

Department of Architectural Technology

ARCH 2330

BUILDING TECHNOLOGY III

1 cl hrs, 6 lab hrs, 4 credits

Course Description: This course studies the development of building systems as they occur during the design development phase of architecture. Using case study research methods, students analyze factors, such as building assemblies and systems, codes and government regulations, human ergonomics, and sustainability, which affect building construction and use. Their solutions to these issues are integrated into their final building design solutions. The student creates a series of reports and a set of construction drawings using both analog methods (hand sketching and drawing) and digital tools including traditional CAD software and Building Information Modeling techniques.

Course Context: This is the third class in the required sequence of four building technology courses. As this course is under development it is subject to changes. Notice of changes will be provided to students.

Prerequisites: ARCH 1230: Building Technology II with a grade of C or higher or ARCH 1240 and ARCH1200 with a grade of C or higher.

Pre- or co-requisites: ARCH 2370: Environmental Systems for Architects

Required Texts:

- Class readings on relevant sections will be posted weekly on either Blackboard or the OpenLab website
- Allen, Edward and Joseph Iano. Fundamentals of Building Construction / Materials and Methods. John Wiley and Sons, 2008.
- Ching, Francis. Building Construction Illustrated. John Wiley and Sons, 2008.

Recommended Text:

- 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.
- James Vandezande, Eddy Krygiel, and Phil Read. Autodesk Revit Architecture 2013 Essentials: Publisher: Sybex; 1 edition (May 1, 2012)

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: Lectures & lab work. Assignments include sketching, a series of reports, class presentation, , quizzes and set of design development level construction drawings. Digital tools learned in prior building technology courses are reinforced and enhanced.

Grading:

50%	Individual Computer Based Drawings	(Comprehensive Drawing Set)
15%	Team Case Studies, Presentations, Research	
15%	Individual Studio Lab Assignments	
15%	Individual Sketching assignments & redlines	
5%	Individual 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 citing 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 (LO)

Upon successful completion of this course, the student will:

1. **Understand** the process and requirements of developing a design from a schematic concept into design development drawings. (Knowledge)
2. **Execute** work through a collaborative process (Gen Ed)
3. **Generate** clear and concise talking points to guide oral presentations of lab assignments. (Gen Ed)
4. **Understand** the advantages and limitations of BIM (building information modeling) as a tool for design development and project delivery. (Skill)
5. **Apply** knowledge of materials and methods of construction, including sustainable principles, to the development of details and assemblies. (Skill)
6. **Sketch** and **draft** details in orthographic and 3-D views in analogue and digital media. (Skill)
7. **Design** and **analyze** exterior wall system based on environmental performance.
8. **Apply** knowledge of professional construction drawing standards for page composition, title blocks, annotation, and schedules. (Skill)
9. **Develop** a professional quality coordinated, edited, and organized set of design development documents for a given building design using BIM and CAD. (Skill)

Assessment

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

1. **Review** students' drawing and modeling work where students must exhibit their visual representation skills (2-D and 3-D). (LO: 6, 8, 9)
2. **Assess** the students' use of professional vocabulary during oral presentations. (LO:3)
3. **Review** the effectiveness of student team organization and their management of the project work by frequent meetings. (LO: 2)
4. **Inspect** student submissions for the efficient and effective use of BIM tools. (LO: 4)
5. **Confirm** the proper coordination of the students' submitted drawing sets. (LO: 9)
6. **Review** the quality and accuracy of the students' submitted analogue and digital models of construction assemblies (LO: 6, 7)
7. **Review** the effectiveness of the design and the accuracy of the analysis of the environmental performance of the submitted exterior wall system. (LO: 5, 7)
8. **Compare** the content and quality of final submission of the design development set to a specific professional standard. (LO 1, 8, 9)

Term Project / Weekly Assignments: Each student is responsible for turning in an assignment even if absent the day the assignment is given. It is the student's responsibility to have the email address or telephone number of another student in the class, or to speak with the instructor when absent. Late assignments will be downgraded 1/3 grade for each class date they are late. If the assignment deserves an **A-**, but was delivered two classes late, the student will receive a **B**. (**A- to B+ to B**)

Course Requirements: Students should expect to spend at least 10 hours per week outside of class time preparing assignments by hand and at the computer. The computer lab is open weekdays and on Saturdays and Sundays during the semester. Hours are posted after the first week of classes. Due to our revised curriculum and greater use of computer labs, open lab hours have been greatly reduced. Remember to plan accordingly and print all assignments the day before your class meets.

