Department of Architectural Technology Spring 2020

ARCH 1231 BUILDING TECHNOLOGY I
1 lecture hour and 4 lab/studio hours, 3 credits

Course Description: An introduction to basic materials of construction and the fundamental principals of hand drafting and system analysis. The coursework includes surveying existing conditions, development of plans, elevations, and sections, and basic details as well as the study of material properties and applications.

Course context: This course is positioned between the Intro to Architecture course and the higher-level building technology courses. This course will prepare you for further exploration of building technology, technical documentation, and understanding of structure, materials, and building assemblies.

Prerequisites: ARCH 1101 Introduction to Architecture

Required Texts:
Allen, Edward. *Fundamentals of Building Construction: Materials and Methods,* John Wiley & Sons, 2014.
Ching, Francis. *Building Construction Illustrated 5th Ed*. John Wiley and Sons, 2014.

Recommended Text:
Ching, Francis. *Architecture-Form, Space, & Order*. John Wiley and Sons, 2007.

Suggested Reference: See the City Tech Openlab for additional reference materials.

Attendance Policy: No more than 10% absences are permitted during the semester. For purposes of record, two late arrivals are considered as one absence. Exceeding this limit will expose the student to grade penalties at the discretion of the instructor due to lack of class participation and mastery of class material.

Academic Integrity: Students and all others who work with information, ideas, texts, images, music, inventions and other intellectual property owe their audience and sources accuracy and honesty in using, crediting and citation of sources. As a community of intellectual and professional workers, the college recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and is punishable by penalties, including failing grades, suspension and expulsion.

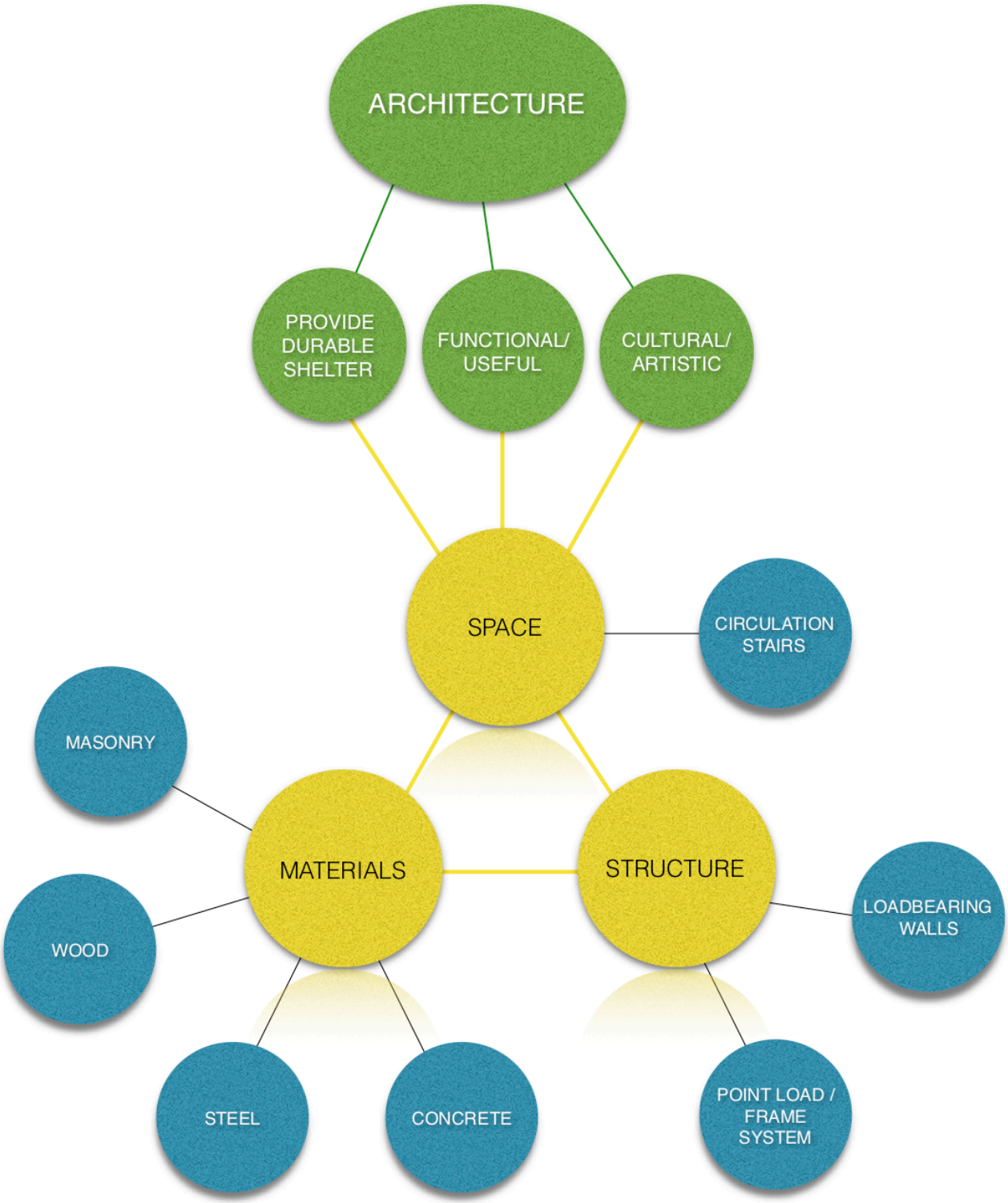
Course Structure: This course combines class discussions based on the readings, site investigations, and drawing labs. Students are required to maintain a combined notebook/sketchbook for all readings and site investigations. Students will learn to develop architectural drawings by hand.

