

# ARCHITECTURAL TECHNOLOGY 1: MATTER

3 SCH | T,R 3:30-4:50 PM | W (Lab) 5:00-6:20 pm

## ARCH 2351 | Fall 2021

College of Architecture, Texas Tech University

Instructor: Neal Lucas Hitch

Building: English And Philosophy | Room: 00001

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Image: Yashiro Photo Office, Junya Ishigami, House and Restaurant, 2019.

### Catalog Description

Introduction to architectural technology and our constructed relationship with the environment. Emphasis on contemporary materials, behaviors, sources, sustainability, methods of fabrication, products and their potentialities.

### Course Description

ARCH 2351 will serve as an introduction to architectural technology specifically as it relates to concepts of material performance/application and is predicated on the understanding of tectonics as the interplay between form, function, and structure. Course lectures and exercises will revolve around the comprehensive analysis of building systems and materials through the study of contemporary precedents as a means to explore various approaches and methodologies relating to sustainability, structural performance, enclosure, and experience.

## Teaching Methods

ARCH 2351 will operate primarily as a lecture-based course supplemented by additional learning methodologies, including required readings/discussions, site visits and analysis, guest speaker presentations, precedent analysis, and one-to-one prototype fabrication conducted in a laboratory setting.

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## Student Learning Objectives

Upon satisfactory completion of this course, students will develop a comprehensive understanding of the following learning objectives:

- + Construction – The understanding of five primary Building Systems of contemporary architecture, and their sub-systems, assemblies, components, materials and methods of construction. (Light Wood Framing, Light Steel Framing, Steel Frame, Concrete Frame, and Masonry)
  - + Design - The ability to choose building systems, sub-systems, assemblies, components and materials that support the architect's design concept.
  - + Communication - The ability to utilize Design Drawings to inform the design process and communicate tectonic design decisions.
  - + Building Systems – The understanding of building systems as a hierarchal relationship of sub-systems, assemblies, components, and materials.
  - + Building Sub-Systems – The understanding of the interrelationship of the four major Building Sub-systems (Structure, Enclosure, Interior and Mechanical), which comprise a Building System.
  - + Layering – The understanding of Building Systems as a hierarchical layering of components, materials and methods of construction.
  - + Integration – The understanding that Building Systems require the integration of subsystems, assemblies, components and materials with each other.
  - + Materials – the understanding of the principles and attributes of the five major building materials (Wood, Masonry, Steel, Concrete and Glass) utilized in the primary building systems.
  - + Tectonics – The understanding of how the building technology of architecture can be a part of the aesthetic of architecture.
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## Student Performance Objectives

Upon satisfactory completion of this course, students will demonstrate mastery over the following performance objectives:

- + An understanding of various material systems/assemblies and a knowledge of how and when to apply them in architectural design.
  - + A comprehension of basic structural principles as they relate to individual material performance.
  - + The critical analysis of an individual material's long-term and short-term environmental impact on its immediate and extended site.
  - + A comprehension of how structural, material, and tectonic decisions influence form and function in architectural design.
  - + The communicating of material and tectonic ideas through written word, spoken word, and architectural drawing.
  - + The creative application of material systems through hands-on construction.
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## NAAB Objectives

- + V.4 Knowledge and Innovation—Architects create and disseminate knowledge focused on design and the built environment in response to ever-changing conditions. New knowledge advances architecture as a cultural force, drives innovation, and prompts the continuous improvement of the discipline.
- + PC.2 Design— How the program instills in students the role of the design process in shaping the built environment and conveys the methods by which design processes integrate multiple factors, in different settings and scales of development, from buildings to cities.
- + SC.4 Technical Knowledge— How the program ensures that students understand the established and emerging systems, technologies, and assemblies of building construction, and the methods and criteria architects use to assess those technologies against the design, economics, and performance objectives of projects.
- SC.5 Design Synthesis—How the program ensures that students understand the established and emerging systems, technologies, and assemblies of building construction, and the methods and criteria architects use to assess those technologies against the design, economics, and performance objectives of projects.

