

Learn Civil 3D in 90 minutes

Instructor guide

Course duration if teaching with this material in class: 3.5 hours or more depending on lecture time, in-class practice, and additional assignments. The “90 minutes” in the title signifies video content in the course.

Recommended student level: Students in civil design, civil engineering, and construction programs

Products: Autodesk Civil 3D

This instructor guide is a comprehensive tool for facilitating this course in the classroom. Prepare to teach the course by thoroughly reviewing this document, as well as all related course materials and resources. You may also share this document with your students to guide them in their assignments. It's always recommended that you work through the course yourself in preparation for each module.

Learning objectives:

- Navigate the Civil 3D interface, including Toolspace, ribbons, and drawing settings.
- Create project drawings from templates and manage project data using data shortcuts.
- Create, manage, style, and label surfaces from survey and LandXML data.
- Use feature lines, sites, grading groups, and grading criteria to develop proposed surface models.
- Create and edit alignments using layout tools and geometry editing commands.
- Generate surface and design profiles to support roadway and site design workflows.
- Create and customize profile views for visualizing and documenting vertical design.
- Create and edit gravity pipe networks and pressure pipe networks for utility design.
- Apply object styles and labels to support design visualization and documentation.
- Develop a coordinated site design that integrates surfaces, alignments, profiles, and utility networks.

The overall course contains the following resources:

- 4 video modules covering all the topics in the course.
- Dataset files for use when following the videos and exercises.
- Quiz questions with timecodes for remedial knowledge check.
- Exam-style final test questions at the conclusion of the course.
- 4 practice exercises with video solutions.

- 1 challenge assignment with recommended assessment criteria.
- Lecture slides that introduce topics and themes covered in the course.

Pre-requisites:

In this course, students learn the core concepts to start using Civil 3D right away and this material could be assigned in the first week or two of class. It is expected that the student has basic computer knowledge and a Civil 3D license assigned to them.

This course is designed to provide students with an opportunity to develop fundamental skills in Civil 3D to create surfaces, grade sites, design alignments and profiles, and model utility networks.

Structure of the course:

The course is split into 4 modules and includes the following components.

Videos:

Each video begins with a list of learning objectives covered in the video. The dataset mentioned throughout all the videos are available if students wish to follow along or practice after watching the videos.

Dataset:

The example used in the videos give learners hands-on experience. The dataset is available to follow along with the instruction in both metric and imperial formats.

Practice exercises:

There are 4 practice exercises included, each exploring a different set of topics. The practice exercises are designed to give students an opportunity to test their knowledge and apply what they have learned. Each practice exercise is accompanied by a video solution.

Challenge exercise:

A course challenge assignment is included, focusing on a set of topics covered in the course. Students are presented with a challenge in an applicable real-world situation, and they apply their skills and the techniques learned to solve the challenge. A grading rubric is provided for the instructor, giving guidelines on assessment criteria. You can also encourage students to work in small groups, first

discussing the desired outputs and working collectively to derive the best process and execution in the software.

Video quiz questions:

Quiz questions are included with each video of the course and the timecodes are included so that students can review the related sections in the video for questions they have answered incorrectly.

Final test questions:

A cumulative set of exam-style questions are included at the conclusion of the course for students to measure what they have learned against realistic multiple-choice questions.

Lecture slides:

Lecture slides are offered to help facilitate in-class discussion.

Using the course in the classroom or self-paced

This course can be implemented as an independent, self-paced project, or can be completed in the classroom in a team setting. A couple of options are outline below:

Option 1: Self-paced

Each student will log into Autodesk.com/learn using their Autodesk Account credentials and follow along with the project instruction. (Alternatively, you may choose to assign the material through your LMS.) Students can work through the projects on their own by following the project steps and challenge instructions, and by exploring any supporting assets. This is a great way to allow students to move through the learning materials at their own pace and explore additional learning opportunities or increase lab time. The self-paced option can also be used for out of classroom or remote assignments. A certificate of completion is awarded once the course is completed.

