Type of Course: **Construction Technology 1, ARCH 24501**
Class Meetings: *Lecture: Wed., 11:00am – 12:20pm;*
Seminars: Wed., 2:00 – 3:20 pm
Professors: **Lectures: Christian Volkmann (coord.)**
Seminars: MT Chang (SM1), Ermira Kasapi (SM2), Zara Tamton (SM3), Adam Johnston (SM4)
Location: **Seminar Rooms: t.b.d.**
Office Hours: **Wed., 12:30am – 1:30pm (Contact: cvolkmann@ccny.cuny.edu)**
Semester/Year: **Spring 2025**

Construction Technology 1

// Introduction

The problem of understanding how to choose and use materials starts with understanding the principles of their inherent properties and with understanding any additional rules of their realization. Each element is integrated with other elements in a building, satisfying the combined needs of structural stability, functional competency, human fulfillment, aesthetic satisfaction and long-term sustainability.

Construction Technology 1 focuses on basic inquiries: anatomy (both structure + skin) and the rules of their integration. Understanding the building's anatomy, the selection of materials, the methods of construction and the anticipation of performance are primary aspects in the process of mastering both the science and the art of building design. The applied knowledge and creative use of materials and construction systems are indispensable in the search for realizing appropriate form, since form, without consideration of materials and methods and their impact on our environment, inevitably tends to degenerate into mere abstraction and decoration.
Even the most modest architectural form must take into account its materialization on a specific site, within a specific climate, with possible means of its assembly, and with considering its impact on our environment. Designing means integrating materials and methods of construction into the making of form and space, not postponing them as an afterthought to the "design" solution. It is an inherent part of processing architecture.

Principles & goals:
- To familiarize developing architects, designers and urban + landscape designers with various materials and methods of construction
- To better appreciate each material and system, its unique characteristics and special applications.
- To gain understanding and competency in principles and implementation of a variety of construction methods and systems on the basis of both past and present practice
- To appreciate the use of materials not only as a means to realize design, but as fully sensual elements of a human experience - engaging all senses, and resulting in a more holistic human experience
- To recognize, and become conscious of environmental impact of our designs and use of appropriate materials and systems to respond to sustainability requirements.

// Schedule

Anatomy I

February 5 (week 1) ***Introduction: Building Anatomy + Design Strategy***
System & material selection. Interrelationship of construction & form-space making. Criteria for building systems.

February 12 College closed

February 19 (week 2) ***Regulatory Requirements & Constraints***
Regulatory requirements on building design, construction, human safety & comfort. Sustainability and other considerations; Systems, concepts, codes & regulations.
Required Reading due: Edward Alan / Joseph Iano; "Fundamentals of Building Construction, Wiley (ISBN: 978-0470074688), Ed.5; Chapter 1 *"Making Buildings"*
Assignment #1 **due in Seminar (individual): Initial analysis/diagramming/detail sketches**
Term project kick-off: Group/Project selection

February 26 ***Foundations***
(week 3) Building structures under varying conditions. Forces & resistance: stresses and strains. Selecting appropriate systems & materials

Required Reading due: Chapter 2 *"Foundations"*
Term Project due: **Structural Analysis and definition of area to be built as physical model**

Structural Material I

March 5 ***Wood – Materials***
(week 4) Wood & wood products. Methods of connection. Introduction to material-related systems. Treatment & Protection. Grading, Standardization & Dimensioning.

Required Reading due: Chapter 3+ Chapter 4: *"Wood" and* "Heavy Timber Frame Construction"
Assignment #2: **Foundation Assignment Due in Seminar Class (individual)**

March 6 (Thursday; but classes follow Wednesday schedule)
(week 5) ***Wood – Systems***
Wood Systems, building the frame: light wood frame construction heavy timber frame construction-light wood frame construction. Case Studies.
Required Reading due: Chapter 5 "Wood Light Frame Construction"
Seminar: Research group exchange per specific term project (4x)

March 12 ***Masonry – Materials***
(week 7) Masonry as a material. Types & characteristics; fabrication. Introduction to systems
Required Reading due: Chapter 8. "*Brick Masonry*"
Term Project due: **Foundation Assignment Due in Seminar Class**

March 19 **Sustainability in Masonry Construction**
(week 8) Guest Lecture: John Bachenski, Masonry Sustainability Solutions LLC
Types & characteristics; fabrication. Introduction to innovative systems and materials
Required Reading due: Chapter 9. "*Stone and Concrete Masonry*"
Term Project: **Superstructure-Framework Assignment Due in Seminar Class**

