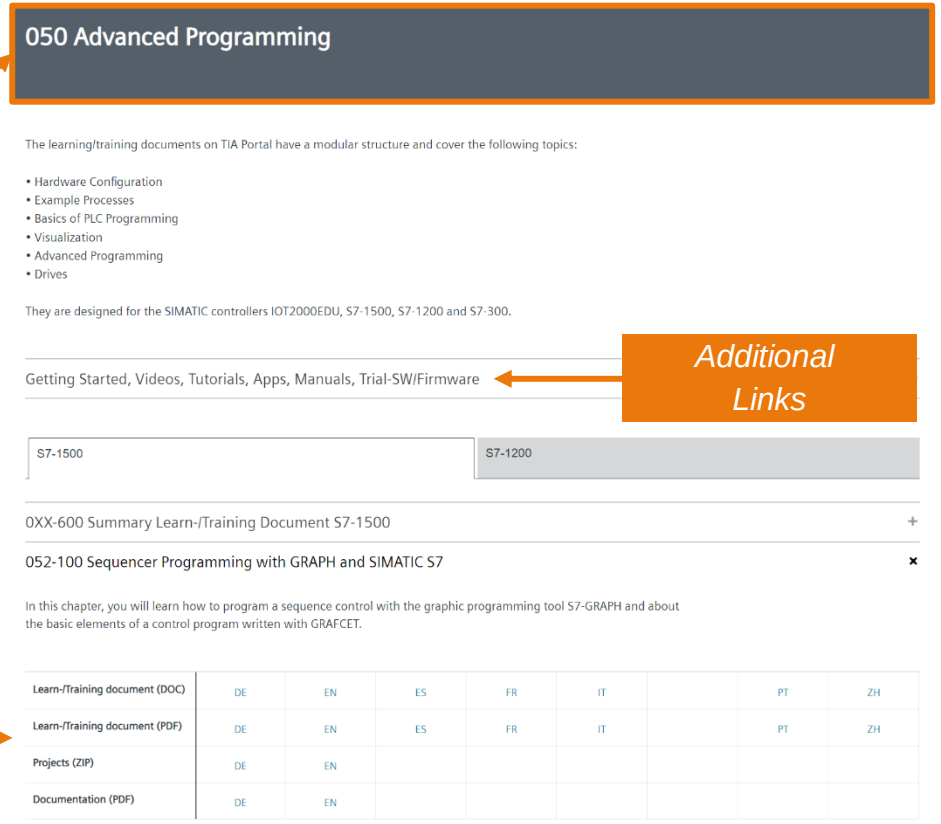
Overview
TIA Portal modules





Free download of desired document in up to 8 languages ***including projects & documentation***

Download area always has an identical structure and downloads are always for free

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What's new:
Course "DigitalTwin@Education"

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150 Digital Twin

The Learning & Training Documents "DigitalTwin@Education" have a modular structure, include step-by-step instructions to make them easy to follow and cover the following topics:

- Module 1: Virtual commissioning of a provided virtual 3D sorting plant model with the TIA Portal, PLCSIM Advanced and NX MCD (Mechatronics Concept Designer)
- Module 2: Explanation of the specified automation program in TIA Portal for the control of the existing 3D sorting plant model
- Module 3: Presentation of possible modifications and optimizations of the automation program in TIA Portal for the provided virtual 3D sorting plant model
- Module 4: Modeling and creation of your own static 3D model for the sorting plan using the NX CAD system
- Module 5: Dynamization of the created 3D sorting plant model using the NX MCD CAE system
- Module 6 – in Preparation: Creation and mapping of the relevant signals for the automation program for the created 3D sorting plant model in NX MCD. In addition, validation of the desired functionality of the digital twin in interaction with the virtual controller in PLCSIM Advanced.

They are prepared for use with SIMATIC STEP 7 Professional V15 or higher, SIMATIC WinCC Advanced V15 or higher, PLCSIM Advanced V2.0 or higher and NX MCD V12.0 or higher.

