Subject Number(s)
4.507/4.567

Subject Title and Subtitle
Introduction to Building Information Modeling in Architecture

Term offered
Spring 2026

Instructor(s)
Takehiko Nagkaura

TA(s)
Tracy Miao

Credit Units
3-2-7 U/G or 3-2-4 G

Level
U: 4.507; G: 4.567

Prerequisites
None

Schedule

Lecture/Review	Thursday, 9:00am-10:30am (1-132)
Demo/Lab/workshop	Thursday, 10:30am-Noon (1-132)

Subject Description
This course addresses fundamental methods, theories, and practices that engage contemporary modeling tools in the context of architectural design. It introduces selected academic and professional topics through lectures, demonstrations, and assignments. Topics include component types and assembly, parametric modeling, visualization, simulations, and scripting. Students are expected to initiate intellectual explorations through the use of Building Information Modeling software (Revit) for architectural design projects, and to develop foundations to apply it to their own research projects and design practices later.

For Spring 2026 class, Alva Aalto's design projects are used for analysis. For modeling and simulation, archival resource (drawings and photos) is provided by Aalto Foundation in Helsinki, and outcome of selected student projects will be shared and reviewed with the curators.

List of Subject Objectives
Learn the theoretical and historical background of BIM software
Analyze and understand architectural project through making BIM model and using simulation tools
Represent and visualize architectural design using animation, XR and interaction tool with BIM model
Develop parametric BIM components and formalize design method using visual scripting tool
Speculate research opportunities in application or development of BIM software

Evaluation Criteria
Final grade is based on 2 projects and attendance (i.e., class participation). The progress of each project will be reviewed at a constant pace during the regular classes. The class ends with a final review (project 1+2)

during the last class, and there is no exam during the exam period. The weight of each portion for grading (9 unit option/12 unit option) is below.

    Project 1: Modeling/Simulation (50%/45%)
    Project 2: Parametric Design and Advanced Visualization (40%/45%)
    Attendance (10%)
        * Dynamo visual scripting is a topic covered at the end of the semester. Students who apply for 9 unit option are not asked to include Dynamo exercise in the Project 2.

        * Each project is evaluated in terms of completion, timeliness, and quality of presentation.

Schedule of Exercises, Projects, Quizzes, Exams or Assignments

class 01		Project 01 out : Design Analysis/Simulation
Thursday	Introduction	Demo: Revit Basic Interface, View/Projection, Grid and Levels
2026.02.05	History: BIM vs. Geometric Modeling	Lab: working session
class 02		
Thursday	Ontology of Architectural Types	Demo: Pre-defined Parametric Types, Constraint Propagation
2026.02.12	*Progress check:* Resource compilation	Lab: working session
class 03		
Thursday	Projection and Perspective	Demo: Transformation, Group/Link, Area/Rm, Sheet/Schedule
2026.02.219	*Progress check:*Design Documents	Lab: working session
class 04		
Thursday	Image Processing, Visualization	Demo: Raytracer, Day-lighting, Photometric Light (IES)
2026.02.26	*Progress check*: BIM model	Lab: working session
class 05		
Thursday	Integrated System	Demo: Material, Walk-through, Topography
2026.03.05	Visual Representations	Lab: STL/DWG conversion (for 3D printing)
class 06		
Thursday	Analysis and Simulations	Demo: Green Building Studio, Robot, Navisworks
2026.03.12	Construction, Energy, and Structural	Lab: working session
class 07		
Thursday	*Presentation: Project 01*	
2026.03.19		
Thursday	Spring Vacation (3.24-3.28) ------------	--
2026.03.26		
class 08		
Thursday	Revisiting Parametric Types in BIM	Project 02 out : Adaptive Design (Generative/Parametric)
2026.04.02		Demo: Custom Types (Family), Progressive Modeling
class 09		
Thursday	Subdivisions and Parametric Types	Demo and Lab: Adaptive Component
2026.04.09		Typology BIM (Nagakura and Sung)
class 10		
Thursday	AR/VR and BIM	Demo:AR/VR/Unity 3D
2026.04.16	Design and Globalization	
class 11		

