



## Construction I : Materials and Methods

### Course Information

<b>Course Number:</b>	ARCH 531-401 / ARCH 431-401 / ARCH 599	
<b>Semester:</b>	Fall 2023	
<b>Lecture Meeting Time:</b>	Every Thursday, 10:15am-11:45am EST In person	
<b>Lecture Location:</b>	<b>In-person instruction:</b> Meyerson B3	
<b>Lab Meeting Time:</b>	Every other Friday, 1:45pm-3:00pm EST Instruction Varies: In-person site visits, in-person lecture, online lecture, see schedule <i>Alternates time with Structures Lab every other week</i>	
<b>Lab Location:</b>	Meyerson B3	
<b>Instructor:</b>	Philip Ryan AIA	<a href="mailto:info@studiomodh.com">info@studiomodh.com</a>
<b>Graduate Assistant</b>	Shengnan Gao	<a href="mailto:sgao14@upenn.edu">sgao14@upenn.edu</a>
	Duy (Jeremy) Pham	<a href="mailto:breland@upenn.edu">breland@upenn.edu</a>
	Breland Land	<a href="mailto:jeremyph@upenn.edu">jeremyph@upenn.edu</a>
<b>Resources</b>	Canvas:	<a href="https://canvas.upenn.edu/courses/1730377">https://canvas.upenn.edu/courses/1730377</a>

### Course Introduction

**What you will learn in this class** ARCH 431/531 is the first of two courses explaining Construction Technology. The first course will introduce the student to the relationship of design and construction in the creation of buildings.

The early lectures will trace the evolution and innovation of construction technique throughout history. It will then be followed by a primer describing how design and the act of drawing establishes a vocabulary that architect's use to describe the construction of buildings. This will look at how conceptual design and communicating intent aids in the creation of a great building. The remainder of the semester will build a "light scale" building from the ground up, examining the fundamental material and construction concepts related to construction starting with excavation and ending with interior finishes. The labs will complement the lectures with site visits and more focused lessons.

The second course, ARCH 532, will explore larger and more complex buildings at the institutional and commercial scale and tie this exploration into the use of Building Information Modeling (BIM), a tool that is utilized extensively throughout the design and construction industry. The lab component will focus exclusively on teaching the student how to marry the concepts of lecture with an actual BIM Model.

---

**Course Objectives**

- Understand how construction has evolved historically and how it continues to evolve with changes in climate, materials, and the demands of society
- Understand the fundamental goals of each building system used during the construction process
- Explore the variations available within each building system and the criteria used to determine the right selection for a building project and environment
- Examine, through case study and example, how general principles are applied to the particular conditions of a project
- Understand how consultants, authorities having jurisdiction, contractors, and clients participate and influence the construction of a building
- Explore how design is integral in the assembly of a building and vice versa
- Examine the impact material and assembly decisions have on cost, durability, and environmental impact (carbon footprint, energy use, re-use)
- See how principles and examples discussed in class manifest in the real world through exploratory assignments, site visits, and case study
- Understand how the design of the assembly of building is connected to the formal design process, environmental systems, structure, siting, energy, and economics.

---

**How the Lectures are structured**

Lectures will be in-person during the scheduled meeting time. A supplemental Zoom live broadcast will accompany the lecture for students who have pre-approved medical reasons to attend via Zoom. Recordings will be available after lecture. Lectures will be one and a quarter hours long. All students are expected to attend in person unless they inform the instructor that they will not be able to attend due to COVID related, other medical, or time-zone restrictions related to the COVID event. All lectures will be recorded and made available. Each lecture will be organized around four elements using broad principles and case study as content:

- Core Principles of a particular system
- Systems or types available to design professionals
- How a system is executed in the field
- The historical context of a system when relevant

---

**How the Labs are structured**

Lectures will be in-person, at a physical site location, and on-line during the scheduled meeting time. A supplemental Zoom live broadcast will accompany the lecture for students who have pre-approved medical reasons to attend via Zoom. Recordings will be available after lecture. The labs may include:

