

## Introduction to BIM for the AECO industry

### Instructor guide

Course duration: ~3 hours to 5 hours, depending on lecture time and slides used

Recommended student level: Students in intro-level BIM courses in architecture, engineering, and construction programs.

Products: Autodesk Revit, Forma, Insight, Autodesk Construction Cloud, Cloud Worksharing

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:

- Describe BIM principles and workflows.
- Define and use key BIM documentation.
- Convert 2D drawings to 3D models.
- Use a Common Data Environment (CDE).
- Work collaboratively with other disciplines to coordinate conceptual models.
- Develop bridging documents and models to transfer knowledge of the building to future stakeholders.
- Incorporate sustainability in outcomes-based BIM workflows

The overall course contains the following resources:

- 5 video modules covering all the topics in the course.
- Dataset files for use when following the video modules.
- Quiz questions with timecodes for remedial knowledge check.
- Exam-style final test questions at the conclusion of the course.
- 4 practice exercises with exercise files and solutions.
- 2 challenge assignments with recommended assessment criteria.
- Lecture slides that introduce topics and themes covered in the course.

**Pre-requisites:**

In this course, learners will discover how to use Autodesk Revit, Forma, and Autodesk Construction Cloud for the tasks they'll encounter during their BIM project development. The course offers students some of the core concepts to start using these tools and could be assigned in the first week or two of class. It is expected that the student has basic computer knowledge.

This course is designed to provide students with a foundational understanding of Building Information Modeling (BIM) and its transformative impact on architecture, engineering, construction and operation of built assets. By exploring BIM principles and workflows, students will gain insights into how BIM drives efficiency, collaboration, and innovation across all project stages.

To that end, students should be given access to the various products within the course. Instructions for granting students product licenses and setting up ACC in the classroom are included with the Teaching Supplements downloads.

**Structure of the course:**

The course is split into 5 modules and is designed to cover core Autodesk skills required for BIM fundamental workflows.

**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 the video.

**Dataset:**

The example used in the videos is of a simple building project with a Revit model for the architecture, structural, and MEP disciplines, and 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 dataset and video solution.

**Challenge exercise:**

Two challenge assignments are 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**

The Introduction to BIM for the AECO industry 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 shop 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.

Each section is listed below along with suggested time allocations for instruction. The referenced demonstrations are based on the step-by-step instruction included in the videos.

## 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 1-01 Introduction to BIM

**Total time required for module:** 15 minutes

**Discuss course objectives:** 2 minutes

**Demonstrate:** 8 minutes

- Explain what Building Information Modeling (BIM) is.
- Describe how BIM connects multidiscipline teams.
- Explain how the common data environment is fundamental to efficient collaboration and project progress.

#### Datasets:

*No datasets for this video*

#### Assignments (additional):

- **Quiz:** 5 minutes
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### Module 1-02 Incorporate BIM in the planning and design stage

**Total time required for module:** 15 minutes

**Discuss course objectives:** 2 minutes

**Demonstrate:** 8 minutes

- Explain the role of the design phase in shaping project concepts and alignment with client objectives.
- Describe key documentation produced during this stage.
- Describe the importance of early set up of the common data environment (CDE).

- Describe the value of early model collaboration between different disciplines.
- Explain how the BIM model evolves during the design stage.

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
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**Module 1-03 Use BIM in construction and handover stages**

**Total time required for module:** 15 minutes

**Discuss course objectives:** 2 minutes

**Demonstrate:** 8 minutes

- Explain the role of role of BIM during the construction and handover stages.
- Describe how the common data environment (CDE) transitions through the project lifecycle.
- Explain what a digital twin is and its role in operational efficiency.
- Describe the impact of BIM on cost and reducing time on site.
- Identify key documentation produced during this stage of the project.

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
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**Module 2-01 Shift from a 2D to 3D BIM workflow**

**Total time required for module:** 10 minutes

**Discuss objectives:** 2 minutes

**Demonstrate:** 3 minutes

- Describe the fundamental differences between 2Dimensional drafting and 3Dimensional modelling.
- Explain the benefits of 3D parametric objects, in a BIM workflow.
- Explain how 3D modelling improves time efficiency and supports better design coordination.