Deadline note: Unless otherwise instructed assignments will be due and must be posted on Blackboard in advance of class meetings at least 12 hours prior to the class's official start time. If class begins 8:30 AM then assignment must be posted by 8:30 PM the night before.

If assignments require printing, you must print before the start of class. You will not be permitted to print during class and any assignment not ready at the start of class will be graded as late. Submission of PDF or original files will not excuse the lateness due to lack of printing. Late assignments are downgraded.

File Naming and Protocols: All file names should include student's name (last then first), assignment number, assignment name, and date. All work must be submitted using the same version of Revit or AutoCAD that is installed in the lab. If you have a newer version configure your "Save_as" settings.

Individual Assignment Examples:

Last_First_##_AssignmentName_MMDDYY.extension

Wright_Frank_01_Grid_092312.pdf or Wright_Frank_01_Grid_092312.rvt

Only files named properly will be accepted. Other formats will be rejected and considered as not submitted.

Group Assignment Examples:

GroupNumber_##_AssignmentName_MMDDYY.extension

Group.01_01_Grid_092312.pdf or Group.01_01_Grid_092312.rvt

GroupMemberNames_##_AssignmentName_MMDDYY.extension or

Wright.Sullivan.Meis.Corbusier_01_Grid_092312.pdf or Group.01_01_Grid_092312.rvt

As the semester progresses you will be required to maintain and hand in a running archive of all your work, including sketches, group assignments, etc. This archive is the primary source used for grading. At the end of the semester you will submit a final archive. File name for the archive is to include course number, course section, semester, professor's name, project name, drawing title, your name (last then first) and due date.

Examples:

ARCH2330_Section#_Semester_ProfessorsName_Lastname_Firstname_duedate.dwg

ARCH2330_9619_Fall12_Prof.Smith_Trubin_Alex_102212.dwg (due date = mmddyy)

Course Outline (Updated outline may be provided)

