

Virginia Western Community College

ARC 221

Architectural CAD Applications Software I

Prerequisites

CAD 241

Course Description

Teaches the principles and techniques of architectural drawing practices through the use of architecture specific CAD software. Utilizes the commands and features of the software to generate drawings that emphasize architectural design and structural systems.

Semester Credits: 3 Lecture Hours: 2 Lab/Recitation Hours: 2

Required Materials

Textbook:

Revit Architecture 2015: A Hands-On Guide, 1st ed., author: Goldberg, Peach Pit Press, ISBN# 9780133144680

Other Required Materials:

USB Flash Drive



Course Outcomes

1. Understand the concepts of Revit Architecture.
2. Create building models.
2. Generate different analysis such as area, solar studies.
3. Create walkthroughs, detail views and schedules.

Instructor Objectives To teach students the basic building designing and modeling concepts using Revit Architecture software and use it in creating various real-world building designs. Instructor will emphasize self- learning and strongly encourage students to ask questions and participate in the class discussions.

Topical Description

Chapter 1: Introduction to Autodesk Revit Architecture 2008

| | | |
|---|------|------|
| Autodesk Revit Architecture 2008 | 1-2 | |
| Autodesk Revit Architecture as a Building Information Modeler | | 1-2 |
| Basic Concepts and Principles | | 1-2 |
| Understanding the Parametric Building Modeling Technology | 1-4 | |
| Understanding Autodesk Revit Architecture Terms | 1-4 | |
| Creating a Building Model Using Parametric Building Elements | | 1-6 |
| Visibility/Graphics Overrides, Scale, and Detail Level | | 1-8 |
| Extracting Project Information | | 1-8 |
| Creating an Architectural Drawing Set | | 1-8 |
| Creating an Unusual Building Geometry | | 1-8 |
| Flexibility of Creating Special Elements | | 1-9 |
| Creating Structural Layouts | | 1-9 |
| Working on Large Projects | | 1-9 |
| Working in Large Teams and Coordinating with Consultants | 1-9 | |
| Starting Autodesk Revit Architecture 2008 | 1-10 | |
| The User Interface | | 1-11 |
| Invoking Tools | | 1-11 |
| Title Bar | 1-12 | |
| Menu Bar | | 1-12 |
| Toolbar | | 1-12 |
| Standard Toolbar | 1-13 | |
| View Toolbar | | 1-13 |
| Edit Toolbar | | 1-14 |



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|--|------|------|
| Tools Toolbar | | 1-14 |
| Workset Toolbar | 1-15 | |
| Design Options Toolbar | | 1-15 |
| Design Bar | | 1-15 |
| Type Selector Bar | | 1-16 |
| Element Properties Button | 1-17 | |
| Options Bar | | 1-17 |
| Drawing window | 1-18 | |
| Project browser | | 1-18 |
| Status Bar | | 1-18 |
| View Control Bar | 1-18 | |
| Keyboard Accelerators | | 1-19 |
| Dialog Boxes | | 1-19 |
| Multiple Document Environment | 1-20 | |
| Interoperability of Revit Architecture | | 1-21 |
| Building Information Modelling and Revit Architecture 2008 | 1-22 | |
| Autodesk Revit Architecture Help | 1-22 | |
| Revit Architecture 2008 Help | | 1-23 |
| Context Sensitive Help | | 1-25 |
| Getting Started | | |
| Tutorials | | |

Chapter 2: Getting Started with Revit Architecture

| | | |
|---|------|------|
| Starting a New Project | | 2-2 |
| Setting Units | | 2-3 |
| Length Unit Settings | | 2-3 |
| Area Unit Settings | | 2-4 |
| Volume and Angle Unit Settings | | 2-4 |
| Snap Settings | | 2-5 |
| Dimension Snaps | 2-5 | |
| Object Snaps | | 2-6 |
| Temporary Overrides | | 2-7 |
| Saving the Project | | 2-8 |
| Using the Save As Tool | | 2-8 |
| Using the Save Tool | | 2-10 |
| Using the Save to Central Tool - Introduction to Worksets | 2-10 | |
| Modifying Other Settings | 2-11 | |
| General Tab | | 2-12 |
| Graphics Tab | | 2-12 |
| File Locations Tab | | 2-12 |
| Spelling Tab | | 2-13 |
| Rendering Tab | | 2-14 |
| Closing a Project | 2-15 | |
| Exiting Revit Architecture | | 2-15 |
| Opening an Existing Project | | 2-15 |
| Opening an Existing Project Using the Open Tool | 2-16 | |