150-001 Virtual commissioning of a production plant using a dynamic 3D model ×

The following pages show how you can perform virtual commissioning of the dynamic 3D model using the TIA Portal and a WinCC HMI. The CAD tool NX V12.0 and the CAE add-on Mechatronics Concept Designer V12.0 were used to create the dynamic 3D model.

Learn-/Training document (DOC)	DE	EN	ES	FR	IT			ZH
Learn-/Training document (PDF)	DE	EN	ES	FR	IT			ZH
Projects (ZIP)		EN						

150-002 Configuration of the Automation Program of a Dynamic 3D Model in the TIA Portal +

150-003 Enhancements and Optimizations of an Automation Program for a 3D Model +

150-004 Creating a Static 3D Model Using the NX CAD System +

150-005 Creation of a Dynamic 3D Model Using the Mechatronics Concept Designer CAE System +

150-006 Signal Creation for a Dynamic 3D Model in the Mechatronics Concept Designer CAE System +

Teach the Digital Twin in your class in a simple manner with step-by-step instructions

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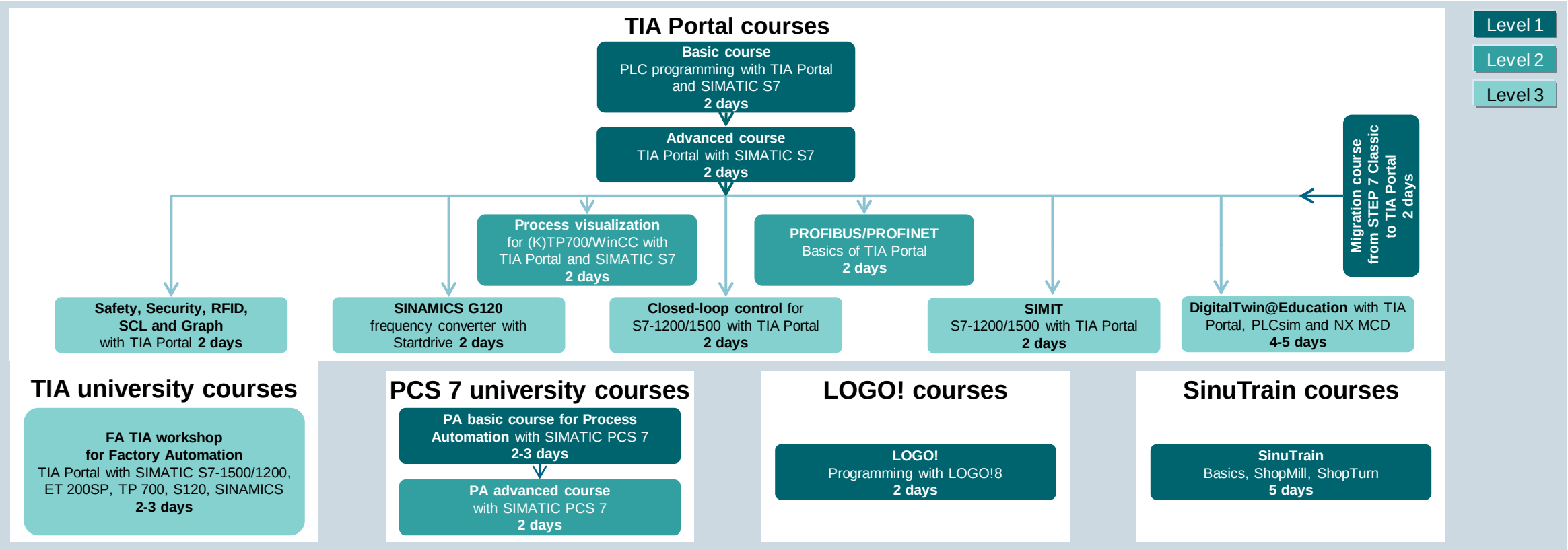
Recommendation: Prepared courses

Recommendations:
Implement prepared courses with SCE learning/training documents



Perform "Knowledge transfer" for your students/trainees or for your own further training through step-by-step instructions with SCE learning/training documents.

