

**New York City College of Technology – City University of New York**  
300 Jay Street, Brooklyn, New York 11201

**Department of Architectural Technology**

**ARCH 1130**

**BUILDING TECHNOLOGY I**

1 classroom hour, 4 lab/studio hours, 3 credits

**Course Description:** This course presents an introduction to basic materials of construction and the fundamental principles of architectural hand drafting and system analysis. The coursework includes surveying existing conditions, development of drawings of plans, elevations, sections, and basic details from foundation to roof as well as the study of material properties and applications with an emphasis on wood and masonry and shallow foundation systems.

**Course context:** This is the first course in the Building Technology sequence required for both the AAS and the BTech degrees offered by the Department of Architectural Technology. Each course in this sequence is a pre-requisite for the following course. There are four Building Technology courses.

**Prerequisites:** CUNY Proficiency in Reading and Writing  
CUNY Proficiency in Mathematics

**Pre- or co-requisites:** ENG 1101

**Required Texts:**

Allen, Edward. *Fundamentals of Building Construction: Materials and Methods, 5<sup>th</sup> Edition*. John Wiley and Sons, 2008.\*

Ching, Francis. *Architectural Graphics, 5<sup>th</sup> Edition*. John Wiley and Sons, 2009.\*

\*Note: These texts will be utilized through the 4 semesters of Building Technology Courses.

**Recommended Texts:**

American Institute of Architects. *Architectural Graphic Standards, 11<sup>th</sup> Edition Student Edition*. John Wiley and Sons, 2008.

Ching, Francis. *Building Construction Illustrated*. John Wiley and Sons, 2008.

**Attendance Policy:** No more than 10% absences are permitted during the semester. For the purposes of record, two lateness are considered as one absence. Exceeding this limit will expose the student to failing at the discretion of the instructor.

**Course Structure:** This course will combine a weekly lecture focused on particular materials and methods of construction and studio lab time to develop a series of drawings, modeling investigations, and assemblies discussed in the lectures. There will be several quizzes based on key terms and concepts discussed in the class and in the assigned readings. There will be a comprehensive final exam. A portfolio will be developed to document the studio lab work as the semester progresses. Field trips will offer first hand on-site investigation of the materials and methods covered in the course.

**Grading:** Final grade will be determined according to the following grade weighting:

50% Studio Lab Assignments

20% Quizzes

25% Final Exam

5% Class Participation

**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.

**Learning Objectives:** Upon successful completion of this course the student should be able to:

1. **Understand** the relationship of technology to tectonics and architectural character. (Knowledge)
2. **Recall and recite** the key terms, properties, and fabrication techniques of the materials reviewed in the lectures and readings. (Gen Ed)
3. **Develop and apply** a professional vocabulary of architectural terminology. (Gen Ed)
4. **Understand and apply professional etiquette to classroom situations.** (Gen Ed)
5. **Recall and recite** the environmental implications of specific materials and types of construction. (Gen Ed)
6. **Manipulate and apply** geometric, proportional and scale systems. (Gen Ed)
7. **Apply** an understanding of the relationship of physiology and anatomy to building construction. (Gen Ed)
8. **Use and apply procedural** texts to supplement instruction on the use of hardware and software. (Gen Ed)
9. **Sketch and draft** details in orthographic and 3 dimensional views in analogue and digital media. (Skill)
10. **Develop** analog and digital models of construction assemblies. (Skill)
11. **Survey** Existing Conditions (Skill)
12. **Analyze** assemblies and details through research and visual observation. (Skill)
13. **Develop** a coordinated drawing set (plans, section, elevations, details) of a wood and/or masonry structure. (Skill)

**Assessment:**

Students will be given weekly quizzes, sketch assignments, lab assignments and a final exam to test their ability to:

1. Draw with basic understanding of line quality, line weight and lettering.
2. Produce a basic set of working drawings for wood frame and masonry construction.
3. Explain what is meant by each of the "key terms and concepts" listed at the end of each chapter of the assigned text.
4. Identify key components and materials in various building assembly details and suggest alternatives.
5. Draw sketches or sections of the different materials and building systems discussed in the lectures.

**Course Outline:**

**WEEK 1:**

**Week 1 Lecture: Course Overview, Introduction to Professional Practice, Architectural Education, and Architectural Curriculum**

**Week 1 Lab: Introduction to architectural drawing:** required hand-drafting equipment, explanation on how to set up a typical sheet, title block, line weights and lettering. Introduction to scanning files and formatting in jpeg or pdf formats. Review layout and requirements for Drawing Assignment A.

**Week 1 Homework:** Assignment A\_Geometry and Proportion

**Week 1 Reading:** Ching, Architectural Drafting, Chapters 1-2, pp 1-26.

**WEEK 2:**

**Week 2 Lecture: Making Buildings: Materials and Systems:** Introduction to the materials to be discussed throughout the semester. Discussion on tectonics, sustainability, and economics as context for the work of the architect. Introduction to masonry and wood construction. Discussion on nature of materials + selecting construction systems, inherent properties including fabrication, structural behavior, and building systems.

*Week 2 Lab: **Architectural Drawings, Scale and Dimension:*** review types of architectural drawings (orthogonal and three dimensional,) demonstrate how to use an architectural scale.

*Week 2 Homework:* Assignment B\_Architectural Drawing Typologies

*Week 2 Reading:* Ching, Architectural Drafting, Chapters 3-4 pp 27-84.

### **WEEK 3:**

*Week 3 Lecture: **Stone Masonry:*** types of building stone, quarrying and milling stone, selecting stone for buildings, stone masonry construction, concrete masonry units, fabrication, coursing, decorative units, masonry wall construction with concrete masonry units.