- Physical Site Visit: a site visit to a facility or construction site followed by a live question and answer session with a construction professional.
- Virtual Site Visit: a pre-recorded site visit (to ensure video quality and integrity) followed by a live question and answer session with a construction professional.
- Focused Lectures: a live, online lecture on a particular narrow issue with a live question and answer session
- Asynchronous Content + Live Session: an assignment may be given to view and produce content PRIOR to attendance at the lab meeting time. The lab meeting time will expand

As some of these modules will be reliant on outside consultants and guests, the scheduling and structure will be announced the week of the lab on CANVAS in the calendar and via email.

## Course Workload

---

### Weekly Workload

A student can expect a workload as follows:

- 1.5 hour lecture
- 1.5 hour bi-weekly lab (1.5 hour in person or online, 1 hour of worktime)
- 1 hour weekly assignment/reading or weekly quiz

At the middle and end of the semester there will be a mid-term and final exam, given online.

- Assume 1-2 days of studying notes and lecture video for preparation.

---

### Assignments

Assignments are given and described on the CANVAS website. A rubric is included with each assignment describing the parameters the instructor or G.A. will use in grading the assignment. All assignments are submitted ONLINE. Assignments submitted late within one week will have a deduction of 2-3 points (depending on assignment). Assignments submitted after that point will only be eligible for 50% credit and will not be graded for content. Excessively late assignments will be accepted at the discretion of the Instructor.

---

### Quizzes

Short, five question, weekly quizzes will be given during weeks when no assignment is due. The quizzes will be based on lecture content from the current week's lecture. The quiz is given on CANVAS (online). Students will have 30 minutes to complete the test once it has started. The quiz shall be completed within seven days of being given.

---

### Exams

There will be an online 90-minute midterm and a 90-minute final exam. The exams will cover each half of the semester, respectively. The exams will be three parts including:

- Multiple choice
- Short answer
- Visual identification with description

A study session will be held prior to the exam.

---

## Course Materials + Expectations

---

### Reading

The following texts will be used actively throughout the course and are the same books used in ARCH 532 Construction II:

- *Edward Allen's Fundamentals of Building Construction, 7<sup>th</sup> Edition (old editions are acceptable)*
- *Instructor provided texts*
- *Andrew Watts Modern Construction Handbook, 4<sup>th</sup> Edition*

Recommended Text:

- *Francis DK Ching, Building Construction Illustrated*

Books are available at the Book store, Architecture Library for review, as well as at Amazon.com and other online book sources.

## Course Policies

---

### Attendance

Attendance is mandatory at both the lectures and labs. A significant amount of material is covered in each lecture and follow up labs. Attendance is registered via participation in lectures and labs through login. Attendance is also re-affirmed through a student's successful participation in assignments and quizzes.

Students are expected to attend all classes for the entire scheduled meeting time and are responsible for completing assignments and for knowing the material covered in class. Students are allowed one absence without a final course grade reduction. After the allowed absence a student's final course grade will be reduced one-half level for each additional absence (e.g. after the second absence from a seminar the final course grade will be lowered from a B+ to a B, after the third absence from a B to B-, etc.).

---

### Grading

Grading will be tracked on CANVAS for all aspects of the class. Please note that the final "weighting" of the grades will be done near the end of the semester. Grades are weighted based on the following percentage distribution:

- 10% attendance
- 40% assignments and quizzes
- 25% Midterm Examination
- 25% Final Examination

Final letter grades will be based on the following numeric groupings:

- 99%+           A+
- 95-98           A
- 90-94           A-
- 87-89           B+
- 83-86           B
- 80-82           B-
- 77-79           C+
- 76-76           C
- 70-72           C-
- Below 69       F
- Incomplete     I

Note that an incomplete is granted for medical or special circumstances only and must be arranged with the instructor and department prior to the end of the semester.