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Detailed overview:
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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days
LOGO! course	**Basic Course on programming of LOGO!**	▪ Basic knowledge of Windows PC ▪ Basic knowledge of automation technology	▪ LOGO! logic module: 900-010	▪ Information about the use of LOGO! logic modules ▪ Getting started with LOGO! ▪ Terminal blocks and block numbers of LOGO! ▪ Logic operations ▪ Block representation in the display of LOGO! ▪ The four golden rules for operating LOGO! ▪ Overview of the LOGO! menus ▪ Example task factory gate control system ▪ Program input in LOGO! ▪ Parameter assignment to a block ▪ Starting and testing the program ▪ Debugging in LOGO! ▪ Programming and debugging with LOGO! Soft Comfort	2
TIA Portal course	**Basic Course for PLC programming with SIMATIC S7 and TIA Portal** *Our recommendation: Start with this basic course*	▪ Basic knowledge of Windows PC ▪ Basic knowledge of automation technology	▪ Hardware configuration S7-1200 modules: 011-100 | 011-101 | 011-102 ▪ Hardware configuration S7-1500 modules: 012-100 | 012-101 | 012-105 ▪ Hardware configuration S7-300 module: 013-101 ▪ Process description module: 020-100 ▪ Programming S7-1200 modules: 031-100 | 031-200 | 031-300 | 031-410 ▪ Programming S7-1500 modules: 032-100 | 032-200 | 032-300 | 032-410	▪ Field of application and configuration of SIMATIC S7 device types ▪ Operation and function of SIMATIC S7 ▪ Creating a project with TIA Portal ▪ Configuring an SIMATIC S7 station in TIA Portal ▪ Writing, testing and storing program blocks in TIA Portal ▪ Addressing and program representation (LAD, FBD) ▪ Program structure and program blocks (OB, FB, FC and DB) ▪ Basic operation set ▪ Symbolic addressing ▪ Online test and diagnostic functions ▪ Tag declaration in function blocks (FB) and functions (FC) ▪ Creating a program example with tag declaration and data block ▪ Standard and system functions (IEC timer/ IEC counter) ▪ News for programming SIMATIC S7 with TIA Portal	2

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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days

TIA Portal course	**Advance Training Course for PLC programming with SIMATIC S7 and TIA Portal**	▪ Basic knowledge of Windows PC
		▪ Basic course SIMATIC S7 with TIA Portal
			▪ Hardware configuration S7-1200 module: 011-100
			▪ Hardware configuration S7-1500 module: 012-100
			▪ Hardware configuration S7-300 module: 013-101
			▪ Process description module: 020-100
			▪ Programming S7-1200 modules: 031-420 | 031-500 | 031-600
			▪ Programming S7-1500 modules: 032-420 | 032-500 | 032-600
				▪ Brief review of the basic course with TIA Portal
				▪ Data types and data blocks in SIMATIC S7
				▪ Program example with data block in TIA Portal
				▪ Application examples for structured programming with FCs, FBs and DBs
				▪ Extended instruction set and mathematical functions
				▪ Reading, outputting and scaling analog values
				▪ Application example for analog value processing in TIA Portal
				▪ Test and diagnostic functions in TIA Portal
				  ▪ Monitoring hardware online
				  ▪ Module and operating status
				  ▪ Monitoring, controlling and forcing inputs and outputs
				▪ Exercises for troubleshooting and diagnostics with TIA Portal
				▪ Error localization and error elimination at SIMATIC S7
				  ▪ Hardware diagnostics and diagnostic buffer
				  ▪ Additional functions in the target system of the controller
				  ▪ Comparing reference data, block assignment and program structure as well as blocks
				▪ Error organization blocks at SIMATIC S7
				▪ Diagnostics and error messages for SIMATIC S7 via the integrated Web server
					2