*Week 3 Lab: **On Site Documentation: Stone Building Elevation***

*Week 3 Homework:* Assignment C\_Stone Building Elevation

*Week 3 Reading:* Allen, Stone Masonry, Chapter 9, pp. 337-375

### **WEEK 4:**

*Week 4 Lecture: **Brick Masonry:*** brick fabrication, structural characteristics, mortar, coursing, and masonry wall construction.

*Week 4 Lab: **Brick Wall Construction and Documentation***

*Week 4 Homework:* Assignment D\_Brick Wall Drawing and Model

*Week 4 Reading:* Allen, Brick Masonry, Chapter 8, pp. 298-335

### **WEEK 5:**

*Week 5 Lecture: **Site Work and Shallow Foundations:*** Overview of subsoil exploration, test borings. Review type of soils, frost line, and water table. Discussion of excavation and shoring, shallow foundation systems, waterproofing and drainage.

*Week 5 Lab: **Introduction to Case Study Project***

*Week 5 Homework:* Complete Assignment D\_Brick Wall Drawing and Model

*Week 5 Reading:* Allen, Foundations, Chapter 2, pp. 38-55, 71-83

### **WEEK 6:**

*Week 6 Lecture: **Masonry Wall Construction:*** types of masonry walls, spanning systems, detailing, special problems, building code issues, uniqueness of masonry construction.

*Week 6 Lab: **Case Study Structural Analysis***

*Week 6 Homework:* Assignment E\_Structural Analysis (three dimensional drawing)

*Week 6 Reading:* Allen, Masonry Wall Construction, Chapter 10, pp. 376-409

**WEEK 7:**

*Week 7 Lecture: **Wood:*** Characteristics, structure, classification of trees and properties, softwoods and hardwoods, limitations, manufacture of lumber, grading of lumber, plywood, glue laminated lumber, composite boards, wood joining, types of wood construction.

*Week 7 Lab: **Case Study Structural Analysis***

*Week 7 Homework:* Complete Assignment E\_Structural Analysis (three dimensional drawing)

*Week 7 Reading:* Allen, Wood, Chapter 3, pp. 85-129

**WEEK 8:**

*Week 8 Lecture: **Heavy Timber Frame Construction:*** Fire-resistance construction, lateral bracing, longer spans.

*Week 8 Lab: **Case Study Wall Section with Floor Structure (three dimensions)***

*Week 8 Homework:* Assignment F\_Wall Section (three dimensional drawing)

*Week 8 Reading:* Allen, Heavy Timber Frame Construction, Chapter 4, pp. 135-160

**WEEK 8:**

*Week 8 Lecture: **Wood Light Frame Construction:*** history, balloon frame, platform frame, foundation connections and insulation.

*Week 8 Lab: **Case Study Wall Section with Floor Structure (three dimensions)***

*Week 8 Homework:* Complete Assignment F\_Wall Section (three dimensional drawing)

*Week 8 Reading:* Allen, Wood Light Frame Construction, Chapter 5, pp. 161-220

**WEEK 9:**

*Week 9 Lecture: **Roofing:*** Steep roofs, roof finishes, green roofs.

*Week 9 Lab: **Case Study Parapet Detail***

*Week 9 Homework:* Assignment G\_Parapet Section (three dimensional drawing)

*Week 9 Reading:* Allen, Roofing, Chapter 16, pp. 678-705

**WEEK 10:**

*Week 10 Lecture: **Windows and Doors:*** types of windows, window frames, glazing, installing windows, doors types, resistance to wind and rain, thermal performance, impact resistance.

*Week 10 Lab: **Case Study Window Details***

*Week 10 Homework:* Assignment H\_Wall Section At Window (three dimensional drawing)

*Week 10 Reading:* Allen, Windows and Doors Chapter 18, pp. 747-781

**WEEK 11:**

*Week 11 Lecture: **Interior Systems and Finishes:*** mechanical systems integration and coordination, building insulation, and interior finishes, stairs, fireplaces.

*Week 11 Lab: **Case Study Environmental Performance Analysis***

*Week 11 Homework: Complete* Assignment H\_Wall Section At Window w/ performance analysis diagrammed and noted (three dimensional drawing)

*Week 11 Reading:* Allen, Interior Finishes for Wood Light Frame Construction Chapter 7, pp.255-295

**WEEK 12:**

*Week 12 Lecture: **Stairs***

*Week 12 Lab: **Designing Stairs:*** code compliance, terminology, calculation techniques, drawing conventions.

*Week 12 Homework:* Assignment I\_Interior Stair (three dimensional drawing)

*Week 12 Reading:* supplementary reading tbd

**WEEK 13:**

*Week 13 Lecture: **Case Study Stairs***

*Week 13 Lab: **Case Study Stairs:*** code compliance, terminology, calc. techniques, drawing conventions.

*Week 13 Homework:* Complete Assignment I\_Interior Stair (three dimensional drawing)

*Week 13 Reading:* Final Exam Review

**WEEK 14:**

*Week 14 Lecture: **Review for Final Exam***

*Week 13 Lab: **Drawing set coordination, editing, documenting***

*Week 13 Homework Assignment: Continue coordination and editing*

*Week 13 Reading:* Final Exam Review

**WEEK 15:**

*Week 15 Lecture: **Final Exam***

*Week 15 Lab: **Pin Up Review of Drawing Sets***

*Week 15 Homework Assignment: none*

*Week 15 Reading: none*