

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

Department of Architectural Technology

FALL 2012

ARCH 2330 - XXX

BUILDING TECHNOLOGY III

1 cl hrs, 6 lab hrs, 4 credits.

Tuesdays and Thursdays 8:30 – 11:25 am

Prof.: Alexander Aptekar

E-Mail: AAptekar@CityTech.Cuny.Edu

Office Hours : XXX

pm and by appointment

Offices are in V205-209.

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, that 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 course in the required sequence of four building technology sequence. Since this is the first time this course is offered, it is subject to changes. These will be discussed with ample notice to students.

Prerequisites: ARCH 1230: Building Technology II with a grade of C or higher. For Spring 2012, a student needs ARCH 1240 and ARCH1200 with a grade of C or higher.

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

Required Texts:

Class reader on Blackboard; relevant sections will be posted weekly.

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.

Phil Read, Eddy Krygiel, and James Vandezande Autodesk Revit Architecture 2012 Essentials John Wiley and Sons, 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 and lab work. Assignments include a series of reports, class presentation, sketching, quizzes and set of construction drawings. Digital tools learned in prior building technology courses are reinforced.

Grading:

20%	Studio Lab Assignments
10%	Quizzes
15%	Sketching assignments
50%	Comprehensive Drawing Set
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 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). (Los: 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 (Los: 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. (Los: 5, 7)
8. **Compare** the content and quality of final submission of the design development set to a specific professional standard. (Los 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.

Course Requirements: The student should spend at least 10 hours per week outside of class time preparing assignments by hand and at the computer. Computer lab hours are posted after the first week of classes. The lab is open on Saturdays and Sundays during the semester. Because of the new curriculum and greater use of computer labs, open lab hours have been greatly reduced. Remember to prepare accordingly.

Deadline note: unless otherwise instructed the due assignments must be posted to the class blackboard website at least 10 hours before the class's official time.

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

Example:

Smith_Shelley_1_012512.file extension

Only files named appropriately will be accepted. Any other format will be rejected and considered as not submitted.

At the end of the semester, you will be required to submit your work for archiving. The file format will be different. Here the file format will include course number, course section, semester, professor's name, project name, drawing title, your name (last then first)

Examples:

ARCH2330_0000_semester_ProfessorsName_Project_xxTitle_Last_First.dwg

ARCH2330_9619_Smith_Project_03SitePlan_Trubin_Alex.dwg

We will discuss this requirement further towards the end of the semester.

Course Outline

WEEK 1:

Class 01:

Lecture: Course Introduction:

Introduction to the scope of this course & review of course outline. Establishment of file naming and protocols. Review of the course project statement and overview of the design development process and the term's work. Comparison of sketching, drafting and CAD techniques of expressing Architecture and producing CD's. The history and development of AutoCAD and BIM. Comparison of Standard Digital Software (AutoCAD) vs. BIM based applications (Revit). Overview of the organization of the building documentation using building grids and levels to understand both lateral and vertical layouts.

Lab [Computer Topics]:

Revit interface & navigation (views, windows ribbons, toolboxes and commands)

Model manipulation (View model, creating sections, elevations and perspective views)

Management of view windows

Assignment: i

Post 2 JPEG's of the Revit sample model "rac_basic_sample_project.rvt" to blackboard

Research Assignments: uses BIM and groupings of BIM information sets

Reading: Introduction to BIM on the Blackboard reader articles 411, 412, 413, 451 p 5-9

Revit interface and navigation Blackboard reader tutorials from Autodesk: View the model (3);

Working in the Revit Environment (managing view windows, controlling visibility and graphic display)

Deadline for assignment/research etc.: none

Class 02:

Lecture: Site Considerations and Zoning:

An explanation of zoning and lecture on zoning analysis. The lecture will develop an explanation of resources for developing zoning requirements. The class will include a discussion of Zoning on the site and its impact on the building massing. Sustainability and building orientation will be out lined.

Lab: Site Plan, Zoning Analysis and Documentation

Drafting of site boundaries and lines to outline zoning boundaries will be developed. These times were including setback and massing requirements.