TIA Portal course	**Conversion Course from STEP 7 Classic to the TIA Portal with SIMATIC S7**	▪ Basic knowledge of Windows PC ▪ Basic knowledge of automation technology ▪ Basic knowledge of PLC programming with STEP 7 Classic ***Note:*** *This course is intended for users converting from STEP 7 Classic*	▪ Hardware configuration S7-1200 modules: 011-100 | 011-101 | 011-102 ▪ Hardware configuration S7-1500 modules: 012-100 | 012-101 | 012-105 | 012-110 ▪ Hardware configuration S7-300 module: 013-101 ▪ Process description modules: 020-100 ▪ Programming S7-1200 modules: 031-100 | 031-200 | 031-300 | 031-410 ▪ Programming S7-1500 modules: 032-100 | 032-200 | 032-300 | 032-410	▪ Field of application and configuration of the new SIMATIC S7 controllers ▪ Creating a project with TIA Portal ▪ Configuring an SIMATIC S7 station in TIA Portal ▪ Writing, testing and storing program blocks in TIA Portal ▪ Addressing and program visualization with LAD and FBD ▪ Program structure and program blocks with OB, FB, FC and DB ▪ Symbolic addressing ▪ Online/test and diagnostics functions ▪ Tag declaration in function blocks (FB) and functions (FC) ▪ Creating a program example with tag declaration and data block ▪ Standard and system functions (IEC timer/ IEC counter) ▪ News for programming a SIMATIC S7 with TIA Portal	2

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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days
TIA Portal course	**Process Visualization with SIMATIC WinCC Basic and SIMATIC S7-1200 in the TIA Portal**	▪ Basic knowledge of Windows PC ▪ Advance Course SIMATIC S7 with TIA Portal	▪ WinCC Basic with KTP700 Basic and SIMATIC S7-1200 module: 041-101	▪ Visualization systems in automation engineering ▪ Process control system with SIMATIC WinCC Basic and TIA Portal ▪ System description ▪ Project structure ▪ Creating a process control system with SIMATIC WinCC Basic ▪ Starting WinCC Basic and creating projects ▪ Specifying the tag management ▪ Creating process pictures ▪ Controlling process values and representing process values ▪ Setting the Runtime properties of the computer/panel and starting Runtime ▪ Integrating graphics with SIMATIC WinCC Basic ▪ Archiving and displaying measured values with WinCC Basic ▪ Alarm logging of SIMATIC WinCC Basic	2
TIA Portal course	**Process Visualization with SIMATIC WinCC Advanced and SIMATIC S7-1500 in the TIA Portal**	▪ Basic knowledge of Windows PC ▪ Advance Course SIMATIC S7 with TIA Portal	▪ WinCC Advanced with TP700 Comfort and SIMATIC S7 module: 042-201	▪ Visualization systems in automation engineering ▪ Process control system with SIMATIC WinCC Advanced and TIA Portal ▪ System description ▪ Project structure ▪ Creating a process control system with SIMATIC WinCC Advanced ▪ Starting WinCC Advanced and creating projects ▪ Specifying the tag management ▪ Creating process pictures ▪ Controlling process values and representing process values ▪ Setting the Runtime properties of the computer/panel and starting Runtime ▪ Integrating graphics with SIMATIC WinCC Advanced ▪ Archiving and displaying measured values with WinCC Advanced ▪ Alarm logging system of SIMATIC WinCC Advanced	2