Contact Info:

Professor: Lynn Gernert, AIA
Email: *Lgernert@citytech.cuny.edu*

Grading:
30% Module 1
40% Module 2
25% Module 3
5% Participation + Class Reflections

CONCEPT MAP FOR ARCH 1231 COURSE CONTENT



MODULE 1:	300 pts
Drawing Assignments:	
Plan, Section, Elev	**204**
Reading Notes:	**64**
Sketchbook Assignments:	**32**

MODULE 2:	400pts
Drawing Assignment:	
Plan, Wall Section, Axon	**264**
Reading Notes:	**120**
Sketchbook Assignments:	**16**

MODULE 3:	252pts
Drawing Assignments:	
Axon + Unit Sections	**120**
Reading Notes:	**100**
Sketchbook Assignments:	**32**

CLASS PARTICIPATION	48 pts
Discussions/Reflections	**40**
Assessment Exercises:	**8**

Grading Details: see course grade sheet for specific points for each required element.

Class Submission Requirements/Protocols:

All files must be submitted via Dropbox or OneDrive with the following folder directory and file naming conventions. All images must be formatted using Adobe Illustrator per provided templates. All work must be scanned or photographed following professional standards and edited as required for clarity and resolution

Course Folder: **ARCH 1231_2020_01_Lastname_Firstname**

Sub Folders: 2020_01_Module 1_Lastname
2020_01_Module 2_Lastname
2020_01_Module 3_Lastname

Files: All submissions must be in PDF format (not jpeg). All files (drawings, reading notes, sketch assignments) must be named as follows:

Lastname_Firstname_ARCH1231_202001_ProfessorLastName_Module#_assignment title_YYYYMMDD.pdf

For example:

Skywalker_Luke_ARCH1231_202001_Gernert_Module1_firstfloorplan_20200305.pdf

Organa_Lea_ARCH1231_202001_Gernert_Module3_reading6_masonry wall const_20200211.pd

Reading Notes MUST be submitted as a single PDF multipage file for each reading topic in required list.

Any submission not conforming to the above standards will NOT be accepted and must be resubmitted.

