

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. Students create 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 can only be late 1 class and will be downgraded one level. For example, an assignment that is A work becomes an A- and an assignment that is a C- becomes a D. After 1 class session late - assignments will not be accepted and will receive an F.

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_DueDate(MMDDYY).pdf
Smith_John_01_Grid_092312.pdf or *Smith_John_01_Grid_092312.rvt*

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

Group Assignment Examples: (must include names of all team members)

GroupMemberNames(firstLastInitial)_AssignmentName_DueDate (MMDDYY).pdf or
JohnL.PauMI.GeorgeH.RingoS_Presentation_BuildingAnalysis-SiteAnalysis-CaseStudy_022310.ppt (original)
JohnL.PauMI.GeorgeH.RingoS_Presentation_BuildingAnalysis-SiteAnalysis-CaseStudy_022310.pdf

PDF files:

Most assignments will require that you submit the original source file and a PDF file. Do not submit multiple pdf's – they must be compiled into a single PDF.

Rejected Assignments:

Assignments which are not named correctly or are not compiled as a single PDF will be rejected, marked late and downgraded. They must be resubmitted before the next class meets.

Research Archive/Log:

Each student is required to keep a running chronological running archive of all work & research they complete during the semester. This is to include materials that you downloaded or sourced from the internet, weekly scanned sketches from your sketchbook. **This PDF is to be up to date by the end of each week and must be available for review in class at all times.** All sources must be cited or work is considered plagiarized. At the end of the semester you will submit a final research 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:

Last_First_Research-Archive_AR2330.(semester)_King.pdf
Smith_John_Research-Archive_AR2330.SP17_King.pdf

Weekly Course Outline (Updated outline may be provided)

Week	Class	Lecture	Lab Activity
1	1	Introduction & Team Up & Project Selection <ul style="list-style-type: none"> Syllabus, Project Statement & Teams Project Development Process DD to CD 	<ul style="list-style-type: none"> Class Administration & Procedures. Divide into teams, team interviews, team schedule & join class OpenLab website. (graded in class) Building Selection <p>Due next week</p> <ul style="list-style-type: none"> Team project site visit – before next class Preliminary inventory/analysis due next class
2	2	Project & Site Analysis <ul style="list-style-type: none"> Building Project Analysis Site Inventory & Analysis Identify Case Study 	<ul style="list-style-type: none"> Class Discussion: Analyze structure, mechanical systems, circulation, code compliance, façade, construction materials & detailing. Become familiar with Site inventory & Analysis. Oasisnyc.net Identify Case Study by Building Type <p>Due next class:</p> <ul style="list-style-type: none"> Team case study visit - before next class Case study log and summary due next class Each student: AutoCAD building plan & grid
2	3	Complete Project Analysis & Case Study <ul style="list-style-type: none"> In class working session Critical Path Planning 	<ul style="list-style-type: none"> In class working session to complete thorough analysis of building and case study notes. Review: case study visit photos, sketches & notes. Prepare for next class presentation. <p>Due next class:</p> <ul style="list-style-type: none"> Presentation posted day before – OLab/BBoard Individual CAD Plan with Grid and Dimensions
4	4	Team Analysis Presentations: <ul style="list-style-type: none"> Building Façade Materials Selection (2 materials). Identify Case Studies for materials development. Team members must research different materials. AutoCAD Floor Plan with Grid & Dimensions drawn by each individual is due today 	<ul style="list-style-type: none"> Final Team Presentations <ul style="list-style-type: none"> -Building Analysis (structure, floor to floor, mechanical, circulation) -Site Analysis -Precedent Case Study -Program Listing of Spaces and Sizes Presentations Graded In Class – Group and Individual Grade Each Student to begin Materials Research Log
3	5	Zoning and Building Code Introduction <ul style="list-style-type: none"> Introduction to zoning and building codes Drawing zoning diagrams & isometrics In class Zoning Worksheets to review FAR, envelope, setbacks, Sky exposure 	<ul style="list-style-type: none"> Oasisnyc.net, City planning Department, NYC Building Department, NYC Zoning Text, Use Groups, Districts, FAR, zoning envelope, Setbacks, sky exposure, street wall height, etc. <p>Individual Work Due next class:</p> <ul style="list-style-type: none"> Sheet Z-1 Site Plan, Environs Maps & Zoning Map Zoning Worksheets submitted night before class
6	6	Zoning Calculations and Envelope <ul style="list-style-type: none"> In class pinup review of Z-1 sheet 22 x 34 sheet plotted 50% on 11 x 17 In class worksheet review In class AutoCAD skills development 	<ul style="list-style-type: none"> In class AutoCAD 3d skills development (3d Solids, Boolean Operations, Flatshot) (Zoning envelope plan, elevation, section & isometrics, Setbacks, sky exposure, street wall ht.) <p>Individual work due next class:</p> <ul style="list-style-type: none"> Sheet Z-1 with corrections & FAR calculations Sheet Z-2 Zoning Envelope - Building Site Plan, Elevations, Sections and Isometrics Sheet Z-3 Zoning Text