| | |
|--------------------------------|------|
| Model Display Tools | 2-19 |
| Using the Zoom Tools | 2-19 |
| Dynamically Modifying the View | 2-21 |
| Using the Orient Tool | 2-22 |
| Other Display Options | 2-23 |
| Tutorial 1- Apartment 1 | 2-23 |
| Tutorial 2- Club | 2-27 |
| Self-Evaluation Test | 2-29 |
| Review Questions | 2-29 |
| Exercise 1 | 2-31 |
| Exercise 2 | 2-31 |

Chapter 3: Creating the First Project

| | |
|---|------|
| Creating a Building Project | 3-2 |
| Sequence of Creating a Building Model | 3-2 |
| Understanding Wall Types | 3-3 |
| Creating Exterior Walls | 3-4 |
| Sketching Walls | 3-11 |
| Sketching Interior Walls | 3-17 |
| Tutorial 1- Apartment 1 | 3-20 |
| Tutorial 2- Club | 3-28 |
| Tutorial 3- Apartment 1- Interior Walls | 3-34 |
| Tutorial 4- Club- Interior Walls | 3-41 |
| Self-Evaluation Test | 3-46 |
| Review Questions | 3-47 |
| Exercise 1 | 3-48 |
| Exercise 2 | 3-49 |
| Exercise 3 | 3-50 |

Chapter 4: Using Basic Building Components-I

| | |
|-----------------------------------|------|
| Using Doors in a Building Model | 4-2 |
| Adding Doors | 4-2 |
| Understanding Door Properties | 4-4 |
| Adding a Door to a Wall | 4-7 |
| Using Windows in a Building Model | 4-8 |
| Adding Windows | 4-9 |
| Understanding Window Properties | 4-11 |
| Adding a Window to a Wall | 4-13 |
| Creating Openings in Walls | 4-15 |
| Tutorial 1- Apartment 1 | 4-15 |
| Tutorial 2- Club | 4-26 |
| Self-Evaluation Test | 4-31 |
| Review Questions | 4-32 |
| Exercise 1 | 4-33 |
| Exercise 2 | 4-34 |
| Exercise 3 | 4-35 |



Chapter 5: Using the Editing Tools

| | | |
|--|------|------|
| Creating a Selection | | 5-2 |
| Selecting Multiple Elements | | 5-2 |
| Restoring the Selection | | 5-3 |
| Removing Elements from a Selection | | 5-3 |
| Moving and Copying Elements | | 5-4 |
| Changing the Temporary Dimensions | | 5-4 |
| Using the Drag Option | | 5-4 |
| Dragging End-joined Components | 5-5 | |
| Using the Move Tool | | 5-5 |
| Using the Copy Tool | | 5-6 |
| Trimming and Extending Elements | 5-7 | |
| Using the Trim/Extend to Corner Option | 5-7 | |
| Using the Trim/Extend Single Element Option | | 5-9 |
| Using the Trim/Extend Multiple Elements Option | 5-9 | |
| Cutting and Pasting Elements | | 5-11 |
| Cutting Elements | 5-11 | |
| Copying Elements to the Clipboard | 5-11 | |
| Pasting Elements from the Clipboard | | 5-11 |
| Rotating Elements | | 5-12 |
| Mirroring Elements | | 5-14 |
| Using the Pick Option | | 5-14 |
| Using the Draw Option | | 5-15 |
| Creating an Offset | | 5-16 |
| Creating an Array of Elements | | 5-18 |
| Linear Array | | 5-18 |
| Radial Array | | 5-20 |
| Matching Elements | | 5-22 |
| Aligning Elements and Working with Constraints | 5-22 | |
| Deleting Elements | | 5-23 |
| Splitting Walls | | 5-24 |
| Grouping Elements | | 5-25 |
| Creating Groups by Selecting Elements in the Project Views | 5-26 | |
| Creating Groups Using the Group Editor | 5-26 | |
| Creating a Detail Group | | 5-27 |
| Placing Groups | | 5-28 |
| Swapping Groups | 5-29 | |
| Modifying Groups | | 5-29 |
| Excluding Elements from the Group | | 5-29 |
| Saving and Loading Groups | | 5-30 |
| Converting Groups to Linked Revit Model | 5-31 | |
| Deleting Groups | 5-32 | |
| Creating Similar Elements | 5-32 | |
| Pinning Elements | 5-32 | |
| Resizing Elements | | 5-33 |
| Using Diagnostic Tools | 5-34 | |
| Measuring Distance Between Elements | | 5-34 |