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
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**Module 2-02 Convert 2D drawings to 3D information models**

**Total time required for module:** 25 minutes

**Discuss objectives:** 2 minutes

**Demonstrate:** 11 minutes

- Link CAD files into Revit projects.
- Convert two-dimensional (2D) lines into three-dimensional (3D) walls.
- Describe how two-dimensional (2D) files can be used in three-dimensional (3D) BIM workflows.
- Explain how Revit's wall tool converts two-dimensional (2D) lines into three-dimensional (3D) walls with embedded data.

**Hands-on time:** 10 minutes

**Review objectives:** 2 minutes

**Datasets:**

*02-02.rvt*

*Floor Plan – Base Level.dwg*

**Assignments (additional):**

- **Quiz:** 5 minutes
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## Module 2-03 Use 2D plans to create 3D multi-story models

**Total time required for module:** 25 minutes

**Discuss objectives:** 2 minutes

**Demonstrate:** 11 minutes

- Link CAD files into Revit and onto multiple floor levels.
- Create walls over multiple floor levels in Revit using the wall tools.
- Measure areas and other properties from modeled elements.
- Describe the benefits of three-dimensional (3D) parametric objects in improving design accuracy and coordination.

**Hands-on time:** 10 minutes

**Review objectives:** 2 minute

**Datasets:**

*02-03.rvt*

*Floor Plan – Upper Level.dwg*

**Assignments (additional):**

- **Quiz:** 5 minutes
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## Module 2-04 Navigate and enhance 3D views

**Total time required for module:** 20 minutes

**Discuss objectives:** 1 minute

**Demonstrate:** 8 minutes

- Use 3D views within Revit.
- Apply Revit's parametric model updates in real time and across multiple views.
- Edit view properties to improve the clarity and presentation of design intent.
- Create 3D exploded views.

**Hands-on time:** 10 minutes



**Review objectives:** 1 minute

**Datasets:**

*02-04.rvt*

**Assignments (additional):**

- **Quiz:** 5 minutes
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## **Module 2-05 Generate 2D construction documentation from 3D models**

**Total time required for module:** 20 minutes

**Discuss objectives:** 1 minute

**Demonstrate:** 8 minutes

- Generate 2D construction documentation from a 3D model.
- Manage and present design and construction data efficiently .
- Add annotation, text and other information to 3D model elements.

**Hands-on time:**10 minutes

**Review objectives:** 1 minute

**Datasets:**

*02-05.rvt*

**Assignments (additional):**

- **Quiz:** 5 minutes
  - **Practice Exercise 1: Convert a 2D drawing into a 3D model:** 30 minutes
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## **M3-01 Access Autodesk Construction Cloud**

**Total time required for module:** 20 minutes

**Discuss objectives:** 1 minute

**Demonstrate:** 8 minutes

- Explain the role of the CDE in facilitating collaboration.
- Describe the benefits of a centralized cloud storage in preventing miscommunication and reducing errors.
- Explain how permission settings are used to restrict people from accessing and editing project files.

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
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## M3-02 Create folders for organizing content

**Total time required for module:** 20 minutes

**Discuss objectives:** 2 minute

**Demonstrate:** 6 minutes

- Create dedicated team workspaces in a CDE.
- Create team folders to organize models, drawings, and documents.
- Explain the importance of a well-organized CDE for collaboration.
- Describe the purpose of folders in managing file progression and collaboration.
- Explain how a structured CDE minimizes delays, avoids duplication, and supports efficient project delivery.

**Hands-on time:** 10 minutes

**Review objectives:** 2 minute

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
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**M3-03 Assign permissions for project integrity**

**Total time required for module:** 20 minutes

**Discuss objectives:** 2 minute

**Demonstrate:** 6 minutes

- Explain permission levels in a common data environment.
- Demonstrate role-based access management.
- Apply access controls for specific stakeholders.
- Implement permission settings in Autodesk Construction Cloud.

**Hands-on time:** 10 minutes

**Review objectives:** 2 minute

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
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**M3-04 Create attributes to communicate BIM details**

**Total time required for module:** 20 minutes

**Discuss objectives:** 2 minute

**Demonstrate:** 6 minutes

- Explain the importance of BIM standards such as file naming.

- Explain how metadata communicates file purpose or status in a project cycle.
- Assign metadata and other attributes to files.