## Means of Evaluation - Deliverables

<b>Participation</b>	10%	Full engagement in all class activities including, but not limited to: lectures, case study presentations, reading discussions, and group discussions in both classroom and lab settings.
<b>Annotated sketches</b>	15% (2.5% each)	Detailed sketch (ink on paper or stylus & tablet), showcasing building enclosure by means of a wall section and/or critical detail of any given project discussed in that week's lecture. To be submitted in accompaniment to each week's exam essay questions.
<b>Exams</b>	30% (5% each)	Exams will be administered each Tuesday following the previous week's lecture/readings. Exams will consist of multiple-choice questions, written responses, and 'take home' short answer questions that will be expected due the following class.
<b>Fabrication study 1 Due week 7</b>	15%	The first fabrication study will explore the technique of casting as a construction method. Groups of around five will work together to design and build the formwork for a modular casting system. They will then choose one material (concrete, plaster, resin, etc...) to cast in their formwork. Successful completion of the project must demonstrate the fabrication of multiple clean casts that can be stacked or arranged together in a modular system. Groups are expected to develop their ideas and projects in lab settings as well as outside of the classroom.
<b>Fabrication study 2 Due week 13</b>	15%	The second fabrication study will explore methods of building involving assemblies using wood, paper, or an approved material of the student's choice. Groups of around five will work together to design and build each assembly using various techniques (laser cutting, CNC milling, etc.). Successful projects will demonstrate creative and inventive thinking as it relates to both material manipulation and tectonics. There is no strict guideline specifying the size of the installations; however, each project must facilitate at least one interactive prepositional relationship beyond those related to observing (inside, above, below, underneath). Groups are expected to develop their ideas and projects in lab settings as well as outside of the classroom.
<b>Team case studies</b>	15%	Unique groups of around five will be chosen during the first week of classes and will each be assigned one case study building from a list provided by the instructor relating to one of the seven main material categories (mud, masonry, concrete, steel/glass, timber, paper/unconventional, and 'nature'). Lab time throughout the semester will be dedicated in part to developing these presentations. Groups will prepare their projects in a presentation format, formatted using Adobe InDesign, Google slides, or other... Successful case study presentations must be well researched, include image credits, a properly formatted bibliography/reference list, and original diagrammatic/sketched content.

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## Means of Evaluation - Methods of Assessment

- + Completion of all deliverables in a timely manner.
- + Active engagement during all class activities, including instructor lectures, peer precedent case study presentations, labs, guest speaker presentations, and site visits.
- + Design criticism by individual instructors and assembled juries.
- + Demonstration of adequate understanding of various construction skills.
- + Thoughtful engagement with course prompts.
- + Comprehension and appropriate application of course readings.
- + General participation in all class activities.

Date	Program	Assignments
week 1 / class 1 / 8.24 week 1 / class 2 / 8.26	Introduction & syllabus overview Case study presentation overview	<b>Assigned:</b> case study projects and groups <b>Reading:</b> [Ito, Tarzans...] [Ishigami, Freeness...] [Schwartz, Introducing... ch. Investigating...]
week 2 / class 1 / 8.31 week 2 / class 2 / 9.2	Lecture: intro to architectural technology / romp through the history of tectonics Lecture: material performance / form vs. function vs. structure	<b>Reading:</b> [Schwartz, Introducing... ch. Intro-Framework] <b>Reading:</b> [McLean & Silver, Introduction to...]
week 3 / class 1 / 9.7 week 3 / class 2 / 9.9	Lecture: mud & earth Case study presentations	<b>Reading:</b> [Heringer, Upscaling Earth] <b>Exam 1:</b> material performance & history <b>Due:</b> exam 1 essay questions
week 4 / class 1 / 9.14 week 4 / class 2 / 9.16	Lecture: masonry Case study presentations	<b>Reading:</b> [Deplazes, Constructing... Ch. Masonry] <b>Exam 2:</b> mud & earth <b>Due:</b> exam 2 essay questions & annotated sketch 1
week 5 / class 1 / 9.21 week 5 / class 2 / 9.23	Lecture: concrete Case study presentations	<b>Reading:</b> [Deplazes, Constructing... Ch. Concrete] <b>Exam 3:</b> masonry <b>Assigned:</b> fabrication study 1, casting <b>Due:</b> Exam 3 essay questions & annotated sketch 2
week 6 / class 1 / 9.28 week 6 / class 2 / 9.30	Guest lecture 1 Case study presentations	<b>Reading:</b> [Solanki, Why Materials Matter] <b>Exam 4:</b> concrete <b>Due:</b> exam 4 essay questions & annotated sketch 3
week 7 / class 1 / 10.5 week 7 / class 2 / 10.7	Site visit & analysis 1 Fabrication study 1: casting review	<b>Reading:</b> [Ishigami, Freeing Architecture] <b>Due:</b> fabrication study 1, casting
week 8 / class 1 / 10.12 week 8 / class 2 / 10.14	Lecture: steel / glass Case study presentations	<b>Reading:</b> [Deplazes, Constructing... Ch. Steel; Glass...]
week 9 / class 1 / 10.19 week 9 / class 2 / 10.21	Lecture: timber Case study presentations	<b>Reading:</b> [Deplazes, Constructing... Ch. Timber] <b>Exam 5:</b> steel / glass <b>Due:</b> exam 5 essay questions & annotated sketch 4
week 10/class 1 / 10.26 week 10/class 2 / 10.28	Lecture: paper / unconventional materials Case study presentations	<b>Exam 6:</b> timber <b>Due:</b> exam 6 essay questions & annotated sketch 5 <b>Assigned:</b> fabrication study 2, assembling
week 11 / class 1 / 11.02 week 11 / class 2 / 11.04	Guest lecture 2 Case study presentations	<b>Reading:</b> [Hello Wood, Children of the Wood] <b>Due:</b> annotated sketch 6
week 12 / class 1 / 11.9 week 12 / class 2 / 11.11	Site visit & analysis 2 Case study presentations	<b>Reading:</b> [Hello Wood, Builder Society Manifesto]
week 13 / class 1 / 11.16 week 13 / class 2 / 11.18	Fabrication study 2: assembling review pt. 1 Fabrication study 2: assembling review pt. 2	<b>Due:</b> fabrication study 2, assembling
week 14 / class 1 / 11.23 <del>week 14 / class 2 / 11.25</del>	Lecture: nature as a building material No class (Thanksgiving break)	
week 15 / class 1 / 11.30	Installation of fabrication studies at Urban Tech	
week 16 / final / 12.7	Final presentation	<b>Due:</b> presentation transcript and bibliography

