Autodesk Civil 3D Essentials

Target Audience

This course is designed for civil engineers, surveyors, designers, and infrastructure professionals who are new to Autodesk Civil 3D and want to learn essential tools for creating and managing civil engineering projects such as roads, land development, and utility networks.

Course Objective

The objective of this course is to provide participants with the foundational skills needed to design, analyze, and document civil engineering projects using Autodesk Civil 3D, ensuring efficiency and accuracy in project workflows.

Course Outcome

- Learn to navigate the Civil 3D interface and create project components such as surfaces, alignments, and profiles.
- Understand how to manage survey data and create digital terrain models (DTMs) for site development.
- Develop skills in designing corridors, grading, and utility networks for infrastructure projects.
- Gain proficiency in generating plans, sections, and documentation for construction and stakeholder communication.

Course Outline: The course comprises **40 -hours** of theory and labs and is divided into **13** different chapters. Each chapter will be followed by hands-on lab exercises to reinforce learning and gauge understanding of the topics covered.

Chapter 1. Introduction to AutoCAD Civil 3D

Introduction to AutoCAD Civil 3D

Basic Features of AutoCAD Civil 3D

- Points
- Point Groups
- Surfaces
- Alignments
- Profiles
- Profile Views
- Assemblies and Subassemblies
- Corridors
- Parcels
- Grading
- Sections
- Pipe Networks
- Pressure Pipe Networks
- Superelevation View

Starting AutoCAD Civil 3D

AutoCAD Civil 3D User Interface

- Drawing Area
- Ribbon
- Application Menu
- Command Bar
- Drawing File Tabs
- Status Bar
- TOOLSPACE Palette
- Shortcut Menu
- Layout Tools
- Autodesk Account
- Panorama Window

Civil 3D Workspaces

- Civil 3D
- Drafting & Annotation
- 3D Modeling
- Planning and Analysis

Getting Started with AutoCAD Civil 3D

- Drawing Templates
- Drawing Settings

Chapter 2. Working with Points

Point Object
- Components of Point Object
- Creating Points

Point Settings and Styles
- Point Styles

Point Label Styles
- Creating a Point Label Style
- Adding the Text Component to the Label

Editing Points
- Renumbering a Point
- Changing the Elevation of the Point
- Changing the Point Elevation with Respect to a Surface
- Deleting a Point
- Zooming to a Point
- Locking/Unlocking Points
- Using the Geodetic Calculator
- Editing Points Using the Panorama Window
- Importing/Exporting/Transferring Points
- Creating a New File Format
- Adding Point Tables

Point Groups
- Creating Point Groups
- Editing Point Groups
- Description Keys

Chapter 3. Working with Surfaces

Surfaces
- Types of Surfaces

Creating and Editing Surfaces
- Creating a Surface
- Adding Data from Different Sources to a Surface
- Adding Surface Boundaries
- Deleting a Boundary
- Adding Breaklines to the Surface
- Editing a Surface
- Creating Surface Masks

- Creating Volume Surfaces

Surface Styles

- Creating a Surface Style
- Editing Surface Styles
- Editing Surface Properties

Surface Tools

- Drape Image
- Extract Solids from Surface
- Export to DEM
- Extract Objects

Chapter 4. Surface Volumes and Analysis

Surface Volumes

- Volumes Dashboard
- Composite Volumes
- Bounded Volumes

Creating Volume Surfaces

- Creating the TIN Volume Surface
- Creating the Grid Volume Surface

Surface Analysis

- Contour Analysis
- Direction Analysis
- Elevations Analysis
- Slopes Analysis
- Slope Arrows Analysis
- User-defined Contours Analysis
- Watersheds Analysis

Surface Analysis Tables

- Creating Legend Table Styles
- Adding Surface Legend Tables

Surface Labels

- Adding Contour Labels
- Adding Slope Labels
- Adding Spot Labels

Surface Label Styles

- Information Tab
- General Tab
- Layout Tab

- Dragged State Tab

Chapter 5. Alignments

Alignments
- Types of Alignments
- Key Points for Designing an Alignment
- Components of Alignment
- Factors Affecting an Alignment

Creating Alignments
- Creating Alignments Using Polylines
- Creating Alignments Using the Alignment Layout Tools

Alignment Layout Tools Toolbar
- Tangent Tools
- Point of Intersection Tools (PI)
- Line Tools
- Curve Tools
- Line with Spiral Tools
- Curve with Spiral Tools
- Spiral Tools

Creating Alignments using the Best Fit Method
- Creating Lines, Arcs, and Points as Entities
- by Using the Best Fit Entities Tool

Criteria-Based Alignment Design
- Design Criteria
- Creating Connected Alignments
- Design Checks
- Working with Design Checks in a Design Check Set
- Creating a Design-based Alignment
- Editing the Design Criteria

Alignment Properties
- Information Tab
- Station Control Tab
- Design Criteria Tab

Alignment Styles
- Creating an Alignment Style
- Editing the Current Alignment Style

Alignment Label Styles
- Creating an Alignment Label Style

- Creating a Label Set
- Adding Alignment Labels

Editing Alignments

- Editing an Alignment Layout Using the Geometry Editor
- Editing the Alignment Using the Grip Edits

Adding Alignment Tables

Superelevation

- Analyzing Superelevation
- Creating Superelevation View

Chapter 6. Working with Profiles

Profiles

- Types of Profiles
- Creating a Surface Profile
- Creating a Profile View
- Creating a Layout or Criteria-Based Profile
- Creating a Superimposed Profile
- Creating Multiple Profile Views
- Creating a Quick Profile
- Creating Dynamic Offset Profiles