Week	Class	Lecture	Lab Activity
1	1	Introduction & Team Up! <i>Syllabus, Project Statement & Teams</i> <i><u>Project Development Process DD to CD</u></i>	<i>Divide into teams, team interviews & team OpenLab website. Class Administration & Requirements.</i> Graded In Class Team Interview Presentations
	2	Project and Site Selection <i><u>Building Project Analysis</u></i> <i><u>Site Inventory & Analysis</u></i>	<i>Analyze structure, mechanical systems, circulation, code compliance, façade, construction materials & detailing. Site inventory & Analysis. Oasisnyc.net</i> Preliminary Site Plan Due - Review AutoCAD
2	3	Team Project Review and Pinup <i><u>In Class Pinup and Student Discussion</u></i> <i>- <u>Building Project Analysis</u></i> <i>- <u>Site Analysis</u></i> <i><u>Critical Path Planning</u></i>	<i>All day pinup and discussion of site sketches, photographs, inventory and analysis. Building Plans, Sections and Elevations with trace overlays. Identify issues.</i> Graded In Class - Team Building Analysis, Site Analysis & Critical Path Presentations
	4	Zoning and Building Code Introduction <i><u>Introduction to zoning and building codes</u></i> <i><u>Drafting zoning diagrams & isometrics</u></i>	<i>Oasisnyc.net, City planning Department, NYC Building Department, NYC Zoning Text, Use Groups, Districts, FAR, zoning envelope, Setbacks, sky exposure, street wall height, etc.</i> Graded – Site Plan, Environs Maps & Zoning Map
3	5	Site Inventory & Analysis <i><u>Continue development of zoning & analysis of project site – with a focus on site.</u></i>	<i>Team Desk Crits and development of project inventory and analysis. Review of Site Visit Sketches, Q & A for zoning.</i> Graded – Zoning Calculations, Setbacks, Isometrics
	6	Site & Zoning Development <i><u>Continue development of zoning & analysis of project site – with a focus on zoning.</u></i>	<i>Team Desk Crits and development of project inventory and analysis. Discussion of zoning.</i> Graded - Freehand Site Sketches & Details
4	7	Building Analysis & Development <i><u>Transition building from design to construction</u></i>	<i>Team Desk Crits and study of project transition from building design to construction documents.</i> Graded – Zoning Text Sheet
	Team Project Presentations Next 2 classes Existing and proposed solutions. Team is to redraw the project in AutoCAD for study and presentation. <i>Site Selection</i> Structural Analysis – identify grid, column locations and long spans.		<i>Mechanical Analysis – fresh air intake, vertical & horizontal route of supply and return. RCP Types</i> <i>Building Materials Identification and Selection</i> <i>Building Layout Review – Room Types, Sizes, Shapes & Circulation Issues</i> <i>Written Program Analysis</i>
5	8	Team Project Presentations – Day 1 <i><u>Team presentations and class discussion</u></i> <i><u>Presentations must be posted the day before</u></i> <i><u>Late assignments will be dropped a full grade</u></i> <i><u>No exceptions!!!</u></i>	<i>Team presentations of proposed solutions for building each project. Each team to write up and post specific recommendations to another team.</i> Both project analysis presentations and recommendations to another team will be graded
	9	Team Project Presentations – Day 2 <i><u>Presentations must be posted the day before</u></i> <i><u>Late assignments will be dropped a full grade</u></i> <i><u>No exceptions!!!</u></i>	Same as previous day for remaining groups
		Individual Submission Uploaded to Blackboard	Drawing Set– Site Sketches & Zoning Sheets
10		Scavenger Hunt with Annotation <i><u>Introduction to Revit/BIM</u></i>	<i>Introduction to Revit and the Scavenger Hunt Project. Review of view creation including sections, elevations, perspectives and details. Adding notes, labels, leaders and dimensions.</i>

6	11	Scavenger Hunt Pinup review & Warmup Project <i>Pinup review</i>	<i>Pinup Review of Scavenger Hunt. Starting a new Revit file through a one day warmup project.</i>
Building Development Notes			Graded - Scavenger Hunt Assignment Work begun in each class must be completed prior to the next class or it will be marked late.
	12	Grids & Levels <i>Structural grids and floor to floor heights</i>	<i>Revit: Begin individual project drawing. Creation of structural grid, levels & building massing. Layout of Architectural Plans and Elevations</i>
7	13	Foundations & Floors <i>Building foundation and flooring systems</i>	<i>Revit: Creation of foundations, footings and structural walls & floor systems. Creation of basement columns using concrete.</i>
	14	Building Structure – Columns Beams and Trusses <i>Upper level structural elements</i>	<i>Revit: Creation of upper building structure using steel columns, beams and trusses. Layout of structural drawings</i> Graded – Grids, Levels, Foundations & Floors
8	15	Walls & Doors – Fire Rating, Egress & Code <i>Egress and code requirement for walls and doors</i>	<i>Introduction to egress and code requirements for room occupancy, door widths and partition fire ratings. Discussion of ADA door requirements.</i> <i>Revit: Drafting of project floor plans</i>
	16	Partition Type & Door Detail Development <i>Identity & draw partition types Room & Door Tag</i>	<i>Teams to develop comprehensive list of required wall types (unrated, 1hr, 2hr, 3hr) and specialty walls (shaft and chase walls). AutoCAD: Draft partition types and details. Revit: Create custom matching wall types, wall tags. Adding room names/numbers, door tags.</i>
9	17	Team Case Study & Research Presentations <i>Case Study & Research presentations</i>	<i>Research presentations including ADA Design, Egress and Building Code, Vertical Circulation, Stair Codes & Construction, Structural Systems, Mechanical System Strategies.</i> Graded – Individual Partition Types – 5 required In class team case study / research presentations.
	18	Vertical Systems: Cores, Stairs & Mechanical <i>Elevator and stair cores, shafts, bathrooms Revit Stair & Elevator Tools</i>	<i>Development of elevator and stair cores, location and design of mechanical shafts and plumbing chase, bathroom layouts. Strategies for horizontal mechanical systems, perimeter heating and cooling.</i> Assign Stair & Core Study Sheets
10	19	Roof Drainage plans & details	<i>Revit: Creation of roof systems and details. Use of roof tools by footprint, extrusion and face. Developing roof details.</i> Graded – Cores & Stair: Plans, Sections, Details
	20	Drawing Set Layout and Annotation <i>Adding Schedules, Titleblocks & Perspectives Selecting plan details and wall sections.</i>	<i>Revit: Scavenger hunt for your project. Layout of sheet, creation of views, editing titleblock families. Strategies for sheet naming and numbering, creation of cover sheet and 3d renderings. Addition of Annotation, labels, notes, leaders, dimensions.</i>
Graded Submission Due by Next Class			Drawing Set to Date – Plans, Sections, Details