| | | |
|---|------|------|
| Selecting Elements Using the Element ID | 5-35 | |
| Tutorial 1- Apartment 1 | | 5-36 |
| Tutorial 2- Club | | 5-41 |
| Self-Evaluation Test | | 5-47 |
| Review Questions | | 5-48 |
| Exercise 1 | | 5-48 |
| Exercise 2 | | 5-49 |
| Exercise 3 | | 5-50 |
| Exercise 4 | | |

Chapter 6: Working with Datum and Creating Standard Views

| | | |
|--|------|------|
| Working with Levels | | 6-2 |
| Understanding Level Properties | | 6-3 |
| Adding Levels | | 6-5 |
| Modifying Level Parameters | | 6-7 |
| Hiding Elements in a View | | 6-9 |
| Controlling the Visibility of Levels | 6-10 | |
| Working with Grids | | 6-11 |
| Creating Grids | | 6-11 |
| Modifying Grids | 6-16 | |
| Grid Properties | | 6-17 |
| Controlling the Visibility of Grids | 6-19 | |
| Reference Planes | 6-19 | |
| Work Planes | | 6-20 |
| Setting the Work Plane | | 6-20 |
| Controlling the Visibility of Work Planes | | 6-21 |
| Working with Project Views | | 6-22 |
| Viewing the Building Model | | 6-22 |
| Visibility/Graphics Overrides of an Element | 6-23 | |
| Visibility/Graphics Overrides of an Element Category | | 6-24 |
| Making Elements Transparent | | 6-25 |
| Using the Temporary Hide/Isolate Tool | | 6-26 |
| Plan Views | | 6-27 |
| Elevation Views | | 6-28 |
| Section Views | | 6-31 |
| Using the Scope Box Tool | 6-36 | |
| Tutorial 1- Apartment 1 | | 6-38 |
| Tutorial 2- Club | | 6-46 |
| Self-Evaluation Test | | 6-52 |
| Review Questions | | 6-53 |
| Exercise 1 | | 6-54 |
| Exercise 2 | | 6-55 |

Chapter 7: Using Basic Building Components-II

| | | |
|------------------------------|--|-----|
| Creating Floors | | 7-2 |
| Sketching the Floor Boundary | | 7-4 |
| Creating Roofs | | 7-6 |



| | |
|--|------|
| Creating the Roof by Footprint | 7-6 |
| Creating the Roofs by Extrusion | 7-9 |
| Modifying the Roof Shape and Properties | 7-12 |
| Shape Editing Tools for Slopes, Floors, and Roofs | 7-15 |
| Modify Sub-Elements | 7-15 |
| Draw Points | 7-16 |
| Draw Split Lines | 7-17 |
| Pick Supports | 7-17 |
| Reset Shape | 7-17 |
| Creating Ceilings | 7-17 |
| Creating an Automatic Ceiling | 7-18 |
| Sketching the Ceiling | 7-18 |
| Using the Pick Walls Method | 7-19 |
| Modifying the Ceiling | 7-20 |
| Rooms | 7-22 |
| Adding Rooms | 7-22 |
| Calculating Room Volumes | 7-26 |
| Cutting Openings in the Wall, Floor, Roof, and Ceiling | 7-26 |
| Joining the Walls with the Other Elements | 7-28 |
| Using the Attach/Detach Tool | 7-28 |
| Tutorial 1- Apartment 1 | 7-29 |
| Tutorial 2- Club | 7-34 |
| Self-Evaluation Test | 7-42 |
| Review Questions | 7-43 |
| Exercise 1 | 7-44 |
| Exercise 2 | 7-44 |