---

### Class Website

The class will use the University of Pennsylvania CANVAS course website for the distribution of assignments, information, and all discussion regarding grades or issues related to the class. This is a secure website that is being used, in accordance with Federal and University policies, to protect your privacy.

The site is located at: <https://canvas.upenn.edu/courses/1730377>

---

## Instructor Bio

---

### Philip Ryan RA Instructor Bio

Philip Ryan is the principal and founder of Studio Modh Architecture ([www.studiomodh.com](http://www.studiomodh.com)), an AIA award winning firm in Brooklyn, NY. Prior to forming the studio, Philip Ryan worked for Tod Williams Billie Tsien Architects in New York for fourteen years in design and management leadership capacities before leaving as a Senior Associate in 2012.

His design and construction experience while at the office was extensive including notably the design and construction of the AIA Honor Award winning American Folk Art Museum in New York, the AIA Honor Award winning Skirkanich Hall at the University of Pennsylvania, and the AIA Honor Award winning Barnes Foundation in Philadelphia, PA. The experience at Tod and Billie's studio has equipped him with a deep appreciation for the capabilities of architecture to enhance place as well as a sophisticated understanding of how to innovatively use material and detail buildings of import.

Studio Modh Architecture is actively engaged in a wide variety of institutional, commercial, and residential projects across the United States. Recently completed projects include the headquarters for the Motivate / Citibike group, the new Creative and Critical Writing Centers at the University of Pennsylvania, and a conceptual design for Princeton University's Facilities Group to facilitate the future growth of nearly 300,000 square feet of space on campus.

Teaching is a critical component of the architectural process and Philip has taught graduate and undergraduate studios at the Rhode Island School of Design and City College of New York. He has been a guest critic at the University of Texas at Austin, RISD, Yale University, City College, Columbia University, and the University of Pennsylvania.

Philip is a registered Architect in the state of New York, New Jersey, Connecticut and Pennsylvania, a member of the American Institute of Architects, and has been certified by NCARB.

---

## University Code of Academic Integrity

---

### University of Pennsylvania's Code of Academic Integrity

Since the University is an academic community, its fundamental purpose is the pursuit of knowledge. Essential to the success of this educational mission is a commitment to the principles of academic integrity. Every member of the University community is responsible for upholding the highest standards of honesty at all times. Students, as members of the community, are also responsible for adhering to the principles and spirit of the following Code of Academic Integrity.\*

### Academic Dishonesty Definitions

Activities that have the effect or intention of interfering with education, pursuit of knowledge, or fair evaluation of a student's performance are prohibited. Examples of such activities include but are not limited to the following definitions:

---

<b>Cheating</b>	Using or attempting to use unauthorized assistance, material, or study aids in examinations or other academic work or preventing, or attempting to prevent, another from using authorized assistance, material, or study aids. Example: using a cheat sheet in a quiz or exam, altering a graded exam and resubmitting it for a better grade, etc.
<b>Plagiarism</b>	Using the ideas, data, or language of another without specific or proper acknowledgment. Example: copying another person's paper, article, or computer work and submitting it for an assignment, cloning someone else's ideas without attribution, failing to use quotation marks where appropriate, etc.
<b>Fabrication</b>	Submitting contrived or altered information in any academic exercise. Example: making up data for an experiment, fudging data, citing nonexistent articles, contriving sources, etc.
<b>Multiple Submissions</b>	Multiple submissions: submitting, without prior permission, any work submitted to fulfill another academic requirement.
<b>Misrepresentation of academic records</b>	Misrepresentation of academic records: misrepresenting or tampering with or attempting to tamper with any portion of a student's transcripts or academic record, either before or after coming to the University of Pennsylvania. Example: forging a change of grade slip, tampering with computer records, falsifying academic information on one's resume, etc.
<b>Facilitating Academic Dishonesty</b>	Knowingly helping or attempting to help another violate any provision of the Code. Example: working together on a take-home exam, etc.
<b>Unfair Advantage</b>	Attempting to gain unauthorized advantage over fellow students in an academic exercise. Example: gaining or providing unauthorized access to examination materials, obstructing or interfering with another student's efforts in an academic exercise, lying about a need for an extension for an exam or paper, continuing to write even when time is up during an exam, destroying or keeping library materials for one's own use, etc.

