Solar PV Design with AutoCAD and PVSyst

Target Audience

This course is designed for electrical engineers, solar PV designers, project engineers, EPC professionals, consultants, renewable energy professionals, technicians, and engineering students who want to develop practical skills in solar PV engineering documentation, electrical drawing preparation, system layout development, and PV performance simulation. It is particularly suitable for participants with basic knowledge of solar PV systems who want hands-on exposure to AutoCAD and PVSyst for creating professional PV layouts, Single Line Diagrams (SLDs), system simulations, performance analysis, loss evaluation, and engineering reports.

Course Outcomes

Upon successful completion of this course, participants will be able to:

- Understand the workflow for professional solar PV engineering documentation.
- Create solar PV layouts using AutoCAD.
- Prepare roof layouts and electrical layouts for PV installations.
- Develop professional Single Line Diagrams (SLDs) for solar PV systems.
- Apply appropriate electrical symbols and PV system representations in engineering drawings.
- Configure off-grid PV projects in PVSyst.
- Configure grid-connected PV projects in PVSyst.
- Import and utilize appropriate meteorological data for PV simulations.
- Configure PV arrays and inverters for simulation.
- Perform 3D shading analysis and evaluate shading impacts.
- Analyze energy yield and system losses using PVSyst.
- Generate professional PV simulation and performance reports.
- Optimize PV system performance using simulation results.

Course Objectives

By the end of this course, learners will:

- Develop practical proficiency in AutoCAD for solar PV design applications.
- Learn to prepare professional PV system layouts and engineering drawings.

- Understand the structure and technical requirements of PV Single Line Diagrams.
- Develop skills in representing AC and DC circuits and protection devices in SLDs.
- Gain hands-on experience creating PVSyst projects for different PV configurations.
- Learn to configure system components and simulation parameters.
- Understand the use of meteorological and weather data in PV simulations.
- Analyze shading, energy yield, and system losses.
- Develop competency in interpreting PVSyst simulation results.
- Generate industry-ready engineering documentation and performance reports.

Course Outline

The course comprises **24-hours** of theory and labs and is divided into 6 different chapters. Each chapter will be followed by hands-on lab exercises to reinforce learning and gauge understanding of the topics covered.

Table of Contents

Chapter 1: Solar PV Engineering Design and Documentation Fundamentals

- Components of a Solar PV System
- Off-Grid Systems
- On-Grid Systems
- Hybrid Systems
- Grid-Tied with Battery Backup
- Comparison of PV System Configurations
- Applications of Different System Types
- PV System Representation
- Engineering Design Requirements
- Solar PV Design Documentation
- Electrical Design Documentation
- PV Design Workflow

Chapter 2: Single Line Diagram Development for Solar PV Systems

- Introduction to SLD
- Electrical Symbols

- PV System Representation
- AC and DC Circuits
- Protection Devices in SLD
- Preparing Professional SLDs
- Documentation Standards
- PV Array Representation
- Inverter Representation
- Battery System Representation
- Electrical Protection Representation
- Professional SLD Documentation Workflow

Chapter 3: AutoCAD for Solar PV Design

- AutoCAD Interface
- Basic Drawing Tools
- PV Layout Preparation
- Roof Layout Design
- Electrical Layout Drawing
- Single Line Diagram Drafting
- Plotting and Exporting Drawings
- Solar PV Layout Components
- PV Module Layout Representation
- Electrical Equipment Layout
- Drawing Organization and Documentation
- Professional Solar PV Drawing Workflow

Chapter 4: PVSyst Software for Off-Grid Systems

- Introduction to PVSyst
- Software Interface
- Creating a New Project
- Meteorological Data
- Component Selection

- Off-Grid Simulation
- Result Interpretation
- 3D Shading Analysis
- Performance Reports
- PV Array Configuration
- Battery System Configuration
- Inverter Configuration
- Simulation Parameters
- Off-Grid Performance Evaluation
- Simulation Result Analysis

Chapter 5: PVSyst for On-Grid Systems

- Creating Grid-Connected Projects
- Weather Data Import
- PV Array Configuration
- Inverter Configuration
- System Simulation
- Energy Yield Analysis
- Loss Analysis
- Financial Evaluation
- Report Generation
- Performance Optimization
- Grid-Connected System Configuration
- Simulation Parameter Definition
- Energy Production Assessment
- System Performance Evaluation

Chapter 6: PV Simulation Analysis, Reporting and Optimization

- Result Interpretation
- Energy Yield Analysis
- Loss Analysis

- 3D Shading Analysis
- Performance Reports
- System Performance Evaluation
- Financial Evaluation
- Performance Optimization
- Simulation Result Comparison
- Identification of System Losses
- PV System Performance Assessment
- Engineering Report Generation
- Simulation-Based Design Optimization