Chapter 8: Using Basic Building Components-III

| | |
|---|------|
| Using Components in a Project | 8-2 |
| Adding Components | 8-2 |
| Using Stairs in a Project | 8-5 |
| Adding Stairs | 8-5 |
| Modifying Stairs Properties | 8-6 |
| Creating Stairs by Sketching Runs | 8-8 |
| Creating Stairs by Sketching the Boundary and Riser Lines | 8-12 |
| Using Railings in a Building Model | 8-14 |
| Creating Railings | 8-14 |
| Modifying Railing Properties | 8-16 |
| Creating Ramps | 8-16 |
| Using Curtain Systems in a Project | 8-18 |
| Creating a Curtain Wall Using the Wall Tool | 8-19 |
| Creating a Curtain System by Lines | 8-19 |
| Creating a Curtain System by Face | 8-20 |
| Adding Curtain Grids | 8-20 |
| Modifying Curtain System Panels | 8-21 |
| Adding Doors and Awnings to a Curtain System | 8-22 |
| Adding Mullions | 8-22 |



| | |
|--|------|
| Copying Elements from One Level to Another | 8-23 |
| Using the Paste Aligned Tool | 8-23 |
| Tutorial 1- Apartment 1 | 8-24 |
| Tutorial 2- Club | 8-31 |
| Tutorial 3- Elevator and Stair Lobby | 8-34 |
| Self-Evaluation Test | 8-42 |
| Review Questions | 8-42 |
| Exercise 1 | 8-43 |

Chapter 9: Adding Site Features

| | |
|--|------|
| Creating a Toposurface | 9-2 |
| Creating Toposurface Subregions | 9-4 |
| Splitting a Toposurface | 9-5 |
| Merging Toposurfaces | 9-6 |
| Creating Toposurface Using the Imported Data | 9-7 |
| Setting the Site Properties | 9-7 |
| Adding Property Lines | 9-9 |
| Sketching Property Lines | 9-9 |
| Creating Property Lines Using Distances and Bearings | 9-10 |
| Creating Building Pads | 9-11 |
| Adding Site Components | 9-13 |
| Adding Parking Components | 9-14 |
| Adding Labels to Contours | 9-14 |
| Tutorial 1- Site Plan | 9-15 |
| Self-Evaluation Test | 9-31 |
| Review Questions | 9-31 |
| Exercise 1 | 9-32 |
| Exercise 2 | 9-33 |

Chapter 10: Using Massing Tools

| | |
|---|-------|
| Understanding the Massing Concepts | 10-2 |
| Creating the Massing Geometry | 10-3 |
| Using the Create Mass Tool | 10-4 |
| Editing the Massing Geometry | 10-10 |
| Creating Cuts in the Massing Geometry | 10-11 |
| Placing the Massing Geometry | 10-13 |
| Creating Building Elements from the Massing Geometry | 10-13 |
| Creating Walls by Selecting Faces | 10-13 |
| Creating Floors by Selecting Faces | 10-14 |
| Creating Roofs by Selecting Faces | 10-15 |
| Creating Curtain Systems by Selecting Faces | 10-16 |
| Controlling Visibility of the Massing Geometry | 10-17 |
| Adding Other Building Elements | 10-17 |
| Creating Families | 10-19 |
| Creating In-Place Families | 10-19 |
| Creating Families Using the Standard Family Templates | 10-19 |



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|-------------------------------|-------|
| Tutorial 1- Office Building 2 | 10-28 |
| Self-Evaluation Test | 10-43 |
| Review Questions | 10-43 |
| Exercise 1 | 10-44 |
| Exercise 2 | 10-46 |

