

SolidWorks Syllabus

SolidWorks Syllabus

Module 1: Introduction to SolidWorks

- **Introduction to CAD and SolidWorks**
 - Understanding CAD (Computer-Aided Design) and its role in product development.
 - Overview of SolidWorks software and its capabilities.
 - The user interface of SolidWorks: Command manager, Feature manager, Graphics area, and Property manager.
- **SolidWorks File Structure**
 - Understanding different file types: Part (.sldprt), Assembly (.sldasm), Drawing (.slddrw).
 - Understanding document templates and file management.
- **Basic Sketching and Drawing**
 - Creating 2D sketches and understanding sketch entities: lines, arcs, circles, etc.
 - Using constraints and relations in sketches.
 - Sketch tools and modifications.

Module 2: Part Modeling

- **Creating Basic 3D Parts**
 - Starting a new part file and using sketch tools.
 - Creating simple 3D shapes: Extrude, Revolve, Sweep, and Loft.
 - Editing parts: Fillets, Chamfers, and Shells.
- **Advanced Part Modeling**
 - Creating complex geometry: Swept and Lofted features.

- Working with reference geometry: Planes, Axes, and Coordinate systems.
- Creating and editing patterns (linear, circular, sketch patterns).
- Working with fillets, chamfers, and holes.

- **Using the Feature Manager**
 - Understanding the feature tree for managing 3D features.
 - Modifying and editing existing features.
 - Using the 'Delete Face' and 'Insert Face' tools.

Module 3: Assembly Design

- **Creating Assemblies**
 - Starting a new assembly and inserting parts.
 - Mating parts in an assembly (Mate types: Coincident, Parallel, Concentric, Distance, etc.).
 - Assembly constraints and best practices for mating parts.
- **Managing Large Assemblies**
 - Handling large assemblies: Assembly Visualization and Lightweight components.
 - Assembly features: Assembly cuts, components, and reference geometry.
 - Using subassemblies to manage complexity.
- **Assembly Motion**
 - Simulating motion and interaction between parts in an assembly.
 - Animating assembly motions to demonstrate functionality.

Module 4: Drawing Creation

SolidWorks Syllabus

- **Creating Technical Drawings**
 - Introduction to 2D drawing: Creating a new drawing file.
 - Adding views: Standard views (front, top, side), isometric views, and section views.
 - Scaling and dimensioning drawings for manufacturing.
 - **Annotations and Detailing**
 - Adding dimensions and geometric tolerances.
 - Detailing drawings: Bill of Materials (BOM), Notes, and Part Numbers.
 - Creating and modifying custom title blocks.
 - **Advanced Drawing Techniques**
 - Creating exploded views of assemblies.
 - Using detail views, broken-out sections, and auxiliary views.
 - Creating multiple drawing sheets and managing drawing templates.
-

Module 5: Sheet Metal Design

- **Sheet Metal Overview**
 - Understanding sheet metal design principles.
 - Creating sheet metal parts using Base Flange and Edge Flange features.
- **Advanced Sheet Metal Features**
 - Working with bends, corners, and lofted bends.
 - Using the 'Flatten' tool to create flat patterns for manufacturing.
 - Adding cutouts, holes, and other custom features for sheet metal parts.
- **Creating Sheet Metal Drawings**
 - Generating flat patterns in drawing sheets.

- Creating and managing cut lists for sheet metal parts.
-

Module 6: Surface Modeling

- **Introduction to Surface Modeling**
 - Understanding surface modeling and its applications.
 - Creating basic surfaces: Planar, Loft, Sweep, and Boundary Surface.
 - **Advanced Surface Features**
 - Working with complex surfaces: Split, Trim, and Knit.
 - Using surface modeling to create advanced geometry for product designs.
 - **Converting Surfaces to Solids**
 - Converting surface models to solid bodies.
 - Using surface bodies in assembly designs.
-

Module 7: Simulation and Analysis

- **Introduction to SolidWorks Simulation**
 - Understanding the basics of simulation and analysis in SolidWorks.
 - Running static structural analysis on parts and assemblies.
- **Applying Materials and Fixtures**
 - Assigning materials to parts and assemblies.
 - Defining fixtures, loads, and boundary conditions for simulations.
- **Running and Interpreting Simulation Results**
 - Running analysis and interpreting results like stress, strain, displacement, and factor of safety.

SolidWorks Syllabus

- Using simulation results to optimize designs.
 - **Advanced Simulation**
 - Performing thermal and fluid analysis.
 - Running motion simulations and analyzing kinematics.
-

Module 8: Product Data Management (PDM)

- **Introduction to SolidWorks PDM**
 - Overview of Product Data Management (PDM) and its benefits.
 - Understanding the PDM interface and managing files.
 - **File and Revision Control**
 - Checking in and checking out files in PDM.
 - Managing revisions and versions of parts, assemblies, and drawings.
 - **Collaboration and Workflow Management**
 - Using workflows to manage design approval and document control.
 - Collaboration between multiple users and teams in SolidWorks PDM.
-

Module 9: Advanced Features and Techniques

- **Working with Configurations**
 - Creating and managing configurations for parts and assemblies.
 - Using configurations for design variations and options.
-

- **Design Tables**
 - Automating the creation of multiple configurations using design tables.
 - Modifying design parameters through Excel-based tables.
 - **Design Automation and Macros**
 - Automating repetitive tasks using SolidWorks macros.
 - Recording and editing macros for custom commands.
-

Module 10: Rendering and Visualization

- **Visualize and Rendering Tools**
 - Introduction to SolidWorks Visualize.
 - Creating high-quality renderings and images for product presentations.
 - **Applying Materials and Appearances**
 - Applying realistic materials and appearances to models.
 - Using lighting and cameras to enhance renderings.
 - **Creating Animations and Exploded Views**
 - Creating animations of assemblies.
 - Creating exploded views for product presentations and manuals.
-

Module 11: Final Project

- **Hands-On Final Project**
 - Create a complex assembly or product design from start to finish.
 - Design a part, assembly, and generate the associated technical drawings.
-

SolidWorks Syllabus

- Apply simulation to validate the design.
 - Present the final product with rendered images, animations, and technical drawings.
 - **Project Review and Presentation**
 - Present the final project and demonstrate design and simulation workflows.
 - Receive feedback and suggestions for improvements.
-

Learning Outcomes:

By the end of this course, students will be able to:

- Master SolidWorks' tools for 3D modeling, assembly design, and technical drawings.
 - Create detailed part models, assemblies, and high-quality 2D drawings.
 - Perform basic and advanced simulations to analyze design performance.
 - Use SolidWorks' surface modeling, sheet metal design, and rendering features.
 - Work with SolidWorks PDM for managing product data and collaboration.
 - Develop custom solutions using macros and design tables for automation.
-

Tools and Technologies Covered:

- **SolidWorks:** Core software for CAD modeling, assemblies, simulation, and rendering.
 - **SolidWorks PDM:** For product data management and collaboration.
 - **SolidWorks Visualize:** For rendering and creating high-quality images of models.
-