General Education Learning Outcomes / Assessment Methods	
Learning Outcomes	**Assessment Methods**
Upon successful completion of this course the student shall be able to:	To evaluate the students' achievement of the learning objectives, the professor will do the following:
1. Develop **Knowledge** from the range of architectural disciplinary concepts presented in the course.	• **Review** student notebooks**, observe** student participation in class discussions, **and review** student applications of disciplinary concepts in drawing assignments.
2. Use the texts assigned in the course as well as background knowledge from within the discipline in order to **Draw Inferences** from the material.	• Use a pre and post written exam to assess students' development and achievement over the course of the semester.
3. **Apply Information** from the reading within the discipline.	• **Review** student applications of disciplinary concepts in drawing assignments.

National Architectural Accrediting Board (NAAB) Students Performance Criteria (SPC) / Assessment Methods	
Learning Outcomes	**Assessment Methods**
Upon successful completion of this course the student shall be able to:	To evaluate the students' achievement of the learning objectives, the professor will do the following:
4. Understand the fundamentals of formal ordering systems and the capacity to inform two- and three-dimensional design.	4. **Review** student drawing assignments with implementation of the organizing grid.
5. Understand some of the basic principles used in the appropriate selection of interior and exterior construction materials, finishes, products, components, and assemblies based on their inherent performance, including environmental impact and reuse.	**5. Review** student notebooks and drawing assignments with application of material properties, rules of thumb, and performance analysis.

Course Specific Learning Outcomes / Assessment Methods	
Learning Outcomes	**Assessment Methods**
Upon successful completion of this course the student shall be able to:	To evaluate the students' achievement of the learning objectives, the professor will do the following:
6. Layout plan drawings by hand and with digital tools.	**6. Review** student plan assignments for accuracy and application of line weights and drawing conventions.
7. Understand and apply basic principles of structural characteristics of materials following rules of thumb.	7. Review student drawing assignments for accurate application of rules of thumb to sizing structural elements for a specific span.

Weekly Course Outline:

MODULE I.a **READING TEXT AND DRAWINGS**

This first section of the course is focused on building foundational skills for effectively reading technical texts, analyzing and summarizing these texts through concept mapping, careful note taking, and sketching and diagramming. This section also builds foundational skills about reading and understanding architectural drawings.

CLASS 1	*Activity/Assessment:*	Reading Texts, Reading Drawings
	Review:	Course Concept Map
	Homework:	Post Concept Map Reflection on OpenLab
CLASS 2	*Seminar:*	Learning by Reading: Reading #1
	Reflection:	Post Learning by Text Reflection
	Activity:	Reading #1: Building Elements + Materials
	Homework:	Post Reflection Reading #1
		Reading #2: Egress + Stairs Concept Map
CLASS 3	*Seminar:*	Learning by Reading: Reading #2
	Activity:	Review Concept Map + Note Structure
	Homework:	Post Reflection Reading #2 + Stair Sketches
CLASS 4	*Discussion/Activity:*	Reading Drawings
	Reflection:	Post Reading Drawings Reflection
	Homework:	**Scan, organize, submit Reading Notes #1,2**

DELIVERABLES DUE:

SKETCHES
- Stair Sketches

READING #1 (ONE PDF FILE SUBMISSION)
- Concept Map(s) Summary
- Notes for Each Subsection
- Key Sketches/Diagrams from Text

READING #2 (ONE PDF FILE SUBMISSION)
- Concept Map(s) Summary
- Notes for Each Subsection
- Key Sketches/Diagrams from Text

REFLECTIONS POSTED TO BLOG
- Concept Mapping
- Learning by Text Discussion
- Reading #1 What did I learn?
- Reading #2 What did I learn?
- Reading Drawings Exercise

MODULE I.b **CASE STUDY ORDER DIAGRAM AND BASE DRAWING STUDY**

This section of the course is focused on building foundational skills for understanding the ordering of the case study building and the relationships between the plan, section, and elevation of the building.