Week	Class	Lecture	Lab Activity
4	7	Zoning Review: Intro to Egress, Occupancy & Space Layout <ul style="list-style-type: none"> Intro to Egress, Occupancy, Space Layout Final Zoning Review Regardless of your presentation day all presentations are due before class #8 and all individual zoning sets are due before class #9 	<ul style="list-style-type: none"> In class pinup of 11 x 17 sheets, Z-1, Z-2, Z-3 Review of egress, occupancy and space layout. Additional analysis of team building for presentation. Due for Grading before next class: Team Presentations-upload before next class
	8	Team Zoning Presentation – Day 1 <ul style="list-style-type: none"> Team Egress, Occupancy, Space Presentation 	<ul style="list-style-type: none"> Team presentations of Zoning Solutions and Egress, Occupancy and Space Layout Planning. Due for individual final grading next class: Complete Zoning Set Z-1, Z-2, Z-3 Uploaded before next class
5	9	Team Zoning Presentation – Day 2 <ul style="list-style-type: none"> Team Egress, Occupancy, Space Presentation 	<ul style="list-style-type: none"> Team presentations of Zoning Solutions and Egress, Occupancy and Space Layout Planning. Due for next class: Install current version of Revit at home Open & review program prior to class
	10	Introduction to BIM/Revit – Day 1 <ul style="list-style-type: none"> Scavenger Hunt with Annotation Assigned 	<ul style="list-style-type: none"> Introduction to Revit and the Scavenger Hunt Review of view creation including sections, elevations, perspectives and details. Formatting views on titleblocks Adding notes, labels, leaders and dimensions. Due for next class: Preliminary Plots for Scavenger Hunt
6	11	Introduction to BIM/Revit – Day 2 <ul style="list-style-type: none"> Scavenger Hunt with Annotation PinUp 	<ul style="list-style-type: none"> Pinup Review of Scavenger Hunt. Starting a new Revit file through a one day warmup project. Due before next class: Final Scavenger Hunt Assignment
		BIM/Revit Project Drawings Begins 22 x 34 Titleblocks	<p>Work begun in each class must be completed prior to the next class or it will be marked late.</p> <p>There will be periodic progress set submissions of work formatted on sheets</p>
	12	Grids & Levels <ul style="list-style-type: none"> Structural grids and floor to floor heights 	<ul style="list-style-type: none"> Revit: Begin individual project drawing. Creation of structural grid, levels & building massing. Annotation of Grid Dimensions Layout of Architectural Plans and Elevations Due before next class: Grids & Levels with Dimensions All Floor Plans formatted on Titleblocks
7	13	Foundations & Floors <ul style="list-style-type: none"> Building foundation and flooring systems 	<ul style="list-style-type: none"> Revit: Creation of foundations, footings and structural walls & floor systems. Creation of basement columns using concrete. Due before next class: PDF Set – Building Plans, Elevations, Sections
Progress Set 1		PDF set due – Formatted on Titleblocks All Floor Plans, Exterior Elevations, 2 Building Sections	Shows Grids, Levels, Foundation & Floors Plotted to a single PDF & uploaded to Blackboard