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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days
TIA Portal course	**Basics of PROFIBUS and PROFINET with the TIA Portal**	▪ Basic knowledge of Windows PC ▪ Basic course SIMATIC S7 with TIA Portal	▪ Hardware configuration SIMATIC S7-1500 and ET200SP via PROFINET module: 012-201	▪ Fieldbus systems in automation engineering ▪ Requirements for a bus system ▪ Hierarchy levels in automation engineering ▪ General information about fieldbus systems ▪ Technical specifications and functionality of PROFINET/PROFIBUS ▪ Bus configuration and network structure ▪ Components for configuring PROFINET/PROFIBUS ▪ PROFINET/PROFIBUS network components ▪ Remote programming via PROFINET/PROFIBUS ▪ I/O controllers and field devices on PROFINET/PROFIBUS ▪ Commissioning PROFINET with a SIMATIC S7 I/O controller and ET 200 I/O devices ▪ Commissioning PROFIBUS with a SIMATIC S7 master and ET 200 slaves ▪ Optional: CPU/CPU communication on PROFINET/PROFIBUS	2
TIA Portal course	**Safety Integrated Safety Engineering on PROFINET with SIMATIC S7 in the TIA Portal**	▪ Basic knowledge of Windows PC ▪ SIMATIC S7 continuation course with the TIA Portal, bus systems with SIMATIC S7	▪ PROFIsafe and PROFINET with ET 200SP and SIMATIC S7-1500 module: 072-100	▪ Basic information for the integration of machine safety ▪ Regulations and standards ▪ Risk analysis ▪ General information on fieldbus systems in use for personal safety ▪ Components for configuring a safety-related application on PROFINET ▪ Safety Integrated with SIMATIC S7 in the TIA Portal ▪ Fail-safe communication with PROFIsafe ▪ I/O components for PROFIsafe ▪ Safety-related programming with the STEP 7 Safety software in the TIA Portal ▪ Commissioning and programming of PROFIsafe with SIMATIC 1500 and ET 200SP ▪ Error diagnostics and error analysis for safety engineering application in the TIA Portal ▪ Optional: Fail-safe CPU/CPU communication in the TIA Portal with SIMATIC S7	2

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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days
TIA Portal course	**Application for Industrie 4.0 Industrial Networking IT Security / OPC UA with the TIA Portal**	▪ Basic knowledge of Windows PC ▪ Basic course SIMATIC S7 with TIA Portal	▪ Advanced Communication modules - OPC UA with SIMATIC S7-1500 and Node-RED: 092-300 | 092-303 ▪ Security module - Industrial Ethernet with SIMATIC S7-1500 and SCALANCE XC208: 142-100 ▪ Security module - Industrial Security with SIMATIC S7-1500 and SCALANCE S615: 142-200	▪ Industrie 4.0 - Driving the Digital Enterprise ▪ IT security with OPC / Ethernet / PROFINET ▪ General information on OPC UA / Ethernet / PROFINET ▪ Applications for IT security on Industrial Ethernet ▪ Applications for IT security on PROFINET ▪ Technical specifications and functionality of OPC UA ▪ OPC UA – Open communication in the TIA Portal with SIMATIC S7-1500 ▪ Commissioning OPC UA with SIMATIC S7-1500 as a server and Node-RED as client ▪ Other OPC UA clients such as TP700, Excel, etc.	2
TIA Portal course	**Application for Industrie 4.0 Industrial Networking PROFINET / IO-Link / RFID with the TIA Portal**	▪ Basic knowledge of Windows PC ▪ Basic course SIMATIC S7 with TIA Portal	▪ Hardware configuration S7-1500 module: 012-100 ▪ RFID Sensor Technology with RF210R IO-Link, ET 200SP and SIMATIC S7-1500 module: 102-101	▪ Industrie 4.0 - Driving the Digital Enterprise ▪ Networking with Industrial Ethernet and PROFINET ▪ Bus configuration and network structure of PROFINET ▪ Commissioning of PROFINET (I/O controller and I/O device) with the TIA Portal ▪ Topology, network diagnostics in the TIA Portal ▪ Intelligent connection of sensors and switchgear with IO-Link ▪ Commissioning of IO-Link on PROFINET with ET 200SP ▪ RFID sensor technology ▪ Commissioning of RFID sensor RF 210R on IO-Link ▪ Integrated diagnostics for PROFINET / IO-Link / RFID	2

