# A4715: Fall 2019
# ReThinking BIM

**Instructor:**
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**Time & Location:**
Thursdays 7-9 pm // 115 Avery

## 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. At the same time, this kind of literacy is becoming even more essential as our daily lives are increasingly saturated with structured data; of which provides us with invaluable insights and feedback that alter our decisions, behaviors, and validate our ideas. This class puts forth the challenge for students to develop robust data driven methodologies and computational frameworks that intensify creative iteration and validate design solutions by utilizing various parametric design platforms to build tools and workflows for 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. In the first third of the semester, students will utilize Revit to model an existing piece of architecture in New York City as a means to learn the basics of the tools with several lectures and tutorials that address more advanced topics.  Students will then re-design their initial draft with this new toolset according to a conceptual proposal put forth at the beginning of the semester. Post midterm the class will develop more advanced parametric and data-driven design methodologies that focus on achieving a revised set of design goals.

## COURSE GRADING CRITERIA

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

## COURSE REQUIREMENTS

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

## SCHEDULE

| Session | Date | Topics | Assignments |
|---|---|---|---|
| **1** | 9/5 | Intro to BIM & Parametric thinking, BIM in Practice<br>*Demo*: Revit UI, Views, Links, Grids, Levels, Floors, Walls, Families | Complete Tutorials<br>Begin existing case study model |
| **2** | 9/12 | Collaboration in AEC, Data Exchange<br>*Demo*: Type/Instance, Columns, Beams Curtain Walls, Circulation, Roofs, Views, Graphics | Complete Tutorials<br>Progress case study model |
| **3** | 9/19 | Intro to Visual Programming Part I (Dynamo), Intro to Final Project<br>*Demo:* Point Clouds, Dynamo | Point Cloud Exercise<br>Dynamo Exercise<br>Form project groups/Concept Proposal |
| **4** | 9/26 | Composite Drawing Techniques<br>*Demo:* Tips and tricks for developing drawings and renders from digital models | Complete Tutorials<br>Composite drawings from project models |
| **5** | 10/3 | Parametric Components in Practice<br>*Demo:* Revit Families and Adaptive Components | Complete Tutorials<br>Build your own Family (individual)<br>Progress on final project proposals |
| **6** | 10/10 | Intro to Visual Programming Part II (Grasshopper), Interoperability Part I<br>*Demo:* Adaptive Components Continued, Intro to Grasshopper UI | Complete Grasshopper Tutorials<br>Design a component for your project |
| **7** | 10/17 | Visual Programming Part III: Data Management<br>*Demo: (*Grasshopper) Lists, Trees | Complete Tutorials<br>Grasshopper exercises |
| **8** | 10/24 | Interoperability in BIM, Environmental Analysis Part I<br>*Demo:* Interoperability tools (w/ adaptive components), Intro to Grasshopper plugins | Progress on final project Part I Deliverables |
| **9** | 10/31 | Desk Crits | Progress on final project Part I Deliverables |
| **10** | 11/7 | Environmental Analysis Part II, Managing Data<br>*Demo:* Grasshopper / Interop demos continued | **Part I Deliverables due**<br>Progress on final project |
| **11** | 11/14 | Coding in the AEC industry, Point Clouds in Practice<br>*Demo:* Coding inside & outside Grasshopper and Dynamo, 3d Scanning and point clouds demo | Progress on final project |
| **12** | 11/21 | Desk Crits | Progress on final project |
| **--** | 12/16 | | **FINAL Project Due** |

## ASSIGNMENTS

Throughout the semester students are expected to keep up with the course assignments 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 of these submissions will be discussed during lectures.

### Part I

The first portion of the course will revolve around a case study in Manhattan. Students will be expected to independently model the building in Revit utilizing the lessons learned from the first four sessions of the course. For the mid-term a Part I submission will be due for each team. This submission will include a developed existing conditions Revit model, an adaptive component that may or may not make its way into the final submission, and a first pass at some Composite Drawings that begin to show the direction of the final project submission. More details will be provided during lectures.

### Part II (Final Submission)

The final submission for this course should consist of a proposal for an adaptation/intervention of the case study building modeled in Part I of the semester that utilizes the knowledge acquired throughout the course. Students should work in groups of two on a single submission. Each student's contributions should be made clear throughout the course submissions. If a student feels that they are able to apply the concepts from the course on a building other than the case study, this is strongly encouraged, but should be discussed with the instructor first.

## COURSE FORUM AND SUBMISSIONS

**OVERVIEW**

Submissions for assignments will be handled using our Discourse Forum. All enrolled students will receive an invite following the first class. The discussion forum will be used by the instructor to post class material and by students to submit their assignments. Students will also be encouraged to use the platform to ask questions and engage others in class related discussions.

**LINK**

http://forum.rethinkingbim.com

## COURSE RESOURCES

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

ReThinking BIM Tutorials: https://vimeo.com/user4826920 &
https://www.youtube.com/channel/UC82U-lpftjA7lCeb9Rhdraw
Dynamo Forum: https://forum.dynamobim.com/
Grasshopper/Rhino Forum: https://discourse.mcneel.com/c/grasshopper
Revit API Docs: https://apidocs.co/apps/revit/2019#
Revit Architecture Forum: https://forums.autodesk.com/t5/revit-architecture-forum/bd-p/133
LinkedIn Learn: https://www.linkedin.com/learning/revit-2019-essential-training-for-architecture-imperial