Option 2: Instructor-led

In this option, instructors will log into Autodesk.com/learn using their Autodesk Account credentials and download the learning materials. Instructors can then guide the students through each project, using the accompanying lecture slides for instruction and practice exercises as handouts. This option allows for guided, step-by-step classroom engagement. This approach works well in a more traditional classroom setting and will allow instructors to easily keep students on the same pace. The challenge

exercise can be used as a learning opportunity for students who complete their work early or are looking for additional hands-on opportunities.

Course contents

Each module is listed below along with suggested time allocations for instruction. Review the video tutorials for the detailed instruction in each module.

Module 1 Set up the Civil 3D environment

Approximate total overall time for teaching this module: 25 minutes

Module 1-01 Navigate key interface elements

Total time required for module unit: 10 minutes

Discuss course objectives: 1 minute

Demonstrate: 4 minutes

- Create a drawing from a specified template.
- Navigate the interface including Toolspace, ribbons, and drawing settings
- Create a data shortcut project and assign it to project drawings.

Hands-on time: 5 minutes

Datasets:

C3D90/M1-01

Note: Download all datasets from the course resources. In advance to following along with this course's content, instructor should assign the Civil 3D product. At this point, check students' access and that downloaded files open. Begin with Module 1-01.

Assignments (additional):

- **Quiz:** 1 minute
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Module 1-02 Create and manage data shortcuts

Total time required for module unit: 15 minutes

Discuss course objectives: 2 minutes

Demonstrate: 5 minutes

- Set the working folder.
- Create and set a data shortcut project.
- Associate a drawing to a data shortcut project.
- Create a data shortcut
- Create a data reference.

Hands-on time: 8 minutes

Datasets:

Datasets: C3D90/M1-02

Assignments (additional):

- **Quiz:** 1 minute
- **Practice exercise: Create a project drawing in Civil 3D** 10 minutes (or use in class for hands-on time). **Datasets:** C3D90/PE_M1

Module 2 Incorporate site data and perform surface modeling in Civil 3D

Approximate total overall time for teaching this module: 65 minutes

Module 2-01 Work with sites

Total time required for module unit: 10 minutes

Discuss objectives: 2 minutes

Demonstrate: 8 minutes

- Explain what sites are and how they are used to organize Civil 3D objects.
- Describe how priorities and interactions within sites affect feature lines and grading groups.
- Describe how alignments and feature lines behave when they overlap within a site.

Hands-on time: 0 minutes

Datasets:

C3D90/M2-01

Assignments (additional):

- **Quiz:** 1 minute
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Module 2-02 Work with survey surfaces

Total time required for module unit: 20 minutes

Discuss objectives: 2 minutes

Demonstrate: 8 minutes

- Identify surface content used to create a surface from points.
- Export and import surfaces using the LandXML format.

Hands-on time: 10 minutes

Datasets:

C3D90/M2-01

Assignments (additional):

- **Quiz:** 1 minute
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Module 2-03 Apply surface styles and labels

Total time required for module unit: 15 minutes

Discuss objectives: 2 minutes

Demonstrate: 6 minutes

- Analyze a surface.
- Change surface styles to control how they are displayed.
- Add labels to clarify elevation representation.

Hands-on time: 8 minutes

Datasets:

C3D90/M2-03

Assignments (additional):

- **Quiz:** 1 minute
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Module 2-04 Create grading

Total time required for module unit: 20 minutes

Discuss objectives: 2 minutes

Demonstrate: 8 minutes

- Create a grading group to organize proposed grading designs.
- Apply grading criteria to feature lines to generate proposed surfaces.
- Edit grading objects to meet design constraints.

Hands-on time: 10 minutes

Datasets:

C3D90/M2-04

Assignments (additional):

- **Quiz:** 1 minute
 - **Practice exercise:** Create a project drawing in Civil 3D 10 minutes (or use in class for hands-on time). **Datasets:** C3D90/PE_M2
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Module 3 Define geometry for Civil 3D with Alignments, Profiles, and Profile Views

Approximate total overall time for teaching this module: 45 minutes

M3-01 Add alignments, profiles, and profile views

Total time required for module unit: 10 minutes

Discuss objectives: 2 minute

Demonstrate: 4 minutes

- Distinguish between alignments, profiles, and profile views.
- Explain how profile views show the relationship between alignments and profiles.