[Students have a choice of demonstrating understanding and drafting the assignments using hand sketches (on graph paper), AutoCAD or the massing tools in Revit.]

Assignment: ii

Completion of site plan including zoning documentation.

Reading: Blackboard reader article #201; <http://www.nyc.gov/html/dcp/home.html> read under zoning section "zoning districts"; research zoning terms discussed in class in the zoning glossary.

Deadline for assignment/research etc.: i JPEG's (posted to blackboard)

WEEK 2:

Test: Revit topics from previous week; zoning terms

Class 03:

Lecture: Building Structure Systems:

Structural frame, structural spacing and size of steel sections discussed. Give an explanation of defiant structural systems types and their applications. The use of Grids and Levels to Organize the Building Documentation Process. Discussion on the development of details and building systems and introduction to Revit assignment.

Lab: Site, Column Grids & Levels using BIM (Revit) software:

Site lines including property lines

Layout of building grid working from predefined building following the structural plans. Including a drafting typical floor steel framing plan.

Assignment: iii

Completion of building site, levels, structure grid drawings and framing plan

Reading: Building Structure Systems Allen & Iano pp 367-380; 386-413

Column grids and levels Blackboard reader #451 p 31-34; Tutorials from Autodesk- design the preliminary layout (3); add basic building elements (placing columns)

Deadline for assignment/research etc.: ii site plan (posted to blackboard) and a short summary of the zoning reading

Class 04:

Lecture: Foundations:

An explanation of concrete foundations and drafting are explained including detailing of foundation walls, and footings.

Lab: foundation and cellars plans

Modeling foundations, floors and ceilings

Assignment: iii foundations

Completion of foundation and cellars plans in Revit

Reading: Foundations Allen & Iano p 19-29; 39-42; 59-64;

Modeling foundations, floors and ceilings in Revit Blackboard reader article #451 p 12-17; #453 p 11-13

Deadline for assignment/research etc.: Due class 05

WEEK 3:

Test: Steel framing and Revit column grids and levels

Class 05:

Lecture: Building Code, Fire Ratings and Assemblies; Wall & Space Layout:

Develop the layout of a typical floor plan of a university building that incorporates a program of retail spaces, classrooms, offices and support spaces, lobby and core, egress circulation and stairs, mechanical systems with an understanding of fire rated enclosures and wall types.

Lab:

Develop the layout of a typical floor plan.

Assignment: iv plans

Develop a typical floor plans

Reading: Building Code Blackboard reader article #202; Allen & Iano p 5-10; 414-418.

Walls in Revit Blackboard reader article #451 pp12-17. Tutorials from Autodesk: adding basic elements (placing walls and doors)

Deadline for assignment/research etc.: iii foundations (posted to blackboard)

Class 06:

Lecture: Fire Ratings Assemblies details:

Sources for fire rated assemblies including the Gypsum Association manual.

Lab: typical and entrance floor plan

Basic layout of walls using wall types and understanding the importance of correct wall justification for location & egress.

Assignment: iv plans

Develop of floor plans and egress circulation

Reading: Partitions Allen & Iano pp 803-817; 823-834

Deadline for assignment/research etc.: Due class 07

No class Tuesday February 21st College follows a Monday schedule

Draft of research paper due 11 pm Monday February 20th

WEEK 4:

Class 7:

Lecture: Building hierarchy & Space Layout:

The lecture explores; organizing spaces developing plans integrating building core design and vertical circulation.

Lab: typical floor plan, entrance and cellar floor plans

Development of both integrated entrance floor and cellar level.

Assignment: iv plans

Completion of floor plans

Reading: same as class 6

Deadline for assignment/research etc.: iv draft of typical and entrance floor plans

Final of research paper due 12 am Tuesday February 28th

Class 8:

Lecture: Sections and / Revit page layout:

Development of sections using building sections using Revit tools. The creation and use of Title blocks, sheet organization, layout, and viewports for construction documents.

Lab: plotting sheets

The development of printable sheets including plans and sections.

Assignment: iv

Completion of sections and sheet layouts.