---

\* If a student is unsure whether his action(s) constitute a violation of the Code of Academic Integrity, then it is that student's responsibility to consult with the instructor to clarify any ambiguities.



## Construction I : Materials and Methods

### Course Schedule + Assignments – see CANVAS for final due dates as they may change

Week /Date	Element	Detail / Work required
<b>Week 01</b> Aug 31	Lecture	<b>Welcome / History of Construction I</b>
	Lab	<b>Structures Lab</b>
	Read / View for Lecture	<ul style="list-style-type: none"> <li>• Vitruvius. Ten Books of Architecture. “Book I”. Pp 3-32</li> <li>• Vitruvius. Ten Books of Architecture. “Book II”. Pp 35-65</li> </ul>
	Quiz	
	Assignment	<b>Assignment 01 Given:</b> Case Study Video + Question (three part assignment)
<b>Week 02</b> Sep 07	Lecture	<b>History of Construction II</b>
	Lab	<b>Construction Lab:</b> Case Study of Historic Rehabilitation
	Read / View for Lecture	•
	Quiz	None
	Assignment	<b>Assignment #01 Part 1 and 2 Due:</b> Case Study question / video
<b>Week 03</b> Sep 14	Lecture	<b>Why We Draw</b>
	Lab	<b>Archives Visit 1:</b> half students go to Structures Lab / Half students go to Const Lab (archives) Saturday 9/16 Site Visit to Esherick and Mother’s House (instructions in assignment)
	Read / View for Lecture	<ul style="list-style-type: none"> <li>• Allen. Fundamentals of Building Construction. “Chapter 1: Making Buildings”.</li> <li>• Watts. Modern Construction Handbook. “Chapter 1: Materials”</li> <li>• Video: Foundation and Excavation</li> </ul>
	Quiz	None
	Assignment	<b>Assignment #01 Part 3 Due:</b> Image and Description <b>Assignment #02 Given :</b> Draw a Detail / Build a model of Esherick / Mothers House
<b>Week 04</b> Sep 21	Lecture	<b>Excavation</b>
	Lab	<b>Archives Visit 2:</b> half students go to Structures Lab / Half students go to Const Lab (archives)
	Read / View for Lecture	<ul style="list-style-type: none"> <li>• Allen. Fundamentals of Building Construction. “Chapter 2: Foundations and Sitework”.</li> </ul>
	Quiz	<b>Quiz #1 History of Construction Due</b>
	Assignment	None

