

**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 5<sup>th</sup> 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 as well as using digital tools.

**Contact Info:**

|                |  |
|----------------|--|
| Professor:     | Jason A. Montgomery, NCARB LEED AP   |
| Email:         | <a href="mailto:jmontgomery@citytech.cuny.edu">jmontgomery@citytech.cuny.edu</a> |
| Text messages: | 718.791.2787 (always include your name in message)                               |
| Office Hours:  | Tuesdays 1:15pm-2:15pm, Fridays 2:15pm-3:15pm V207                               |

|                 |     |                                 |
|-----------------|-----|---------------------------------|
| <b>Grading:</b> | 10% | Module 1                        |
|                 | 20% | Module 2                        |
|                 | 30% | Module 3                        |
|                 | 35% | Module 4                        |
|                 | 5%  | Participation + Class Protocols |

**MODULE 1:** 100 pts

**Drawing Assignments:**

Plan+2 Sections+ Axon 75

**Reading Notes: 16**

**Sketchbook Assignments: 4**

**Assessment Exercises: 5**

**MODULE 2:** 200 pts

**Drawing Assignment:**

2 Plans 118

**Reading Notes: 64**

**Sketchbook Assignments: 18**

**MODULE 3:** 300 pts

**Drawing Assignments:**

2 Axons + Sections 232

**Reading Notes: 68**

**MODULE 4:** 350 pts

**Drawing Assignments:**

Plan/Section/Elev Dtls + Axon 267

**Reading Notes: 72**

**Sketchbook Assignments: 6**

**Assessment Exercises: 5**

**CLASS PARTICIPATION** 50 pts

Discussions 50 pts

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

**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\_2019\_01\_Lastname\_Firstname**

Sub Folders: 2019\_01\_Module 1\_Lastname  
2019\_01\_Module 2\_Lastname  
2019\_01\_Module 3\_Lastname  
2019\_01\_Module 4\_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\_201901\_ProfessorLastName\_Module#\_assignment title\_YYYYMMDD.pdf**

For example:

Skywalker\_Luke\_ARCH1231\_201901\_Montgomery\_Module2\_firstfloorplan\_20190125.pdf

Organa\_Lea\_ARCH1231\_201901\_Montgomery\_Module3\_reading7\_steelbeams\_20190326.pdf

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 <b>Knowledge</b> from the range of architectural disciplinary concepts presented in the course.   | <ul style="list-style-type: none"> <li>• <b>Review</b> student notebooks, <b>observe</b> student participation in class discussions, <b>and review</b> student applications of disciplinary concepts in drawing assignments.</li> </ul> |
| 2. Use the texts assigned in the course as well as background knowledge from within the discipline in order to <b>Draw Inferences</b> from the material. | <ul style="list-style-type: none"> <li>• Use a pre and post written exam to assess students' development and achievement over the course of the semester.</li> </ul>  |
| 3. <b>Apply Information</b> from the reading within the discipline.  | <ul style="list-style-type: none"> <li>• <b>Review</b> student applications of disciplinary concepts in drawing assignments.</li> </ul>   |

| 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:  |
| <b>4. Understand</b> the fundamentals of formal ordering systems and the capacity to inform two- and three-dimensional design.   | <b>4. Review</b> student drawing assignments with implementation of the organizing grid.  |
| <b>5. Understand</b> 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. | <b>5. Review</b> 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:                                     |
| <b>6. Layout plan drawings</b> by hand and with digital tools.   | <b>6. Review</b> student plan assignments for accuracy and application of line weights and drawing conventions.                            |
| <b>7. Understand and apply</b> basic principles of structural characteristics of materials following rules of thumb. | <b>7. Review</b> student drawing assignments for accurate application of rules of thumb to sizing structural elements for a specific span. |

Weekly Course Outline:

|                   |   |   |
|-------------------|---|---|
| <b>MODULE I</b>   | <b>MEASURED SPACE (PLAN, SECTIONS (2), AXON) + READING #1 + SKETCHBOOK ASSIGNMENT</b>   |   |
| <b>CLASS 1</b>    | <i>Activity/Assessment:</i>   | Intro, Reading Texts, Reading Drawings  |
| <b>CLASS 2</b>    | <b>SITE VISIT:</b><br><i>Sketchbook:</i>  | <b>Measured Space Site Survey</b><br>Measured Space Site Survey   |
| <b>CLASS 3</b>    | <i>Drawing Assignment:</i><br><b>Discussion:</b><br><i>Drawing Lab:</i><br><i>Reading Notes:</i><br><br><i>Additional Discussion:</i> | Measured Space<br><b>Arch Drawing / Orthographic Projection</b><br>Measured Space Plan Guideline Underlay*<br>Stairs + Egress (Reading #1) Post Summary to OpenLab<br>Note Taking + Reading |
| <b>CLASS 4</b>    | <i>Drawing Assignment:</i><br><b>Discussion:</b><br><br><i>Reading Notes:</i><br><i>Drawing Lab:</i>                                  | Measured Space<br><b>Stairs + Egress (Reading #1)</b><br>Egress, Configurations, Code, Design<br>Submit Notebooks for Prof. review<br>Measured Space Plans w/Stairs                         |
| <b>CLASS 5</b>    | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i>   | Measured Space<br>Measured Space Section Setup*   |
| <b>CLASS 6</b>    | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i>   | Measured Space<br>Measured Space Axon Setup*  |
| <b>CLASS 7</b>    | <i>Assignment Review:</i><br><i>Drawing Lab:</i><br><i>Reading Notes:</i>   | Measured Space Assignment Feedback<br>Submission Prep Demonstration<br>Building Elements (Reading #2) Post Summary to OpenLab   |
| <b>SUBMISSION</b> | <b>MODULE 1</b><br><b>DUE DATE: CLASS 9</b>   | <b>Measured Space Drawing Assignment</b><br><b><u>Reading #1 Notes + Sketchbook Assignment</u></b>  |

**MODULE 2****CASE STUDY PLANS (2 FLOOR PLANS) + READINGS #2,3,4,5 + SKETCHBOOK ASSIGNMENTS (3)**

|                   |   |  |
|-------------------|---|--|
| <b>CLASS 8</b>    | <b>SITE VISIT:</b><br><i>Discussion:</i><br><br><i>Sketchbook:</i>  | <b>Case Study Building Site<br/>Building Elements (Reading #2)</b><br>The Building, Space, Circulation, Stairs,<br>Transparency<br>Site Investigation Assignment   |
| <b>CLASS 9</b>    | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i><br><i>Reading Notes:</i><br><br><i>Additional Discussion:</i> | Case Study Floor Plans<br>Case Study Plan Grid/Centerlines Underlay*<br>Structural Components (Reading #3) Post<br>Summary to OpenLab<br>Note Taking + Reading   |
| <b>CLASS 10</b>   | <b>SITE VISIT:</b><br><i>Discussion:</i><br><br><i>Sketchbook:</i>  | <b>Structure Walk<br/>Structural Components (Reading #3)</b><br>Forces, Columns, Beams, Spans, Trusses, Frames,<br>Walls, Plates, Arches, Vaults, Domes, Joints,<br>Connections<br>Structural Components Sketches  |
| <b>CLASS 11</b>   | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i><br><i>Reading Notes:</i>                                      | Case Study Floor Plans<br>Case Study Plan Guidelines/Geometry<br>Structural Typologies (Reading #4) Post<br>Summary to OpenLab   |
| <b>CLASS 12</b>   | <i>Drawing Assignment:</i><br><i>Discussion:</i><br><br><i>Drawing Lab:</i><br><i>Reading Notes:</i>            | Case Study Floor Plans<br><b>Structural Typologies (Reading #4)</b><br>Structural Units, Spans, Patterns<br>Lateral Stability, Relation b/w Structure + Space<br>Case Study Plan Development<br>Materials + Properties (Reading #5) Post<br>Summary to OpenLab |
| <b>CLASS 13</b>   | <b>SITE VISIT:</b><br><i>Discussion:</i><br><br><i>Sketchbook:</i>  | <b>Materials Walk<br/>Materials + Properties (Reading #5)</b><br>Stone, Brick, CMU, Wood, Concrete, Steel<br>Materials + Properties Sketches   |
| <b>CLASS 14</b>   | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i>   | Case Study Floor Plans<br>Case Study Plan Development  |
| <b>CLASS 15</b>   | <i>Assignment Review:</i>   | Case Study Floor Plans Feedback  |
| <b>SUBMISSION</b> | <b>MODULE 2<br/>DUE DATE: CLASS 17</b>  | Case Study Floor Plans Assignment<br>Readings #2,3,4,5 Notes<br><u>Sketchbook Assignments (3)</u>  |