Chapter 11: Adding Annotations and Dimensions

| | |
|---|-------|
| Adding Tags | 11-2 |
| Tagging Elements | 11-3 |
| Tagging All Elements in a View | 11-6 |
| Adding Room Tags | 11-8 |
| Room Separation | 11-8 |
| Adding Room Tags | 11-10 |
| Adding Keynotes | 11-11 |
| Adding Symbols | 11-12 |
| Adding Dimensions | 11-13 |
| Dimensioning Terminology | 11-14 |
| Converting Temporary Dimensions to Permanent Dimensions | 11-15 |
| Adding Permanent Dimensions | 11-16 |
| Editing Dimensions | 11-18 |
| Controlling the Tick Mark and Dimension Arrow Display | 11-20 |
| Creating Automatic Linear Wall Dimensions | 11-21 |
| Adding Spot Dimensions | 11-21 |
| Placing a Spot Dimension | 11-21 |
| Modifying Spot Dimension Properties | 11-22 |
| Tutorial 1- Apartment 1 | 11-23 |
| Self-Evaluation Test | 11-32 |
| Review Questions | 11-33 |
| Exercise 1 | 11-34 |
| Exercise 2 | 11-35 |
| Exercise 3 | 11-36 |

Chapter 12: Creating Project Details and Schedules

| | |
|--|-------|
| Project Detailing in Autodesk Revit Architecture | 12-2 |
| Creating Details Using the Building Model | 12-2 |
| Creating a Callout View | 12-3 |
| Displaying the Callout View | 12-3 |
| Modifying Callout View Properties | 12-4 |
| Creating Details in the Callout View | 12-6 |
| Crop Regions | 12-7 |
| Model Crop Region | 12-7 |
| Annotation Crop Region | 12-7 |
| Creating Drafted Details | 12-12 |
| Creating a Drafting View | 12-12 |
| Drafting a Detail | 12-13 |
| Line Styles Settings | 12-13 |
| Using Line Weights | 12-15 |



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|---------------------------------------|-------|-------|
| Using Line Patterns | | 12-16 |
| Adding Text Notes | | 12-17 |
| Creating Text Notes | | 12-17 |
| Editing Text Notes | | 12-18 |
| Creating a Model Text | | 12-20 |
| Revision Clouds | | 12-22 |
| Creating a Revision Cloud | 12-23 | |
| Adding a Revision Tag | | 12-24 |
| Using Schedules in a Project | | 12-25 |
| Generating a Schedule | | 12-26 |
| Creating a Legend View | | 12-29 |
| Tutorial 1- Apartment 1- Callout View | | 12-30 |
| Tutorial 2- Apartment 1- Schedules | 12-40 | |
| Tutorial 3- Road Section Detail | | 12-44 |
| Self-Evaluation Test | | 12-50 |
| Review Questions | | 12-50 |
| Exercise 1 | | 12-51 |
| Exercise 2 | | 12-52 |
| Exercise 3 | | 12-53 |

Chapter 13: Creating Drawing Sheets and Plotting

| | | |
|---|-------|-------|
| Creating Drawing Sheets | 13-2 | |
| Adding Drawing Sheet to a Project | 13-2 | |
| Adding Views to the Drawing Sheet | | 13-5 |
| Modifying the View Properties | | 13-7 |
| Adding Schedules to the Drawing Sheet | | 13-9 |
| Modifying the Building Model from the Drawing Sheet | | 13-11 |
| Duplicate Dependent Views | | 13-11 |
| Creating Dependent Views | | 13-12 |
| Adding Matchline to the Dependent Views | 13-13 | |
| Printing in Autodesk Revit Architecture | | 13-14 |
| Printing Drawing Sheets and Project Views | 13-15 | |
| Selecting and Modifying the Printer Settings | 13-15 | |
| Using the Print Setup Dialog Box | 13-18 | |
| Previewing the Print Setup | 13-19 | |
| Tutorial 1- Apartment 1 | | 13-20 |
| Self-Evaluation Test | | 13-25 |
| Review Questions | | 13-26 |
| Exercise 1 | | 13-27 |
| Exercise 2 | | 13-29 |

Chapter 14: Creating 3D Views

| | | |
|--|------|------|
| Three-Dimensional (3D) Views | | 14-2 |
| Creating Orthographic Views | | 14-3 |
| Dynamically Viewing the Building Model | 14-4 | |
| Using the Orient Tool | | 14-6 |
| Generating the Perspective Views | 14-8 | |