Hands-on time: 4 minutes

Datasets:

C3D90/M3-01

Assignments (additional):

- **Quiz:** 1 minute
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M3-02 Create, edit, and label alignments

Total time required for module unit: 15 minutes

Discuss objectives: 2 minute

Demonstrate: 5 minutes

- Create alignments from existing polylines.
- Use layout tools and the geometry editor to create and edit alignments.
- Label alignment stationing for documentation and design clarity.

Hands-on time: 8 minutes

Datasets:

C3D90/M3-02

Assignments (additional):

- **Quiz:** 1 minute
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M3-03 Create, edit, and label profiles and profile views

Total time required for module unit: 20 minutes

Discuss objectives: 2 minute

Demonstrate: 6 minutes

- Create profiles from existing surfaces.
- Use profile creation tools and the geometry editor to create and edit profiles.
- Create and label profile views for visualization and documentation.

Hands-on time: 12 minutes

Datasets:

C3D90/M3-03

Assignments (additional):

- **Quiz:** 1 minute
- **Practice exercise: Create and label an alignment, a profile, and a profile view** 15 minutes (or use in class for hands-on time). **Datasets:** C3D90/PE_M3

Module 4 Create gravity and pressure pipes in Civil 3D

Approximate total overall time for teaching this module: 85 minutes

M4-01 Work with pipe and pressure pipe networks

Total time required for module unit: 10 minutes

Discuss objectives: 2 minute

Demonstrate: 4 minutes

- Distinguish between pipe networks and pressure networks.
- Explain when to use each type based on the utility system being designed.

Hands-on time: 4 minutes

Datasets:

C3D90/M4-01

Assignments (additional):

- **Quiz: 1 minute**
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M4-02 Create gravity pipe networks

Total time required for module unit: 15 minutes

Discuss objectives: 2 minute

Demonstrate: 5 minutes

- Create gravity pipe networks using object-based workflows and layout tools.

Hands-on time: 8 minutes

Datasets:

C3D90/M4-02

Assignments (additional):

- **Quiz:** 1 minute
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M4-03 Edit and label gravity pipe networks

Total time required for module unit: 20 minutes

Discuss objectives: 2 minute

Demonstrate: 6 minutes

- Edit structures and pipes to reflect design changes.
- Apply labels to gravity pipe networks in plan and profile views.

Hands-on time: 12 minutes

Datasets:

C3D90/M4-03

Assignments (additional):

- **Quiz:** 1 minute
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M4-04 Create and edit pressure pipe networks

Total time required for module unit: 20 minutes

Discuss objectives: 2 minute

Demonstrate: 6 minutes

- Create pressure pipe networks using object-based workflows and layout tools.
- Create pipe runs from existing geometry.
- Place fittings and appurtenances.
- Create branch connections.

- Swap parts to reflect design intent.

Hands-on time: 12 minutes

Datasets:

C3D90/M4-04

Assignments (additional):

- **Quiz:** 1 minute
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M4-05 Edit pressure pipe network profiles and apply labels

Total time required for module unit: 20 minutes

Discuss objectives: 2 minute

Demonstrate: 6 minutes

- Edit profiles for pressure pipe runs to reflect design intent.
- Apply labels to pressure pipe networks in both plan and profile views.

Hands-on time: 12 minutes

Datasets:

C3D90/M4-05

Assignments (additional):

- **Quiz:** 1 minute
 - **Practice exercise: Create and label an alignment, a profile, and a profile view** 15 minutes (or use in class for hands-on time). Datasets: C3D90/PE_M4
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Next steps (additional):

End-of-course exam questions: 10 minutes

Course Challenge exercise: 60 minutes

Project | Model civil site features: Create a site project with a proposed surface and utilities

In the Project challenge, students will demonstrate their knowledge of creating a new data shortcut project, working with surfaces, creating grading, creating a storm pipe network and a pressure pipe network, and adding labels.

This is an opportunity for students to apply a full range of skills from the course and create their own solution from start to finish. There's no solution video but there are some steps included in the Teaching Supplements if you wish to give students further guidance. This is a chance, however, for students to work independently and demonstrate what they have learned.

Datasets:

Use the dataset provided in the Datasets: C3D90/CE

Grading: A grading rubric is also provided in the Teaching Supplements to provide you with a guide to grade your students on this challenge.