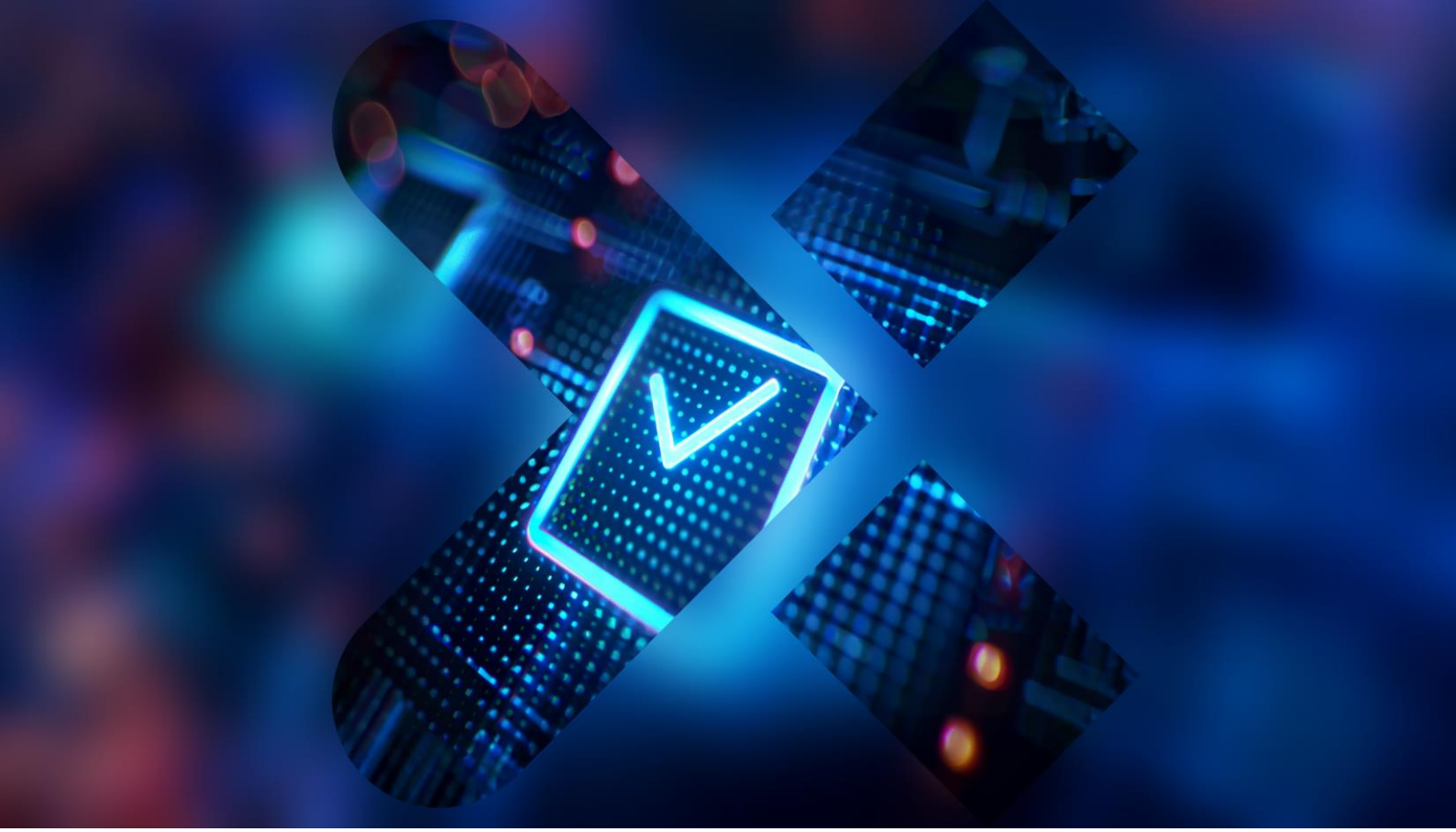

GRID SOFTWARE UNIVERSITY

PSS®SINCAL

Course Catalogue

Document: GSW-U-PSS-S

SIEMENS

Contents

1. PSS®SINCAL Training

1.1 Introduction

PSS®SINCAL is a modular simulation software that can be used flexibly and efficiently according to individual requirements. PSS®SINCAL offers a variety of simulation and analysis functions for the planning, design, protection and operation of power supply systems. Among other things, modules are available for the investigation of voltage quality, frequency stability, the interconnection of distributed generation, network protection coordination, supply restoration, and economic calculations. We have developed a comprehensive training program for PSS®SINCAL for you.
Employee development is a key factor in mastering the challenges of energy transition and digitalization. Siemens understands the importance of adequately trained personnel for reliable and secure grid management and operation.