Skin I

March 26 ***Transparency – Glass***
(week 9) Glass, glazing, fenestration. Types and characteristics of glass & glass products. Thermal properties, R-values, transmission & reflection.
Required Reading due: Chapter 17 "Glass and Glazing"
Assignment #3: **Opening Assignment Due in Seminar Class (individual)**
April 01: Last day to withdraw with the grade of "W"

April 2 ***Roof Structures***
(week 10) Types; framing; systems & materials; functions style & aesthetics

Required Reading due: Chapter 16 "Roofing", and pp.222-230

MIDTERM EXAM during Seminar Class

Anatomy II

April 9 (week 11) ***Case Study _ Heavy Timber Design-Build***
Combining design and technology requirements; comprehensive system thinking; site coordination

Required Reading due: Chapter 4 "Heavy Timber Frame Construction" (Review)
Term Project: **Assignments as determined: Skin; Windows/doors; Façade features**

April 16 *SPRING RECESS* (no class, April 12 – April 20)

April 23 (week 12) **Masonry – *Systems***
Masonry System types & characteristics. Introduction to the systems & materials of stone, brick, terra cotta, concrete unit masonry, glass unit masonry, & synthetic masonry.

Required Reading due: Chapter 8 & 9. "*Brick Masonry*" and "*Stone and Concrete Masonry*"
Seminar class: Joint pin-up (two sections)

April 30 (week 13) ***Passive Design – Climate Response***
Climate and microclimate, climate regions of the world and US, defining the climate data tables, climate types, design strategies for different climate zones, climatic anomalies.

Required Reading: "Heating, Cooling + Lighting: Design Methods for Architects", 3rd ed., pp.71-129
Term Project: **Roof Assignment Due in Seminar Class**

May 7 (week 14) **Interior Finishes:** Walls, ceilings & floors. Joints, joint lines, junctures, anticipating *tolerances* and installation sequences; Finish materials: Plaster, paint, stone, tile, wood, glass; cabinetry & doors, hardware applications. Shop drawings, fabrication & site supervision.

Required Reading due: Chapter 24 "Finish Ceiling and Floors"
Redlining of Term project presentation during Seminar Class

May 14 (week 15) ***(No Lecture)***
Redlining of Term project presentation during Seminar Class

May 21 (week 16) ***FINAL EXAM****; Term project presentation Date: t.b.d.*
Submission of final documentation

COURSE REQUIREMENTS AND STUDENT EVALUATION:

Attendance is mandatory at all lectures and seminars. More than two (2) seminar absences or two (2) lecture absences may result in a failing grade, or a student may be dropped at the discretion of the seminar professor. Your lateness and absences will affect your over all grade. Primary responsibility for student evaluation rests with the seminar professor.

Assignments are to be submitted on time. Late submissions will be graded down. Re-submittal of assignments is at the discretion of the seminar instructor

Term Projects are collaborative team projects. If you encounter issues in terms of equal work distribution of your term project in your group, please initialize the pages of your subsequent presentations and your final report, based on the particular sections that every team member contributed to.
Accordingly, all team members will not necessarily receive the same grade for their work. The evaluation is related to the amount contributed, the quality of the work, presentation skills and your demonstrated understanding in seminar discussions and final presentations.

You are advised to anticipate these circumstances throughout the course of the semester. You should therefore discuss the distribution of work on a regular basis and adjust scopes accordingly.
Seminar teachers are available to advise on feasible work distribution, particularly if team issues occur.

Textbook: Allen, Edward and Iano, Joseph. (2014). *Fundamentals of Building Construction: Materials and Methods*, 5th or 6th Edition. John Wiley & Sons, Inc., Hoboken, New Jersey. (ISBN: 978-0470074688)
The course outline and textbook are to be brought to meetings each week.

Final grades will be based upon performance in the following:

Midterm Examination	25%
Final Examination	25%
Term Project	25%
Assignments, participation, quizzes	25%

(Percentages shown are guidelines and can be subject to modification by seminar instructors.)
All parts listed above must be successfully completed to receive a passing grade in the course.

ASSIGNMENTS (individual):

#1. DUE February 19: Which of the offered term projects interests you, and why? Pick by articulating the aesthetic concept (space; interior-exterior relationships; views and context; differentiated building composition and involved elements) in several labeled sketched diagrams.
Zooming in, relate these observations to first assembly sketches (of motives or "key details" you like). Set these sketches up in a way that they express joinery, fastening strategies, material junctures by showing the assembly simultaneously in section and elevation. Make assumptions on how you believe materials are joined, showing fasteners (i.e. screws, nails, bolts …) as part of the drawing.