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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days
TIA Portal course	**Basic Course: SCL High-Level Language with SIMATIC S7 and TIA Portal**	▪ Basic knowledge of Windows PC ▪ Advance Course SIMATIC S7 with TIA Portal	▪ SCL and SIMATIC S7-1200 module: 051-201 ▪ SCL and SIMATIC S7-1500 module: 052-201	▪ Brief review of the SIMATIC S7 control system ▪ Creating a project with the TIA Portal ▪ Configuring an S7 station ▪ Working with the SCL editor ▪ Customizing the SCL user interface ▪ Creating user programs in SCL ▪ Entering declarations, instructions and comments ▪ Description of SCL language ▪ The compiling process ▪ Selection and assignment of the possible block types ▪ Specification of the block interfaces in SCL ▪ Continuous monitoring ▪ Activating breakpoints ▪ Monitoring/forcing tags ▪ Reference data	2
TIA Portal course	**Machining Step Programming with GRAPH in the TIA Portal**	▪ Basic knowledge of Windows PC ▪ Basic course SIMATIC S7 with TIA Portal	▪ GRAPH and SIMATIC S7 module: 052-100	▪ Possible representations of sequencers; GRAFCET ▪ GRAPH programming software as a component of TIA Portal ▪ Creating a project with hardware configuration and symbol table in STEP 7 ▪ Elements of a sequencer in GRAPH (step / transition / branch / jump / etc.) ▪ Creating and compiling a sequencer with GRAPH ▪ Downloading a machining step program to PLC and testing it ▪ Monitoring the sequencer in GRAPH and other diagnostic functions ▪ Sequence control with GRAPH ▪ Synchronizing the sequencer with the process ▪ Machining step programming with constraints ▪ Input/output parameters of the GRAPH function blocks ▪ Interlock functions in GRAPH (Interlock) ▪ Supervision functions in GRAPH (Supervision)	2

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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days
TIA Portal course	**Basics for Programming an IOT2000**	▪ Basic knowledge of Windows PC ▪ Basic knowledge of automation engineering and the C programming language	▪ Hardware configuration IOT2000 module: 014-101 ▪ FC-Programming IOT2000 module: 034-100 ▪ OPC-UA and Node-RED with SIMATIC IOT2000 modules: 092-300 / 092-303 / 094-100	▪ Information on areas of application and structure of IOT2000 ▪ Introduction to SIMATIC IOT2000 ▪ Applications with the IOT2000 (Node-RED, Arduino, OPC client, S7 connection with Node-RED, etc.) ▪ Commissioning of IOT2000 including TIA Runtime ▪ Addressing the IOT2000 GPIOs ▪ Creating a project with the TIA Portal ▪ Configuring a SIMATIC S7 station in the TIA Portal ▪ Writing, testing and storing program blocks in the TIA Portal	2
TIA Portal course	**Frequency Converter SINAMICS G120 on PROFINET with SIMATIC S7 and TIA Portal**	▪ Basic knowledge of Windows PC ▪ Advance Course SIMATIC S7 with TIA Portal	▪ Frequency Converter G120 on PROFINET with SIMATIC S7-1500 module: 062-101	▪ Presentation of the SINAMICS frequency converters from SIEMENS ▪ Drive configuration with the SIZER software ▪ Commissioning and parameter assignment of these converters with SINAMICS Startdrive ▪ Structure of the parameter assignment with authorization levels ▪ Parameter assignment of SINAMICS G120 ▪ Commissioning with asynchronous motor ▪ Troubleshooting ▪ Connection of a frequency converter to a SIMATIC S7 PLC via PROFINET ▪ Communication structure of PROFINET ▪ Commissioning a SIMATIC S7 PLC as an IO controller ▪ Setting up the frequency converter as an IO device on PROFINET ▪ Remote control of the frequency converter via PROFINET ▪ Remote parameter assignment of the frequency converter via PROFINET ▪ Remote diagnostics for the frequency converter via PROFINET ▪ Parameter assignment with the SINAMICS Startdrive software in the TIA Portal ▪ Optional: Motion Control technology objects for S7-1500	2

