About this Course

Course objectives
Upon completion of this course you will be able to:
- Import, edit, and repair CAD geometry.
- Import and edit orphan meshes.
- Use virtual topology to ease the meshing of complicated geometry.
- Partition geometry to enable different meshing techniques.

Targeted audience
Simulation Analysts

Prerequisites
None

2 days
**Day 1**

- **Lecture 1**  Geometry Import and Repair
  - Demonstration 1  Geometry Import and Repair: Lens Model
  - Demonstration 2  Geometry Import, Diagnostics, and Defeaturing
  - Workshop 1  Geometry Import and Repair: Machine Part
  - Workshop 2  Geometry Repair: Piston Model
  - Workshop 3  Creating a Shell From a Thin Solid

- **Lecture 2**  Orphan and Native Meshes
  - Demonstration 3  Importing and Editing an Orphan Mesh
  - Demonstration 4  Virtual Topology: Piston Model
  - Demonstration 5  Virtual Topology: U-Joint Model
  - Workshop 4  Importing, Editing, and Extracting Geometry from a Mesh
  - Workshop 5  Virtual Topology: Bracket Model

**Day 2**

- **Lecture 3**  Meshing and Partitioning
  - Demonstration 6  Partitioning and Mixed Meshing
  - Demonstration 7  Sweep Meshing Techniques
  - Workshop 6  Hex Meshing Intersecting Pipes
  - Workshop 7  Hex Meshing a Cardan Joint
  - Workshop 8  Additional Geometry Repair and Meshing Exercises

- **Lecture 4**  Bottom-Up Meshing
  - Demonstration 8  Bottom-Up Meshing
  - Workshop 9  Bottom-Up Meshing
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Lesson 1: Geometry Import and Repair

The following topics are covered in this lesson.

Lesson content:
- Geometry Import and Repair
- Workshop Preliminaries
- Demonstration 1  Geometry Import and Repair: Lens Model
- Demonstration 2  Geometry Import, Diagnostics, and Defeating
- Workshop 1  Geometry Import and Repair: Machine Part
- Workshop 2  Geometry Repair: Piston Model
- Workshop 3  Creating a Shell From a Thin Solid

Here are the steps to be followed:

1. Introduction
2. Geometry Import
3. CAD Associative Import
4. CAD Standalone Import
5. Neutral Geometry Formats
6. Geometry Repair
7. Query and Diagnostics Tools
8. Geometry Import Flowchart
9. Example
10. Shell Midsurface Creation
Lesson 2: Orphan and Native Meshes

The following topics are covered in this lesson.

Lesson content:
- Orphan and Native Meshes
- Demonstration 3 Importing and Editing an Orphan Mesh
- Demonstration 4 Virtual Topology: Piston Model
- Demonstration 5 Virtual Topology: U-Joint Model
- Workshop 4 Importing, Editing, and Extracting Geometry from a Mesh
- Workshop 5 Virtual Topology: Bracket Model

Orphan and Native Meshes

Here are the steps to be followed:

1. Introduction
2. Dependent and Independent Part Instances
3. Orphan Meshes
4. Mesh Editing
5. Creating Geometry from an Orphan Mesh
6. Combined Orphan and Native Meshes
7. Mesh Generation Techniques
   a. Free meshing
   b. Swept meshing
   c. Structured meshing
8. Virtual Topology
Lesson 3: Meshing and Partitioning

The following topics are covered in this lesson.

Lesson content:
- Meshing and Partitioning
- Demonstration 6: Partitioning and Mixed Meshing
- Demonstration 7: Sweep Meshing Techniques
- Workshop 6: Hex Meshing Intersecting Pipes
- Workshop 7: Hex Meshing a Cardan Joint
- Workshop 8: Additional Geometry Repair and Meshing Exercises

Meshing and Partitioning

Here are the steps to be followed:

1. Enabling Various Meshing Techniques
2. Controlling Mesh Density and Gradation
3. Methods of Gaining More Control over the Mesh
4. Creating and Merging Meshable Regions
5. Hex Meshing Revolved Regions
6. Mesh Stack Direction
7. Parametric Modeling
8. Assigning Element Types
9. Verifying Mesh Quality
10. Mass and Mesh Queries
Lesson 4: Bottom-Up Meshing

The following topics are covered in this lesson.

Lesson content:
- Bottom-Up Meshing
- Demonstration 8  Bottom-Up Meshing
- Workshop 9  Bottom-Up Meshing

Here are the steps to be followed:
1. Introduction
2. Basic Features
3. Example
4. Summary