

# Solid Edge Syllabus

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### Module 1: Introduction to Solid Edge

- **Overview of CAD and Solid Edge**
  - Introduction to the importance of CAD in product development.
  - Understanding the key capabilities and applications of Solid Edge.
  - User Interface and Navigation: Ribbon, Command Bar, and PathFinder.
  - Customizing the workspace for efficiency.
- **File Management and Templates**
  - Understanding Solid Edge file structure: Part (.par), Assembly (.asm), and Draft (.dft).
  - Setting up and managing templates for new projects.
  - Understanding and using file types, including design and template files.

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### Module 2: Part Modeling

- **Basic Part Modeling**
  - Introduction to 3D modeling concepts: Creating 3D geometry from sketches.
  - Sketching in Solid Edge: Basic tools (Line, Circle, Rectangle, etc.), applying constraints (dimensioning, relations).
  - Creating 3D features: Extrude, Revolve, Sweep, and Loft.
- **Advanced Part Modeling**
  - Modifying parts: Fillets, Chamfers, Shells, and Drafts.

- Advanced features: Patterning, Mirroring, and using the Hole Wizard.
- Working with reference geometry: Planes, Axes, and Points.
- Feature operations: Editing, Suppressing, and Rolling back features.

- **Sheet Metal Part Modeling**

- Introduction to sheet metal design principles.
- Creating sheet metal parts using the Base Flange, Edge Flange, and Bend features.
- Using the “Unfold” tool to create flat patterns for manufacturing.

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### Module 3: Assembly Design

- **Creating Assemblies**
  - Introduction to the assembly environment.
  - Inserting parts and positioning them within an assembly.
  - Mating components: Using Mate, Align, and Insert constraints.
  - Using assembly patterns and subassemblies for better management.
- **Assembly Operations**
  - Assembly cut and feature tools.
  - Working with assembly features like holes and cuts applied to multiple components.
  - Managing assemblies with complex relationships.
  - Creating exploded views for visualization.
- **Assembly Motion and Interference Checking**
  - Simulating motion and checking component interactions.

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- Performing interference checks to ensure design integrity.
- Analyzing assembly performance using kinematic simulations.

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## Module 4: Drafting and 2D Drawing Creation

- **Creating 2D Drawings from 3D Models**
  - Introduction to the drafting environment and creating new drawing files.
  - Placing views: Standard views (front, top, side), isometric views, section views, and detail views.
  - Creating auxiliary and exploded views for assemblies.
- **Dimensioning and Annotations**
  - Adding dimensions: Linear, angular, radial, and ordinate.
  - Geometric tolerancing and symbols: Creating annotations and using callouts.
  - Creating and managing Bill of Materials (BOM) in assemblies.
- **Advanced Drawing Tools**
  - Creating title blocks and custom drawing templates.
  - Detailing complex views for manufacturing (e.g., hole charts, machining annotations).
  - Managing drawing layers and sheet sizes.

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## Module 5: Sheet Metal Design

- **Sheet Metal Design Basics**
  - Introduction to Solid Edge's sheet metal environment.

- Working with sheet metal features like Base Flange, Edge Flange, and Bends.
- Creating and unfolding sheet metal parts.

- **Advanced Sheet Metal Features**

- Working with custom bends, corner reliefs, and advanced cutting features.
- Using pattern tools to replicate features across the sheet metal part.
- Generating flat patterns for fabrication.

- **Drawing Sheet Metal Parts**

- Creating flat patterns in drawings.
- Adding bend tables and managing bend allowances.

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## Module 6: Surface Modeling

- **Introduction to Surface Modeling**

- Understanding surface modeling and its applications.
- Basic surface creation: Extrude, Revolve, Sweep, and Loft.
- Working with surface-based features for complex geometry.

- **Advanced Surface Modeling**

- Creating complex shapes with advanced surface tools: Boundary Surface, Sweep Surface.
- Combining surfaces and solids: Using the "Thicken" tool to create solid bodies.
- Surface analysis tools to check continuity and smoothness.

- **Surface and Solid Integration**

- Converting surfaces into solid bodies for manufacturing purposes.
- Editing and repairing surfaces using the "Repair" and "Thicken" tools.

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## Module 7: Parametric and Design Intent

- **Understanding Parametric Design**
  - Introduction to parametric modeling in Solid Edge.
  - Using variables, dimensions, and relationships to define models.
  - Creating and modifying parameters that drive designs.
- **Working with Family of Parts**
  - Creating family of parts using parameters and configurations.
  - Managing part variations using a family table.
  - Design intent: Understanding how changes in parameters affect models.
- **Using Equations**
  - Creating equations to drive complex relationships between dimensions.
  - Using the Equation Editor for advanced design logic.

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## Module 8: Solid Edge Simulation and Analysis

- **Introduction to Solid Edge Simulation**
  - Overview of Solid Edge Simulation tools.
  - Running basic static analysis on parts and assemblies.
  - Applying loads, boundary conditions, and material properties.
- **Performing Structural Analysis**
  - Running linear static analysis to evaluate stress, displacement, and safety factors.
  - Interpreting simulation results and making design improvements.
- **Advanced Simulation**

- Running modal and thermal analysis.
  - Using motion analysis tools for simulating the behavior of assemblies.
- **Simulation for Manufacturing**
    - Using simulation results to optimize designs for manufacturing.
    - Analyzing part performance under real-world conditions.

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## Module 9: Generative Design and Additive Manufacturing

- **Generative Design Basics**
  - Introduction to generative design principles.
  - Using Solid Edge's generative design tools for lightweight structures.
  - Setting design criteria and optimizing geometry for performance.
- **Additive Manufacturing (3D Printing)**
  - Introduction to additive manufacturing and 3D printing tools in Solid Edge.
  - Preparing models for 3D printing and converting them into printable formats (STL).
  - Generating support structures and optimizing parts for 3D printing.

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## Module 10: Product Data Management (PDM)

- **Introduction to PDM**
  - Overview of Product Data Management (PDM) concepts and benefits.

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- Managing CAD files with Solid Edge PDM and using a PDM system for version control.
  - **PDM Workflow Management**
    - Creating and managing workflows for design approval and change management.
    - Collaboration and document sharing between teams.
  - **Managing Product Lifecycle**
    - Tracking revisions, changes, and product versions.
    - Integration with ERP and PLM systems for data consistency.
  - Master Solid Edge for 3D part modeling, assembly design, and technical drawing creation.
  - Utilize sheet metal and surface modeling tools for complex designs.
  - Perform basic and advanced simulations to test and optimize product designs.
  - Create and manage parametric models and configurations to automate design changes.
  - Apply Product Data Management (PDM) techniques for effective collaboration.
  - Utilize Solid Edge's generative design and additive manufacturing tools.
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## Module 11: Final Project

- **Hands-On Final Project**
    - Create a complete design from part creation to assembly and technical drawing.
    - Apply advanced features such as sheet metal, surface modeling, and simulation.
    - Develop a final project that demonstrates your proficiency in Solid Edge.
  - **Project Review and Presentation**
    - Present the final design, technical drawings, and simulations to demonstrate the design process.
    - Receive feedback from instructors and peers for continuous improvement.
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## Tools and Technologies Covered:

- **Solid Edge:** Core software for part modeling, assembly design, sheet metal, and surface modeling.
- **Solid Edge Simulation:** For structural, thermal, and motion analysis.
- **Solid Edge PDM:** Product Data Management system for managing CAD data.
- **Additive Manufacturing Tools:** For preparing models for 3D printing.

## Learning Outcomes:

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