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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days
TIA Portal course	**Control technology SIMATIC S7 with TIA Portal**	▪ Basic knowledge of Windows PC ▪ Advance Course SIMATIC S7 with TIA Portal	▪ Programming S7-1200 module: 031-500 ▪ Programming S7-1500 module: 032-500 ▪ Extended programming S7-1200 module: 051-300 ▪ Extended programming S7-1500 module: 052-300	▪ Controllers in automated plants ▪ Software controller for SIMATIC S7 in TIA Portal ▪ Design steps and modeling in controlling of process variables ▪ Quality requirements for the control loop ▪ Controller structures ▪ Controller parameters and adjustment procedure ▪ Controller testing ▪ Data types at SIMATIC S7 ▪ Mathematical functions and data type conversion ▪ Reading, outputting and scaling analog values ▪ Developing a program for two-step controllers in TIA Portal ▪ Testing the program for two-step controllers and commissioning with processes ▪ Controller block as software PID controller ▪ Configuring an SIMATIC S7 station in TIA Portal ▪ Integrating and configuring the PID controller software in STEP 7 programs with TIA Portal ▪ Setting and configuring the PID controller software in TIA Portal ▪ Commissioning the PID controller software with processes	2
TIA Portal course	**Project Work and Commissioning of Industrie 4.0 System with Application Examples for Different IEC 61131 Programming Languages**	▪ Basic knowledge of Windows PC ▪ Basic knowledge of control engineering/STEP 7		▪ To be individually coordinated with the system of the customer or the systems used elsewhere	2

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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days
TIA Portal course	**SIMIT SCE – Simulating Plants Dynamically on the PC**	▪ Basic knowledge of Windows PC ▪ Basic course SIMATIC S7	▪ Process description sorting station module: 020-100 ▪ SIMIT process simulation – coupling modules: 020-110 / 020-111 / 020-112 ▪ SIMIT process simulation – basics module: 020-120	▪ General information about SIMIT ▪ Installing the SIMIT software ▪ Managing and setting up projects ▪ General procedure for creating a project ▪ Setting up a new project ▪ Configuration of the interface to PLCSim / PLCSim Advanced / OPC UA ▪ Configuring an operating screen ▪ General information about animation of screens ▪ Component types and components ▪ Assigning component parameters ▪ Creating example projects ▪ Starting the simulator and testing the programs ▪ Connection to real PLC	2
TIA Portal course	DigitalTwin@Education	▪ Basic and advanced knowledge of TIA Portal/PLCSIM Advanced und NX MCD	▪ Modul 1: 150-001 Virtual commissioning of a production plant using a dynamic 3D model ▪ Modul 2: 150-002 Configuration of the Automation Program of a Dynamic 3D Model in the TIA Portal ▪ Modul 3: 150-003 Enhancements and Optimizations of an Automation Program for a 3D Model ▪ Modul 4: 150-004 Creating a Static 3D Model Using the NX CAD System ▪ Modul 5: 150-005 Creation of a Dynamic 3D Model Using the Mechatronics Concept Designer CAE System ▪ Modul 6: 150-006 Signal Creation for a Dynamic 3D Model in the Mechatronics Concept Designer CAE System	▪ Module 1: Virtual commissioning of a provided virtual 3D sorting plant model with the TIA Portal, PLCSIM Advanced and NX MCD (Mechatronics Concept Designer) ▪ Module 2: Explanation of the specified automation program in TIA Portal for the control of the existing 3D sorting plant model ▪ Module 3: Presentation of possible modifications and optimizations of the automation program in TIA Portal for the provided virtual 3D sorting plant model ▪ Module 4: Modeling and creation of your own static 3D model for the sorting plan using the NX CAD system ▪ Module 5: Dynamization of the created 3D sorting plant model using the NX MCD CAE system ▪ Module 6 – in Preparation: Creation and mapping of the relevant signals for the automation program for the created 3D sorting plant model in NX MCD. In addition, validation of the desired functionality of the digital twin in interaction with the virtual controller in PLCSIM Advanced. They are prepared for use with SIMATIC STEP 7 Professional V15 or higher, SIMATIC WinCC Advanced V15 or higher, PLCSIM Advanced V2.0 or higher and NX MCD V12.0 or higher.	5