1.2 Training Program

The training courses are arranged into categories based on common tasks, roles and responsibilities of the typical electrical power utility business. This structure is offered as a guideline to assist customers in developing the best training plan with the support of Siemens for their employees, thereby providing a value-added approach.

PSS®SINCAL – Basics– The participant can operate the PSS®SINCAL network planning program. Basic calculations such as power flow and short circuit can be performed.
PSS®SINCAL – Protection – The participant can use the protection modules in the PSS®SINCAL network planning program. Both overcurrent time protection and distance protection are covered.
PSS®SINCAL – Harmonic Analysis– Participants will learn the basics of how to conduct harmonic studies using the PSS®SINCAL grid planning program.
PSS®SINCAL – Dynamics– The participant learns the basics of using the network planning program PSS®SINCAL for investigations of dynamic processes. Basic calculations in the areas of stability, transient processes, graphical modelling and eigenvalues can be performed.
PSS®SINCAL – Automation – Participants will learn the basics of developing scripts and programs (in Python®) to integrate PSS®SINCAL into their automated workflows. The use of the programming interfaces for the automation of the graphical user interface (GUI) and the calculation engine will be trained. Furthermore, the interaction with the input and result databases will be demonstrated.
PSS®SINCAL – Advanced for Distribution Companies – Participants will acquire advanced knowledge about the use of the PSS®SINCAL grid planning program for distribution grids. You will learn to use the software for further calculations on topics related to load flow, short circuits and load development.
PSS®SINCAL – Probabilistic Reliability Analysis – The participant will gain knowledge about the basics and how to perform reliability calculations with PSS®SINCAL. Particular emphasis is placed on the interpretation of the results.

1.3 Language

Most courses can be offered in English and German. You can view the available languages in the General Information section of each course. Courses taught in another language may require an interpreter, which may incur fees for adapting the course. Customers with language translation requirements should contact the Siemens Training Department.

1.4 Delivery Methods

Our courses are available via multiple delivery methods:

Classroom	Teacher-led training in a formal classroom at Siemens
Remote	Live instructor-led training delivered through online conferencing tools
On-Site	Instructor-led training delivered at the customer's site in a customer-provided training environment
eLearning	Pre-recorded training session provided upon request
Blended Learning	A combination of eLearning and instructor-led training
On-The Job	Perform tasks and gain hands-on experience under the supervision of a trainer

You can see the suggested roles in the target audience section of each specific course.

1.5 Training Material

Training materials have been created specifically for PSS®SINCAL training courses. Siemens provides all necessary training materials, including course manuals and reference material, in paper and/or Portable Document Format (PDF) files. Each participant will receive individual copies of the training materials. The contents of the training materials are confidential and proprietary, and use is protected by Siemens' copyright and may only be used for internal use.

1.6 Course registration and Contact information

Registration applications should be submitted to the Training Center at least 15 working days before the planned start of the course. To ensure adequate access to the equipment, participation in the courses is limited. Course places will be reserved in the order in which registrations are received.

To register, for more information about our courses or for special requirements, please contact your local Siemens sales partner or send us an e-mail: gridsoftware-training@siemens.com

1.7 Cancellation Policy

Siemens may cancel courses with fewer than five (5) registered participants at least two weeks before the scheduled start of this course. All registered participants will be informed of the cancellation and optionally rescheduled for a later offer.

For cancellations of registrations for participation received less than two weeks before the start of the course, a cancellation fee of 50% of the lesson will be charged. If an enrolled participant does not show up for a scheduled course, a cancellation fee of 100% of the lesson will be charged.

2. PSS®SINCAL Basics

2.1 PSS®SINCAL – Basics

Objectives

The participant can operate the PSS®SINCAL network planning program. Basic calculations such as power flow and short circuit can be performed.