Reading: Blackboard reader article #451 pp 64-73

Deadline for assignment/research etc.: none

WEEK 5:

Test: Building Code, fire ratings, partitions. Walls in Revit

Class 9:

Lecture: Schedules (plan):

The lecture explores; the use and importance of tags and schedules in CD drawings. Explorations of different types of schedules including doors schedule. Tags, their symbols and uses including room tags.

Lab: schedule sheets

The organization and creation of doors schedule on the CD sheets. The implementation of drafting room tagging on the floor plans.

Assignment: v

Development of schedule sheets and room tags

Reading: TBN

Deadline for assignment/research etc.:

Class 10:

Lecture: Making Presentations:

Techniques and best practices for percent import.

Lab: preliminary student research presentations given to professor.

Assignment:

Completion of schedule sheets

Reading: TBN

Deadline for assignment/research etc.: BIM research project (posted to blackboard)

WEEK 6:

Test: Creating sheets in Revit

Class 11: [Printed drawings due]

Lecture: Redline CDs:

What is redlining drawings and how is it used in professional practice.

Lab: presentations to class

Redlining sheets

Assignment:
Reading: TBN

Deadline for assignment/research etc.: 50% submittal (i – v)

Sheets including: typical floor plan, entrance floor plan, cellar plan, typical floor steel framing plan, two sections, and door schedule sheet

Class 12:

Lecture: Introduction to AutoCAD (vector drafting)

Review of concepts introduced in lecture 1: Comparison of sketching, drafting and CAD techniques of expressing Architecture and producing CD's. The history and development of AutoCAD and BIM. Comparison of Standard Digital Software (AutoCAD) vs. BIM based applications (Revit).

Lab [Computer Topics]: AutoCAD Fundamentals 1

AutoCAD environment and initial set-up

Interacting with AutoCAD

Students learn to type the commands, rather relying on pull down menus.

Create objects (line, circle, arc, rectangle, polygon, ellipse)

View objects (zoom, pan, regen)

Edit/modify objects (erase, move, copy, rotate, scale, trim, extend, offset, mirror, fillet, chamfer)

Selection methods (crossing, window)

Drawing accuracy (ortho, OSNAPS)

Assignment: vi

CAD into. drafting exercises:

3 exercises: house elevation, shapes, car in elevation

Draw plumbing fixtures: double sink, WB (square and oval), toilets (tank and flush valve), tub.

Draw doors 2" thick in 30", 32", 34", 36" widths.

Reading: TBN

Deadline for assignment/research etc.:

WEEK 7:

Class 13:

Lecture: review key AutoCAD concepts

Lab [Computer Topics]:

Return drawings, discuss overall problems, meet with individual students.

Assignment:

Reading: TBN

Deadline for assignment/research etc.:

Class 14:

Lecture: AutoCAD Fundamentals 2; role and creation of templates

Lab [Computer Topics]: Grips, units and scale, snap and grid, cartesian coordinate system, distance entry techniques, inquiry commands (area, distance, list, ID), explode
Templates

Assignment: continue with previous assignment

Research: AutoCAD in the office

Reading: TBN

Deadline for assignment/research etc.: none

WEEK 8:

Test: AutoCAD commands

Class 15

Lecture: Line weights and line types used in architecture; discussion of site plan

Lab [Computer Topics]:

Layers (purpose, creating and deleting, current, use of color, freeze/thaw, on/off, lock/unlock); linetypes; lineweights; properties (palette, match properties)

Assignment: project site plan

Reading: TBN

Deadline for assignment/research etc.: vi CAD into. drafting exercises

Class 16:

Lecture: Stairs; calculation:

Vertical circulation and methods for calculating stairs. Clearance requirements and handrail requirements.

Lab [Computer Topics]:

Drafting of stairs section from cellar through typical floor.

Assignment: vii

development of sectional drawings of stairs

Reading: TBN

Deadline for assignment/research etc.: none

WEEK 9:

Test: AutoCAD Line weights

Class 17:

Lecture: Stairs; details: and AutoCAD Text and dimensions

Stair plans of cellar typical and entry levels. Development of details of stair connections with building structure.