<b>Week 05</b> Sep 28	Lecture	<b>Foundations</b>
	Lab	<b>Structures Lab</b>
	Reading for Lecture	<ul style="list-style-type: none"> <li>Allen. Fundamentals of Building Construction. "Chapter 2: Foundations and Sitework".</li> </ul>
	Quiz	None
	Assignment	None
<b>Week 06</b> Oct 05	Lecture	<b>Light Framing</b>
	Lab	<b>No Lab this week – good luck on mid review</b>
	Reading for Lecture	<ul style="list-style-type: none"> <li>Video: Light Framing</li> <li>Allen. Fundamentals of Building Construction. "Chapter 4: Timber Frame Construction".</li> <li>Allen. Fundamentals of Building Construction. "Chapter 5: Wood Light Frame Construction".</li> <li>Allen. Fundamentals of Building Construction. "Chapter 12: Light Gauge Steel Frame Construction".</li> </ul>
	Quiz	<b>Quiz #2 Excavation Due</b>
	Assignment	<b>Assignment #02 Due</b>
<b>Week 07</b> Oct 12		<b>Fall Break</b>
		No Class
<b>Week 08</b> Oct 19	Lecture	<b>Enclosure: Brick</b>
	Lab	<b>Construction Lab : Mid Term Exam</b>
	Reading for Lecture	<ul style="list-style-type: none"> <li>Video: Brick Cladding and Insulation</li> <li>Allen. Fundamentals of Building Construction. "Chapter 8: Brick Masonry".</li> <li>Allen. Fundamentals of Building Construction. "Chapter 9: Stone and Concrete Masonry".</li> <li>Allen. Fundamentals of Building Construction. "Chapter 10: Masonry Wall Construction".</li> <li>Watts. Modern Construction Handbook. "Chapter 2". Pp 164-183</li> </ul>
	Quiz	None
	Assignment	None
<b>Week 09</b> Oct 26	Lecture	<b>Enclosure: Siding</b>
	Lab	<b>Structures Lab</b>
	Reading for Lecture	<ul style="list-style-type: none"> <li>None</li> </ul>
	Quiz	None
	Assignment	None
<b>Week 10</b> Nov 02	Lecture	<b>Enclosure: Plaster, Panels, Stone</b>
	Lab	<b>Construction Lab : Brick Factory and Wall building Visit</b>
	Reading for Lecture	<ul style="list-style-type: none"> <li>None</li> </ul>
	Quiz	None
	Assignment	<b>Assignment #03 Given : Field Report from Masonry Visit</b>

<b>Week 11</b> Nov 09	Lecture	<b>Enclosure: Windows</b>
	Lab	<b>Structures Lab</b>
	Reading for Lecture	<ul style="list-style-type: none"> <li>• Allen. Fundamentals of Building Construction. "Chapter 17: Glass and Glazing".</li> <li>• Allen. Fundamentals of Building Construction. "Chapter 18: Windows + Doors".</li> <li>• Allen. Fundamentals of Building Construction. "Chapter 19: Designing Exterior Wall Systems".</li> </ul>
	Quiz	None
	Assignment	None
<b>Week 12</b> Nov 16	Lecture	<b>Enclosure: Roof</b>
	Lab	<b>Construction Lab : Construction Site Visit</b>
	Reading for Lecture	<ul style="list-style-type: none"> <li>• Allen. Fundamentals of Building Construction. "Chapter 16: Roofing".</li> </ul>
	Quiz	<b>Quiz #3: Windows Due</b>
	Assignment	<b>Assignment #03 Masonry Field Report Due</b> <b>Assignment #04 Given : Field Report from Construction Visit</b>
<b>Week 13</b> Nov 21 (tues)	Lecture	<b>Finishes</b>
	Lab	<b>Structures Lab</b>
	Reading for Lecture	<ul style="list-style-type: none"> <li>• Video : Central park Apartment Finishes</li> <li>• Allen. Fundamentals of Building Construction. "Chapter 7: Interior Finishes".</li> <li>• Allen. Fundamentals of Building Construction. "Chapter 23: Interior Walls and Partitions".</li> <li>• Allen. Fundamentals of Building Construction. "Chapter 24: Finish Ceilings and Floors".</li> </ul>
	Quiz	None
	Assignment	None
<b>Week 14</b> Nov 30	Lecture	<b>Systems: Mechanical, Plumbing</b>
	Lab	<b>Construction Lab : Final Exam Review</b>
	Reading for Lecture	None
	Quiz	None
	Assignment	<b>Assignment #04 Construction Field Report Due</b> <b>Assignment #05 Given : Draw a detail</b>
<b>Week 15</b> Dec 07	Lecture	<b>Systems: Fire Protection + Electrical</b>
	Lab	<b>Structures Lab</b>
	Reading for Lecture	None
	Quiz	None
	Assignment	
<b>Dec 12</b>		<b>Last Day of Class</b>
	Assignment	<b>Assignment #05 Draw a Detail Due</b>
<b>Final Exam</b> <b>TBD</b>	Date to be determined	<b>To be scheduled by university</b>