

Rhino 3D Modeling for Beginners **From Basics to Practical Design**

Target Audience

This course is designed for beginners, including students, designers, engineers, and professionals who are new to Rhino 3D and want to learn the fundamentals of 3D modeling, surface creation, and design visualization. No prior experience with Rhino is required.

Course Objective

To provide beginners with a solid foundation in Rhino 3D modeling, enabling them to understand the interface, create basic to intermediate 3D objects, edit curves and surfaces, and produce simple renders. The course emphasizes hands-on exercises to build confidence and develop practical skills in 3D design.

Course Outcome

- Ability to navigate the Rhino interface and use basic commands effectively.
- Understanding of points, curves, surfaces, polysurfaces, and solids in Rhino 3D.
- Skills to perform object selection, transformation, and accurate modeling techniques.
- Capability to annotate, organize, and manage layers, groups, and blocks in a project.
- Basic knowledge of curve and surface analysis, rendering, and visualization.
- Confidence to combine different modeling techniques to create complete 3D designs.

Course Outline: The course comprises **40-hours** of theory and labs and is divided into **21** different chapters. Each chapter will be followed by hands-on lab exercises to reinforce learning and ensure practical understanding of the topics covered..

Chapter 1. Introduction to Rhino

- The Rhino interface
- Rhino commands
- Using templates
- Start from menu, toolbar, or command line
- Undo, repeat, cancel commands
- Command options
- Getting help

Chapter 2. Rhino Objects

- Why NURBS modeling
- Points, curves, surfaces
- Closed/open and trimmed/untrimmed surfaces
- Surface isoparametric and edge curves
- Curve and surface degree
- Control points: visibility, editing, adding/deleting/redistributing
- Polysurfaces, solids, light-weight extrusion objects
- Polygon mesh objects

Chapter 3. Selecting Objects

- Select and deselect objects
- Selection menu
- Select objects with windows
- Other ways of selecting objects
- Sub-object selection

Chapter 4. Navigating Viewports

- Viewport title and projection types
- Parallel, perspective, two-point perspective
- Mouse navigation and key/mouse combinations
- Viewport display modes: Wireframe, Shaded, Rendered, Raytraced, other shaded modes

Chapter 5. Accurate Modeling

- The Rhino cursor
- Grid snap, Ortho mode
- Object snaps: persistent, one-time, using references
- Constrain cursor movement: Ortho, distance constraint, angle constraint, combined constraints
- SmartTrack™
- Coordinate systems: right-hand rule, construction plane, relative, world coordinates
- Elevator mode

Chapter 6. Creating Surfaces from Curves

- Surface from edge curves
- Extrude curves
- Loft curves
- Revolve curves
- Revolve curves with a rail
- Sweep along one rail curve
- Sweep along two rail curves

Chapter 7. Editing Curves and Surfaces

- Join
- Explode
- Trimming and splitting: Trim, Split, Untrim

Chapter 8. Transforms – Move, Copy, Rotate, Scale, Mirror, Boolean

- Move objects (dragging and elevator mode)
- Copy objects
- Rotate
- Scale
- Mirror
- Boolean Operations (Union, Difference, Intersection, Split)

Chapter 9. Organization – Layers, Groups, and Blocks

- Layers: popup layer list, layers panel
- Groups
- Blocks
- Worksessions

Chapter 10. Annotation: Dimensions and Text

- Dimensions
- Annotation text
- Leaders
- Dots
- Hatching
- Hidden line removal
- Notes

Chapter 11. Curve and Surface Analysis

- Measure distance, angle, radius
- Direction

- Visual surface analysis: curvature, environment map, zebra, draft angle
- Edge evaluation and diagnostics

Chapter 12. Rendering

- Lights
- Materials
- Environment
- Ground plane
- Render preview

Chapter 13. Solids and Transforms – Pull Toy

- Enter coordinates
- Draw body, axles, wheel hubs
- Draw lug nuts and array them
- Draw tires
- Mirror wheels
- Draw eyes and pull cord

Chapter 14. Revolve Curves - Flashlight

- Set up guides
- Draw body and lens profile curves
- Build body and lens surfaces
- Use history

Chapter 15. Sweep, Loft, and Extrude - Headphones

- Create speaker shell
- Sub-object selection
- Create padding, cover, mounting bracket, headband
- Round headband ends
- Create speaker wire
- Mirror headphone parts

Chapter 16. Loft and Sweep - Boat

- Lay out hull curves
- Check for fairness and curvature
- Create 3-D curves
- Revise curves
- Loft hull surfaces
- Build transom and deck

Chapter 17. Point Editing and Blending - Penguin

- Body
- Eyes
- Beak
- Feet
- Tail
- Wings
- Finishing touches
- Add lights and materials

Chapter 18. Trace Images - Dragonfly

- Place reference images
- Trace chest and body
- Create body segments, tail, chest, head, neck, eyes
- Trace wings and legs

Chapter 19. Flow Along a Surface – Wrap Text

- Create planar reference plane
- Create text objects to wrap

Chapter 20. Blocks

- Create solid shapes
- Drill and copy holes
- Make 2-D drawing
- Dimension 2-D drawing

Chapter 21. Layouts – Title Block

- Layout viewports
- Insert title block