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|-------------------------|-------|
| Using the Section Box | 14-15 |
| Tutorial 1- Apartment 1 | 14-16 |
| Tutorial 2- Club | 14-21 |
| Self-Evaluation Test | 14-25 |
| Review Questions | 14-26 |
| Exercise 1 | 14-27 |
| Exercise 2 | 14-28 |
| Exercise 3 | 14-29 |

Chapter 15: Rendering Views and Creating Walkthroughs

| | |
|--|-------|
| Rendering Views | 15-2 |
| Rendering Scene Settings | 15-3 |
| Lighting Settings | 15-12 |
| Modifying Sun and Sky Settings | 15-13 |
| Using Radiosity | 15-16 |
| Using Materials and Textures | 15-17 |
| Using the Paint Tool | 15-22 |
| Rendering Views Using the Raytrace Tool | 15-22 |
| Using the Display Model Tool | 15-24 |
| Selecting the Plant Season | 15-24 |
| Adding Archvision, Real People, and Vehicles | 15-27 |
| Using the Decal Tool | 15-27 |
| Placing a Decal | 15-27 |
| Editing a Decal | 15-29 |
| Creating a Walkthrough | 15-29 |
| Creating the Walkthrough Path | 15-29 |
| Editing and Playing the Walkthrough | 15-30 |
| Recording a Walkthrough | 15-33 |
| Tutorial 1- Apartment 1 | 15-35 |
| Tutorial 2- Office Building | 15-48 |
| Self-Evaluation Test | 15-53 |
| Review Questions | 15-54 |
| Exercise 1 | 15-55 |
| Exercise 2 | 15-56 |

Chapter 16: Using Advanced Features

| | |
|--|-------|
| Creating Structural Components | 16-2 |
| Creating Structural Walls | 16-4 |
| Creating Structural Columns | 16-5 |
| Adding Structural Beams and Braces | 16-8 |
| Cutting Openings in Beams, Braces, and Columns | 16-9 |
| Creating Multiple Design Options | 16-10 |
| Generating Design Options for a Project | 16-10 |
| Presenting Design Options | 16-11 |
| Using Area Analysis Tools | 16-12 |
| Area Schemes | 16-13 |



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| Area Plans | 16-14 |
| Area Schedules | 16-16 |
| Color Schemes | 16-17 |
| Creating Color Schemes | 16-17 |
| Masking Regions | 16-22 |
| Adding Masking Regions to a Project | 16-22 |
| Using Project Phasing Tools | 16-23 |
| Understanding Phasing Concepts | 16-23 |
| Linking Building Models and Sharing Coordinates | 16-25 |
| Linking and Importing Models | 16-26 |
| Linking Revit Models | 16-28 |
| Nested Linked Models | 16-29 |
| Converting Linked Models to Groups - Binding Links | 16-31 |
| Managing Links | 16-33 |
| Including Elements of Linked Models in Schedules | 16-33 |
| Applying the Color Schemes of Host Model to Rooms and Areas of the Linked Models | 16-34 |
| Copying Linked Model Elements | 16-35 |
| Sharing Projects by Using the Worksets | 16-35 |
| Creating Worksets | 16-36 |
| Subdividing the Building Model into Worksets | 16-36 |
| Creating a Central File | 16-37 |
| Creating Local Files | 16-38 |
| Purging Unused Element Families | 16-39 |
| Transferring Project Standards | 16-39 |
| Organizing the Project Browser | 16-40 |
| Generating Shadows | 16-40 |
| Revit Architecture Solar Studies | 16-40 |
| Generating Still Solar Study | 16-41 |
| Creating an Animated Solar Study | 16-42 |
| Revit Architecture Interoperability | 16-45 |
| Publishing Tips in Revit Architecture 2008 | 16-47 |
| Tutorial 1- Apartment 1 | 16-49 |
| Tutorial 2- Apartment Complex | 16-60 |
| Self-Evaluation Test | 16-68 |
| Review Questions | 16-68 |
| Exercise 1 | 16-69 |
| Exercise | |
| 2 | |



Notes to Instructors
(List information about optional topics, departmental exams, etc)

1. The final project/exam is worth 15-20% of the final grade.