General Information

Course Code	GSW-U-PSS-S-BAS
Delivery Method	Classroom, Remote, On-Site
Duration	3 Days
Language	English, German

Target Audience

Engineers and service technicians from energy supply companies and industry in the operation, planning and design of networks

Prerequisites

Basic knowledge of electrical engineering

Content

Introduction to:

- Basic operation of PSS®SINCAL
  - User interface
  - Schematic plan
  - Basic functions (creating and editing network elements)
  - Display of results (in tables, reports, graphics)
  - Display filters and evaluation options
  - Table editor
  - Graphics editor (formatting, evaluating, objects)
- Setting up networks (importing/ exporting data)
- Explanation of the behavior and correct modeling of electrical equipment such as decentralized generators, storage, E-Mob. stations, controllable transformers, etc.
- Basics, execution, and evaluation of load flow calculations with practical modeling and evaluation tips
- Basics of short-circuit current calculation and introduction to IEC 60909
- Practical examples for 3-phase, 2-phase, and 1-phase short-circuit current calculations
- Advanced modelling functionalities like variants, catalogs, include-networks, operation points, time series, etc.

3. PSS®SINCAL Protection Suite

3.1 PSS®SINCAL – Protection Suite

Objectives

The participant can use the protection modules in the PSS®SINCAL network planning program. Both overcurrent time protection and distance protection are covered.

General Information

Course Code	GSW-U-PSS-S-PRO
Delivery Method	Classroom, Remote, On-Site
Duration	2 Days
Language	English, German

Target Audience

Engineers and service technicians from energy supply companies and industry in the operation, planning, protection and design of power grids.

Prerequisites

PSS®SINCAL – Basics

Content

Introduction to:

- Overcurrent Time Protection (Module OC)
  - Introduction to Overcurrent Time Protection
  - Modeling and Evaluation in PSS®SINCAL
  - Grading Diagrams (I-t Diagrams)
- Distance and Differential Protection (Module DI)
  - Introduction to Distance and Differential Protection
  - Modeling and Evaluation in PSS®SINCAL
  - Automatic Calculation of Distance Protection Settings
- Simulation and Evaluation of Protection Tripping (Module SZ)
  - Calculation of Individual Faults or Groups
  - Evaluation of Results
  - Protection Route Calculation
- Creation of local protection devices
- Introduction to the Protection Analysis Module (PSA)

4. PSS®SINCAL Harmonic Analysis

4.1 PSS®SINCAL – Harmonic Analysis

Objectives

Participants will learn the basics of how to conduct harmonic studies using the PSS®SINCAL grid planning program.

General Information

Course Code	GSW-U-PSS-S-HAR
Delivery Method	Classroom, Remote, On-Site
Duration	2 days
Language	English, German

Target Audience

Engineers and service technicians from energy supply companies and industry in the operation, planning, protection and design of power grids

Prerequisites

Basic knowledge of electrical engineering
Course PSS®SINCAL Basics (GSW-SIN-BAS) or comparable knowledge

Content

Introduction to:

- Power quality theory basics and standards
- Goal and structure of power quality studies
- Network modelling, Harmonic models for lines, transformers, machines, power electronics
- Harmonic locus curve and grid resonances
- Harmonic voltage distortion
- Evaluation of harmonic voltage distortion acc. Power quality standards
- Mitigation measures
- Introduction into PSS/SINCAL harmonic modelling and handling
- Setup of network model with different operation scenarios
- Calculation of locus curves and harmonic distortion
- Filter design
- Impact of network restructuring on harmonic distortion
- Documentation of results

5. PSS®SINCAL Dynamics

5.1 PSS®SINCAL – Dynamics

Objectives

The participant learns the basics of using the network planning program PSS®SINCAL for investigations of dynamic processes. Basic calculations in the areas of stability, transient processes, graphical modelling and eigenvalues can be performed.

General Information

Course Code	GSW-U-PSS-S-DYNDSA-ADM
Delivery Method	Classroom, Remote, On-Site
Duration	2 days
Language	English, German

Target Audience

Engineers and service technicians from energy supply companies and industry in the operation, planning, protection and design of power grids

Prerequisites

Fundamentals of Electrical Power Engineering Training "PSS®SINCAL Basics"

Content

Introduction to:

- Fundamentals of Electrical Grid Dynamics
- Overview PSS®SINCAL - Dynamics (Modules and Methods)
- Creation of custom models using graphical model images (GMB)
- User interface (windows, messages, properties)
- Program controls (modes: RMS, EMT; plotter images; Disturbances)
- Dynamic models for loads, machines and power electronics
- Presentation of the results (tables, protocols, graphics)
- Post-processing of results (editing, evaluation, printing)
- Exercises in PSS®SINCAL with practical calculation examples

6. PSS®SINCAL
Automation using the programming interfaces and database

6.1 PSS®SINCAL – Automation using the programming interfaces and database (with Python®)

Objectives

Participants will learn the basics of developing scripts and programs (in Python®) to integrate PSS®SINCAL into their automated workflows. The use of the programming interfaces for the automation of the graphical user interface (GUI) and the calculation engine will be trained. Furthermore, the interaction with the input and result databases will be demonstrated.