**MODULE 3****CASE STUDY STRUCTURAL STUDY (AXON + EXPLODED AXON + SECTIONS) + READINGS #6,7**

|                   |  |  |
|-------------------|--|--|
| <b>CLASS 16</b>   | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i><br><i>Reading Notes:</i>                           | Case Study Structural Study<br>Axon Grid + Guidelines*<br>Material Modules (Reading #6)<br>Post Summary to OpenLab   |
| <b>CLASS 17</b>   | <i>Drawing Assignment:</i><br><i>Discussion:</i><br><br><i>Drawing Lab:</i><br><i>Reading Notes:</i> | Case Study Structural Study<br><b>Material Modules (Reading #6)</b><br>Brick/CMU Bonding, Wood Components,<br>Steel Shapes, Concrete Beams<br>Axon Development<br>Spans + Rules of Thumb (Reading #7)<br>Post Summary to OpenLab |
| <b>CLASS 18</b>   | <i>Drawing Assignment:</i><br><i>Discussion:</i><br><br><i>Drawing Lab:</i>                          | Case Study Structural Study<br><b>Spans + Rules of Thumb (Reading #7)</b><br>Masonry Arches, Lintels, Wood Beams + Joists<br>Steel Beams + Joists, Reinforced Concrete Beams<br>Structural Overlay on Axon                       |
| <b>CLASS 19</b>   | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i>  | Case Study Structural Study<br>Structural Calcs + Sections   |
| <b>CLASS 20</b>   | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i>  | Case Study Structural Study<br>Structural Exploded Axon  |
| <b>CLASS 21</b>   | <i>Assignment Review:</i>  | Case Study Struct Study Feedback   |
| <b>SUBMISSION</b> | <b>MODULE 3</b><br><b>DUE DATE: CLASS 23</b>   | Case Study Struct Study Assignment<br><u>Readings #6,7 Notes</u>   |

**MODULE 4****CASE STUDY ENVELOP STUDY (PLAN ELEV SECT DETLS + AXON) + READINGS #8,9 + SKETCHBOOK ASSIGN**

|                   |  |   |
|-------------------|--|---|
| <b>CLASS 22</b>   | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i><br><i>Reading Notes:</i>                     | Masonry Exterior Wall Details + Analysis<br>Plan/Section/Elevation Detail Underlay<br>Assemblies + Performance (Reading #8)<br>Post Summary to OpenLab  |
| <b>CLASS 23</b>   | <b>SITE VISIT:</b><br><i>Discussion:</i><br><br><i>Sketchbook:</i><br><i>Reading Notes:</i>    | <b>Assemblies + Performance Walk</b><br><b>Assemblies + Performance (Reading #8)</b><br>Building Envelop, Exterior Walls, Moisture<br>Protection, Flashing, Thermal Protection<br>Designing Exterior Walls<br><b>Assemblies + Performance Sketches</b><br><b>Masonry Envelope Assemblies (Read #9)</b><br>Post Summary to OpenLab |
| <b>CLASS 24</b>   | <i>Drawing Assignment:</i><br><i>Discussion:</i><br><br><i>Drawing Lab:</i>                    | Masonry Exterior Wall Details + Analysis<br><b>Masonry Envelop Assemblies (Reading #9)</b><br>Masonry Cavity Walls, Brick Coursing, Stone<br>Lintels, CMU Coursing + Bond Beam, Rigid Foam<br>Insulation, Batt Insulation, Vapor Barrier, Interior<br>Furring, Plaster on Lath, Drywall<br>Plan/Section/Elevation Detail          |
| <b>CLASS 25</b>   | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i>  | Masonry Exterior Wall Details + Analysis<br>Plan/Section/Elevation Details  |
| <b>CLASS 26</b>   | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i>  | Masonry Exterior Wall Details + Analysis<br>"Peel Away" Axon  |
| <b>CLASS 27</b>   | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i>  | Masonry Exterior Wall Details + Analysis<br>"Peel Away" Axon  |
| <b>CLASS 28</b>   | <i>Drawing Assignment:</i><br><i>Drawing Lab:</i>  | Masonry Exterior Wall Details + Analysis<br>R-value Calc  |
| <b>CLASS 29</b>   | <i>Assignment Review:</i>  | Masonry Ext Wall Dtls + Analysis Feedback   |
| <b>CLASS 30</b>   | <i>Activity/Assessments:</i>   | Activity, Reading Texts, Reading Drawings   |
| <b>SUBMISSION</b> | <b>MODULE 4:</b><br><b>DUE DATE: CLASS 30*</b><br><b>*or on alt date required by Professor</b> | <b>Masonry Exterior Wall Details + Analysis</b><br><b><u>Readings #8,9 Notes + Sketchbook Assign.</u></b>   |

