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 or ENG 092W if part of a learning community

Required Texts:
Allen, Edward. *Fundamentals of Building Construction: Materials and Methods, 5th Edition*. John Wiley and Sons, 2008.
Ching, Francis. *Architectural Graphics, 5th Edition.* John Wiley and Sons, 2009.

Recommended Texts:
Ramsey, Charles George, Harold Reeve Sleeper, and Bruce Bassler. *Architectural Graphic Standards: Student Edition (Ramsey/Sleeper Architectural Graphic Standards Series)*. 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 masonry and/or wood structure. (Skill)

Assessment:

To evaluate the students' achievement of the learning objectives, the professor will do the following:

1. **Review** research assignment focused on the analysis of assemblies and details and the relationship of technology to tectonics and architectural character. (Los: 1, 8)
2. **Test** the students' ability to recall and recite the key terms and material of the readings and lectures through weekly quizzes and a final exam. (Los: 2, 4)
3. **Review** students' drawing and modeling work where students must exhibit their visual representation skills (2-D and 3-D). (Los: 5, 6, 9)
4. **Assess** the students' use of professional vocabulary during oral presentations.(Lo: 3)
5. **Review** students' field notes and final drawings for accuracy in documenting existing conditions. (Los: 3, 7)
6. **Inspect** student submissions for quality of drafting including use of line weights, lettering, and proper use of scale. (Los: 5, 7, 9)
7. **Confirm** the proper coordination of the students' submitted drawing sets. (Lo: 9)
8. **Review** the quality and accuracy of the students' submitted analogue and digital models of construction assemblies. (Los: 6, 8)

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. 376-40

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 9:

Week 9 Lecture: **Wood Light Frame Construction:** history, balloon frame, platform frame, foundation connections and insulation.

Week 9 Lab: **Case Study Wall Section with Floor Structure (three dimensions)**

Week 9 Homework: Complete Assignment F_Wall Section (three dimensional drawing)

Week 9 Reading: Allen, Wood Light Frame Construction, Chapter 5, pp. 161-220

WEEK 10:

Week 10 Lecture: **Roofing:** Steep roofs, roof finishes, green roofs.

Week 10 Lab: **Case Study Parapet Detail**

Week 10 Homework: Assignment G_Parapet Section (three dimensional drawing)

Week 10 Reading: Allen, Roofing, Chapter 16, pp. 678-705

WEEK 11:

Week 11 Lecture: **Windows and Doors:** types of windows, window frames, glazing, installing windows, doors types, resistance to wind and rain, thermal performance, impact resistance.

Week 11 Lab: **Case Study Window Details**

Week 11 Homework: Assignment H_Wall Section At Window (three dimensional drawing)

Week 11 Reading: Allen, Windows and Doors Chapter 18, pp. 747-781

WEEK 12:

Week 12 Lecture: **Interior Systems and Finishes:** mechanical systems integration and coordination, building insulation, and interior finishes, stairs, fireplaces.

Week 12 Lab: **Case Study Environmental Performance Analysis**

Week 12 Homework: Complete Assignment H_Wall Section At Window w/ performance analysis diagramed and noted (three dimensional drawing)

Week 12 Reading: Allen, Interior Finishes for Wood Light Frame Construction Chapter 7, pp.255-295

WEEK 13:

Week 13 Lecture: **Stairs**

Week 13 Lab: **Designing Stairs:** code compliance, terminology, calculation techniques, drawing conventions.

Week 13 Homework: Complete Assignment I_Interior Stair (three dimensional drawing)

Week 13 Reading: supplementary reading tbd

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