Week	Class	Lecture	Lab Activity
7	14	Building Structure – Columns Beams and Trusses <ul style="list-style-type: none"> Upper level structural elements View Templates Layout of structural drawings 	<ul style="list-style-type: none"> Revit: Concrete Columns and Beams and Slab from Basement to First Floor Creation of upper building structure using steel columns, beams and trusses. <p>Due before next class:</p> <ul style="list-style-type: none"> Building Structure Cumulative Progress Set
Progress Set 2		PDF set due – Formatted on Titleblocks Existing Architectural Drawings plus All Structural Floor Plans & 2 Building Sections	Shows Structure Only Grids, Levels, Foundation & Floors Plotted to a single PDF & uploaded to Blackboard
8	15	Walls & Doors – Fire Rating, Egress & Codes <ul style="list-style-type: none"> Review of egress and code requirement for walls and doors, ADA requirements. Room & Door Tag 	<ul style="list-style-type: none"> Revit: Floor plan layout skills development Organizing Floor plans with Room Names and Numbers, Door Names and Numbers <p>Due before next class:</p> <ul style="list-style-type: none"> Basement and First Floor layout with Room Tags & Door Tags
16		Door Schedules Partition and Door Type Detail Development <ul style="list-style-type: none"> Cover sheet with perspectives and drawings list for Architectural & Structural Drawings Door Schedules Identity & draw partition types 	<ul style="list-style-type: none"> Add cover sheet w/ perspectives & drawings list Teams to develop comprehensive list of required wall types (unrated, 1hr, 2hr, 3hr) and specialty walls (shaft and chase walls). Begin drafting of partition types and details. Generate door schedules <p>Due before next class:</p> <ul style="list-style-type: none"> Door Schedules formatted on floor plans First Partition with annotation on Titleblock Research presentations: upload before next class
Progress Set 3		PDF set due – Formatted on Titleblocks Update of all architectural & structural drawings with partition sheet Existing Architectural Drawings plus All Structural Floor Plans & 2 Building Sections	Cover Sheet Floor Plans Building Elevations & Sections Partition Types Structural Plans & Sections
9	17	Individual Materials Case Study & Research Presentations (occur in project groups) <ul style="list-style-type: none"> Case Study & Research presentations 	<ul style="list-style-type: none"> Research presentations for materials and building envelop development. Must include sketches of proposed wall sections. Must study 2 conditions -one for curtain wall and the second for the chosen solid material. Can be same or different buildings <p>Due next class:</p> <ul style="list-style-type: none"> Graded – Individual Partition Types – 5 required In class team case study / research presentations.
18		Vertical Systems: Cores, Stairs & Mechanical <ul style="list-style-type: none"> Elevator and stair cores, shafts, bathrooms Revit Stair & Elevator Tools Layout of enlarged core sheets 	<ul style="list-style-type: none"> 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. <p>Due by next class:</p> <ul style="list-style-type: none"> Updated Floor Plans Core plans/stair sections - plotted 22x34