Defining a Profile Design Criteria

Editing Layout/Design Profiles

- Editing Profile Using the Profile Layout Tools Toolbar
- Editing Profiles Using Grips

Profile and Profile View Styles

- Creating a Profile Style
- Creating a Profile View Style
- Assigning the Profile View Style

Profile Labels

- Creating a New Profile Label Style
- Creating a Label Set
- Assigning Labels to a Profile
- Creating a New Profile View Label Style

Band Sets and Band Styles

- Creating a Band Style (Framing a Band)

Profile Properties

Profile View Properties

Chapter 7. Working with Assemblies and Subassemblies

Introduction to Assemblies and Subassemblies
Assemblies
- Components of an Assembly
- Creating Assemblies
- Assembly Properties
- Assembly Styles

Using Codes
- Point Codes
- Link Codes
- Shape Codes
- Code Set Styles
- Creating Label Styles
- Creating Code Set Styles

Working with Subassemblies
- Subassembly Properties
- Creating Subassemblies Using Polylines
- Adding Codes to the Subassembly
- Subassembly Catalog Library

Adding Assemblies to Tool Palettes

Chapter 8. Working with Corridors and Parcels

Overview
Corridors
- Creating Corridor
- Corridor Properties

Corridor Surface
- Options in the Surfaces Tab
- Creating a Corridor Surface
- Adding the Surface Boundary
- Editing the Corridor Boundary

Calculating Earthwork Volumes
Creating Civil 3D Objects using Corridor
- Create Polyline From Corridor
- Create Feature Line from Corridor
- Create Alignment from Corridor
- Create Profile from Corridor

- Create COGO Points from Corridor
- Creating Surfaces from Corridor

Selecting and Editing Corridor Station

- Selecting the Baselines and Offsets of a Corridor
- Selecting a Station
- Editing a Corridor Section

Checking the Corridor Visibility

- Drive
- Sight Distance

Extracting Corridor Solids and Bodies

- Codes to Extract Page
- Property Data Page
- Output Options Page

Restoring Corridor Bowties
Introduction to Parcels

- Key Points for Designing a Parcel

Creating Parcels

- Creating Parcels using Polylines
- Creating Parcels using the Parcels Layout Tools

Parcels Layout Tools Toolbar

- Lot Line Tools
- Parcel Sizing Tools
- PI Editing Tools
- Other Tools

Parcel Sizing Parameters
Right Of Way (ROW) Parcel

- Creating Right of Way Parcels

Parcel Properties

- Information Tab
- Composition Tab
- Analysis Tab
- User Defined Properties Tab

Chapter 9. Sample Lines, Sections, and Quantity Takeoffs

Overview
Sample Lines
Creating Sample Lines
Sample Line Properties

Sample Line Group Properties
Editing Sample Lines
Creating Section Views

- Creating a Single Section View
- Creating Multiple Section Views
- Section View Band Set
- Adding Section View Labels
- Section View Properties
- Editing Sections
- Move Sections Views to a Different Section View Group

Quantity Takeoffs

- Defining the Quantity Takeoff Criteria
- Computing Materials
- Generating Volume Reports
- Adding Tables

Chapter 10. Feature Lines and Grading

Overview
Feature Lines

- Creating Feature Lines by Using the Create Feature Line Tool
- Editing Feature Lines
- Editing the Feature Line Geometry
- Creating Dynamic Feature Lines
- Setting the Properties and Style of the Feature Line
- Adding Labels to Feature Lines

Grading Objects

- Creating Criteria Sets
- Creating a Grading Group
- Using the Grading Creation Tools Toolbar
- Editing Gradings Using the Grading Editor Tool
- Creating the Grading Infill
- Grading Transition
- Grading Utilities
- Grading Style

Chapter 11. Pipe Networks

Overview
Pipe Network
- Pipes
- Structures
- Null Structures
- Part Catalog
- Parts List
- Part Builder
- Part Rules

Creating a Pipe Network
- Using the Network Layout Tools
- Pipes and Structures Tool
- Pipes Only Tool
- Structures Only Tool
- Creating Pipe Networks from Objects

Drawing Pipe Network Parts in a Profile View
- Editing a Pipe Network in a Profile View

Network Properties
- Structure Properties
- Pipe Properties

Editing a Pipe Network in Plan Layout
- Using the Pipe Network Layout Tools Toolbar
- Editing Pipes and Structures Using the Toolspace Item View
- Grip Editing of the Pipe Network

Adding Pipe Network Labels
Adding Tables
- Adding a Structure Table
- Adding a Pipe Table

Interference Check
- Creating the Style for the Interference Check
- Running the Interference Check

Swapping Parts

Chapter 12. Pressure Networks

Pressure Network
- Defining Network Components
- Creating a Pressure Network

- Creating Pressure Networks from Objects

Pressure Network Properties

- Pressure Pipe Properties
- Fittings and Appurtenances Properties

Editing Pressure Network

- Using the Pressure Network Plan Layout or Profile Layout Tab
- Editing Pressure Network Objects Using the TOOLSPACE Item View
- Grip Editing of the Pressure Pipe Network

Adding Pressure Network Labels

Adding Pressure Network Tables

- Adding a Pressure Pipe Table
- Adding a Fitting Table
- Adding an Appurtenance Table

Validating a Pressure Network

- Performing Design Check
- Performing Depth Check

Chapter 13. Working with Plan Production Tools and Data Shortcuts

Plan Production Tools

- Creating View Frames
- Creating Sheets

Data Sharing

- Data Shortcut
- Data Reference