CLASS 5	***SITE VISIT:***	**Case Study Site Analysis**
	Activity:	Analysis: Geometry, Grid, Spatial Sequence
CLASS 6	*Drawing Lab:*	**Case Study Order Diagram**
	Activity:	Diagram Development
	Homework:	**Complete Diagram**
CLASS 7	*Drawing Lab:*	Case Study Plan, Section, Elev.
	Activity:	Grid Lines and Floor Elevations
	Homework:	**Complete Board Setup**
CLASS 8	*Drawing Lab:*	Case Study Partial Floor Plan
	Activity:	Develop Floor Plan
	Homework:	Continue Floor Plan
CLASS 9	*Drawing Lab:*	Case Study Partial Section
	Activity:	Develop Partial Section
	Homework:	Continue Section
CLASS 10	*Drawing Lab:*	Case Study Partial Elevation
	Activity:	Develop Partial Section
	Homework:	Continue Elevation
CLASS 11	*Drawing Lab:*	Case Study Plan, Section, Elevation
	Activity:	Finalize Plan, Section, Elevation
	Homework:	**Complete board**
CLASS 12	***PIN UP REVIEW:***	**DIAGRAM + BASE DRAWING BOARD**
	DELIVERABLES DUE:	Scan and edit the two drawings. Convert into PDF format with the correct filename.

DRAWINGS
Order diagram (ONE PDF FILE)
Plan, Section, Elevation (ONE PDF FILE)

SKETCHES
Site Geometry Analysis Sketches

MODULE 2.a **EXTERIOR MASONRY WALL SYSTEMS**

This section of the course is focused on building foundational knowledge of the nature of masonry construction and how masonry wall types address various issues of the performance of exterior walls. This includes learning about building with stone and concrete masonry units (CMU) and the methods of laying these elements together to form exterior walls.

CLASS 13	*Seminar:*	Learning by Reading: Reading #3
	Homework:	Post Reflection Reading #3 Stone Masonry Reading #4 Masonry Wall Construction Concept Map
CLASS 14	*Seminar:*	Learning by Reading: Reading #4
	Review:	Masonry Wall Construction Concept Maps
	Homework:	Post Reflection Reading #4 Masonry Wall Construction
CLASS 15	***SITE VISIT:***	**Masonry Analysis of Case Study Building**
	Activity:	Masonry Sketches
	Homework:	Post Reflection + Scan/Format Sketches

DELIVERABLES DUE:

SKETCHES
- Masonry Sketches

READING #3 (ONE PDF FILE SUBMISSION)
- Concept Map(s) Summary
- Notes for Each Subsection
- Key Sketches/Diagrams from Text

READING #4 (ONE PDF FILE SUBMISSION)
- Concept Map(s) Summary
- Notes for Each Subsection
- Key Sketches/Diagrams from Text

REFLECTIONS POSTED TO BLOG:
- Reading #3 What did I learn?
- Reading #4 What did I learn?
- Learning About Masonry

MODULE 2.b **EXTERIOR MASONRY WALL SYSTEMS**

This section of the course is focused on the process of studying an exterior wall in section, and plan and axonometric. The scale of the study focuses on the understanding of wall sections in general as an introduction to technical wall sections rather than on high resolution details.