**Hands-on time:** 10 minutes

**Review objectives:** 2 minute

**Datasets:**

*M03-04a-Example filenames handout.doc*

**Assignments (additional):**

- **Quiz:** 5 minutes
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### **M3-05 Create and assign naming standards for ISO standards compliance**

**Total time required for module:** 22 minutes

**Discuss objectives:** 1 minute

**Demonstrate:** 10 minutes

- Explain how files are named in a BIM project.
- Create a naming standard in a CDE.
- Assign a naming standard to folders and files within a CDE

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
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### **M3-06 Collaborate a Revit project model in the cloud**

**Total time required for module:** 25 minutes

**Discuss objectives:** 2 minute

**Demonstrate:** 12 minutes

- Collaborate a Revit project model to the CDE.
- Adhere to naming conventions and standards.
- Open a workshared central model in Revit.
- Synchronize local changes back to the central model on the CDE.
- Check for and download changes made by other project team members.

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*M3-06 Architectural dataset.rvt*

**Assignments (additional):**

- **Quiz:** 5 minutes
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## **M3-07 Create and manage coordination**

**Total time required for module:** 20 minutes

**Discuss objectives:** 2 minute

**Demonstrate:** 7 minutes

- Explain the purpose of a design collaboration space.
- Set up and manage design collaboration spaces in a CDE.
- Demonstrate model coordination and issue tracking.

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*PRJ001-ARC-02-ZZ-M3-A-0001.rvt*

*PRJ001-STR-02-ZZ-M3-S-0001.rvt*

**Assignments (additional):**

- **Quiz:** 5 minutes
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**M3-08 Perform a clash detection**

**Total time required for module:** 20 minutes

**Discuss objectives:** 2 minute

**Demonstrate:** 6 minutes

- Set up a shared multidiscipline coordination space in the CDE.
- Perform multidiscipline clash detection.
- Report and assign coordination issues to the relevant stakeholders.

**Hands-on time:** 10 minutes

**Review objectives:** 2 minute

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
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**M3-09 Share a project model with other disciplines**

**Total time required for module:** 15 minutes

**Discuss objectives:** 1 minute

**Demonstrate:** 3 minutes

- Describe how teams collaborate their designs with other disciplines.
- Create a package of a Revit project model.
- Share a package with the wider team in a BIM project.

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*PRJ001-ARC-02-ZZ-M3-A-0001.rvt*

*PRJ001-STR-02-ZZ-M3-S-0001.rvt*

**Assignments (additional):**

- **Quiz:** 5 minutes
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### **M3-10 Consume a package and link a shared Revit model**

**Total time required for module:** 18 minutes

**Discuss objectives:** 2 minute

**Demonstrate:** 4 minutes

- Consume a shared package from another discipline.
- Federate multidiscipline models in Revit.
- Explain how to use another discipline's model to influence design.

**Hands-on time:** 10 minutes

**Review objectives:** 2 minute

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
  - **Practice Exercise 2: Collaborate a workshared central model to the cloud:** 15 minutes
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### **M4-01 Integrate outcome-based BIM**

**Total time required for module:** 20 minutes

**Discuss objectives:** 1 minute

**Demonstrate:** 8 minutes

- Describe the principles of outcome-based BIM.
- Explain the impact of generative AI in assisting designers in making informed decisions.
- Explain how AI-driven tools like Autodesk Forma enhance early-stage design decision-making.
- Describe how Autodesk Insight is used for analyzing data.

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
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## **M4-02 Use Forma for outcome-based BIM**

**Total time required for module:** 20 minutes

**Discuss objectives:** 1 minute

**Demonstrate:** 8 minutes

- Use Forma's data rich environment to inform early design decisions.
- Integrate AI driven insights to achieve better outcomes.
- Conduct sun hour analysis to evaluate daylight exposure on facades.
- Use solar power analysis to determine a site or concept's potential for solar power generation.
- Assess wind impact to identify potential wind tunnels and comfort levels.

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes



#### **M4-03 Use Autodesk Insight to analyze carbon**

**Total time required for module:** 20 minutes cre

**Discuss objectives:** 1 minute

**Demonstrate:** 8 minutes

- Create a Revit energy analytical model and send it to Autodesk Insight.
- Assess the sustainability of designs using carbon analysis tools.
- Describe how variables such as material choice or lifespan of a building, impacts operational and embodied carbon.