Lab time is available every Wednesday from 5:00 PM-6:20 PM. Students are expected to utilize this time to meet with their fabrication-study groups, case-study groups, instructor, TA's, and SA's to brainstorm, prepare material and work towards class objectives.

## Required Texts

- + Andrea Deplazes, Constructing Architecture
- + William McLean & Peter Silver, Introduction to Architectural Technology
- + William McLean & Peter Silver, Environmental Design Sourcebook

## Additional Readings & References

- + Akihisa Hirata, Tankgling
  - + Anna Heringer, Upscaling Earth
  - + Gottfried Semper, Style in the Technical and Tectonic Arts
  - + Hello Wood, Children of the Wood
  - + Hello Wood, Builder's Society Manifesto
  - + Jennifer Taylor, Transfer of Intention: Toyo Ito and the Metaphorical Tectonic
  - + Junya Ishigami, Freeness in Architecture
  - + Kengo Kuma, Materials, Structure, Details
  - + Kenneth Frampton, Studies in Tectonic Culture
  - + Seetal Solanki, Why Materials Matter
  - + Toyo Ito, Tarzans in the Media Forest
  - + Toyo Ito, On Creating Architecture
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## Course Requirements

- + Working computer capable of running design software including but not limited to:
    - Adobe Photoshop
    - Adobe Illustrator
    - Adobe InDesign
    - Adobe Lightroom
    - Rhino 6
    - Microsoft Word or similar program
    - Zoom
    - Teams
    - Miro
  - + Sketchbook and drawing utensils or tablet and pencil
  - + Marking, measuring, and cutting tools for drawing, modeling, and illustrating
  - + Various materials up to students discretion needed to design/build fabrications studies 1 &2
  - + Elbow grease
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## Grading Scale

### A – Excellent work.

Work is thoughtfully executed, engages critically with the prompt, and exceeds the given requirements.

### B – Good work.

Work is thoughtful and engages the prompt. Requirements are met and well-executed.

### C – Average work.

Work is completed and fulfills the requirements.

### D – Inferior work.

Work does not fully satisfy expectations or requirements.

### F – Incomplete.

work is missing work or incomplete

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## Attendance Policy

Each student is allowed two unexcused absences. All absences are considered unexcused except for absences due to religious observance or due to illness/health as agreed upon prior to class by the student and instructor. Students are expected to comply with rules for reporting student illness requiring absence from class for more than one week. See University Academic Regulations. Attendance is defined as full participation in all class activities, including group and individual critiques, lectures, presentations, demonstrations, discussions, in-class assignments, and possible field trips. Attendance requires students to have their sketchbooks, computer, tools, supplies, and work available for all activities. Excessive tardiness, leaving early, lack of participation, unresponsiveness, and disruptive behavior will count as an absence. Working on assignments from other classes is not to be allowed during class time.

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## Retention of Work

I give the College of Architecture and Texas Tech University, and/or Texas Tech University System (herein, "Texas Tech") the absolute right and unrestricted permission to collect, use, publish, reproduce, edit, exhibit, project, display and/or copyright work created by me during the course of my education at Texas Tech, through any form (print, digital, physical model, broadcast or otherwise) at any campus or elsewhere, for art, advertising, future accreditation, visiting committees, recruitment, marketing, fundraising, publicity, archival or any other lawful purpose.

## **Covid-19 Information**

### **Face Covering Policy:**

As of May 19, 2021, face coverings are now optional in TTU facilities and classrooms, and all other COVID-19 campus protocols have been lifted. It is highly recommended that those who have not been vaccinated for COVID-19 wear face coverings to help prevent the spread of the virus.