CLASS 16	*Drawing Lab:*	Exterior Wall Board Set Up
	Activity:	Set out Guide Lines/Grid Lines
	Homework:	Complete set out
CLASS 17	*Drawing Lab:*	Exterior Wall Plan Detail
	Activity:	Layout Layers of Exterior Wall in Plan
	Homework:	Continue Plan Detail Development
CLASS 18	*Drawing Lab:*	Exterior Wall Section
	Activity:	Layout Layers of Exterior Wall in Section
	Homework:	Continue Plan Detail Development
CLASS 19	*Drawing Lab:*	Exterior Wall Section
	Activity:	Integrate Window in Plan + Section
	Homework:	Continue Wall Section Development
CLASS 20	*Drawing Lab:*	Exterior Wall Axonometric
	Activity:	Layout Layers of Exterior Wall
	Homework:	Continue Axon Development
CLASS 21	*Drawing Lab:*	Exterior Wall Axonometric
	Activity:	Develop Layers of Exterior Wall
	Homework:	**Complete board**
CLASS 22	***PIN UP REVIEW:***	**Exterior Wall Board**
	DELIVERABLES DUE:	Scan and edit the drawing. Convert into PDF format with the correct filename. DRAWINGS Exterior Wall Drawings (ONE PDF FILE)

MODULE 3.a **STRUCTURAL SYSTEMS**

This section of the course is focused on building foundational knowledge of the nature of structural systems based on material properties and fabrication. This section provides an overview of the major systems of construction common in today's industry.

CLASS 23	*Seminar:*	Learning by Reading: Reading #5 + #6
	Homework:	Post Reflection: Reading #5 Struct. Forces Post Reflection: Reading #6 Struct. Systems
CLASS 24	***SITE VISIT:***	**Structure Walk** Post Reflection + Site Sketches

DELIVERABLES DUE:

SKETCHES
- Structure Walk Sketches

READING #5 (ONE PDF FILE SUBMISSION)
- Concept Map(s) Summary
- Notes for Each Subsection
- Key Sketches/Diagrams from Text

READING #6 (ONE PDF FILE SUBMISSION)
- Concept Map(s) Summary
- Notes for Each Subsection
- Key Sketches/Diagrams from Text

REFLECTIONS POSTED TO BLOG:
- Reading #5 What did I learn?
- Reading #6 What did I learn?
- Structural Walk

MODULE 3.b STRUCTURAL SYSTEMS

This section of the course is focused on demonstrating foundational knowledge of the nature of structural systems based on material properties and fabrication through the design of a basic structural system and depicting it in a three-dimensional diagram as well as component sections annotated with calculations and critical dimensions.

CLASS 25	*Drawing Lab:*	Structural System Study
	Activity:	System Calcs + Design, Element Sections
	Homework:	Sketch System, Element Sections, and Calcs
CLASS 26	*Drawing Lab:*	Structural System Study
	Activity:	System Axon Geometry and Grid Setup
	Homework:	Complete Board Setup
CLASS 27	*Drawing Lab:*	Case Study Structural Study
	Activity:	Develop Axon, Layout Element Sections
	Homework:	Complete Element Sections w/ Dimensions
CLASS 28	*Drawing Lab:*	Case Study Structural Study
	Activity:	Develop Axon + Annotations and Calculations
	Homework:	Continue Axon, Sections, Annotations, Calcs
CLASS 29	*Activity/Assessment:*	Reading Texts, Reading Drawings
	Drawing Lab:	Case Study Structural Study
	Activity:	Complete Axon + Annotations and Calculations
	Homework:	**Complete board**
CLASS 30	***PIN UP REVIEW:***	**Structural Study**
	Course Reflection:	Impact of Course Approach to Building Technical Knowledge through Reading, Notetaking, Site Visits, Sketching and Drawing
	DELIVERABLES DUE:	Scan and edit the drawing. Convert into PDF format with the correct filename. DRAWINGS Structural Study (ONE PDF FILE) SKETCHES Struct System Design, Sections, and Calcs REFLECTION Impact of Course Approach to Building Technical Knowledge through Reading, Notetaking, Site Visits, Sketching and Drawing

Learning Activities:
Course format will include a combination of any of the following activities:

- **Site Visits / High Impact Learning Practices:**
  Site trips will look to visit existing buildings and construction sites, tour newly constructed buildings and urban spaces or visit institutions, including but not limited to museums, churches, or other colleges with discussions led by either the instructor or on-site experts in the field or the subject.
- **Discussions:**
  Discussions will be led by a qualified instructor and if warranted invited guest lecturers or experts in the field or subject.
- **Activities:**
  Students will participate in activities that provide them with the opportunity to apply what is learned in a given subject.
- **Research Activities:**
  Students will be given directed readings and be required to correlate their readings with the lab exercises. Supplemental research will be encouraged to promote a greater analytical and critical understanding.
- **Presentations:**
  Students will participate in written, oral and graphic presentation of course subjects and issues identified through their reading, writing, and lab work.