Week	Class	Lecture	Lab Activity
10	19	Roof Plans: Drainage & Details <ul style="list-style-type: none"> Pinup Review of Core Sheets 	<ul style="list-style-type: none"> Revit: Creation of roof systems and details. Use of roof tools by footprint, extrusion and face. Developing roof details. Roof drains and drainage systems <p>Due by next class:</p> <ul style="list-style-type: none"> Roof plan formatted on sheet w/drains & slope
	20	Drawing Coordination: Keys, Annotation & Dimensions <ul style="list-style-type: none"> Exterior Dimension Strings Interior String Dimensions 	<ul style="list-style-type: none"> Adding Annotation & dimensions to drawing set Addition of Annotation, labels, notes, leaders, dimensions. <p>Due next class:</p> <ul style="list-style-type: none"> Roof plan formatted on sheet w/drains & slope
	Graded Progress Set 4	<p>PDF set & Plotted 11 x 17 set due - for grading All drawings to date</p> <p>New to this set are annotation & dimensions, core and stair plans, stair sections, wall tags Continue to include room tags, door tags, scheduled etc.</p>	Cover Sheet Floor Plans Roof Plan Core plans & Stair Sections Building Elevations & Sections Partition Types Structural Plans & Sections
11	21	Façade Development : Windows & Curtain Walls <ul style="list-style-type: none"> Wall sections layout 	<ul style="list-style-type: none"> Punched window openings in solid materials Curtain wall systems – grid organization Adding doors to curtain walls, modifying panels, changing materials and colors for spandrel glass. Façade wall section development and detailing. <p>Due next class: (plot 22 x 34 on 11 x 17)</p> <ul style="list-style-type: none"> Curtain wall sections & details on Titleblock
	22	Façade Development: Masonry Walls <ul style="list-style-type: none"> Sweeps and Reveals, wall sections 	<ul style="list-style-type: none"> 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. <p>Due next class: (plot 22 x 34 on 11 x 17)</p> <ul style="list-style-type: none"> Masonry wall sections & details on Titleblock
12	23	Façade Development: Precast Panel Systems <ul style="list-style-type: none"> Construction and design of precast facades *plotted previously on 11 x 17 	<ul style="list-style-type: none"> Methods of creating a precast panel system including the use of reveals, the use of curtain wall tools and other techniques. <p>Due next class: (plotted full size 22 x 34)</p> <ul style="list-style-type: none"> *Curtain wall sections & details on Titleblock *Masonry wall sections & details on Titleblock Solid wall sections & details on Titleblock
	24	Preliminary Project Presentation: Wall Section Pinup & Red-marks <ul style="list-style-type: none"> Graded Assignment Student red-marks 	<ul style="list-style-type: none"> Pinup of first floor plan & 3 wall section sheets <p>Due next class: (plot full size 22 x 34)</p> <ul style="list-style-type: none"> Solid wall sections & details on Titleblock
	Progress Set 5	<p>Cumulative set with addition of wall section sheets Scans of Red-marked Wall Section Sheets</p>	<p>Upload to blackboard</p>

Week	Class	Lecture	Lab Activity
13	25	Reflected Ceiling Plans: Mechanical & Lighting Systems Integration <ul style="list-style-type: none"> Creating a color coded plan by wall type 	<ul style="list-style-type: none"> Layout of reflected ceiling plans, integration of lighting and mechanical systems, grids and soffits. Ceiling details and building code. <p>Due next class:</p> <ul style="list-style-type: none"> Reflected ceiling plan of first floor – plot 11 x 17
	26	Space Layout: Enlarged Plans & Interior Elevations <ul style="list-style-type: none"> <u>Creating a color coded plan by space type</u> 	<ul style="list-style-type: none"> Development of enlarged plans and elevations. Adding furniture and developing room layout. <p>Due next class:</p> <ul style="list-style-type: none"> Color coded floor plan with key
14	27	Details Development: Façade Development Sections, Plans, Elevations & Isometric <ul style="list-style-type: none"> Begin to develop assembly model In class work session 	<ul style="list-style-type: none"> Individual Desk Crits Focus on detail development Matching Enlarged plans, elevations, sections and isometrics Construction of assembly model <p>Due next class:</p> <ul style="list-style-type: none"> Color coded floor plan with key
	28	Details Development: Façade Development Sections, Plans, Elevations & Isometric <ul style="list-style-type: none"> Continue to develop assembly model In class work session 	<ul style="list-style-type: none"> Individual desk crits. Focus on detail development Continue on drawing set development <p>Due next class:</p> <ul style="list-style-type: none"> Final Presentations
15	29	Individual Final Presentation: Day 1 - Grouped by Teams <ul style="list-style-type: none"> <i>Presentations must be posted and plotted the day before – no plotting permitted on the day of presentation – no exceptions!!</i> 	<ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> Graded Final PowerPoint Process Presentations of individual project drawings and details Printed set – format 11x17 and 22x34 as required
	30	Individual Final Presentation: Day 2 - Grouped by Teams	Same as previous day
Final Submissions uploaded to blackboard			Date will be set at the end of the semester