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*Insight Model.rvt*

**Assignments (additional):**

- **Quiz:** 5 minutes
- **Practice Exercise 3: Conduct a sun hours analysis of a concept model in Forma:** 15 minutes

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#### **M5-01 Incorporate information requirements**

**Total time required for module:** 20 minutes

**Discuss objectives:** 1 minute

**Demonstrate:** 8 minutes

- Identify key BIM information requirements documentation.
- Explain how defining high level strategic needs early, ensures . . .
- Describe how high-level goals are translated into specific, measurable information needs.
- Describe how project participants understand who does what, when that is needed and how it should be shared.

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*No datasets for this video*

**Assignments (additional):**

- **Quiz:** 5 minutes
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## **M5-02 Read and extract information from a BEP**

**Total time required for module:** 20 minutes

**Discuss objectives:** 2 minute

**Demonstrate:** 6 minutes

- Read a BIM execution plan (BEP) to extract key project details.
- Describe how the information in a BIM execution plan allows teams to collaborate efficiently.

**Hands-on time:** 10 minutes

**Review objectives:** 2 minute

**Datasets:**

*BIM Execution Plan.pdf*

**Assignments (additional):**

- **Quiz:** 5 minutes
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## **M5-03 Apply information from a BEP to a Revit model**

**Total time required for module:** 20 minutes

**Discuss objectives:** 2 minute

**Demonstrate:** 6 minutes

- Apply information in a BEP to meet naming standards.

- Apply information in a BEP to meet file format requirements.
- Apply information in a BEP to meet collaboration and workflow standards.

**Hands-on time:** 10 minutes

**Review objectives:** 2 minute

**Datasets:**

*BIM Execution Plan.pdf*

*Project Model.rvt*

**Assignments (additional):**

- **Quiz:** 5 minutes
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**M5-04 Read and extract information from an AIR**

**Total time required for module:** 20 minutes

**Discuss objectives:** 2 minute

**Demonstrate:** 6 minutes

- Read and interpret an asset information requirements document (AIR).
- Describe the different types of information in an AIR.
- Explain what information is required to be added to a project.
- Explain who is responsible for adding information to a project.

**Hands-on time:** 10 minutes

**Review objectives:** 2 minute

**Datasets:**

*PRJ001-ARC-02-ZZ-IE-A-0001.xlsx*

*PRJ001-CON-XX-XX-SP-Z-0003\_AIR.pdf*

*PRJ001-CON-XX-XX-SP-Z-0004\_AIR Appendix A.xlsx*

**Assignments (additional):**

- **Quiz:** 5 minutes
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## M5-05 Apply information from an AIR to a Revit model

**Total time required for module:** 22 minutes

**Discuss objectives:** 1 minute

**Demonstrate:** 10 minutes

- Apply asset information requirements to a project information model.
- Load classification systems in a Revit project.
- Assign classification information to instance and type elements within a Revit project information model.

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*COBie Project Settings metric.xml*

*Information model.rvt*

*PRJ001-CON-XX-XX-SP-Z-0003\_AIR.pdf*

*PRJ001-CON-XX-XX-SP-Z-0004\_AIR Appendix A.xlsx*

**Assignments (additional):**

- **Quiz:** 5 minutes
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## M5-06 Export asset information from a Revit project

**Total time required for module:** 17 minutes

**Discuss objectives:** 1 minute

**Demonstrate:** 5 minutes

- Apply an AIR document to set up structured asset data for sharing with other disciplines.
- Export asset information within a Revit project model in COBie format.

**Hands-on time:** 10 minutes

**Review objectives:** 1 minute

**Datasets:**

*Information model.rvt*

**Assignments (additional):**

- **Quiz:** 5 minutes
  - **Practice Exercise 4: Load a classification system and apply information from an AIR to a 3D project model:** 30 minutes
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**Next steps (additional):**

**End-of-course exam questions:** 20 minutes

**Challenge exercise – Complete the model and conduct a carbon analysis:** 30 minutes

*Could be assigned after Module 4.*

**Datasets:**

*Base level model.rvt*

*Carbon Analysis Model.rvt*

*Floor Plan - Upstairs level Walls.dwg*

**End-of-course challenge exercise – Convert 2D plans to a 3D information model:** 60 minutes

**Datasets:**

*End of course challenge dataset.rvt*

*Floor Plan.dwg*

*AIR Appendix A.xlsx*

*AIR.pdf*

*BIM Execution Plan.pdf*

*COBie Project Settings.xml*

*Door and Window positions.pdf*



*Door and window schedules.pdf*

*Elevations.pdf*

*Grids.pdf*

*Room and wall dimensions.pdf*

*Room names.pdf*