Lab [Computer Topics]:

Drafted stair plans and details and dimension stair plans

Assignment: viii

Development of drawings of stair plans

Reading: TBN

Deadline for assignment/research etc.: none

Class 18:

Lecture: Scales and their relationships:

Review of drawings scale concepts. Scale AutoCAD; scale and Paper space concepts (layouts, viewports, scale, layers, text and dimensions, annotation) Scale in association with text and dim styles and line scale.

Lab [Computer Topics]:

Development of stairs drawings, scale view relationships.

Create templates for each scale (1/8, 1/4, 1/2, 1", 1 1/2, 3"); draw annotation symbols for each scale

Assignment:

Development of drawings of stairs and views

Reading: TBN

Deadline for assignment/research etc.: vii stairs section

WEEK 10:

Test: AutoCAD Text and scale

Class 19:

Lecture: Blocks, Hatch and their relationships:

Material hatch's development and blocks of stairs.

Lab [Computer Topics]:

Drafted stair plans and details.

Assignment:

Completion of stairs sheet

Reading: TBN

Deadline for assignment/research etc.: AutoCAD in the office research draft (posted to blackboard)

Class 20:

Lecture: Printing and output:

Pages setup, sheet layout, printers, paper sizes, SCALE, Role of CTB; saving and loading CTB files
Plot dialogue box, Page setup manager, Printing at City Tech. Importing DWF files to Revit

Lab [Computer Topics]:

Development and printing of stairs sheets.

Assignment:

Completion printing 80% submittal (i - viii)

Reading: TBN

Deadline for assignment/research etc.: none

WEEK 11:

Class 21:

Lecture: Communication in the building industry:

Lab: Redlining

Redlining sheets

Assignment:

Reading: TBN

Deadline for assignment/research etc.: 80% submittal

Class 22:

Lecture: Fireproofing:

Wall type details drawing covering the used hour rating assemblies and column enclosures

Lab [Computer Topics]:

The development of annotated wall types and column enclosures details.

Assignment: ix

Fireproofing details sheet development of wall types sheet and fireproofing details

Reading: TBN

Deadline for assignment/research etc.: none

WEEK 12:

Test: Importing DWF files to Revit

Class 23:

Lecture: elevations:

Building elevations design; fenestration and openings.

Lab [Computer Topics]:

Development of elevations.

Assignment: x

Development elevations

Reading: TBN

Deadline for assignment/research etc.: AutoCAD in the office research draft (posted to blackboard)

Class 24:

Lecture: windows:

The lecture explores; the use and detailing of fenestration and window openings. It defines the uses and methods window tags.

Lab [Computer Topics]:

Development of window details and schedules sheet.

Assignment:

Development of Building model

Reading: TBN

Deadline for assignment/research etc.: ix Fireproofing details sheet

WEEK 13:

Class 25:

Lecture: Roof assembly:

Roof components and assembly.

Lab [Computer Topics]:

Development of roof plan and details including flashing. Flat roofs slopes and drainage systems

Assignment: xi

Development roof plan.

Reading: TBN

Deadline for assignment/research etc.: x window sheet drawing

Class 26:

Lecture: Roof details:

advantages the advantages and options are flat roofs.

Lab [Computer Topics]:

Roof details.

Assignment:

Completion of roof sheets

Reading: TBN

Deadline for assignment/research etc.: none

WEEK 14:

Class 27:

Lecture: output options/rendering:

Review of sheets printing and drawing sets requirements. Introduction to rendering with Revit.

Lab [Computer Topics]:

Development of final drawing set sheets

Assignment:

Development roof plan.

Reading: TBN

Deadline for assignment/research etc.: xi roof sheets

Class 28:

Lecture: professional presentations:

techniques and requirements for professional presentation of this construction documents.

Lab [Computer Topics]:

Development of final drawing set sheets

Assignment:

Development roof plan.

Reading: TBN

Deadline for assignment/research etc.: none

WEEK 15:

Class 29:

Lecture: portfolios:

Portfolio uses and requirements

Lab [Computer Topics]:

final presentations

Assignment:

Development roof plan.

Deadline for assignment/research etc.: all project sheets

Class 30:

Lecture: congratulations:

Lab [Computer Topics]:

presentation of CD portfolios

Deadline for assignment/research etc.: portfolios