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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days
TIA university courses	**University Workshop: TIA Portal with SIMATIC S7-1500, ET 200SP on PROFINET and Visualization with WinCC Advanced**	▪ Basic knowledge of automation engineering with SIMATIC	▪ Hardware configuration S7-1500 module: 012-100 ▪ Hardware configuration S7-1500 module and ET 200SP: 012-201 ▪ Process description module: 020-100 ▪ Programming S7-1500 modules: 032-200 | 032-300 | 032-410 | 032-420 ▪ Visualization module: 042-201 ▪ Frequency Converter G120 on PROFINET with SIMATIC S7-1500 module: 062-101	▪ TIA Portal: New information about SIMATIC S7-1200/1500 PLCs ▪ Safety and security with SIMATIC S7-1200/1500 ▪ More efficient programming and configuration with the TIA Portal and SIMATIC S7-1500 ▪ New commands and functions of SIMATIC S7-1200/1500 ▪ Programming examples for SIMATIC S7-1500 ▪ Test and diagnostic functions for SIMATIC S7-1500 ▪ Remote programming and web services for SIMATIC S7-1500 ▪ Commissioning of PROFINET with the TIA Portal: SIMATIC S7-1500 as IO controller and ET 200SP as IO device ▪ Process visualization in the TIA Portal with WinCC ▪ Example application for WinCC with the TIA Portal and Comfort Panel TP700 ▪ Commissioning and parameter assignment of these converters with SINAMICS Startdrive ▪ Connection of a frequency converter to a SIMATIC S7 PLC via PROFINET	2

PCS 7 University course	**PA Basic Course for Process Automation with SIMATIC PCS 7 Process Control System**	▪ Basic knowledge of SIMATIC S7
		▪ Process visualization basic knowledge
			▪ PA university curriculums for SIMATIC PCS 7 modules: P01-00 to P01-08	▪ Introduction to process control system
				▪ SIMATIC Process Control System PCS 7
				▪ Process description and system structure
				▪ SIMATIC Manager and hardware configuration
				▪ Plant hierarchy in SIMATIC PCS 7
				▪ Continuous Function Chart (CFC)
				  ▪ Individual control functions with CFC
				  ▪ Plant safety with CFC
				  ▪ Control technology with CFC
				▪ Programming sequential control systems with Sequential Function Chart (SFC)
				▪ SIMATIC PCS 7 graphic generation for the operator station
					2

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Course type	Course	Prerequisites	SCE Learn-/Training Documents	Contents	Days
PCS 7 University course	**PA Advance Course for Process Automation with SIMATIC PCS 7 Process Control System**	▪ Basic knowledge of Windows PC ▪ Basic knowledge of process control technology with SIMATIC PCS 7 basic knowledge of Windows PC	▪ PA university curriculums for SIMATIC PCS 7 modules: P01-01 | P02-01 to P02-03 | P03-01 | P03-02	▪ Commissioning PCS 7 project from basic course ▪ Repetition and details of programming with CFC and SFC in PCS 7 ▪ Alarm Engineering and alarm system in PCS 7 ▪ Bulk processing and reusability of structures in PCS 7 ▪ Archiving ▪ Trend reporting and trend display in PCS 7 ▪ Advanced operator control design with ActiveX controls and user-defined objects ▪ Vertical integration with OPC	2
SinuTrain course	**Basics of CNC technology with SinuTrain**	▪ Basic knowledge of Windows PC ▪ Basic knowledge of NC technology	▪ CNC technology modules: 700-010 | 700-020 | 700-030	▪ Basic concept and configuration versions of SinuTrain as training software for SINUMERIK controllers ▪ Handling of control components of SinuTrain ▪ Manual functions and screen layout ▪ Setup and measuring of tools ▪ Work offsets ▪ Practical commissioning of the machine tool ▪ Part program management and program editor ▪ Creating a simple workpiece according to DIN 66025 ▪ Programming DIN standard cycles with SinuTrain ▪ Simulation functions in SinuTrain ▪ Machining of the workpiece with the machine tool ▪ Special characteristics of SHOPMILL and SHOPTURN ▪ Work step programming ▪ Program creation with the contour calculator ▪ CAD reader ▪ Data backup and data transmission ▪ Programming milling parts with SHOPMILL ▪ Programming lathed parts with SHOPTURN	2

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