Thursday 2026.04.23	Visual Programming	Demo and Lab: Dynamo, Revit API/SDK

class 12

Thursday 2026.04.30	Coding Process and Knowledge Guest lectures Final presentation. (Default for students with 9-unit option)	Demo and Lab: Dynamo, Revit API/SDK BIM and practice (Front, Boston)

class 13

Thursday 2026.05.07	Final presentation. (Default for students with 12-unit option)

Tuesday 2026.05.12	Last day of MIT classes

May 16-21	MIT Final Exam period
May 28-30	MIT Commencement

Textbooks and Reading Sources

None. All custom resource (digital files for tutorials and demonstrations, links to examples) are online. The followings include the snapshot of the resource page.

http://cat2.mit.edu/4.567/2026s/samples.html

Tutorial 00

Install Revit 2025 (Use free educational version: Make sure to register as student)

Autodesk Revit Videos and Tutorials

Linkedin Learning (Formerly Lynda.com) for MIT: This is a commercial site providing on-line software tutorials on video. Via the above link, MIT community members get free access if you use it on MIT network or with MIT certificate on your machine. Once you get into the home page, pull-down Browse the Library menu and click CAD. Revit appears under CAD Software category on the left column of the page. My suggestion for a new learner is to use the one for Version 2025 (choose it from the left column) such as Revit Architecture 2025 Essential Training with Paul F. Aubin.

Tutorial 01

Demo file: Revit 3D model modified from AutoDesk tutorial site (.rvt, 7MB)

Revit 2025 version, Revit 2024 version

4.560 Analytique

Photoshop Channel and Mask Demo

Demo file: images for photoshop demo (zipped jpg files, 1Mb)

Tutorial 02

Demo file: Citrohan House - Grid and Levels (.rvt, 2.5MB) Revit 2025 version   Revit 2024 version

Renaissance Revit by Paul F. Aubin: Interesting book on modeling classic elements in Revit

Autodesk A360 for sharing a project on cloud

Tutorial 03

D'Espouy Analytique

QuickTime example

Demo file: Citrohan House - Stairs, Curtain Wall, Link and Sheet (.zip, 2.7MB)

<p style="text-align:center">Revit 2025 version   Revit 2024 version</p>

Tutorial 04
   Demo file: Citrohan House - Rendering, Photometric Lights and Textures (.rvt, 7MB)
   Lighting fixture catalogue with photometrics
   Illumination Transformation Example with IES Lights

Tutorial 05
   Demo file: Citrohan House for site modeling (.rvt, 5MB)
<p style="text-align:center">Revit 2025 version   Revit 2024 version</p>
   Sample Revit animations
   Sample animations from 4.562
   Demo file: Sample model for animation (.rvt 5.4Mb)
<p style="text-align:center">Revit 2025 version   Revit 2024 version</p>

Tutorial 06
   Demo file: In-Place Element, In-Place Mass (.rvt, 5MB)
<p style="text-align:center">Revit 2025 version   Revit 2024 version</p>

Tutorial 07
   Demo file: Custom Family part 1 and 2 (.rvt, 3MB)
<p style="text-align:center">Revit 2025 version   Revit 2024 version</p>

Tutorial 08
   Demo file: Curtain Wall and Surface Division (included in the zip for of Tutorial 09)

Tutorial 09
   Demo file: Conceptual Mass and Adaptive Placement Points (.zip, 2MB)
<p style="text-align:center">**Revit 2025 version**   Revit 2024 version</p>
   On-line tutorials/samples

Tutorial 10
   Shape Grammar examples
   Demo file: NITROS plug-in for Autocad (.vlx 100k)
   Demo file: Sample model for addendum (.rvt 7Mb)
   Demo file: Adaptive Placement Point with XYZ axis arrow (.rfa 7Mb)
   Demo file: VSTA example files (.rvt 6Mb) demo-09_VSTA_sample.zip

Tutorial 11
   Dynamo: Dynamo script examples (The files to go with the class note handout.)
   Dynamo: Revit project that works with the Dynamo script examples
   Site of Ian Keough, who initially created Dynamo and his original Dynamo download site

Lab Fees (if any)

No cost for MIT architecture students. Students from other school may need to pay for the cost of 3D printing a small model.