General Information

Course Code	GSW-U-PSS-S-AUT
Delivery Method	Classroom, Remote, On-Site
Duration	2 days
Language	English, German

Target Audience

Engineers and service technicians from energy supply companies and industry in the operation, planning, protection and design of power grids

Prerequisites

- Basic knowledge of electrical engineering
- Basic knowledge of Phython® programming language

Content

Introduction to:

- Introduction to the concepts and approaches to using the programming interfaces and databases of PSS®SINCAL
- Introduction to COM servers and the functions available
- Use of the documentation in the manual
- All API-Use Cases
  1. Automate GUI interactions and workflows
  2. Automate simulations using the engine (without GUI) and accessing calculation results
  3. Combined use cases 1 and 2
  4. Automate model variation and multiple simulations
  5. Automated network modelling
  6. Build a customized GUI plug-in
- Exercises for use cases 1-4 (outlook/ discussion for 5 and 6)
- Discussion of participant-specific workflows and design of solution concepts

7. PSS®SINCAL – Advanced for Distribution Companies

Objectives

Participants will acquire advanced knowledge about the use of the PSS®SINCAL grid planning software, focusing on the challenges of data integration, modeling and evaluating of distribution and low-voltage power grids. They will learn how to use the software for advanced calculations on topics related to modeling, integration, and evaluation of decentralized sources and loads using practical system examples.

General Information

Course Code	GSW-U-PSS-S-ADD
Delivery Method	Classroom, Remote, On-Site
Duration	2 days
Language	English, German

Target Audience

Engineers of power distribution companies in the areas of operation, planning, protection, design of the distribution network and its components.

Prerequisites

- Basic knowledge of electrical engineering
- Fundamentals of Electrical Power Engineering Training "PSS®SINCAL Basics

Content

Introduction to:

- Overview PSS®SINCAL Basics
- Multi-User Master-Database (Module PM)
- Evaluation possibilities and challenges of data import possibilities from GIS
- Advanced feeder tracing (FEEDER)
- Targeted load assignment based on available data and with Module LA
- Challenges due to the high share of renewable energy and overview of solutions such as grid expansion, controllable generation, regulated transformers, batteries, load management, etc.
- Overview, modeling, and impact of renewable energy sources, charging stations, and heat pumps on LV and MV networks (Static analysis)
- Definition of operating points and time series
- Definition of areas, load development areas and coefficients
- Calculation of losses
- Maximal Hosting Capacity Analysis (Module ICA)
- Technical connection rules for connection to low and medium voltage networks exemplary according to the German VDE 4110/4105
- Evaluation and optimization of plant size and grid connection points using the EEG module
- Introduction to protection concepts for distribution power grids and basics of overcurrent protection modelling in PSS®SINCAL
- Outlook: Automation possibilities with API/ Python

8. PSS®SINCAL Probabilistic Reliability Analysis

8.1 PSS®SINCAL – Probabilistic Reliability Analysis

Objectives

The participant will gain knowledge about the basics and how to perform reliability calculations with PSS®SINCAL.

Particular emphasis is placed on the interpretation of the results.

General Information

Course Code	GSW-U-PSS-S-REL
Delivery Method	Classroom, Remote, On-Site
Duration	3 days
Language	English, German

Target Audience

Engineers and service technicians from energy supply companies and industry in the operation, planning and design of networks

Prerequisites

Training "PSS®SINCAL Basics"

Content

Contents will be customized in alignment with participants. Exemplary contents could be:

- Introduction to Reliability Calculation
- Basics of Reliability Calculation
- Modelling of the grid, the fault and the resupply
- Calculation examples and practical applications
- Practical training on a medium-voltage grid
- Compilation of the necessary data as well as information on operation and resupply after faults
- Extension of the load flow model for a realistic image of the operating process (disconnection points, operating equipment switched off, etc.)
- Implementation of the protection concept and spec. Load Models
- Implementation of reliability models; Selection of failure models
- Performing the calculations
- Analysis and discussion of the results; Presentation of results

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