### **Seating Charts and Social Distancing:**

There is no longer a mandated social distancing protocol for classroom seating, but diligence is encouraged when indoors and not wearing masks. A seating chart might be used in the classroom to facilitate attendance, class interactions and other in-class engagement activities.

### **Illness-Based Absence Policy:**

Absences due to illness will be excused if discussed with instructor prior to the start of class. Student will be expected to complete all work missed. Deadline extensions may be granted on a case-by-case basis and must be agreed upon prior by the instructor.

### **In-Person Office Hours:**

Available by appointment. Masks are optional but requested if student is not vaccinated. Social distancing may be expected.

### **Personal Hygiene:**

We all should continue to practice frequent hand washing, use hand sanitizers after touching high-touch points (e.g., door handles, shared keyboards, etc.), and cover faces when coughing or sneezing.

### **Potential Changes:**

The University will follow CDC, State, and TTU System guidelines in continuing to manage the campus implications of COVID-19. Any changes affecting class policies or delivery modality will be in accordance with those guidelines and announced as soon as possible.

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## **University Required Statements**

### **ADA Statement**

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note: instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services in West Hall or call 806-742-2405.

### **Academic Integrity Statement**

Academic integrity is taking responsibility for one's own class and/or course work, being individually accountable, and demonstrating intellectual honesty and ethical behavior. Academic integrity is a personal choice to abide by the standards of intellectual honesty and responsibility. Because education is a shared effort to achieve learning through the exchange of ideas, students, faculty, and staff have the collective responsibility to build mutual trust and respect. Ethical behavior and independent thought are essential for the highest level of academic achievement, which then must be measured. Academic achievement includes scholarship, teaching, and learning, all of which are shared endeavors. Grades are a device used to quantify the successful accumulation of knowledge through learning. Adhering to the standards of academic integrity ensures grades are earned honestly. Academic integrity is the foundation upon which students, faculty, and staff build their educational and professional careers. [Texas Tech University Quality Enhancement Plan, Academic Integrity Task Force, 2010]

### **Religious Holy Day Statement**

“Religious holy day” means a holy day observed by a religion whose places of worship are exempt from property taxation under Texas Tax Code §11.20. A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. A student who is excused under section 2 may not be penalized for the absence; however, the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.

### **Discrimination, harassment, and Sexual Violence Statement.**

Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other Title IX violations are not tolerated by the University. Report any incidents to the Office for Student Rights & Resolution, (806)-742-SAFE (7233) or file a report online at [titleix.ttu.edu/students](https://www.depts.ttu.edu/students). Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are: TTU Student Counseling Center, 806-742-3674, <https://www.depts.ttu.edu/scc/> (Provides confidential support on campus.) TTU 24-hour Crisis Helpline, 806-742-5555, (Assists students who are experiencing a mental health or interpersonal violence crisis. If you call the helpline, you will speak with a mental health counselor.) Voice of Hope Lubbock Rape Crisis Center, 806-763-7273, [voiceofhopelubbock.org](http://voiceofhopelubbock.org) (24-hour hotline that provides support for survivors of sexual violence.) The Risk, Intervention, Safety and Education (RISE) Office, 806-742-2110, <https://www.depts.ttu.edu/rise/> (Provides a range of resources and support options focused on prevention education and student wellness.) Texas Tech Police Department, 806-742-3931, <http://www.depts.ttu.edu/tttd/> (To report criminal activity that occurs on or near Texas Tech campus.)

### **Civility in the Classroom Statement**

Texas Tech University is a community of faculty, students, and staff that enjoys an expectation of cooperation, professionalism, and civility during the conduct of all forms of university business, including the conduct of student–student and student–faculty interactions in and out of the classroom. Further, the classroom is a setting in which an exchange of ideas and creative thinking should be encouraged and where intellectual growth and development are fostered. Students who disrupt this classroom mission by rude, sarcastic, threatening, abusive or obscene language and/or behavior will be subject to appropriate sanctions according to university policy. Likewise, faculty members are expected to maintain the highest standards of professionalism in all interactions with all constituents of the university ([www.depts.ttu.edu/ethics/matadorchallenge/ethicalprinciples.php](http://www.depts.ttu.edu/ethics/matadorchallenge/ethicalprinciples.php)).

### **LGBTQIA Support Statement**

I identify as an ally to the lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA) community, and I am available to listen and support you in an affirming manner. I can assist in connecting you with resources on campus to address problems you may face pertaining to sexual orientation and/or gender identity that could interfere with your success at Texas Tech. Please note that additional resources are available through the Office of LGBTQIA within the Center for Campus Life, Student Union Building Room 201, [www.lgbtqia.ttu.edu](http://www.lgbtqia.ttu.edu), 806.742.5433.”