Present the studies in a powerpoint document of ~4 pages (horizontal, 11x17"), including photos, so that other students can easily understand the diagrams and sketches in context.

#2. DUE March 5: Draw to 1 1/2" = 1'-0" scale a wall section showing: concrete footing and a concrete/block cellar foundation wall. Account for frost, drainage, water protection, thermal control, movement and finish grading. Label all materials. *(Individual assignment)*

#3. DUE March 26: Draw to 1 ½" = 1'-0" scale a wall section from top of foundation wall to first floor through a door or operable window opening, investigating the relationship between interior and exterior space, and the climatic/weather factors which might influence your design. Account for water protection, thermal control, movement and finish grading. Label all materials; make use of proper lineweights, hatches, center-lines. Abbreviate the drawing with "cut-lines", so to show the active junctures without wasting paper space. *(Individual assignment)*

TERM PROJECT (team work):

- to strengthen your understanding of the interrelationship between a building's design, and its materials and methods of construction
- to develop your sensitivity and understanding of sustainable design
- to strengthen your research ability
- to strengthen your collaborative skills
- to strengthen your presentation skills

Feb. 26 Structural Analysis and definition of area to be built as (3-D) model
Each group must present a basic structural analysis of their term project in 3-D representation or sketch model. Sketches (of wall sections) should complement the presentation, relating material to conceptual qualities. Pictures and an overall drawing set (plans, sections elevations) of the project should be used as an introduction.
An axonometric/perspectival drawing of the intended model to be build during the semester should conclude the presentation. Also: Present Research and Bibliography of additional sources

Mar. 12 Foundation Assignment
Physical model, 1"=1'-0" or 1-1-2"=1'-0"; from footing, caisson, etc. including foundation wall, to sill plates. Must include moisture protection, insulation, etc. Complementing 3-D and 2-D representations are required; Details of transition: from ground to structure; from foundation wall to above-ground structure

Mar. 19 Superstructure Assignment
Physical model, 1"=1'-0" or 1-1-2"=1'-0"; from foundation wall connection to full vertical height at a significant corner of the building; Complementing 3-D and 2-D representations (wall sections) are required;
Details of transition: from vertical structure to roof; openings in framework

Apr. 9 Facade Assignment
Physical model, 1"=1'-0" or 1-1-2"=1'-0"; relationship between structure + skin ; Both 3-D and 2-D representations (wall sections and complimentary elevations) are required;
Details of transition: from vertical structure to roof; window and door openings

Apr. 30 Roof Assignment
Physical model, 1"=1'-0" or 1-1-2"=1'-0"; from top of support structure/frame wall. Complete roof structure framing with layers to show build up of materials to finished roof. Complementing 3-D and 2-D representations (wall sections) are required

May 21 Completed Term Projects, Wall sections & final report due
(t.b.d.) All significant drawings must be assembled as one compiled digital presentation; add and edit drawings to create consistency; Final Presentation Date: t.b.d.

ANALYSIS: As part of the final presentation you are to write a report-analysis, which will be added to the digital presentation and final submission, including:
Title page with names of students; name of project, location, architect; structural system and primary materials,description of design concept, parti, intent; wall sections, 1 ½" = 1'-0", labeled, dimensioned, centerline references; details, 3" = 1'-0"; sketches; factors that address sustainability, pictures of the project, related to drawn content

Questions to be addressed in your report-analysis are:
Why was this particular location and orientation selected? Why was this building system selected? What could have been an alternative option? Why were these particular materials selected? Did the designer make appropriate, creative and sustainable use of materials and construction systems? How so? What did you learn, or discover from your research? What did you learn by constructing the model? What did you learn through your analysis? What did you learn about collaborative teamwork? In what ways has this research influenced your work in the design studio? What specific questions has this research project raised?

Your paper must be a group effort and reflect the input and the understanding of all of its members. Any differences should be included in your report – divergent views are expected, encouraged and welcomed.

References: Your final report **must** include a bibliography of **all** resources used, with information and quotes cited and footnoted. The format for citations to be followed is:

Books: i.e.: Boyer, Ernest. (1995). *Ready to Learn About Buildings.* Princeton: Falmer Press,256-287.
Articles: i.e.: Glaser, Robert. (1994). Assessing and Testing Structures. *Architecture*, 12, 121-135.
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