11	21	Façade Development : Windows & Curtain Walls	Revit: Punched openings and curtain wall systems. Adding doors to curtain walls, modifying panels and changing materials and colors for spandrel glass. Façade wall section development and detailing.
	22	Façade Development: Masonry Walls <i>Sweeps and Reveals, wall sections</i>	<i>Revit: Creating masonry walls with sweeps and reveals. Creation of custom profiles. Creation of wall section and details and sheet layout. Façade wall section development and detailing.</i>
12	23	Façade Development: Precast Panel Systems <i>Construction and design of precast facades</i>	<i>Revit: Methods of creating a precast panel system including the use of reveals, the use of curtain wall tools and other techniques.</i> 1st - Mid-semester Project Drawings submitted to professor for grading.
	24	Mid-Semester Project Presentation <i>Team Zoning & Site /Individual Projects</i>	<i>Presentation: Full pinup of Team Zoning and Site Drawings and full pinup of individual project drawings. Each student will be responsible for full redmarks of another students drawing set. Redmarked set to be scanned, saved s PDF and posted on OpenLab.</i> 2nd Mid-semester Project Drawings submitted and plotted for pinup, student redmark & grading.
13	25	Reflected Ceiling Plans: Soffits, Details & Code	<i>Revit: Layout of reflected ceiling plans, integration of lighting and mechanical systems, grids and soffits. Ceiling details and building code.</i> Student Redmarks of another student project are to be submitted for grading.
	26	Space Layout: Enlarged Plans & Elevations	<i>Revit: Development of enlarged plans and elevations. Adding furniture and developing room layout.</i>
14	27	Details: Wall Sections & Plans	<i>Revit: Individual desk crits. Development of wall sections, plan, section and elevation details of exterior walls, column conditions, special conditions, etc. Review of leaders and dimensions.</i> Graded pinup of preliminary of wall section sheets for masonry walls, curtain walls & precast systems.
	28	Details: Wall Sections & Plans	<i>Revit: Team & Individual desk crits. Development of wall sections, plan, section and elevation details of exterior walls, column conditions, special conditions, etc. Review of leaders and dimensions.</i>
15	29	Final Presentation: Teams <u><i>Presentations must be posted and plotted the day before – no plotting permitted on the day of presentation – no exceptions!!</i></u>	<i>Full pinup and juried presentation of team & individual drawings. Includes group zoning & site review, building analysis from earlier in semester, followed by individual presentations of drawings sets and details color coded to clarify assembly.</i> Graded Final PowerPoint Process Presentations of individual project drawings and details Printed set – format 11x17 and 22x34 as required
	30	Final Presentation: Teams	<i>Same as previous day</i>
Final Submissions uploaded to blackboard			Date will be set at the end of the semester