Class Submittals List: Following is a list of submittals that will be due throughout the course of the semester. They are subject to change:

Drawing Assignments:
ORDER DIAGRAM AND BASE DRAWING STUDY:
Plan, Elevation, Section
EXTERIOR WALL STUDY
Plan Detail, Wall Section, Axonometric
STRUCTURAL STUDY
System Axon, Component Sections, Calcs

Note: Grades for Incomplete Assignment Submissions will be pro-rated per % of missing drawings

Sketchbook Assignments:
Stair Sketch Documentation
Case Study Geometry Analysis
Case Study Masonry Analysis
Structural Walk
Structural System Design Sketches

Notebook Assignments:
Reading Notes and Sketches for Readings #1-6 covering **all sections and subtopics** listed in the reading list below.

READINGS:

#1 Building Elements + Materials: *Building Construction Illustrated*

Building Elements	2.02-2.03
Stone	12.10
Brick/CMU	12.06-12.07
Wood	12.11-12.14
Steel	12.08
Concrete + Reinforcement	12.04-12.05

#2 Stairs + Egress: *Building Construction Illustrated*

Egress	A.10-A.11
Stair Design	9.03
Stair Requirements	9.04-9.05
Configurations	9.06-9.07

#3 Stone and Concrete Masonry *Fundamentals of Building Construction*

Stone Masonry Chapter 9

- Intro
- Types of Building Stone
- Granite Group
- Limestone Group
- Quartz-based Dimensions Stone Group
- Slate Group
- Marble + Other Group
- Brick Classification
- Quarrying and Milling Stone
- Selecting Stone for Buildings
- Stone Masonry
- Sustainability in Stone + Concrete Masonry

Concrete Masonry Chapter 9

- Manufacture
- Laying Concrete Masonry
- Economic/Utility of Concrete Masonry Construction
- Other Types of Masonry Units

#4 Masonry Wall Construction *Fundamentals of Building Construction*

Masonry Wall Construction Chapter 10

- *Types:*
- Composite Masonry Walls
- Masonry Cavity Walls
- Masonry Loadbearing Walls
- *Spanning Systems:*

Ordinary Joist
Heavy Timber
Steel and Concrete Decks
Detailing:
Cavity Drainage and Flashings
Thermal Insulation

#5 Structural Forces, Components, Types: *Building Construction Illustrated*

Forces	2.11-2.12
Columns	2.13
Beams Spans Trusses	2.14-2.16
Frames Walls Plates	2.17-2.18
Arches Vaults Domes	2.25-2.26
Joints Connections	2.30
Structural Units	2.19
Structural Spans	2.20
Structural Patterns	2.21
Lateral Stability	2.22-2.23
Floor Systems	4.02-4.03
Wall Systems	5.02-5.03

#6 Structural Systems *Building Construction Illustrated*

Concrete:	
Reinforced Concrete	4.04-4.07
Precast Concrete	4.11-4.13
Concrete Columns	5.04-5.05
Steel:	
Steel Framing, Beams	4.14-4.18
Steel Decking	4.22
Steel Columns, Framing	5.35-5.38
Wood:	
Wood Horizontal Struct	4.26-4.40
Wood Columns + Framing	5.47-5.49
Masonry:	
Masonry Walls	5.14-5.21
Masonry Wall Sections	5.23-5.25
Masonry Bonding	5.26-5.27
Stone Masonry	5.33-5.34