

A4715: Fall 2020

ReThinking BIM

Instructor:

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Time:

Thursdays 7-9 pm

INTRODUCTION

Our capabilities as architects today to create and leverage organized building data is continuously expanding the possibilities for designing and understanding what we build and how we can build it. Significant disruptions in technologies within the AEC industry were well underway before the Covid-19 pandemic and Black Lives Matter movement rapidly shifted the world around us. The impact of these events not only accelerates these disruptions, but forces us to reinvent our relationship with technology and the tools we as architects use. Developing a literacy of the digital tools and data structures that exist both within the architectural field and more broadly is an increasingly essential skill for designers. This class puts forth the challenge for students to develop robust data driven methodologies and computational frameworks for creative iteration and validating design solutions through analysis, automation, simulation, optimization, representation, and so forth.

This course is intended to provide foundational knowledge of relevant modeling software and visual programming interfaces, while also discussing contemporary applications of these tools in the industry. Each lecture is split into two parts: the first being a discussion about a particular topic, and the second part being an instructional demo. Early in the semester students will use a combination of Rhino and Revit to model an existing piece of architecture as a means to learn the basics of the tools with several lectures and tutorials that address more advanced topics. As the semester progresses we will shift away from representative architectural modeling, and introduce new paradigms such as geometric wireframing, generative design, and relational databases. During this time students will be introduced to a sampling of more specialized tools (primarily within the visual programming interfaces Grasshopper and Dynamo) that will enable them to take a deeper investigation into topics of interest. For the final project, students will develop their advanced parametric and data-driven design methodologies and apply them to the models developed earlier in the semester with a revised set of design goals.

COURSE GRADING CRITERIA

- 50%: Final Project Submissions (including progress submissions)
- 35%: Weekly Assignment Postings (non-final project submissions)
- 15%: Attendance and Participation

COURSE REQUIREMENTS

- Experience with at least one 3D modeling software
- Attendance of lectures and virtual desk crits
- Completion of all assignments

SCHEDULE

Session	Date	Topics	Assignments
1	9/10	Intro to BIM & Parametric Thinking <i>Demo:</i> Revit UI, Views, Links, Grids, Levels, Floors, Walls, Families	Complete Tutorials Begin existing case study model
2	9/17	Collaboration in AEC, Data Exchange <i>Demo:</i> Type/Instance, Columns, Beams Curtain Walls, Circulation, Roofs, Views, Graphics	Complete Tutorials Progress case study model
3	9/24	Data Types, Intro to Visual Programming Part I (Dynamo) <i>Demo:</i> Point Clouds, Dynamo	Point Cloud Exercise Dynamo Exercise
4	10/1	Interoperability & Data <i>Demo:</i> Basic Interop, Intro to Grasshopper UI and workflow	Complete Tutorials
5	10/8	Databases & Data Trees (Grasshopper) <i>Demo:</i> (Grasshopper) Lists, Trees, Serialization	Complete Tutorials
6	10/15	Parametric Components in Practice <i>Demo:</i> Revit Families / Adaptive Components, Working with databases	Complete Tutorials Form project groups/Answer Questions
7	10/22	Generative Design (a critical discussion) <i>Demo:</i> Interoperability tools, Intro to Ladybug, Environmental Analysis	Complete Tutorials Progress on final project proposal
8	10/29	Composite Drawing Techniques <i>Demo:</i> Tips and tricks for developing drawings and compositions from digital models	Composite drawing from project models
9	11/5	Desk Crits (group) <i>Demo:</i> Grasshopper Plugins / Interop	Progress on final deliverables
10	11/12	Guest Lecture: TBD <i>Demo:</i> Grasshopper Plugins Continued	Progress on final deliverables
11	11/19	Coding in the AEC industry <i>Demo:</i> Documentation, Animations, etc.	Progress on final deliverables
12	12/3	Desk Crits	Progress on final deliverables
--	12/18		FINAL Project Due

ASSIGNMENTS / FINAL PROJECT

Throughout the semester students are expected to keep up with the course assignments and readings with due dates as shown in the schedule. The content and dates of submissions are subject to change where deemed appropriate. Further details on each assignment will be posted weekly on the forum.

Assignments throughout the first half of the course are to be completed individually and submitted weekly on the course forum. Beginning in the second half of the semester, students will be encouraged to work in pairs for the final project proposal. Students may also work individually if there is a particular focus they have and/or if they are incorporating a project from an outside class. Such cases should be discussed with the instructor in order to make clear what portions of the project will be developed within this course.

For the final project, students will apply the computational frameworks developed throughout the latter portion of the semester onto their digital models. Students may use one of the case study models developed during the first half of the semester as the starting point for their project or they may develop their own models to use. The deliverables for the final project will include a combination of orthographic drawings, animations, and a brief instructional video that provides an overview of the workflow that was developed. Further details on the final project will be provided in class.

COURSE FORUM AND SUBMISSIONS

OVERVIEW

Submissions for assignments will be handled using our Discourse Forum. All enrolled students will be invited to the forum after our first class.

The forum will be used by the instructor to post class material and assignments, and by the students to post their assignments each week. Students will also be encouraged to use the platform to ask questions and engage others in class-related discussions.

LINK

<http://forum.rethinkingbim.com>

REVIT PRIMER

For students who are new to Revit, it is expected that you complete the Revit primer prior to Session #3 (9/24). The Revit primer is taught each fall to the MArch students taking the AT4 seminar. This fall the primer will be taught over a span of two days: 9/12 from 9:30 am - 4:30pm, and 9/13 from 9:30 am to 12:30 pm. Rethinking BIM students are encouraged to sit through the tutorial portions, but can complete the exercises on their own time. More details will be provided in Session #1. The tutorials are recorded so students can also complete them on their own time if they wish.

COURSE RESOURCES

These are some basic online sources that may be used throughout the course.
More detailed resources will be provided throughout the semester.

Rethinking BIM Tutorials: <https://www.youtube.com/channel/UC82U-lpftjA7lCeb9Rhdraw>

Revit Primer Tutorials: <https://vimeo.com/user4826920>

Dynamo Forum: <https://forum.dynamobim.com/>

Grasshopper/Rhino Forum: <https://discourse.mcneel.com/c/grasshopper>

Revit API Docs: <http://www.revitapidocs.com/>

Revit Architecture Forum: <https://forums.autodesk.com/t5/revit-architecture-forum/bd-p/133>