**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:**

Measured Space Assignment:

Plan  
Sections (2)  
Axon

Case Study Floor Plans Assignment:

Floor Plans (2)

Case Study Axon + Structural Study

Structural Study Axon  
Exploded Axon  
Component Sections  
Calcs

Masonry Exterior Wall Details + Analysis

Plan Detail  
Elevation Detail  
Wall Section  
Peel Away Axon  
R-Value Analysis Diagram

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

**Sketchbook Assignments:**

Measured Space Site Survey  
Case Study Site Investigation  
Structural Components Walk  
Materials + Properties Walk  
Assemblies + Performance Walk

**Notebook Assignments:**

Reading Notes and Sketches for Readings #1-9 covering **all sections and subtopics** of each reading.



**READINGS:**

|                                    |  |  |                          |                 |
|------------------------------------|--|--|--------------------------|-----------------|
| #1 Stairs + Egress:                | <i>Building Construction Illustrated</i> | Egress                                       | A.10-A.11                |                 |
|                                    |  | Stair Design                                 | 9.03                     |                 |
|                                    |  | Stair Requirements                           | 9.04-9.05                |                 |
|                                    |  | Configurations                               | 9.06-9.07                |                 |
| #2 Building Elements:              | <i>Building Construction Illustrated</i> | Building Elements                            | 2.02-2.03                |                 |
| #3 Structural Components + Forces: | <i>Building Construction Illustrated</i> | 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                     |                 |
| #4 Structural Typologies:          | <i>Building Construction Illustrated</i> | Structural Units                             | 2.19                     |                 |
|                                    |  | Structural Spans                             | 2.20                     |                 |
|                                    |  | Structural Patterns                          | 2.21                     |                 |
|                                    |  | Lateral Stability                            | 2.22-2.23                |                 |
| #5 Materials + Properties:         | <i>Building Construction Illustrated</i> | Stone  | 12.10                    |                 |
|                                    |  | Brick/CMU                                    | 12.06-12.07              |                 |
|                                    |  | Wood   | 12.11-12.12              |                 |
|                                    |  | Steel  | 12.08                    |                 |
|                                    |  | Concrete + Reinforcement                     | 12.04-12.05              |                 |
| #6 Material Modules:               | <i>Building Construction Illustrated</i> | Brick/CMU Bonding                            | 5.26-5.27                |                 |
|                                    |  | Wood Components                              | 12.13-12.14              |                 |
|                                    |  | Steel Shapes                                 | 4.16, 5.37               |                 |
|                                    |  | Reinforced Concrete                          | 4.04, 5.04-5.05          |                 |
|                                    |  | Precast Concrete Floor Systems               | 4.11-4.12                |                 |
|                                    |  |  |                          |                 |
|                                    |  | <i>Fundamentals of Building Construction</i> | Brick Masonry            | Chapter 8       |
|                                    | #7 Material Spans + Rules of Thumb:      | <i>Building Construction Illustrated</i>     | Masonry Arches + Lintels | 5.20-5.21       |
|                                    |  |  | Wood Beams + Joists      | 4.26-4.27, 4.35 |
|                                    |  |  | Wood Subfloor, Decking   | 4.32, 4.40      |
| Wood Plank and Beam                |  |  | 4.38-4.39                |                 |
| Steel Beams                        |  |  | 4.16-4.18                |                 |
| Steel Open-Web Joists              |  |  | 4.19-4.21                |                 |
| Metal Decking                      |  |  | 4.22                     |                 |
| Reinforced Concrete Beams          | 4.04                                     |  |                          |                 |

#8 Assemblies + Performance:

*Building Construction Illustrated*

Building Envelop 7.02  
Walls: Moisture + Flashing 7.22, 7.28-7.29  
Thermal Protection 7.39-7.47

*Fundamentals of Building Construction*

Designing Exterior Wall Systems Chapter 19

#9 Masonry Envelop Assemblies:

*Building Construction Illustrated*

CMU + Brick 5.23-5.25  
Stone 5.33-5.34  
Windows 8.22-8.23, 8.27

*Fundamentals of Building Construction*

Masonry Wall Construction Chapter 10  
Windows and Doors Chapter 18